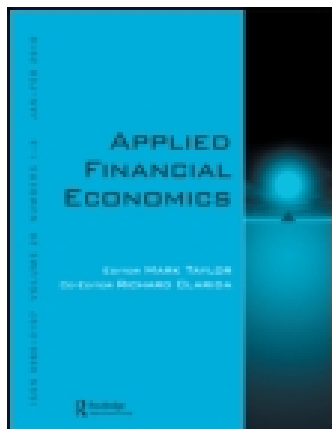


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Publisher: Routledge

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Applied Financial Economics

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/rafe20>

The assets and liabilities gap management of conventional and Islamic banks in the organization of Islamic cooperation (OIC) countries

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Published online: 05 Feb 2014.



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To cite this article: Poi Hun Sun, M. Kabir Hassan, Taufiq Hassan & Shamsheer Mohamed Ramadilli (2014) The assets and liabilities gap management of conventional and Islamic banks in the organization of Islamic cooperation (OIC) countries, *Applied Financial Economics*, 24:5, 333-346, DOI: [10.1080/09603107.2013.877568](https://doi.org/10.1080/09603107.2013.877568)

To link to this article: <http://dx.doi.org/10.1080/09603107.2013.877568>

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The assets and liabilities gap management of conventional and Islamic banks in the organization of Islamic cooperation (OIC) countries

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This article focuses on the short- and long-term assets and liabilities gap and the determinants of net interest/profit margins of both conventional banks and Islamic banks in the Organization of Islamic Cooperation countries over the period from 1997 to 2010. The results show that both conventional and Islamic banks have negative short-term gaps and positive long-term gaps. These indicate that banks use short-term deposits and funding to finance long-term loans, advances and investments, taking into consideration refinancing and reinvestment risks. The findings also show that operating cost is a significant determinant of bank margins and important factor to improve quality of management in banks. Overall, the conventional banks have better quality of assets and liabilities with an optimum composition of profitable assets and low-costs liabilities. The low bank margins in conventional and Islamic banks indicate low volatility in financial markets and the growth of banking business.

Keywords: ALM; Islamic banks; commercial banks; NIM; NPM; dual banking; OIC

JEL Classification: D21; G15; G21

I. Introduction

Like any other business entity, banks source and channel funds with the objective to maximize returns at minimum costs (Maudos and Guevara, 2004). They are a major source

of credit in most economies and are in a competitive industry subjected to rapid economic changes and technological advancements. Overall, the conventional banking (CB) industry worldwide is growing at 20% per annum whereas the Islamic Banking (IB) industry grows at 15% per annum.¹

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¹Reference to 'Global Financial Stability Report: Meeting New Challenges to Stability and Building a Safer System', International Monetary Fund – World Economic and Financial Surveys (2010), Table 3: Selected Indicators on the Size of the Capital Markets, 2008, p. 177.

CBs have been in existence much longer than IBs. They are intermediaries that help facilitate the flow of funds from the surplus to deficit units and charges fees for their services but also interest on loans/financing provided.

IBs are also banks that provide the link between those in need of capital and those with surplus capital, except that they operate fully in compliance with *Shari'ah* requirements. *Shari'ah* principles prohibit banks to deal with interest-bearing financial products and services or any transaction that has an element of *riba*. However, both CBs and IBs are expected to be ethical since they are major suppliers and demanders of funds in most economies.

Both CBs and IBs have similar functions except that they operate in different modes when they provide financial services to individuals and institutions. CBs provide the funds and expect a fixed return on the funds provided (i.e. interest). IBs, on the other hand, share the risks with the borrower and are only rewarded if the venture is successful. Both CBs and IBs receive funding and investments from individuals and organizations which are usually short-term deposits and money that can be withdrawn at any time (Koppenhaver, 1985). These are liabilities on a bank's balance sheet. On the other hand, banks offer loans and investments for both short- and long-term basis. These are assets on a bank's balance sheet. These short-term liabilities and short- and long-term assets in banks create mismatch problems, in which the ability of banks to cover the short-term deposits using long-term assets is questionable. This is the asset and liability management (ALM) issue.

ALM is defined as how banks should balance between profitability and risks (Aziz and Ahmad, 2010). ALM is important to ensure the survival of banks by having to balance among profitability, risks and liquidity. In fact, the well documented financial crises in banking industry – the Savings and Loan Crisis in 1980s (Bodie, 2006), the currency and maturity crisis in year 1997 in Asian nations (Hirose *et al.*, 2004) and the global financial crisis that was started in year 2007 (DeMasi, 2005, 2006; DeMasi, 2008; Poole, 2009) – were all related to banks having mismatches between assets and liabilities and poor quality of assets.

ALM is the oldest approach in banks and is required by the regulatory framework. This incorporates asset management, liability management and fund management. In the increasing competitiveness of banking sector, ALM remains the ongoing issues as banks need to select the optimum strategies in handling funding and investments/financing. This situation becomes challenging and complicated with the development of new products and services in banks. Banks are obligated to constantly monitor the ALM strategies.

Besides, the ever-changing economic environment and regular restructuring of banking regulations have

encouraged banks to use ALM in planning and forecasting (Vij, 2001). The balance among profitability, risks and liquidity remains the major issue in performance measurement as well as to ensure more structured and comprehensive measures of ALM framework. It is expected that different bank types will choose different ALM framework and strategies at different time periods and in different economic environment.

Several studies have provided evidences on the significant impacts of ALM on banks' efficiency and performance, but such study is rare for OIC countries. Belouafi (1993) examines ALM problem faced by Islamic banks and develops a linear optimization model to manage ALM for two Islamic banks. Bidabad and Allahyarifard (2008) argue that since Islamic banking is based on profit–loss principle, there are dissimilarities between ALM approaches in Islamic and conventional banking. Such dissimilarities arise from differences in accounting system followed by both banking system and asset-based financing nature of Islamic banking. The authors use these two fundamental differences of Islamic banks and conventional banks to develop value added economy. Using data from RHB bank of Malaysia, the authors claim that Islamic banking is more efficient than conventional banking.

