

## **State of Liquidity Management in Islamic Financial Institutions**

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### **Abstract**

*Liquidity position and liquidity risk of Islamic financial institutions has been changing over time. Using three measures of liquidity this paper analyses the state of liquidity and the risk management practices of Islamic banks across countries and regions and compares them with conventional banks. It calls for creating new instruments and infrastructure for liquidity risk management and proposes fresh approaches to manage this risk.*

### **1. Introduction**

While liquidity surplus is considered a drag on competitiveness, shortage of liquidity is said to be assassin of banks. Episodes of failure of many conventional banks from the past and the present as well as the cases of financial distress faced by Islamic financial institutions provide the testimony to this claim. Therefore, banks and more so their regulators are keen to keep a vigil on liquidity position of banks and manage this risk. Due to profit sharing nature of Islamic banks, in theory at least, they are likely to be more stable. However, we observe that liquidity risks have played a role in bringing financial distress to Islamic banks as well, and some of them were forced to close.<sup>1</sup> Many different types of risks such as credit risk, operational risk etc., culminate in the form of liquidity problem for individual banks and the banking sector as a whole, therefore it, sometimes, becomes difficult to analyze this risk in isolation. The recent financial crisis has forcefully

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<sup>1</sup> An example is the closure of Ihlas Finans in Turkey in 2001 in the wake of liquidity crisis that had affected the entire banking sector of the country. Conventional banks faced greater problems than Islamic banks during that crisis.

During the Global Financial Crisis of 2007-2009 many conventional banks experienced distress, insolvency and some major ones closed down. Islamic banks in general survived, however, those relying predominantly on wholesale funding such as Islamic investment banks also faced problems.

highlighted the importance of liquidity risk and its management at micro and systemic levels.

The purpose of this paper is to present and explain the dynamic evolution of liquidity and liquidity risk in Islamic banking institutions and show its current status. This is done through analyzing liquidity ratios, deployment ratios and maturity mismatch over a long time horizon that includes period before and after the global financial crisis. The paper further discusses the sources of liquidity risk for Islamic financial institutions in comparison with conventional banks and summarizes liquidity management practices currently used in Islamic financial services industry. It shows how the structure of Islamic banking industry is changing over the time which necessitates greater efforts to liquidity management by the banks themselves and by the regulatory bodies. Some proposals floated at the international level and some rules proposed in Basel III for liquidity risk management are also summarized and evaluated in the appendix.

### *1.1. Definitions of Liquidity and Liquidity Risk*

Liquidity of an asset is its ease of convertibility into cash or a cash equivalent asset. Liquidity risk arises from the difficulty of selling an asset quickly without incurring large losses. For a banking and financial firm “liquidity risk includes both the risk of being unable to fund [its] portfolio of assets at appropriate maturities and rates and the risk of being unable to liquidate a position in a timely manner at reasonable prices.”<sup>2</sup> Sometimes it is defined in terms of maturity mismatch between assets and liabilities while at others it is defined in terms of asynchronous timing of cash inflows and cash outflows from the business.<sup>3</sup> The bank regulatory literature defines it as “risk to a bank’s earnings and capital arising from its inability to timely meet obligations when they come due without incurring unacceptable losses.”<sup>4</sup>

The liquidity risk can also be defined in terms of likelihood of illiquid positions. As defined by Nikolaou (2009): “Risk relates to the probability of having a realization of a random variable different to the realization preferred by the economic agent. In our context the economic agent would have a preference over liquidity. In that sense, the probability of not being liquid would suggest that there is liquidity risk. The higher the probability, the higher the liquidity risk. When the

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2 J.P. Morgan Chase (2000). The text [its] in square brackets is inserted by the author in place of name of the company JP Morgan Chase.

3 See Merrill Lynch (2000).

4 Office of the Comptroller (2000).

probability equals unity (i.e. the possibility becomes a certainty) liquidity risk reaches a maximum and illiquidity materializes. In that sense, there is an inverse relationship between liquidity and liquidity risk, given that the higher the liquidity risk, the higher the probability of becoming illiquid, and therefore, the lower the liquidity.”<sup>5</sup>

### *1.2. Sources of Liquidity Risk*

Liquidity risk emanates from the nature of banking business, from the macro factors that are exogenous to the bank, as well as from the financing and operational policies that are internal to the banking firm. In case of Islamic banks the nature of Sharī‘ah-compatible contracts are an additional source of liquidity risk, particularly if the conventional financial infrastructure is maintained.

Banks provide maturity transformation. Taking deposits that are callable on demand or that on average have shorter maturity than the average maturity of the financing contracts they sell. While maturity transformation provides liquidity insurance to the depositors, which is valued by them, it exposes banks to liquidity risk themselves. Since banks specialize in maturity transformation, they pool deposits and take care to match the level and time profile of their cash inflows and outflows in order to address the liquidity risk they face.

However, maturity mismatch at a given time is not the only source of liquidity risk. The risk of this kind can arrive from many directions and its pinch depends on various factors. In a nutshell its sources (i) on assets side depend on the degree of inability of bank to convert its assets into cash without loss at time of need, i.e. how deep and efficient are the markets of the assets they hold, and (ii) on liabilities side it emanates from unanticipated recall of deposits. Using the categorization in Jameson (2001) and adding a few more we can break them into following behavioural and exogenous sources:

1. Incorrect judgment or complacent attitude of the bank towards timing of its cash in- and out-flows.
2. Unanticipated change in the cost of capital or availability of funding.
3. Abnormal behaviour of financial markets under stress.
4. Range of assumptions used in predicting cash flows.
5. Risk activation by secondary sources such as:

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5 Nikolaou (2009), p. 15-16.

- i. Business strategy failure
  - ii. Corporate governance failure
  - iii. Modelling assumptions
  - iv. Merger and acquisition policy
6. Breakdown in payments and settlement system
  7. Macroeconomic imbalances

We can add to this list the 8. “contractual form”, 9. “Sharī‘ah restriction on sale of debt”, and 10. “financial infrastructure deficiency” as additional sources of liquidity risk in the case of Islamic banks.

### *1.3. Sources of Liquidity Risk Special to Islamic Banks – Contractual Forms, Restriction on Sale of Debt, and Absence of Appropriate Infrastructure<sup>6</sup>*

The various contractual forms available to Islamic banks can be partitioned into three categories: (1) Sharing contracts such as *muḍārabah* and *mushārahah*, (2) trade based contracts such as *murābahah*, *salam*, and *istiṣnā‘* and (3) service based contracts such as *ijārah*. Each of these categories of contracts has various kinds of risk implications including the liquidity risk dimension. The liquidity risk in these contracts can arise directly from the nature of the contract and also indirectly due to realization of other kinds of risks (such as credit risk and market risk) at some stage during the course of the contract. In the following we take each of these contract types and discuss the direct and indirect liquidity risk associated with it both on the asset side and liability side.

1. Profit Sharing Contracts such as *muḍārabah* and *mushārahah* does not pose an asset-liability mismatch problem for the bank if each deposit is invested in a specific project and depositors can only withdraw on maturity of the project in which their funds are invested.<sup>7</sup> While this eliminates liquidity risk to the banks it also wipes out the liquidity insurance possibility for the depositors. It also exposes the depositors to concentrated business risk. It then begs the question what is the role of bank as financial intermediary, why can't an individual directly invest in a project of his choice? Economies of scale and scope of the bank in monitoring of the investment projects are left as the only rationale for investment through banks.

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<sup>6</sup> This section borrows heavily from my earlier paper Ali (2004).

<sup>7</sup> This assumes that accounting period for calculating returns on deposits is same as the accounting period for profit calculation on the projects where funds are invested.

However, there is another rationale too. Banks can also work as providers of pooled investment opportunity to their depositors whereby depositors share in the returns of an investment pool rather than take concentrated risks in one project. This value added to the depositors in the form of investment diversification can be another rationale for the existence of Islamic banks. This arrangement not only smoothes out the variability of returns to depositors but can also address their liquidity needs to some extent if the investment projects are of various maturity periods. In order to address the preferences of depositors for stable income stream and liquidity needs the bank would have to carefully select the projects that have non positive correlation of returns and whose revenue cycles are negatively synchronized with each other. In the normal circumstances the bank does not have any liquidity risk emerging from the liability side because no fixed returns are contractually committed to the depositors.

In the extreme event that the depositors want to recall their investments the sharing assets are sellable in the market. The liquidity risk for the banks comes into picture if these assets fetch a price lower than their fair market price. But this loss is shared between the depositors and the bank in proportion to their capital contributions. Thus the liquidity risk to the bank is reduced by this proportion.

Due to various reasons, *mushārah* and *muḍārah* modes form only a small proportion of the asset portfolio of Islamic banks in present times. Most of their assets are in trade based modes or *ijārah*. Therefore we now turn to assess the liquidity risks embedded in such instruments.

2. *Murābahah*: Abstracting away from the operational details, in *murābahah* contract a bank buys a commodity for a client and sells it to him on a markup price to be paid later. Since *murābahah* receivables are debt payable on maturity they cannot be sold at a price different from the face value in secondary market. This is a source of liquidity risk for the bank, particularly, if average maturities of deposits are shorter than average maturity of *murābahah* contracts or if the deposits are sensitive to market returns. We will call the liquidity risk due to non-re-sellable nature of *murābahah* ‘primary liquidity risk’ associated with this instrument.

There are other risks in *murābahah* that can also give rise to liquidity risk. Let us call them ‘secondary liquidity risk’ associated with this instrument. For example, in a *murābahah* contract the ordering client has the right to refuse acceptance of the delivery for various reasons.<sup>8</sup> If the client rejects and refuses to

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8 Though a sale is a binding contract irrespective of whether it is spot or deferred *murābahah*. However, for a valid sale (spot or *murābahah*) the merchandise must be in the ownership of the seller

receive the commodity the bank is stuck with it until another buyer is found. Thus cancellation risk also gives rise to liquidity risk for the bank. Similarly, if the buyer is unable to pay the due amount on time, which is essentially a credit risk, it can also give rise to liquidity risk for the bank. It is also important to note that like any other sale contract there are operational risks in the procedure of carrying out *murābahah* contract. Likewise there are legal and litigation risks if some laws are violated or if a dispute occurs. This can also give rise to liquidity risk if the payment of price is stopped.

Some ways can be devised to reduce the secondary liquidity risk. For example, banks require the client to keep his business account with them. They often release funds in instalments which contribute towards maintaining the bank's assets protected and liquid funds at its disposal. Our main concern here is the primary liquidity risk of *murābahah* finance.

3. Salam: It is an advance payment commodity sales contract where the delivery of the commodity is deferred.<sup>9</sup> When a bank signs to purchase a commodity on *salam* and pays out the price, its receivable is the commodity due at a specified future date that is stipulated in the contract. In the time of cash needs the bank is unable to exit the *salam* contract by selling it to a third party before maturity because of Sharī'ah restriction of "do not sell what is not in your possession." Thus there cannot be a secondary market for trade in *salam* contracts. This is a source of primary or direct liquidity risk associated with this finance.

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at the time of sale. In a banking *murābahah* the bank does not have the merchandise in its inventory (or in its ownership) to begin with. The bank only buys it from a supplier just in time, on the specification of the merchandise, and on a promise from the end buyer of his intention to buy it from the bank. Then the bank offers it for sale to the end buyer. Since a promise to buy is not a binding contract (i.e., legally unenforceable) hence, there is always a risk that the final sale will not be affected. Therefore, there is a possibility that the bank will end up owning a commodity and it is not as liquid as cash.

Some scholars are of the view that the promise to buy made by the end buyer becomes a binding commitment (i.e., legally enforceable) once the bank has committed its resources and has incurred a cost as a result of this standing promise. In this case the likelihood of the bank ending up with unsold merchandise are low but not zero. For example, the merchandise may not exactly match the specification of the client therefore he has the right to rescind. However, to mitigate such risk the bank resorts to appoint the client (the final buyer) an agent of the bank to procure the merchandise according to the specifications and then sells it to him. (For more discussion see AAOIFI Accounting Standard No.2 and Sharī'ah Standard No. 8).

<sup>9</sup> Jurists have identified specific conditions for validity of this contract which can be found elsewhere, for example see Usmani (1998).

Secondary or indirect liquidity risk arises in *salam* contract when some other risk associated with this contract materializes. For example, the credit risk with this contract is that the seller may not be able to deliver the commodity on the specified date. If it does happen, then the liquidity problem of the bank extends beyond the maturity date. Having not received the commodity it cannot sell it in the market to convert it into a liquid asset. Another example of indirect liquidity risk is if the commodity is delivered but the quality or quantity or some other attribute of the purchased commodity is below the required specifications causing a legal dispute. The litigation risk which was a risk factor before the delivery now becomes a liquidity risk.

A way to mitigate the primary liquidity risk (as well as to avoid the delivery) in *salam* contract is to use parallel *salam*. The idea is to write a separate offsetting *salam* contract.<sup>10</sup> But the second *salam* has to be (i) an independent contract not contingent on the performance of the first *salam* contract, and (ii) must be with a third party (i.e., not with the counter party in the first *salam* contract or its affiliates).<sup>11</sup> However, as long as the credit risk and the risk of dispute are there the secondary liquidity risk (or indirect liquidity risk) of *salam* still remains, and even increases now because of the two parallel contracts instead of one contract.

4. *Istiṣnāʿ*: It is a manufacture to order contract for yet to be manufactured good on payment of an advance price either in full or in instalments. The primary liquidity risk arises in the same way as in *salam* contract but to a lesser extent because it is permissible for the bank to provide funds in instalments or even to defer the whole amount to a future date thus maintaining its liquid assets. Whereas in *salam* full upfront payment is necessary.

The secondary liquidity risks of *istiṣnāʿ* are the same as for *salam* with two exceptions:

- (i) As opposed to *salam*, an *istiṣnāʿ* contract can be cancelled unilaterally before the manufacturer starts manufacturing. Therefore it involves definition and verification of this event. This feature can contribute to lesser or greater liquidity risk to the bank depending upon how well the event is defined, the ease of verification by a third party such as a court, and how much funds have already been advanced by the bank.

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<sup>10</sup> See Khan (1992) and Khan (1995).

<sup>11</sup> The first condition is in order to meet the sharīʿah requirements of: (a) prohibition of contingent sales, (b) prohibition of sale of a thing that is not in possession. The second condition is in order to meet the sharīʿah requirement of prohibition of *aeena* or buy-back arrangement.

- (ii) Time bound delivery is not a must feature of *istiṣnāʿ* contract, however in current practice it is not left open ended otherwise it would have been hard to define an event of default. Thus secondary liquidity risk that is triggered by realization of credit risk is similar to that found in *salam*. The only difference being that some jurists (*fuqahāʿ*) allow penalty for lateness in delivery on the analogy of permissibility of such measure in *ijārah* contracts.<sup>12</sup> This can induce stronger incentives for timely delivery thus reducing the chances and the duration for which the contract remains open to liquidity risk after a default as compared to a *salam* contract.

5. *Ijārah*: In an *ijārah* contract the bank first owns an asset which it leases to its customer. Or the bank gets a tangible asset on lease from a third party and subleases it to the customer. Liquidity risk comes in an *ijārah* contract when the bank has to pay the price of the asset upfront to acquire the asset before it can lease it to its customer. The liquidity risk depends upon whether or not the asset is readily resell-able in the market. This risk is however less here than in *murābaḥah* contract because *murābaḥah* is not re-sellable and re-price-able. The liquidity risk in hire-purchase (*ijārah muntahi bi tamleek*) is even lower because the sale price is built into the rental instalments. However, the rentals cannot be drawn unless the asset is ready to provide usufruct to the lessee, therefore liquidity of this contract also depends on the time required to make the asset useable by the lessee after the agreement.

Above we have discussed the liquidity risk of each individual mode of finance. In reality the situation is more complicated as the overall liquidity risk depends on the proportion of each of these contracts in the bank's portfolio and the concentration and exposure to individual parties through them.

## 2. Current State of Liquidity

To analyze current state of liquidity we have utilized three commonly used measures of liquidity. Assuming a given probability distribution over unforeseen liquidity needs a reduced amount of liquidity, as measured by these ratios, increases the potential for getting into liquidity shortage situation hence the liquidity risk. The three ratios we utilize are: (1) Liquid Assets to Total Assets ratio, where the liquid assets are defined as cash and cash equivalents as well as deposits with other banks. The advantage of this ratio, often called liquidity ratio, is that it gives a quick picture of proportion of liquidity available within a bank as

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12 Usmani (1998)



well as in the banking system as a whole when aggregated across banks. (2) Financing to Deposit ratio. This is the most commonly used ratio of liquidity risk. It captures the changing nature of financing demands and the bank's ability to gather the deposits. (3) Maturity Mismatch of Assets and Liabilities, particularly of short-term nature of less than 3 month period. This captures the liquidity risk generated by the maturity transformation role of the bank. There are other possible measures too, such as the ratio of stable deposits to total deposits or the ratio of profit sharing investment accounts (PSIA) to total deposits, but they are not used due to deficiencies in data.

In section-4, the paper also looks at the situation of change in probability distribution of unforeseen liquidity needs, again indirectly, by examining the change in the structure of funding. As some sources of bank funding are more volatile than others, a shift towards these sources of funding will result in increase in liquidity risk even with no change in the liquidity ratios. Thus the paper captures liquidity risk emanating both: (i) from changes in ratios at a given point in time and (ii) changes in probability distribution of liquidity stress, but does not attempt to quantify these probabilities.

The data on Islamic banks utilized for this study comes from Islamic Banks Information System (IBIS) provided by Islamic Research and Training Institute. We utilized data of 61 Islamic banks from 18 countries and cover the period from 2000 to 2009.<sup>13</sup> The appendix-1 gives the list of countries and number of banks from each country. The data on conventional banks was obtained from Bank Scope and the World Bank.