This study investigates ALM levels in CBs and IBs and specifically identifies the ALM mismatch levels between assets and liabilities using maturity profiles for CBs and IBs, and bank-specific determinants of net interest margins (NIMs) for CBs and net profit margins (NPMs) for IBs. In a two-tier profit–loss sharing Islamic banking model, the bank shares profit/loss with capital provider on the liability side, as well as, with the capital taker from bank on the asset side. The Islamic bank uses a variety of smoothing mechanism to convert an otherwise variable rate given to both depositors and variable rate profit share received from bank customers into fixed rate instruments. Therefore, NPM measures the difference of these rates. Similarly, a conventional bank charges a higher fixed loan rate from bank borrowers and offers a lower fixed rate to depositors. Thus, NIM measures the difference of these two rates. Therefore, NPM and NIM are conceptually different, but given that Islamic banks mostly do *mura-baha* type of financing, the difference between them is slowly eroding. We expect that different economic environments and regulatory requirements in different countries will have different impacts on ALM in banks in these selected countries.

The findings will provide policy-makers and regulators some insights to manage maturity and develop better strategies for ALM (Hatemi-J and Roca, 2008). Furthermore, determinants of performance of banks would be important for structuring specific measures of economic policy (Maudos and Guevara, 2004). These will provide useful insights into both the CB's and IB's behaviour and map out effective ALM strategies.

Recently, most of the CBs are increasingly becoming interested in starting IBs to help them tap into a larger pool of investment funds from the Middle-East market. The assets under the management of Islamic banking are more than US\$1 trillion with Takaful contribution of approximately US\$12 billion. Sukuk issuance has been estimated to be worth US\$120 billion. It is also mentioned that more people would be using Islamic banking system in year 2015 and it continues to expand to provide products and services to people (Sandhu, 2005). With this, a more dynamic and comprehensive ALM framework would provide a confidence buffer for the future expansion of Islamic finance sector in general and the IB sector in particular.

The rest of the article is structured as follows: Section II reviews the literature on gaps between assets and liabilities and the determinants of bank margins for CBs and IBs. Section III documents the models of gaps and determinants of intermediation margin in a single model. Section IV discusses the findings and Section V concludes the article.

II. Literature Review

This section reviews the literature on bank's asset and liabilities management issues and also determinants of bank's margins. There are many reasons for ALM and Silver (1976) explains the possible reasons through his matching hypothesis, interest rate forecast hypothesis, availability hypothesis and substitution hypothesis.

The studies on maturity mismatch or gaps have been carried out to ensure the optimum liquidity in banks to handle the changing environment (Langen, 1989; Chakraborty and Mohapatra, 2009). It is important to use different techniques and tests to analyse the sensitivity of assets and liabilities of banks due to exposure of different risks in ALM and the effect they have on the performance of banks (Gerstner *et al.*, 2008; Totty, 2009). Sandhu (2005) also suggests a study to be conducted on sources and uses of funding in different maturities in IBs, with the belief that more people will be using the Islamic banking system in year 2015.

Vij (2005) uses liquidity profiles of banks to measure the inflows and outflows to determine the gap between assets and liabilities during a particular time period. By using this gap analysis, the direction and volatility of interest rates for re-pricing can be monitored. The assessment and evaluation of banks' behaviour towards liquidity on regular basis will help determine the strategy for banks to use in managing liquidity in complex, comprehensive and dynamic frameworks, in which banks may use asset management model, liability

management model or fund management model (Konovaloa *et al.*, 2008).

ALM can also be analysed with respect to its association with the performance of banks as measured by higher net interest margins and lower operating costs. Ho and Saunders (1981) found that pure spreads account for about 56% of actual bank margins. Allen (1988) finds that bank margins can be used as a benchmark for portfolio diversification and help in risk management.

Wong (1997) introduces operating costs in the model and he finds that operating costs will lead to increase in NIMs due to substitution effects. However, the operating costs will also inversely affect the profitability of banks. Financial transformation in Latin America in the 1990s raised the interests of Brock and Suarez (2000) to conduct the study of banks' spreads on Argentina, Bolivia, Chile, Colombia, Mexico, Peru and Uruguay using two-step regression. The use of panel data allows the comparison across location and time, generating inconclusive results. They show that different banks are equipped with different spreads in which these are influenced by different factors. However, operating costs remain vital determinant in NIMs.

Drakos (2003) indicates that NIMs are important components in banks and these are significantly affected by different types of risks and leverage, whereas Valverde and Fernández's (2007) study on European banks from 1994 to 2001 indicate that specialization and diversification variables to assess the competitiveness in banking sectors with variety of products and services have impact in NIMs.

Maudos and Guevara's (2004) study on the relationship between bank-specific variables and NIMs of banks in Germany, France, UK, Italy and Spain, from 1993 to 2000, conclude that the capital in banks has the greatest impact on NIMs and operating costs are becoming increasing important factor in banks' performance. Capital is vital as a safety net for banks. Higher level of bank capital adequacy ratio will tend to lead banks to set higher intermediation margins for compensation. Operating costs, on the other hand, are becoming decisive factors for transactions in banks. Higher level of operating costs, as a result of higher level of transactions, will lead banks to have higher NIMs for compensation.

Hawtrey and Liang (2008) show that managerial efficiency has significant positive impact on NIMs while interactions between credit and interest rate risks have no significant impact on NIMs. As for this, banks are expected to have investments in highly profitable assets; yet, they are able to obtain low-cost funding in order to have optimum profitability from these assets and liabilities.