### *2.1. State of Liquidity in Islamic Banks (past, present and during the crisis)*

#### Liquidity Measure-1: The Liquid Assets to Total Assets Ratio

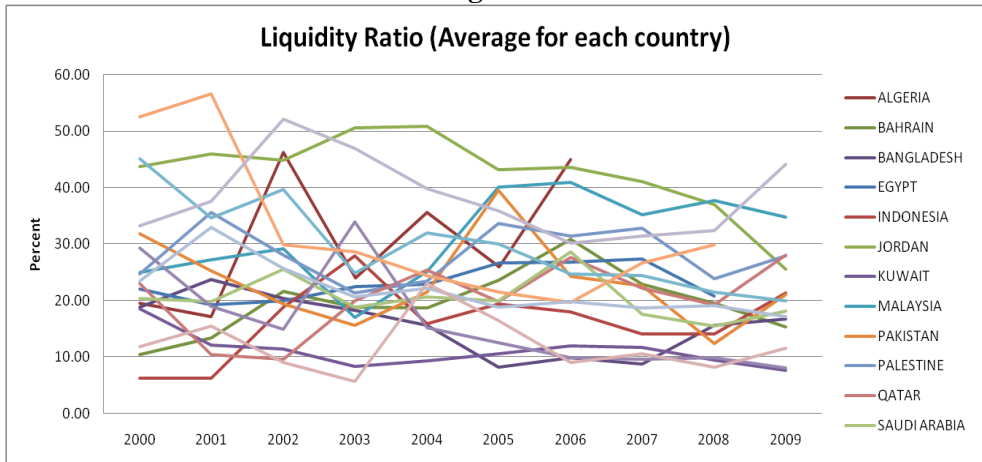
The Figure-1 shows liquidity ratio data for Islamic banking sector from 18 countries over a period from 2000 to 2009. This reflects averages of liquidity ratios of Islamic banks within each country for each year. In this sense Figure-1 represent the liquidity ratio of an average representative Islamic bank in each country. Higher the liquidity ratio, better is the ability of bank to manage liquidity risk. However, very high liquidity ratio indicates a drag on the earnings of the bank as more liquid assets generally bring in low or no returns not only to shareholders but

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<sup>13</sup> This means  $61 \times 10 = 610$  data points. However, eliminating the missing values we still have 512 data points for analysis.

also to the *muḍārabah* based deposit holders. Thus there is a trade-off between higher liquidity and return.

**Figure-1**



Source: Author's calculations using IBIS data.

In general, the countries where Islamic banking is new or where new Islamic banks are coming into being very fast, we can expect to see erratic movements in the liquidity ratios. This is due to the fact that the newly established banks have most of their assets in liquid form in the beginning.

Among the GCC Countries, Kuwait had consistently low liquidity ratio throughout the period. UAE is the country where liquidity ratio dropped most and remained lowest during the global crisis. Among all countries, Jordan has the highest liquidity ratio consistently since 2004 followed by Malaysia. Whereas, the liquidity ratio in Sudan has been consistently showing a downward trend since 2004 but remained in the middle of the range of all countries in the sample.

The Figure-1 also shows that there is a great deal of variation in liquidity ratios across countries in each year. However, this figure does not give any information on variability of liquidity among Islamic banks within a country. This variation among Islamic banks within each country as measured by the standard deviation of liquidity ratios is high in Bahrain, Jordan, Malaysia, Pakistan, Saudi Arabia, and Yemen. The variability is found to be low in Bangladesh, Indonesia, Kuwait,

Qatar, Sudan, Turkey, and UAE.<sup>14</sup> Both the inter- and intra-country variations in liquidity ratios point to a potential for creation of inter-bank market.

While Figure-1 gives a comprehensive picture to compare across countries. However, there is information overload in it precluding readers to see any discernable trend and understand the future direction. Clearer picture emerges when the same information is presented aggregated by regions. Figure-2 gives the liquidity ratio of average Islamic banks by regions.<sup>15</sup> It clearly shows that a downward trend in liquidity ratio had started in most regions even before the global financial crisis. After the crisis this trend further deepened. Only in 2009 after the crisis the liquidity ratio has started to improve. In the past Islamic banks were characterized to have high holding of liquid assets. This high liquidity was partially due to lack of avenues for short-term parking of excess liquidity and partially as a result of risk management strategy as Islamic banks do not have lender of last resort facility. However, the excess of liquidity is becoming a matter of past and possibilities of liquidity shortages are building up.

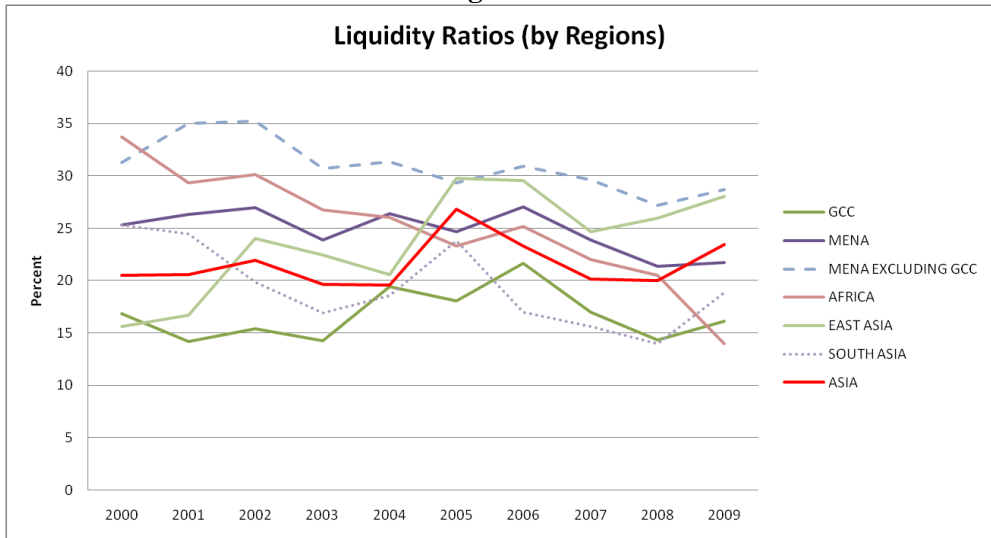
This regional comparison of ratios puts GCC and South East Asia regions on the lower side of liquidity consistently throughout the ten year period. However, in terms of absolute amounts (Dollar value) the liquid assets in these regions are multiple times higher than other regions as the assets of average Islamic banks in these two regions are much high.

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14 To capture within country variation, the standard deviations of liquidity ratios among the Islamic banks within each country were calculated for each year. Countries where this standard deviation exceeded 20 within any of the past five years (2005 to 2009) were classified as high variability countries.

15 Average is taken over the liquidity ratios of all individual Islamic banks within a region. It is not total liquid assets in the region divided by total assets in the region.

**Figure-2**



Source: Author's calculations using IBIS data.

**Table-1**  
**Regional Liquidity Ratios**

YEAR	GCC	MENA	MENA EXCLUDING GCC	AFRICA	EAST ASIA	SOUTH ASIA	ASIA
2000	16.86146	25.29871	31.32532	33.72185	15.65001	25.34142	20.49571
2001	14.2233	26.35404	35.01885	29.34263	16.74299	24.49688	20.61994
2002	15.4576	27.01252	35.26604	30.13395	24.00653	19.87588	21.94121
2003	14.31611	23.86979	30.69384	26.79788	26.72011	16.90559	21.81285
2004	19.42119	26.37737	31.34607	26.03993	20.58021	18.58992	19.58506
2005	18.07303	24.66476	29.37314	23.32841	29.77088	23.84733	26.80911
2006	21.64811	27.0544	30.91604	25.20829	29.52054	17.02539	23.27297
2007	16.99369	23.9035	29.66167	22.01624	24.70429	15.65787	20.18108
2008	14.36213	21.36174	27.19474	20.50475	25.9895	13.97454	19.98202
2009	16.15152	21.7299	28.70287	14.0055	28.04554	18.8833	23.46442

Source: Author's calculations based on IBIS data.

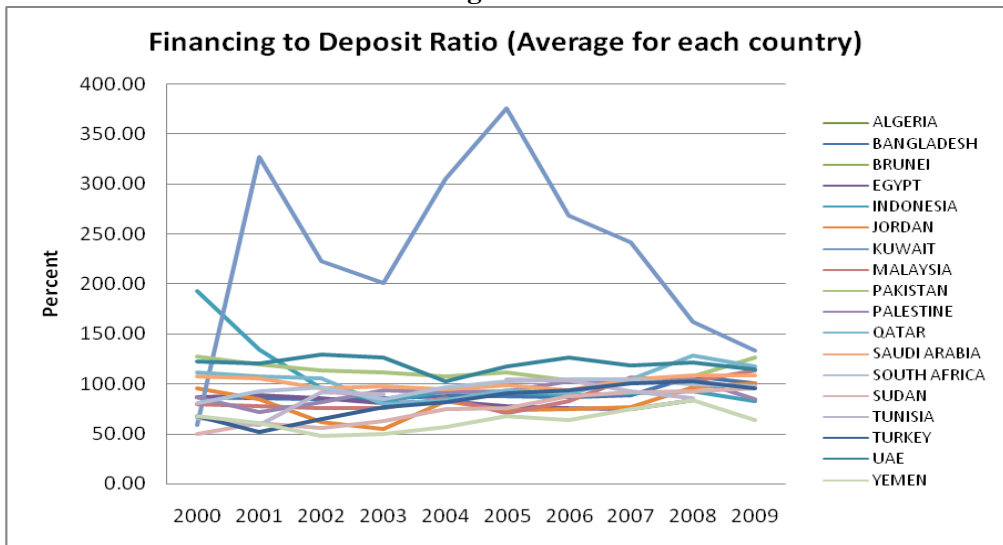
**Liquidity Measure-2: Financing to Deposit Ratio**

An important measure of liquidity risk is the Financing to Deposit Ratio. It captures the relationship between changing nature of demand for financing (be it in the form of *murābahah*, *istiṣnā'*, *ijārah* or partnership based modes) and the

deposit gathering ability of banks to fund that demand. Higher the ratio, higher is the liquidity risk faced by the bank. Figure-3 shows the Financing to Deposit Ratio of average Islamic banks in individual countries. In this regard stable funding, which increases along with demand for financing, is an important factor in managing the liquidity risk. The Financing to Deposit Ratio has moved differently in many countries but in most countries this ratio peaked between 2006 and 2009. During this period the growth rate of financing was higher than the growth rate of deposits in many banks, however, deposits also increased. The exceptions are the investment banks which rely more on wholesale funding and little on retail deposits. As a result these banks faced sharp increase in Financing to Deposit Ratio (i.e., high liquidity risk) during the financial crisis. Islamic investment banks in Bahrain and Kuwait faced significant distress during 2009.

Table-2 gives the region wise average Financing to Deposit Ratios. The same is shown graphically in Figure-4. It clearly shows that this ratio was quite high in the GCC and MENA when compared to other regions. The very high ratio is due to inclusion of investment banks in our sample from these regions. Figure-5 shows the same ratio for other regions after excluding the GCC and MENA. It is evident from the data and its plot that the liquidity risk has moderately increased after the crisis in Asia, East-Asia, South-Asia, and Africa.

**Figure-3**



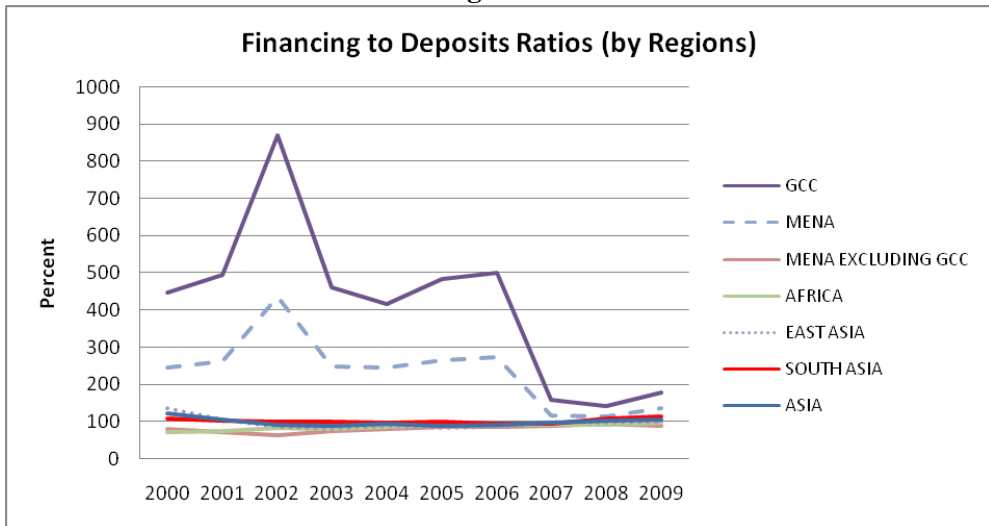
Source: Author's calculations using IBIS data.

**Table-2**  
**Financing To Deposit Ratios By Region**

YEAR	GCC	MENA	MENA EXCLUDING GCC	AFRICA	EAST ASIA	SOUTH ASIA	ASIA
2000	445.19	245.07	78.31	70.51	136.60	107.07	121.83
2001	493.51	262.00	69.07	74.77	106.18	102.47	104.33
2002	870.20	434.80	61.68	82.02	85.43	98.87	92.15
2003	459.55	249.22	73.95	79.40	79.11	98.60	88.85
2004	414.63	246.71	78.80	84.19	88.99	97.29	93.14
2005	483.58	265.76	84.24	89.77	81.07	99.33	90.20
2006	501.15	274.55	85.73	93.15	85.72	95.20	90.46
2007	156.43	118.52	86.93	90.77	98.44	94.23	96.34
2008	140.66	114.59	92.85	90.21	97.68	107.38	102.53
2009	176.84	136.52	86.12	96.40	98.06	113.32	105.69

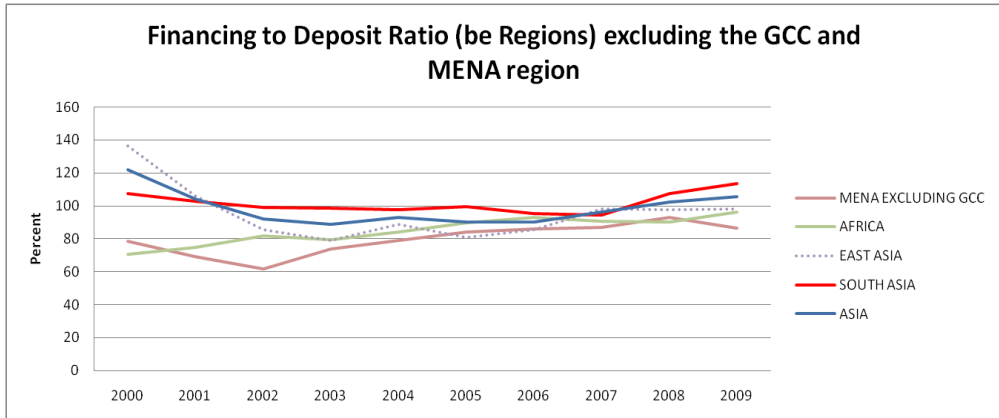
Source: Author's calculations using IBIS data.

**Figure-4**



Source: Author's calculations using IBIS data.

**Figure-5**  
**without GCC**



Source: Author’s calculations using IBIS data.

A growth in deposits equal to the growth in financing is not enough for managing liquidity risk. Stability and liquidity of deposits are also important which is not captured in the above measure. The stability and greater liquidity depends on the diversity of depositor base, on the contractual terms whether the deposits are profit sharing *mudārabah* based accounts or fixed liability *murābahah* and *tawarruq* based deposits. It also depends on the maturity tenor of the deposits whether contractually determined or behaviourally set. Many Islamic banks have strong deposit base, but in some countries the demand for financing is even higher. If this rise in demand is due to economic growth and development of the country in which Islamic bank is operating then this is very healthy. However, if this happens due to financial arbitrage opportunities and speculation then in such environment as competition heats up banks start relying on wholesale funding and short-term funding to provide longer term financing and investment. This itself is a source of liquidity and other risks. The paper will provide some comments on these in a later section. The next section looks at the third measure of liquidity which is maturity gap in the asset and liabilities.

### Liquidity Measure-3: Maturity Gap

The maturity gap tries to measure the congruence of maturity tenors of assets and liabilities of individual banks and, when aggregated, possibly for the banking sector. High positive or high negative gaps are sign of potential liquidity problems. For the purpose of analysis of short-term liquidity position of Islamic banks the focus here is on assets and liabilities gap of up to 3-month maturity. Using the data

for individual banks maturity ladders of assets and liabilities have been constructed and maturity gap for those banks were calculated in 5 tiers: for up to 3 months, 3 to 6 months, 6 months to 1 year, 1 to 3 years, over 3 years, and unspecified maturity. This section analyses only the very short term maturity gap i.e. up to 3 months category.

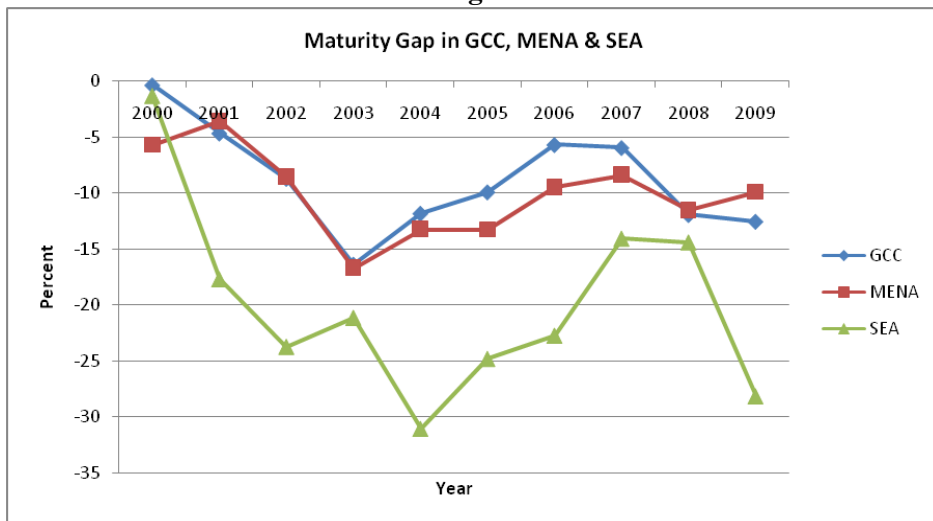
Figure-6 shows the average maturity gap of up to 3 months assets and liabilities of Islamic banks in three regions: The GCC, MENA, and South East Asia (SEA). It is obtained by averaging the respective maturity gap of individual Islamic banks in that region. The data is reported for the years 2000 to 2009.