Claeys and Vennet (2008) investigate the determinants of intermediation margin for Central East and European Countries and Western European countries, over

Table 1. The expected gaps (objective 1)

Gaps	Expected sign
Gaps < 1 year + trading books	-
Gaps > 1 year	+

1994–2001, after deregulation of banking sectors in these countries and document that these countries show low margins, indicating low volatility of performance in banks. Besides, capital adequacy ratio and operational efficiency are becoming vital in CEEC. Maudos and Solís's (2009) study on NIMs in Mexican banking system over the years 1993–2005 documents that specialization and diversification may lead to lower spreads in banks with greater amounts of noninterest income. They also show that the performance of banks in the past can significantly affect NIMs. Kasman *et al.* (2010) study the efficiency of banking system from the year 1995 to 2006 and conclude that the different intermediation margins in different regions are due to differences in the legal, financial, macroeconomic and transition situations.

III. Methodology

Sample and database

The data set for this study comprises 65 CBs and 36 IBs in three regions of OIC countries. The countries selected are (i) Egypt in the Africa region; (ii) Bangladesh, Indonesia, Malaysia and Pakistan in the Asia region and (iii) Bahrain, Jordan, Kuwait, Lebanon, Qatar, Saudi Arabia, Turkey, United Arab Emirates and Yemen in the Middle East and Turkey region. The samples are selected subject to availability of data. These countries are selected as they provide the evidence of IBF using cross-country data and they symbolize a major fraction of the Islamic culture. The study covers the duration from the year 1997 to 2010 in which the total observations for CBs and IBs are 586 and 273 banks, respectively. The data is collected from Bankscope Bureau Van Dijk Electronic Publishing, the primary database to be used for banks' balance sheets and income statements. In bank selections for this study, it is to: (i) select banks with maturity or liquidity risk profiles; and (ii) eliminate banks with limited information for estimating the explanatory models.

Model to gaps and NIMs

The first objective is to analyse the short- and long-term asset and liability gaps for CBs and IBs using the difference between short-term assets and liabilities for short-term gaps and long-term assets and liabilities for

long-term gaps (Goodman and Langer, 1983; Vij, 2005). It is expected that banks will have negative short-term gaps as both CBs and IBs receive greater amount of short-term deposits but they invest the funding available for both short- and long-term loans, advances and investment, with greater than 50% of loans and investments in long-term, causing banks to have positive long-term gaps. As for this, it is expected that both CBs and IBs will have the following results shown in Table 1.

The second objective is to analyse the determinants of NIMs for CBs and NPMs for IBs that only include bank-specific variables: capital adequacy, asset quality, management efficiency, liquidity risk, operating costs, implicit interest payments, size, Lerner index, degree of risk aversions and opportunity costs of required reserves. To assess the impact of previous performance of banks towards current year's performance, the objective is expanded to include lags of NIMs. The variables are explained as follows (Table 2).

Integrated model of the net interest margin

The asset–liability gap analysis is estimated using the short-term, trading book and long-term assets and liabilities that are available in maturity profiles on the balance sheet of banks. The model to be estimated is as follows:

$$STGap_{it} = STA_{it} - STL_{it} \quad (1)$$

$$LTGap_{it} = LTA_{it} - LTL_{it} \quad (2)$$

Where $STGap_{it}$ and $LTGap_{it}$ are short-term and long-term gaps for $t = 1, \dots, T$ represents the number of periods observed and $I = 1, \dots, I$ represents the total number of banks. STA_{it} and LTA_{it} are short- and long-term asset items of banks i at time t , while STL_{it} and LTL_{it} are short- and long-term liability items of banks i at time t .

As for determinants of intermediation margins, the regression model of the NIMs (NIM_{it}) and NPMs (NPM_{it}) as a function of bank-specific variables (BS) is estimated as follows:

$$NIM_{it} = \alpha_i + \sum_{j=1}^J BS_{it}^j + \varepsilon_{it} \quad (3)$$

Table 2. Explanation of variables (objective 2)

Variables	Acronyms	Expected sign	Rationale/supports
Capital adequacy	CA	+	It represents the signal of bank's credit worthiness. A positive relationship is expected in which the higher the capital adequacy ratio the higher capital cushion banks have as well as a long-term bank solvency. However, banks need higher NIMs/NPMs to cover the increased cost of borrowing (Athanasoglou <i>et al.</i> , 2008; Kasman <i>et al.</i> , 2010).
Asset quality	AQ	+	This is a proxy for credit or default risk. It is expected that asset quality ratio will have a positive relationship with intermediation margins, in which a higher proportion of uncollectible loans are expected, banks will need higher bank margins to compensate for the exposure of the expected and unexpected credit risk (Kasman <i>et al.</i> , 2010).
Management efficiency	ME	-	This is a measure of quality of management in banks. It is expected that management efficiency is negatively related to intermediation margins in banks. With better management in banks, bankers will intend to have optimum composition of highly-profitable assets and low-cost liabilities to optimize their performance (Maudos and Solís, 2009; Kasman <i>et al.</i> , 2010).
Liquidity risk	LR	+	It is expected that there is positive relationship between liquidity risk and bank margins. Lower level of cash or deposits in banks will lead banks to have higher liquidity risk. The cost of borrowing from other institutions and money market will also be higher if banks face constraints during runs. In which case banks will need higher spreads to compensate for increased liquidity risk and to cover for the increased borrowing costs (Angbazo, 1997; Brock and Suarez, 2000; Morellec, 2001; Drakos, 2003; Doliente, 2005; Valverde and Fernández, 2007).
Operating costs	OC	+	It is related to transaction size in banks. It is expected that operating costs will positively influence bank margins. With increases in transaction size or greater activities in banks, banks may need to set higher intermediation margins to cover the increased operating costs (Wong, 1997; Brock and Suarez, 2000; Maudos and Guevara, 2004; Doliente, 2005; Hawtrey and Liang, 2008; Maudos and Solís, 2009; Kasman <i>et al.</i> , 2010).
Implicit interest payments	IIP	+	It represents the extra expenses to be paid to depositors or investors. In the competitive markets, banks need to pay higher interest or financing to depositors or investors to source for funding. These would become additional expenses in banks and will be reflected in higher NIMs/NPMs by requesting higher revenues from loans and investments. Implicit interest payment has a positive relationship with NIMs (Maudos and Guevara, 2004; Hawtrey and Liang, 2008; Kasman <i>et al.</i> , 2010).
Size	SIZE	+	It is related to transaction size in banks, banks with greater operation and transaction size will tend to lead to greater risks. In effort to compensate for increased expenses and higher risk, banks will need to have higher bank margins, showing a positive relationship between size and performance of banks (Ho and Saunders, 1981; Saunders and Schumacher, 2000; Hawtrey and Liang, 2008; Maudos and Solís, 2009).
Lerner index	LERNER	+	It is a proxy of market power. The positive relationship between Lerner index and NIMs/NPMs is expected with the indication that higher Lerner index implies stronger monopoly power of banks. Banks with greater market power have the tendency to set higher bank margins to improve efficiency of banks for increased competition (Ho and Saunders, 1981; Saunders and Schumacher, 2000; Maudos and Guevara, 2004; Hawtrey and Liang, 2008; Maudos and Solís, 2009; Kasman <i>et al.</i> , 2010).
Degree of risk aversion	DRA	+	This is a measure of capitalization. Degree of risk aversion is expected to have a positive relationship with bank margins. Banks with increased operations and transaction volumes will tend to have a higher degree of risk aversion and higher bank margins will be needed to compensate for the risk-taking behaviour (Hawtrey and Liang, 2008; Maudos and Solís, 2009; Kasman <i>et al.</i> , 2010).