The Figure-6 reveals that:

With a long history the average maturity gap of up to 3 months assets and liabilities for Islamic banks have been negative in all regions. Implying that on the average Islamic banks face lack of short-term assets as compared to the short-term funds they raise.

The SEA region has been consistently showing larger negative maturity gap for short-term assets and liabilities as compared to the MENA and GCC regions. This implies that the problem of short-term maturity mismatch is more severe in that region and hence the liquidity management issues.

**Figure-6**



Source: Author's calculations using IBIS data.

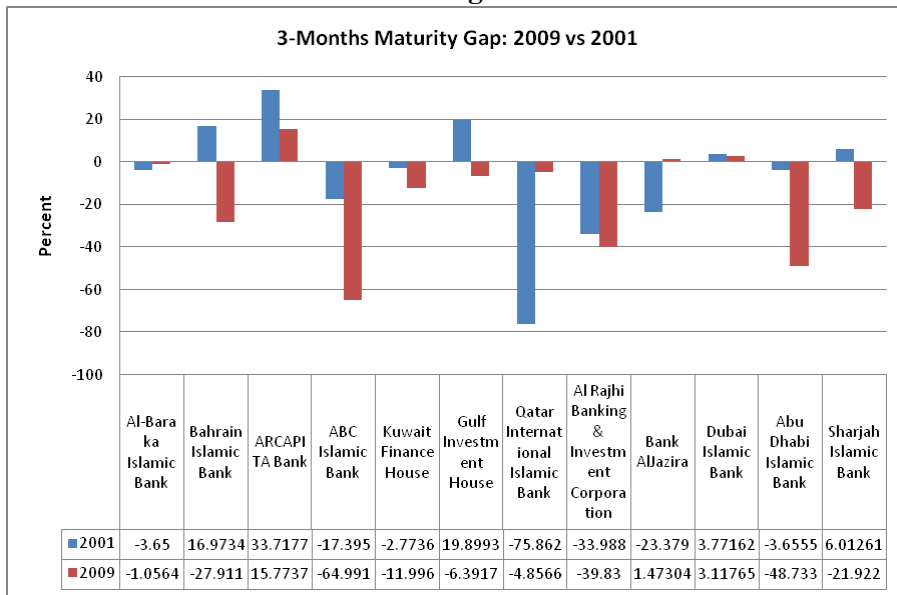


The above are some preliminary observations which will require further investigation because the sources of asset liability mismatch can be many, including the asset and liability management policies of Islamic banks. Therefore a policy response at the level of banks and their regulators will crucially depend on those factors.

It can also be noted from Figure-6 that the short-term maturity mismatch in Islamic banking had been reducing in all regions from 2004 until the advent of the global financial crisis. The liquidity situation started to deteriorate in the GCC (2007) before the SEA region (2008). However, later in the year (2009) the short-term maturity mismatch deteriorated much significantly in the SEA region while it started to taper-off or improve in the GCC and MENA regions respectively.

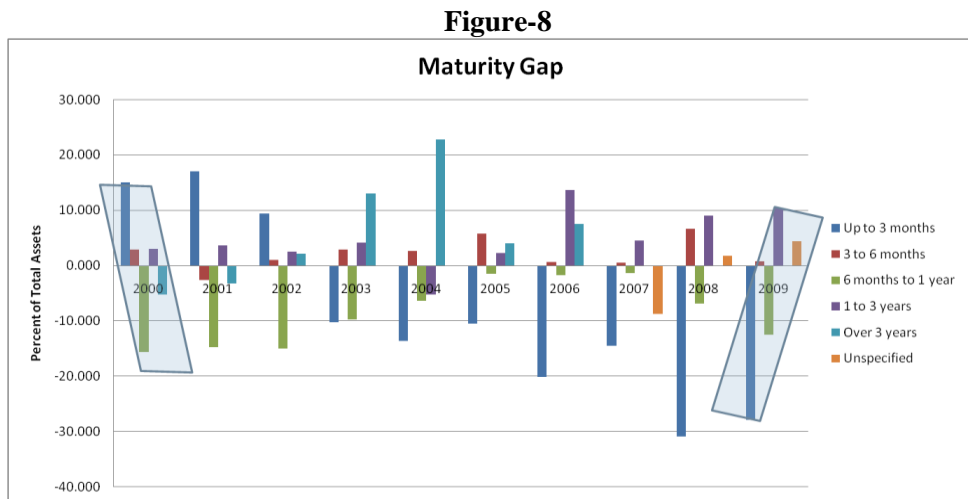
It may also be noted that the structure of liquidity of Islamic banks have changed significantly over the years. From an era of liquidity surplus in the beginning of the decade Islamic banks are now in the era of liquidity shortages. Figure-7 compares the short-term maturity gap during 2001 versus that in 2009 of some Islamic banks. In general, the banks have moved from a position of positive gap to a negative one or from a negative gap to a more negative one.

**Figure-7**



Source: Author's calculation using IBIS data.

The change in liquidity structure is not confined to 3-month gap only. Rather there has been a structural shift over the decade with Islamic banks relying more on short-term funding to fund long term assets, which indeed increases the risks faced by them. To show that the structural shift has taken place in the funding and financing operations of Islamic banks at all levels of maturities we took the example of one bank (name left anonymous) and plotted its maturity gap for all tenors of assets and liabilities from 2000 to 2009. This is shown in Figure-8. It can be seen from the figure that the structure of the maturity distribution has undergone considerable change during this period. In fact, it has now the reverse shape in 2009 compared to the year 2000. To facilitate the reader visually see the difference, two different shaped rhombuses are placed on the data for 2000 and 2009 in Figure-8.



Source: Author's calculations using IBIS data.

## 2.2. Liquidity Comparison with Conventional Banks

For a meaningful comparison of liquidity and liquidity risk of Islamic banks with that of conventional banks some control over the other very divergent factors between the two types of banks is necessary. For example, comparing Islamic banks with major international conventional banks operating at global level will not make sense because of sheer differences in their size, operations, markets, influence and regulatory environment. To control for these differences and yet keeping the comparison with well performing conventional banks, the following methodology was used. Three large banks (largeness defined in terms of assets),

were selected from each of the seven countries where Islamic banks are actively operating. The seven selected countries are Bahrain, UAE, Saudi Arabia, Malaysia, Indonesia, Pakistan, and Turkey. Table-3 shows the average liquidity ratio of three largest conventional banks in each of these seven countries.

**Table-3**  
**Liquidity Ratio (percent) – Average of three large conventional banks in each country**

Year	Bahrain	UAE	Saudi Arabia	Malaysia	Indonesia	Pakistan	Turkey	GCC Average	Asia Average
2006	0.99	6.25	6.26	14.63	2.27	n.a.	8.90	4.50	8.45
2007	1.14	17.70	10.46	17.66	2.62	10.03	8.84	9.77	10.10
2008	1.92	6.37	7.97	14.00	3.37	9.79	9.11	5.42	9.05

Source: Author's calculations using annual reports of conventional banks. In this table the GCC Average is average of Bahrain, UAE and Saudi Arabia. While in this table the Asia average is average of Malaysia, Indonesia and Pakistan. This definition is slightly different than that used in the text for GCC and Asia.

For the three years from 2006 to 2008 the range of liquidity ratio in conventional banks (average of three large banks) was between 4.5 percent to about 10 percent in the GCC region. In comparison to it, the liquidity ratio of average Islamic bank in the same region during that period varied from 14 to 21 percent.

Similarly, for the Asia region the liquidity ratio in conventional banks varied from 8.5 percent to 10 percent during 2006 to 2008. During the same period the liquidity ratio of Islamic banks varied from 20 percent to 23 percent.

This comparison clearly shows that Islamic banks in general are holding high proportion of liquid assets than conventional banks. Even during the financial crisis, which occurred during the above mentioned period of comparison (2006 to 2008), the liquidity of Islamic banks were more than twice the liquidity of conventional banks. This, among other factors, helped most Islamic banks to ride out of the crisis.

The liquidity risk as measured by the Loans to Deposit Ratio in case of conventional banks can be compared with Financing to Deposits Ratio in case of Islamic banks. Using the same approach as above we find that Islamic banks have a high deployment ratio than conventional banks. During 2006 and 2008 the ratio of loans to deposits of conventional banks ranged from 88 percent to 97 percent in the GCC region (see Table-4), while for Islamic banks the financing to deposits ratio was a whopping 140 percent to 156 percent. This implies that Islamic banks in the region were using non-depository sources of funds. This may be partially the

banks' own capital and partially borrowing from wholesale market possibly through commodity *murābaḥah*, *ṣukūk* and private placements. Inclusion of some large Islamic investment banks from the GCC region in our sample can also account for this high ratio as Investment banks do not rely much on retail deposit base.<sup>16</sup>

Comparing the Islamic banks with conventional banks in Asia region for the period 2006 to 2008 again shows that Islamic banks do not leave deposits idle. The financing to deposit ratio of average Islamic bank varied from 90 percent to 96 percent in comparison with 69 percent to 70 percent loans to deposit ratio of average conventional bank.<sup>17</sup>

**Table-4**  
**Loans to Deposits Ratio (percent) – Average of three large conventional banks in each country**

Year	Bahrain	UAE	Saudi Arabia	Malaysia	Indonesia	Pakistan	Turkey	GCC Average	Asia Average
2006	95.32	99.39	70.61	85.42	51.87	72.03	61.38	88.44	69.77
2007	106.02	104.97	70.31	76.50	52.45	68.13	65.62	93.76	65.69
2008	100.36	114.76	75.90	78.67	54.39	74.00	68.79	97.01	69.02

Source: Author's calculations using annual reports of conventional banks. In this table the GCC Average is average of Bahrain, UAE and Saudi Arabia. While in this table the Asia average is average of Malaysia, Indonesia and Pakistan. This definition is slightly different than that used in the text for GCC and Asia.

Given the high utilization ratio of deposits, the less developed state of liquidity management instruments and infrastructure, and non-sellable nature of debt Islamic banks are exposing themselves to higher liquidity risk unless they rely on profit

16 Financing to deposit ratio has been historically higher in the GCC region even for conventional banking sector compared to the other regions of the world. This may be due to existence of some very wealthy families and individuals who invest directly in the capital of the bank rather than opening a deposit account. Why this is historically the case can form an interesting research question for future research. Compared to the pre-crisis period, this ratio substantially declined during the crisis from its historical values for both conventional and Islamic banking sector, but remained higher than other regions (see Table-2 and Table-4).

17 This difference is not because of any difference in Capital Adequacy Ratio (CAR) but due to the fact that Islamic banks can pay to their depositors only from their earnings (a share of profit). In order to pay a share that is competitive enough to the rates available in the market Islamic banks have to ensure efficient deployment and quick turnover of the available funds.

sharing investment accounts (PSIA) and genuinely use risk sharing in their financing as well as funding operations.

### 3. Liquidity Management Practices

#### 3.1. Liquidity Management in Conventional Banks

Liquidity management has always been important for banking. However, in the growing and profitable market of money lending business the liquidity risk often becomes a secondary concern for the managers of banks. Aggressive expansion of lending operations that became possible through securitization of loan portfolios helped the banks to further ignore liquidity risk and expand the asset portfolio even on thin capital base. The financial crisis that followed has taught many important lessons to the banks, their regulators and the society in general. Importance of liquidity risk management is one of these lessons that forced the banks to reconsider their practices. Ernst & Young conducted a survey of 62 large banks in 2010 on behalf of International Institute of Finance and found:<sup>18</sup>

- 92 percent of banks have made changes to their approaches to managing liquidity risk
- Liquidity risk management has become single most important area for banks
- Primary challenges to liquidity management identified by the survey are:
  - Systems 87%
  - Data Quality and Consistency 81%
  - Regulatory Uncertainty 69%
- Banks report that their “risk appetite” is now linked to business decisions.

The global financial crisis has also placed liquidity risk control high in the agenda of regulators. In this regard various proposals have been discussed in the literature to monitor and control this risk for financial stability. Basel Committee on Banking Supervision (BCBS) has come up with new recommendations for liquidity risk management in BASEL-III. Key among them are two quantitative measures (i) Liquidity Coverage Ratio and (ii) Net Stable Funding Ratio. The first one is to ensure that the banks have enough liquid assets to cover for 30 days of net cash out flows. The second one is to encourage more medium- to long-term funding. The details of these measures of BASEL-III and other proposals are given

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18 Ernst & Young (2010).

in Appendix-1. The liquidity management tools available to conventional banks and the regulatory support infrastructure available to them including the lender of last resort facility are well known. Instead of dwelling into these well known aspects the paper moves in the next section to liquidity management practices in Islamic banks.

### 3.2. *Liquidity Management in Islamic Banks*

Liquidity stress is not unknown to fully fledged Islamic banks, subsidiaries of conventional banks as well as to Islamic banking divisions and Islamic investment banks. During the recent crisis all these types have faced liquidity shortages of varying degrees and varying durations. The severity of liquidity crunch in some jurisdictions was so high that central banks offered special facilities or provided temporary blanket guarantees for all accounts, including to Islamic banks.<sup>19</sup> In other jurisdictions they only provided no more than lip service to Islamic banks.

Generally, the risk management, including the liquidity risk management is carried out at the group level rather than individual divisions' level. This means, in case of Islamic banking subsidiary of a conventional bank or Islamic banking window of a conventional bank the liquidity risk management is performed using conventional hedging instruments and techniques. Such banks do not feel the difficulty that fully fledged Islamic banks face when they try to exercise liquidity risk management within the bounds of Sharī'ah in the existing environment. Thus the mixing of liquidity risk management activities of Islamic and conventional lines of business in the former group of banks creates negative externalities for Islamic banks and for the Islamic financial system.

Islamic banks are using both asset side liquidity management and liabilities side liquidity management strategies. Inter-bank placements based on *murābahah* and commodity *murābahah* are most common instruments. In addition to these, Islamic banks have instituted (i) Investment risk reserves and (ii) Profit Equalization reserves that help smooth out the payments to the depositors, hence avoid deposit shifting and control liquidity risk. However, there are arguments for and against this practice.

Within the Islamic banks the responsibility of monitoring the liquidity does not necessarily reside with one section but several departments are involved. However,

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19 An analysis of Sharī'ah legitimacy of such guarantees would be interesting question in itself but this is beyond the scope of the present paper.

increasingly the Chief Risk Officer is getting responsible for liquidity risk management in many banks. The other departments having liquidity risk management responsibilities may include asset-liability-management units, and treasury department.

Various opinion surveys indicate that the Islamic banks do not think that regulators' are less inclined to support them in liquidity risk management. Rather, they consider the unavailability of Islamic money market instruments or the less developed state of such money markets as the major constraint for their liquidity management. This is followed by the constraints imposed by the legal environment and unavailability of Lender of Last Resort facility to them.

Securitization of own assets is so far relatively less among Islamic banks. Only few large banks have issued *ṣukūk* to securitize their own assets for liquidity management. Islamic banks are usually coming in as arranger and facilitator in issuance of *ṣukūk* of other entities and hold these certificates for liquidity management purposes.

#### **4. Issues in Liquidity Management of Islamic Banks**

The above analysis has shown that the liquidity structure of Islamic banks have been changing towards lesser level of liquid assets and increasing maturity gap in the short-term assets and liabilities. These changes have implications for increased liquidity risk faced by Islamic banks. These developments call for a review of liquidity management practices and policies at all levels; i.e., by the individual banks, their regulators, and financial sector policy makers. The situation also calls for creating appropriate instruments, mechanisms, and institutions for efficient liquidity management appropriate for Islamic finance philosophy. The recent global financial crisis has also provided an experience of abrupt liquidity shortages to Islamic banks and the difficulties encountered due to unavailability of suitable infrastructure for providing liquidity to them. Below we highlight some challenges in liquidity management faced by Islamic banks and comment on some proposed solutions with a view to provide future direction.

#### *4.1. Issues in Liquidity Management Instruments and Infrastructure*

##### Inter-bank market

Islamic inter-bank markets based on *muḍārabah* placement of funds or on the basis of *wakālah* (agency contract) exist but they are less developed. The previous sections have shown that liquidity ratios across countries vary considerably (see Figure-1). Thus there is a potential to create cross-border inter-bank placement market to manage liquidity. However, such market has so far not emerged because there exists restrictions on cross boarder movement of capital in many countries and the costs of such transactions are high due to various reasons including the exchange rate risks.

Domestic inter-bank market among Islamic banks exists only in those countries where multiple Islamic banks exist and the variance of liquidity across these banks is high. However, in many countries Islamic banks are very few and this situation does not allow the possibility of inter-bank placements among them. Moreover, during any event of macro economic significance the liquidity positions of Islamic banks start moving in correlated manner, as experienced during the global financial crisis, then this market virtually disappears. These are some limitations and constraints on the development of active domestic inter-bank markets.