(continued)

Table 2. Continued

Variables	Acronyms	Expected sign	Rationale/supports
Opportunity costs of required reserves	OCRR	+	Minimum reserve requirements are significant legal reserves for protection of depositors and investors. With greater levels of required reserves in central or agent banks, banks will face greater opportunity costs of holding reserves and forgone interest or financing. Banks will then need higher margins as compensation, showing a positive relationship between opportunity costs of required reserves and NIMs (Ho and Saunders, 1981; Angbazo, 1997; Saunders and Schumacher, 2000; Maudos and Guevara, 2004; Hawtrey and Liang, 2008; Maudos and Solís, 2009).
Lagged value of NIMs for CBs and NPMs for IBs	or	+	This demonstrates the importance of previous accounting information on the current year's performance. It is expected that lagged value of NIMs will have positive impacts on the current year's performance (Valverde and Fernández, 2007; Maudos and Solís, 2009).

Table 3. Description of variables for asset-liability gap (objective 1) and NIM/NPM determinants (objective 2)

Categories	Acronyms	Ratios	Formula/measurements
Gap analysis	$STGap_{it}$	Gaps < 1 year + trading book	(Short-term assets + trading book) – (short-term liabilities + trading book)
Dependent variables	$LTGap_{it}$	Gaps > 1 year	Long-term assets – long-term liabilities
	NIMs	Net interest margins (CBs)	Differences between interest revenues and interest expenses per dollar of assets
Independent variables	NPMs	Net profit margins (IBs)	Differences between financing revenues and financing costs per dollar of assets
	CA	Capital adequacy	Ratio of total equity to total assets
	AQ	Asset quality	Ratio of loan loss provisions to total loans
	ME	Management efficiency	Ratio of operating costs to income
	LR	Liquidity risk	Short-term asset/total deposits
	OC	Operating costs	Ratio of operating expenses to total assets
	IIP	Implicit interest payments	Difference between operating expenses and non-interest revenues divided by total assets
	SIZE	Size	Logarithms of loans
LERNER	Lerner index	Difference between total revenues and total costs divided by total revenues	
DRA	Degree of risk aversion	Ratio of equity excluding reserves to total assets	
OCRR	Opportunity costs of required reserves	Ratio of liquid reserve (cash variables) to total assets	

Note: The variables and measurements are adopted from Vij (2005) for objective 1 and Kasman *et al.* (2010) and Maudos and Solís (2009) for objective 2, for both CBs and IBs in OIC countries.

$$NPM_{it} = \beta_i + \sum_{j=1}^J BS_{it}^j + v_{it} \quad (4)$$

Where α_i and β_i are unobserved time-invariant bank-specific effect and ε_{it} and v_{it} are disturbance terms. BS_{it}^j include all bank-specific variables and NIM_{it} and NPM_{it} are the dependent variables for CBs and IBs, respectively and these are to be explained and tested.

The relationship between bank-specific variables and NIMs and NPMs for CBs and IBs, respectively, is estimated using Generalized Least Square (GLS) with fixed effects models. It is expected that fixed effects model is better in capturing influence of specific characteristics of

banks. White's heteroscedasticity is used to correct SEs (Drakos, 2003; Maudos and Guevara, 2004; Hawtrey and Liang, 2008; Maudos and Solís, 2009; Kasman *et al.*, 2010). The descriptions of the variables presented are as follows (Table 3).

IV. Findings

This section discusses the findings starting with the descriptive analysis, followed by the gap analysis and the determinants of NIMs.

Table 4. Mean of variables for both CBs and IBs

Variables	586 CBs	273 IBs
Net interest margins	0.0275	–
Net profit margins	–	0.0263
Capital adequacy	0.1153	0.1889
Asset quality	0.0667	0.0846
Management efficiency	0.7899	1.6562
Liquidity risk	0.0386	0.0786
Operating costs	0.0463	0.0539
Implicit interest payments	0.0347	0.026
Size	3.4486	3.1141
Lerner index	0.2549	0.1815
Degree of risk aversion	0.0647	0.1117
Opportunity costs of required reserves	0.0827	0.065

Table 5. Results for gap analysis for CBs and IBs from year 1997 to 2010

Gaps	586 CBs Mean (US\$' m)	273 IBs Mean (US\$' m)
<i>STGap_{it}</i>	–1789.534	–637.2719
<i>LTGap_{it}</i>	3252.875	1334.357

Descriptive analysis

The information in Table 4 shows that on average, NIMs for CBs and NPMs for IBs are 2.75% and 2.63%, respectively, indicating more volatile margins for CBs than IBs. The relatively low NIMs and NPMs for both CBs and IBs indicate the phase of economic growth, banks may tend to create an environment of low operating costs and credit risk, as implied by operating cost ratio of 4.63% for CBs and 5.39% for IBs and asset quality ratios – as measurement of credit risk – are 6.67% and 8.46% for CBs and IBs, respectively. The low NIMs could be due to regulatory requirement to promote stability in banking sector. The OIC countries, in particular, and the Middle East Region, in general, are currently active in formulating and promoting several mega projects for infrastructure and developments with involvement of banks, especially after the global financial crisis and recovery from political turbulences.