##### Commodity *murābahah*

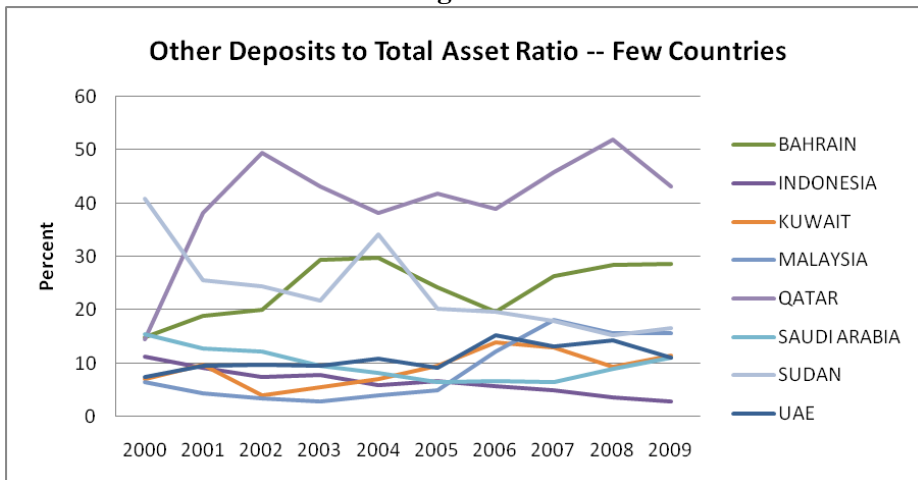
Another solution that has been used, for quite some time now, is the use of commodity *murābahah* to manage short-term liquidity. Such transactions are carried out by large Islamic banks through international metals and commodities markets. In some countries such markets have become also locally available. A liquidity surplus bank can use commodity *murābahah* to buy metal from one party in the international commodity market by making spot payment and sell it to another party on deferred payment basis with a marked-up price. Similarly, temporary liquidity shortage can be made up by buying the commodity on deferred payment basis on mark-up, and selling it in the spot market at going price to get cash. There are Shari'ah as well as public policy issues in using such methods on system-wide level. Commodity *murābahah* does not tie the mark-up to economic value addition as commodity bought and sold is neither intended for consumption nor for further production by the transacting parties. When practiced on large scale, it breaks the much needed link between the financial and the real economic sectors.



However, the use of commodity *murābahah* has now transcended from its use for short-term management of small liquidity gaps to become a funding source or an instrument to raise funds for the banks. This situation not only creates a dichotomy between the real and financial sectors but also increases the systemic risk in Islamic banking sector. The matter therefore calls for a regulatory intervention.

Data on *murābahah* on the liabilities side of the Islamic banks are not available for all banks in the sample. However, it is possible to create its good proxy by calculating the size of ‘deposits due to other creditors’ which include deposits due to banks and other financial institutions that are mostly *murābahah* and fixed obligation deposits.<sup>20</sup> The Table-5 shows the ratio of ‘deposits due to other creditors’ to ‘total assets’ for average Islamic banks in different regions. The same is represented in Figure-9 for some selected countries. This ratio has been rising until 2008 and in many countries it constitutes a substantial portion of total assets (from 15 to 30 percent). This development calls for regulatory intervention. Commodity *murābahah* should not be used as fund raising source, but only as liquidity management tool. This also implies only moderate use of commodity *murābahah*. The regulators should specify upper limit for its use. Benchmarking for this purpose can be done using bank level data in each jurisdiction and at the global level.

**Figure-9**



<sup>20</sup> In this paper ‘deposits due to other customers’ is obtained by using the accounting identity: Assets – Equity – Customer Deposits = Deposits due to Other Customers.

**Table-5**  
**Deposits Due to Other Creditors as Proportion of Total Assets (Percent)**

COUNTRY AVERAGES	BAHRAIN	INDONESIA	KUWAIT	MALAYSIA	QATAR	SAUDI ARABIA	SUDAN	UAE
2000	14.90313	11.30308	7.111149	6.442273	14.40714	15.53766	40.78868	7.504963
2001	18.90095	9.167814	9.791766	4.357644	38.16655	12.90474	25.46221	9.625743
2002	20.1303	7.466366	4.004657	3.369744	49.30553	12.32315	24.49502	9.864709
2003	29.4711	7.842027	5.457043	2.786637	43.17153	9.471009	21.7	9.622013
2004	29.8591	5.952651	7.061392	3.923051	38.08775	8.273096	34.08317	10.84074
2005	24.31076	6.586518	9.612413	4.882895	41.81519	6.457849	20.17907	9.119679
2006	19.70334	5.727467	13.95198	12.30084	38.85201	6.720875	19.61846	15.27284
2007	26.36012	4.885499	12.92624	18.20989	45.82013	6.51784	17.87812	13.26485
2008	28.54338	3.570015	9.288876	15.68579	51.88143	8.937748	15.25784	14.31009
2009	28.63433	2.790146	11.5045	15.61897	43.08906	11.18634	16.60054	11.16435

Source: Author's calculations based on IBIS data.

### *Ṣukūk*

There is also a dearth of market based Sharī'ah compliant instruments for liquidity management of Islamic banks. This dearth is both in terms of number of instruments and available volume. This is not new but has been a long standing situation in Islamic banking. However, some countries have experimented with creation of various capital market and shorter-term products. These efforts so far have shown limited success. For example, the Government Investment Certificates of Sudan and *salam* based *ṣukūk* Bahrain. In the former case the limited number of assets available for securitization was the issue, while in the later case the issuance of *ṣukūk* was not for any direct economic activity and that the instrument was not tradable in the secondary market. Pakistan, Indonesia and Turkey have also introduced *ṣukūk* for liquidity management in domestic markets, however they are still small in number and volume. All these experiences should be carefully evaluated to come up with better and sound instruments for liquidity management.

It is generally believed that availability of *ṣukūk* markets can help in liquidity management. However, the shortage of short-term *ṣukūk* and insufficient volume of *ṣukūk* in the market are also considered as main hindrances in liquidity management. It is thought that issuance of *ṣukūk* in larger volume and in many tenors will result in the creation of an Islamic benchmark rate which can serve as an alternate to LIBOR for pricing of fixed return assets and inter-bank financing. However, the issuance of more *ṣukūk* will not necessarily create a new '*ṣukūk* yield curve' if the *ṣukūk* pricing remains tied to LIBOR. In this case the benchmark

created will not be an alternate but only another reflection of LIBOR. To make true 'şukūk yield curve' it is important to increase the number of *project specific sovereign şukūk*, issue them against diversified economic projects, and price them according to the economic realities of those projects and economic sectors. A benchmark created on the basis of such *şukūk* will then reflect the real economy's rate of return.

The use of project specific *şukūk* as instruments of liquidity management is indeed superior to the use of commodity *murābaḥah* for this purpose because project specific *şukūk* are more tied to underlying economic activity than commodity *murābaḥah*.

#### 4.2. Issues in Regulatory Framework for Liquidity Risk Management

Proper guidelines need to be developed on liquidity management for Islamic banks. These guidelines can be 'principles based' in the first stage in order to encourage and develop a liquidity risk management culture. However, sooner concrete measures from national level regulators will also be needed supported by quantitative measures of liquidity risk and their enforcement.

Liquidity risk is generated from various sources and different risks culminate to it. Therefore, an approach for overall risk management is needed to contain the liquidity risk. However, the primary focus of the regulatory efforts for liquidity risk management is to create and meet certain liquidity ratios, which takes the focus of bank managers away from the real issue to just meeting those ratio requirements. Ideal regulatory measures should not only look at risk in holistic manner but should also account for banks' specific characteristics as well as more generalized ratios and measures for liquidity risk management geared towards systemic stability. The principles of Islamic finance such as prohibition of interest and avoidance of *gharar*; rules of trade such as prohibition of sale without ownership, and emphasis on linking finance and returns with real economy not only control the undue credit expansion and debt accumulation but also bring liquidity and liquidity risk management to the attention of financial institutions.

Further research is needed to find the drivers of liquidity risk in Islamic banking sector and how different it is from conventional banking sector. For example, whether, equity base, asset size, the proportion of *murābaḥah* in total assets or liabilities and the size of deposits have any relation with liquidity risk. To what extent existence of regulatory rules for liquidity risk management contribute to

reduction in liquidity risk? Can a system-wide index of liquidity risk for Islamic banking be created? All these form important questions for research.

#### *4.3. Importance of Principles of Islamic Finance in Liquidity Risk Management*

At this juncture it is also important to emphasise the role of Islamic principles of finance and trade. These principles such as prohibition of interest, avoidance of *gharar*; the other simple principles such as ‘do not sell that you do not own’, prohibition of trade of debts etc, make risk management, including the liquidity risk management, endogenous to the system. Then only little support is needed from external regulations to discipline the violators.

#### *4.4. Out of the Box Thinking*

Out of the box thinking is needed to come up with solutions. Researchers and policy makers need not confine their thinking within the present model of commercial banking and the set-up of the existing financial sector. Alternative financial institutional structure can be envisaged in which banks create a series of deposit pools instead of a common pool. Each deposit pool is for different maturity and duration and used for investments accordingly. Such arrangement minimizes liquidity risk for the banks, and provides better justice or fair treatment to the depositors whose money the banks use. One such proposal is eluded to in Tahir (2006). Another possibility is to create interbank placement arrangement through Unrestricted *Wakālah* on segregated asset pools. The concept of fund placement through *Wakālah* arrangement has already come into practice. The advantage of *Wakālah* over commodity *murābahah* is that it does not necessitate sale and repurchase. IIFM is working on standardized documentation of Unrestricted *Wakālah* contracts (see Alvi 2011).

### **5. Conclusions**

The business model of Islamic banking is changing over the time and moving in a direction where it is acquiring more liquidity risk. The three measures of liquidity risk used in this paper point to this conclusion. A number of factors including competition with conventional banks can be cited as the reason for this situation. However, such investigation can form the agenda for another research.

Better approach to risk management is not to treat only the symptoms but to acquire understanding of the underlying causes where the corrections are needed. This requires risk management of banks across their business lines, since liquidity

risk may be emanating from some fundamental causes which if corrected will alleviate the problem.