Both CBs and IBs show the capital adequacy ratio of 11.53% and 18.89%, respectively. These illustrate the importance of Basel-type capital adequacy rules and an alternative to maintain the stability of banking sectors in these countries.² In terms of management efficiency, the ratios of 0.7899 and 1.6562 for CBs and IBs, respectively, show that IBs are more willing to invest in quality management to improve efficiency that could also be due to the late entry of IBs into banking sector. The governments have encouraged entry of foreign banks and consolidation of smaller banks in order to improve banks' efficiency. Besides, privatization and modernization of banks are

some of the initiatives taken by OIC countries to help promote greater efficiency in their banking sector.

Gap analysis

This section presents the results for asset–liability gaps or, more specifically, both the short- and long-term gaps for CBs and IBs (Table 5).

Both CBs and IBs have average negative short-term gaps of US\$1789.5340 millions and US\$637.2719 millions, respectively. These show that both CBs and IBs have greater short-term liabilities as compared to short-term assets. The results imply that banks have been receiving short-term funding through deposits and short-term borrowings to finance the short- and long-term lending, advances and investments. Fluctuation in interest rates favours the CBs as they compete for funding in the market and make the necessary adjustments in funding. The shorter negative gaps in IBs may be an indication that CBs, that on average are larger in size and have greater ability to pay slightly higher interest expenses, are able to compete more effectively to get more funding through deposits.

Both CBs and IBs have average positive long-term gaps of US\$3252.8750 millions and US\$1334.3570 millions, respectively, implying that long-term assets are greater in value than long-term liabilities in banks. The positive long-term gaps show that in the asset-sensitive balance sheet, banks are willing to take reinvestment risks by holding short-term maturity items to finance the long-term maturity terms. These results are consistent with the literature

² With reference to capital adequacy ratio set in BASEL II of 8% for Tier 1 (Basel, 2006).

(Koppenhaver, 1985) that most banks focus on short-term liability items (short-term deposits and borrowings) to finance the short-term and long-term assets (short-term loans and advances, liquid assets and investments). The greater gap for CBs as compared to IBs indicates that CBs may offer larger transactions for longer-term with their greater capacity. Short-term liabilities are more volatile probably due to increase in competition in banking sectors (Lai and Hassan, 1997).

The overall results on short- and long-term gaps have indicated that banks in OIC countries are not different from banks in developed countries and that they apply liability management strategy in short-term in which they obtain new and short-term funding and monitor this funding according to fluctuations in interest/profit rates. Besides, they also use asset–liability management to handle the loans, advances and investments to individuals, corporations and authorities and they are subject to reinvestment risks.

In the post 2008 financial crisis and greater political stability in OIC countries and certain countries in the Middle East Region, such as Yemen and Turkey, the authorities have engaged in various development and stimulus programmes, such as development of infrastructure, public utilities, healthcare and creating employment opportunities which have led to increase government's borrowing including the banking sector to fulfill the financing needs. Although the consumer savings rates in OIC countries have been relatively stable with little fluctuations, these funding are just sufficient to finance the development projects to help the fund-deficient countries. Besides, governments in Middle East have relaxed the banking supervisions and regulations to encourage consolidation of smaller banks and entry of foreign banks to improve liquidity in banks and financial institutions. Governments in Asia Region, on the other hand, have tightened and strengthened the banking supervision to monitor liquidity risk as banks are needed to support the functioning of money market and institutions.

The short- and long-gaps in OIC countries observed in this study are consistent with past studies in the developed countries. The findings for the gap analysis for CBs and IBs are summarized as follows (Table 6).

Determinants of NIMs

This section presents the findings on the determinants of NIMs.

Findings in Table 7 imply that the operating cost is the most important determinant of NIM/NPM for both CBs and NPMs for IBs. Operating costs show a positive and significant relationship with NIMs/NPMs and NPMs for CBs and IBs, respectively. The higher number of transactions in banks implies higher operating costs and therefore the banks will require higher NIMs to cover the increase in expenses (that is to maintain their performance at the least).

In addition, both CBs and IBs focus on the capital adequacy ratio in which the ratio shows a significant positive relationship with NIMs and NPMs at 1% and 10% level, respectively. Capital adequacy ratio is used as an indication for credit worthiness of banks and well-capitalized banks are better-equipped with long-term solvency (Kasman *et al.*, 2010). It is also a substitution for debt but it is a more expensive source of financing (Angbazo, 1997; Brock and Suarez, 2000; Drakos, 2003; Valverde and Fernández, 2007). Athanoglou *et al.* (2008) mention that capital is a safety net in which it can be used to improve the quality and earnings in banks.

In CBs, management efficiency shows significant negative relationship with NIMs at 1% level, but for NPMs in IBs, it is not statistically significant. The higher managerial efficiency ratio indicates that banks are able to provide higher quality of management and probably able to formulate an optimum composition of highly profitable assets and low-costs liabilities (Maudos and Guevara, 2004) and higher profitability (Athanoglou *et al.*, 2008). Although IBs have greater investment in improving quality of management, the CBs may have better quality of management with greater scale of economy.

Size shows negative impact on NIMs for CBs but shows positive effect on bank margins for IBs. The greater size of banks will lead to a decline in NIMs as banks with greater deposits may not be paying at market rates and increase in volume of loans, but a reduction in units will lead to scale of efficiencies, as supported by the negative relationship between size and NIMs for CBs (Lai and Hassan, 1997; Maudos and Guevara, 2004; Kasman *et al.*, 2010). However, the positive relationship between size and intermediation margins for IBs indicates that banks with large operations have higher risks and losses; therefore, banks tend to charge higher intermediation margins (Hawtrey and Liang, 2008; Maudos and Solís, 2009). Athanoglou *et al.* (2008) show that banks going through an expansion process will bring positive impacts on banks' profitability while banks that are sufficiently large in size but have bureaucratic

Table 6. The gaps for CBs and IBs

Gaps	Expected sign	CBs	IBs
Gaps < 1 year + trading books	–	√	√
Gaps > 1 year	+	√	√

Notes: √ indicates that hypothesis is supported.

Table 7. Determinants of NIMs for CBs and NPMs for IBs

Variable	CBs NIM coefficient	<i>t</i> -Statistic	IBs NPM coefficient	<i>t</i> -Statistic
C	0.0343	3.8489***	-0.0439	-1.8268*
CA	0.0628	4.1061***	0.0532	1.7675*
AQ	-0.0008	-0.0866	-0.0319	-1.8092*
ME	-0.0242	-3.5327***	-0.0003	-1.4897
LR	0.0068	1.2681	0.0322	2.4861**
OC	0.1414	3.8353***	0.3025	6.4101***
IIP	0.092	3.0453***	0.0013	0.0394
SIZE	-0.0014	-1.2602	0.0146	2.3795**
LERNER	0.0078	1.6929*	0.0016	0.8556
DRA	-0.0292	-3.5609***	-0.0343	-0.919
OCRR	-0.0015	-0.4325	-0.0161	-0.7802
AR(1)	0.2859	5.2892***	0.6014	5.9012***
Weighted statistics				
R ²	0.8863		0.8486	
Adjusted R ²	0.8655		0.8092	
<i>F</i> -statistic	42.6991***		21.5655	
<i>p</i> -Value (<i>F</i> -statistic)	0		0	
Durbin-Watson stat	1.9538		2.4043	

Notes: Even though operating costs and size as well as degree of risk aversion and capital adequacy have similar measurements, they have different explanations on NIMs for CBs and NPMs for IBs. The regressions are run for different sets of variables for operating costs, size, degree of risk aversion and capital adequacy but similar results are generated for CBs and IBs, indicating that these variables are important factors influencing NIMs and NPMs for CBs and IBs, respectively.

***denotes significance levels at 1%.

**denotes significance levels at 5%.

*denotes significance levels at 10%.

issues will have a negative impact on a bank's performance, as indicated in the case for IBs and CBs, respectively.

Ho and Saunders (1981) and Saunders and Schumacher (2000) relate transaction sizes to degree of risk aversions; higher degrees of risk aversions would encourage banks to have greater transaction sizes with bigger market structure. As for this, banks will need higher intermediation margins, in which the results show that degree of risk aversions has a significant and negative relationship with NIMs at 1% level but not significant for IBs. Maudos and Guevara (2004) show that a bank's performance is dependent on market power and operating costs as they maximize wealth in the market. It is said that the positive relationship between degree of risk aversion and bank margins indicates that risk-averse banks will tend to have higher margins to compensate for increased risks due to increased transaction sizes (Ho and Saunders, 1981; Saunders and Schumacher, 2000; Maudos and Guevara, 2004; Hawtrey and Liang, 2008; Maudos and Solis, 2009; Kasman *et al.*, 2010). However, this ratio is statistically significant for IBs.

Opportunity costs of required reserve ratios show insignificant negative impacts on spreads for both CBs and IBs. Reserves, being the placement with central and agent banks, are required under regulators' policy. The noninterest reserves are said to reduce the banks' capacity to issue loans or investments, while higher economic costs of funds are suffered for holding reserves. Banks will impose higher margins as compensation for the opportunity costs forgone

(Ho and Saunders, 1981; Angbazo, 1997; Saunders and Schumacher, 2000; Maudos and Guevara, 2004; Hawtrey and Liang, 2008; Maudos and Solis, 2009). However, these findings are inconsistent with the literature.

Lerner index, as a measurement for market power, shows significant positive relationship with NIMs for CBs at 10% levels, but it shows no significant relationship with NPMs for IBs. Banks with higher Lerner index indicate that they have greater monopoly power and market structure. In this, they may be able to charge higher loan rates but offer lower deposit rates so that they earn higher intermediation margins. However, competition and technological innovations may cause constraints on banks in earning higher NIMs (Ho and Saunders, 1981; Saunders and Schumacher, 2000; Maudos and Guevara, 2004; Hawtrey and Liang, 2008; Maudos and Solis, 2009; Kasman *et al.*, 2010).

Liquidity risk ratio shows significant positive relationship with NPMs at 5% level for IBs but not significant positive relationship with NIMs in CBs. The positive relationship between liquidity risk and bank margins implies that with higher liquid assets in banks, banks can reduce the liquidity risk but trade-off with lower profitability. On the other hand, when banks face liquidity risk due to insufficient cash or lower borrowing capacity, higher spreads are imposed. However, banks may need to borrow at higher borrowing rates from money markets or other institutions to improve cash and cash

Table 8. Summary findings of determinants of NIMs and NPMs for CBs and IBs

Variables	Expected sign	CBs	IBs
Capital adequacy	+	√	√
Asset quality	+	X	X
Management efficiency	–	√	√
Liquidity risks	+	√	√
Operating costs	+	√	√
Implicit interest payments	+	√	√
Size	+	X	√
Lerner index	+	√	√
Degree of risk aversion	+	X	X
Opportunity costs of required reserves	+	X	X

Notes: √ indicates that hypothesis is supported.
X indicates that hypothesis is not supported.

equivalents (Valverde and Fernández, 2007). The positive results can also be an indication of industrial benchmark (Brock and Suarez, 2000).

Implicit interest payment ratios show positive impact on performance of both IBs and CBs but significant at 1% level for CBs only. With diversification in products and services as well as competition in the market, these will lead to changes in revenue structure of banks. Implicit interest payments reflect the increasing importance of income and expenses from trading and activity-based fees and these may lead to reduction in NIMs (Ho and Saunders, 1981; Angbazo, 1997; Maudos and Guevara, 2004; Kasman *et al.*, 2010). Maudos and Solís (2009) and Hawtrey and Liang (2008) indicate that higher NIMs are required as implicit interest payments for the additional costs in banks. Saunders and Schumacher (2000) state that lower NIMs can be achieved with higher loan rates but lower deposit rates in banks. The irrelevance of implicit interest payments with NIMs can be due to the competition in funding and banks may incur noninterest expenses (Angbazo, 1997).

Asset quality, as measurement for credit risk, shows negative relationship with NIMs for CBs and NPMs for IBs, respectively, but they are significant at 10% level for IBs. The provision for loans is weakly significant for CBs and IBs (Angbazo, 1997) and that there are insufficient and inadequate accounting methods for loan loss provision in banks, leading to insignificant default risk concept in banks (Kasman *et al.*, 2010). Besides, this may also indicate that banks try to make adjustments in deposit and loan rates for the increased nonperforming loans. The results are consistent with past studies (Brock and Suarez, 2000; Drakos, 2003; Maudos and Guevara, 2004; Valverde and Fernández, 2007; Maudos and Solís, 2009).

The summary of the findings for determinants of NIMs and NPMs for CBs and IBs respectively are summarized in Table 8.

Impact of lagged NIM value

To ascertain whether the accounting values for the current year is influenced by previous accounting values, the following dynamic model was applied:

$$NIM_{it} = \alpha_i + \delta NIM_{it-1} + \sum_{j=1}^J BS_{it}^j + \varepsilon_{it} \quad (5)$$

$$NPM_{it} = \beta_i + \delta NPM_{it-1} + \sum_{j=1}^J BS_{it}^j + v_{it} \quad (6)$$

where α_i and β_i are unobserved time-invariant bank-specific effects and ε_{it} and v_{it} are disturbance terms. δNIM_{it-1} and δNPM_{it-1} are explanatory variables for CBs and IBs, respectively, that are correlated with dependent variable and transformation is done using first-differencing to eliminate individual effects. The regression results, including inertia term, are shown as follows:

Information in Table 9 indicates the merit and significance of accounting information in previous financial year towards the performance of banks in the current year (Valverde and Fernández, 2007; Maudos and Solís, 2009). For both CBs and IBs, the lagged 1 of NIMs and NPMs show significant positive relationship with NIMs at 1% level.³

Comparing the regression results of model (3), (4), (5) and (6), there are no significant differences in the relationship between bank-specific variables and NIMs/NPMs. Among all, operating costs, capital adequacy and management efficiency remain significant factors affecting NIMs.

³ We also used Generalized Methods of Moments (GMM) in Maudos and Solís (2009) and Valverde and Fernández (2007), but due data limitation, GMM can only be used for CBs but not for IBs. However, the results from GMM for CBs are similar to the results shown above.

Table 9. Determinants of the NIMs for CBs and NPMs for IBs with lagged dependent variables

Variable	CBs coefficient	<i>t</i> -Statistic	IBs coefficient	<i>t</i> -Statistic
NIM(-1)	0.6467	25.2005***		
NPM(-1)			0.7406	18.9540***
R ²	0.892		0.8174	
Adjusted R ²	0.8895		0.8079	
<i>F</i> -statistic	356.6664		86.2836	
<i>p</i> -Value (<i>F</i> -statistic)	0		0	
Durbin-Watson stat	1.7518		2.1715	

Notes: The regression includes other bank-specific variables: capital adequacy; asset quality; managerial efficiency; liquidity risk; operating costs; implicit interest payments; size; Lerner index; degree of risk aversions and opportunity costs of required reserves, in which the regression results do not vary significantly from the regression results in Table 7. However, this section is to show the impact of lagged of NIMs and NPMs on performance of banks. The complete set of results can be provided upon request.

***denotes significance levels at 1%.

Table 10. Lagged dependent variables regression results for CBs and IBs

Variables	Expected sign	CBs	IBs
Lagged 1 of NIMs	+	√	
Lagged 1 of NPMs	+		√

Notes: √ indicates that hypothesis is supported.

The comparison between the hypotheses and results for CBs and IBs are summarized in Table 10 below.

The findings suggest that there is no significant difference between CBs and IBs in terms of the operations. The results for the differences between CBs and IBs using *t*-test has is summarized in Table 11 below.

Table 11 shows that there is a significant difference between CBs and IBs at 1% level using both *t*-test and Satterthwaite-Welch *t*-test. This indicates that even though CBs and IBs have similar operations (intermediation functions) they operate on different principles. The CBs are always with the objective to maximize bank’s margins while IBs maximize profits subject to *Shari’ah* principles. Both CBs and IBs are subject to similar variables at different levels and dimensions, leading banks to difference performance of banks. However, both the CBs and IBs are the major suppliers and demanders of funds in the market. This requires the regulatory authorities to have different set of governance requirements to better reflect their commitment and development in the market.

V. Discussion of Results

Banks or financial institutions are important intermediaries between demanders and suppliers of funds to various parties in a country. They play major role in growth and development of nation through investments; yet, they are

subject to different types of risk – liquidity risk, credit risk, investment risk, refinancing risk and other types of risk, to name a few. Besides, they are also subject to challenges in economic and business environment, globalization, competitions and technological advancement.

There is a well-documented literature on ALM in the banking sector of developed countries but not much literature has been documented for developing economies, especially on Islamic banking sector or countries with dual banking system – conventional and Islamic banking systems. This study on ALM of CBs and IBs in OIC countries has been conducted to assess the short- and long-term gaps between asset and liability components in banks and to investigate the determinants of NIMs and NPMs for CBs and IBs, respectively, using bank-specific variables.

Most of the OIC countries are developing economies and have dual banking system – CBs and IBs. A number of these countries are major exporters of oil and gas and petrochemical, while a few other countries are based on agriculture and manufacturing industries. After the global financial crisis and political turbulence, especially in Middle East Region, it is seen that these countries are aggressively transforming their economies and their financial sector that will facilitate their development programmes. Various types of mega and stimulus projects, especially in infrastructure, real estate, reformation of social security and others, have been planned and implemented to improve the economy and the living standards that had been the real reasons for the political instability.

Table 11. Test of differences of short-term and long-term GAPs between CBs and IBs

	<i>t</i> -Test Prob	Satterthwaite-Welch <i>t</i> -test Prob
Long-term gaps between CBs and IBs	0.0004	0.0004
Short-term gaps between CBs and IBs	0.0003	0.0003

In Middle East Region, the authorities have encouraged reform and privatization of banking sectors to improve efficiency of banks and maintain their stability. They have encouraged the entry of foreign banks and consolidation of smaller banks in order to build stronger banking sectors with higher capital base. On the other hand, authorities in Asia Region have strengthened and improved the banking sectors through more stringent regulations. Tighter supervision has been imposed to ensure sufficient capital base and liquidity in banks to support the projects by authorities and corporations.

Looking at the performance of banks, calculation using NIMs for CBs and NPMs for IBs, of around 2.70%, it indicates that banks are in the phase of growing economics, subject to low operating costs and credit risk. These may also be due to regulatory requirements in order to promote stability in the banking sectors. With higher than Basel-type capital adequacy ratio (Basel, 2006), 11.53% for CBs and 18.89% for IBs, it seems banks have sufficient safety net in maintaining stability of banking sectors in these countries. Comparatively, IBs also have better management to improve efficiency in banks.

In assessing the maturity mismatches in both CBs and IBs in OIC countries, both CBs and IBs use liability management strategy for short-term gaps, while they both use asset management strategy for long-term gap management. The results are consistent with the literature in developed economies that banks receive deposits and short-term borrowing to finance long-term lending, advances and investments (Koppenhaver, 1985) (Koppenhaver, 1985). The OIC countries have embarked on mega developmental projects and the banks are participating in these project using Islamic banking financial modes. The banking regulators are simultaneously tightening the banking operations in these countries. As such, these banks have positive long-term gaps that may affect their performances. Moreover, these banks are also subject to refinancing and reinvestment risks from these activities.

An analysis of the relationship between bank-specific variables and performance of banks show that the past performances of banks are important determinants of the current intermediation margins of banks. Banks strive to maximize income through optimum use of assets and liabilities and they use their past performance to manage their ALM strategies.

In addition, operating costs and managerial efficiency in banks have significant relationships with NIMs for CBs and NPMs for IBs. This implies that strategies to minimize operating costs and increasing managerial efficiency will have positive impact on profitability of banks. The current initiatives to develop the financial institutions that participate in the developmental projects of the OIC countries must consider the ALM strategies of these banks, specially the IBs.

The IBs sector has enjoyed a double-digit growth for the last decade. However, IBs are faced with challenges of higher risks and losses in the due process of expansion and require higher spread to cushion the risks. CBs, on the other hand, are subject to more bureaucratic issues and subsequently lower efficiency and profitability. The required reserves with central and agent banks are mandatory components under regulators' policy to maintain stability of financial institutions in the financial markets; yet, these reserves are the opportunity costs for banks as banks do not gain any interest/financing incomes for these placements and banks have actually forgone the funds available for other investments that would help in improving banks' revenues.

Banking sectors in the OIC countries are facing new challenges and competition as their markets and economies grow, though the dual banking systems in these countries have given opportunities to nations to select the preferred products and services. The intermediary functions remain the core business of both banking systems, and diversification of products and services is still progressing based on the ongoing demand from the market. In future, there is a tendency for a structural change in income of banks and financial institutions as the intermediary function becomes less important generator of profits compared to fees-based income from new products and services. The continuous evolution in banking sectors also encourages continuous research in performance of banks from different perspectives.

VI. Summary and Conclusions

In this article, we examined the short- and long-term gaps between asset and liability components in banks and the determinants of NIMs for CBs and NPMs for IBs using

bank-specific variables. Both CBs and IBs experience lower NIMs/NPMs in these mostly developing economies. Second, both CBs and IBs in our study have adequate capitals exceeding the Basel II mandated 8% ratio (Basel, 2006), a sign of relative stability of the banking sector in these countries. Third, both CBS and IBs experience negative short-term gaps and positive long-term gaps, implying that banks tend to use short-term deposits and financing for funding short- and long-term loans, advances and investments, respectively.

Fourth, as for determinants of NIMs, operating costs are the most important determinant. The higher operating costs will lead to higher required NIMs to cover the increase in expenses. It is also possible that minimizing operating costs are decisive for CBs and IBs to improve quality of management in banks. Fifth, the past performances of banks have significant impacts on the current value of banks in both CBs and IBs, which is consistent with earlier studies. Banks should be able to undertake corrective actions to improve their profitability based on past accomplishments. Finally, although both CBs and IBs provide primary intermediary functions, there exists significant differences in their performances, pointing towards fundamental differences of their business models. This result is important for regulators to generate more relevant policies for development of both IBs and CBs separately.

A number of policy recommendations follow our empirical findings. In order to improve banking sectors in OIC countries, competition among banks should be encouraged. Banks should diversify their products and services to improve their performance. Banking regulators should also promote mergers and acquisitions or allow foreign entry to improve efficiency and quality of banks. Bank management may also strive to reduce their operating costs and increase managerial efficiency to improve efficiency performance.

Acknowledgments

The authors thank anonymous referees for their helpful comments. The second author acknowledges a research grant by Muhammed bin Al-Rashed Chair for Islamic Banking Studies by Al Imam Mohammad ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia.

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