Think and work for systemic changes that will facilitate implementation of Islamic principles of finance. Many problems of liquidity risk will be address through this approach. Still proper management of liquidity risk and regulatory oversight will remain important. In this regard the regulations should look at liquidity risk in combination with capital regulations and aggregate debt of the economy and of the financial sector. These aspects are altogether missing in the current regulatory thinking.

There were some good proposals put forward by academia and regulators in the aftermath of the global financial crisis. These were much closer to the principles of Islamic economics and finance. However, those proposals were not given their due weight in the reform efforts taken up by the Basel Committee and international forums like G-20. The approach taken is to tweak and fine tune the existing framework which is politically easy but does not address the fundamental problems which remain at the heart of the crisis. Islamic finance practitioners, researchers and regulators have to shoulder this responsibility to make a change in the global financial system.

## Appendix-1

### Basel III on Liquidity Risk

The financial crisis highlighted the lack of sound liquidity risk management at financial institutions and the need to address systemic liquidity risk—the risk that multiple institutions may face simultaneous difficulties in rolling over their short-term debts or in obtaining new short-term funding through widespread dislocations of money and capital markets. IMF Global Financial Stability Report (GSFR) 2011 takes the view that liquidity risk can materialize in two basic forms:

- Market liquidity risk, which is the risk that a firm will not be able to sell an asset quickly without materially affecting its price;<sup>21</sup> and
- Funding liquidity risk, which is the risk that a firm will not be able to meet expected cash flow requirements (future and current) by raising funds on short notice.

Under Basel III, individual banks will have to maintain higher and better quality liquid assets and to better manage their liquidity risk. However, because they target only individual banks, the Basel III liquidity rules can play only a limited role in addressing systemic liquidity risk concerns. Larger liquidity buffers at each bank should lower the risk that multiple institutions will simultaneously face liquidity shortfalls; but the Basel III rules do not address the additional risk of such simultaneous shortfalls arising out of the interconnectedness of various institutions across a host of financial markets.

Basel III establishes two liquidity standards—a liquidity coverage ratio (LCR) and a net stable funding ratio (NSFR) to be introduced after an observation period and further refinements. Principles for liquidity risk management existed before the crisis, but these rules represent the first time that quantitative standards for liquidity risk have been set at a global level.<sup>22</sup>

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21 Market liquidity can also be defined as the difference between the transaction price and the fundamental value of a security (Brunnermeier and Pedersen, 2009)

22 The latest version of the framework was published in December 2010. An observation period will precede official implementation of the ratios as a minimum standard. In both cases, any revisions to the factors will be finalized one and a half years before their implementation, which will be on 1 January 2015 for the LCR and 1 January 2018 for the NSFR

The LCR aims to improve a bank's ability to withstand a month-long period of liquidity stress as severe as that seen in the 2007-08 financial crisis. The LCR is defined as the "stock of high-quality liquid assets" divided by a measure of a bank's "net cash outflows over a 30-day time period". The resulting ratio should be at least 100 percent.

The NSFR aims to encourage more medium and long-term funding of the assets and activities of the bank, including off-balance sheet exposures as well as capital market activities, and thereby reduce the extent of maturity mismatch at the bank. In theory, this would lower a bank's probability of liquidity runs and associated default. The ratio is defined as a bank's available stable funding (ASF) divided by its required stable funding (RSF) and must be greater than 100 percent.

### **Proposed Measurement Methods of Systemic Liquidity Risk**

Three measurement methods, which are complementary to the Basel III liquidity standards, are proposed and expected to accomplish two goals: (1) measure the extent to which an institution contributes to systemic liquidity risk; and (2) use this to indirectly price the liquidity assistance that an institution would receive from a central bank. Proper pricing of this assistance would help lower the scale of liquidity support warranted by a central bank in times of stress.

The methods are (1) a systemic liquidity risk index (SLRI), that is, a market-based index of systemic liquidity based on violations of common arbitrage relationships; (2) a systemic risk-adjusted liquidity (SRL) model, based on a combination of balance sheet and market data and on options pricing concepts of a financial institution, to calculate the joint probability of simultaneous liquidity shortfalls and the marginal contribution of a financial institution to systemic liquidity risk; and (3) a macro stress –testing model to gauge the effects of an adverse macroeconomic or financial environment on the solvency of multiple institutions and in turn on systemic liquidity risk. Details of the proposed methodologies are depicted in the table below.

### Main Features of the Proposed Methodologies

Features	Systemic Liquidity Risk Index (SLRI)	Systemic Risk-adjusted Liquidity (SRL) Model	Stress-testing (ST) Systemic Liquidity Risk
Indication of systemic liquidity risk	Sharp declines in the SLRI.	Joint probability that firms will experience a funding shortfall simultaneously (i.e., all risk-adjusted net stable funding ratios (NSFRs) fall below 1 at the same time).	Probability that a given number of banks end stress test with negative net cash flow.
Dimension	Time-series and cross-sectional	Time-series and cross-sectional	Time-series and cross-sectional
Macroprudential tools	Insurance premia used to assess institutions for their exposure to systemic liquidity risk.	Price-based macroprudential insurance premia and/or capital surcharge—used for costing contribution of an institution to systemic liquidity risk.	Capital surcharge used to minimize the probability of triggering a liquidity run for a bank.
Modeling technique	Exploits breakdowns of arbitrage relations, signaling market participant's difficulties in obtaining liquidity. Uses principal components analysis.	Uses advanced option pricing to convert an accounting measure of liquidity risk (NSFR) into a risk-adjusted measure of liquidity risk at market prices, and, thus, is forward-looking by definition.	Derives banks' net cash flows as the result of a stress test. Uses Monte Carlo simulation, network analysis, valuation equations for bank positions, and assumptions about a bank creditors' funding withdrawal response to solvency concerns.
Stochastic or deterministic assessment of liquidity risk	Stochastic, based on bank's equity volatility associated with the SLRI.	Stochastic, based on the exposure to funding shocks, which takes into account the joint asset-liability dynamics in response to changes in market rates.	Stochastic, based on banks' probability of default and bank creditors' response to solvency concerns.
Market/Transaction based	Market-based.	Market-based.	On- and off-balance-sheet-transaction based.
Treatment of funding and market liquidity risks	Indirectly. The SLRI is used to measure heightened market and funding liquidity risks.	Market and funding risks are embedded in equity prices, funding rates, and in their volatility.	Explicit modeling of funding and market liquidity risks using behavior observed during the recent crisis.
Treatment of solvency-liquidity feedbacks	Attempts to isolate counterparty risk to create a clean measure of liquidity risk.	There is no explicit treatment of the impact of solvency risk on liquidity risk. However, the derived risk-adjusted NSFR embeds a recognition that banks are vulnerable to solvency risks.	Integrates solvency and liquidity risks explicitly as well as second round feedback between them.
Treatment of channels of systemic risk	Not modeled directly.	Estimates the non-linear, non-parametric dependence structure between sample firms so linkages are endogenous to the model and change dynamically.	Captures institutions' common sources of asset deterioration—including price spirals driven by asset fire sales, network effects, and contagion.
Ease of computation	Econometrically simple and easy to compute.	Econometrically complex and time consuming.	Econometrically complex and time consuming.
Data requirements	Based on publicly available market data. Can be applied to any institution and system with publicly traded securities. No use of supervisory data.	Minimal use of supervisory data. Approach relies on pre-defined prudential specification of liquidity risk (e.g., NSFR) to assess the impact of maturity mismatches but can be directly linked to non-diversifiable liquidity risk, such as the SLRI.	Can be applied to any institution/system, even those that are not publicly traded. Requires detailed supervisory data, including data to assess underlying credit risks of institution assets.

Source: IMF Global Financial Stability Report (2011)



## Appendix - 2

### Data Description

Data for Islamic Banks is obtained from “Islamic Banks Information System” (IBIS) provided by Islamic Research and Training Institute. The IBIS is available on-line at [www.ibisonline.net](http://www.ibisonline.net)

We used data from 61 Islamic Banks from 18 countries for the period 2000 to 2009. However, due to missing values in some years for some banks or because of new banks coming into existence in some countries the sample has to be adjusted accordingly. Hence it is unbalanced dynamic sample. Following table shows the distribution of our sample coverage by showing actual number of Islamic banks covered in each country by each year. In total 524 data points were used for analysis.

Description of Data: Number of Islamic Banks Covered by Country and Year											
Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total Data Points
Algeria	1	1	1	1	1	1	1	1	1	1	10
Bahrain	7	8	9	8	9	11	12	11	11	10	96
Bangladesh	2	2	2	2	2	2	2	2	2	2	20
Egypt	2	2	2	2	2	2	2	2	2	2	20
Indonesia	2	2	2	2	2	2	2	2	2	2	20
Jordan	2	2	2	2	2	2	2	2	2	2	20
Kuwait	2	2	2	2	2	2	2	2	2	2	20
Malaysia	3	3	3	3	3	4	3	3	3	3	31
Pakistan	2	2	2	1	3	3	3	4	4	3	27
Palestine	1	1	1	1	1	1	1	1	1	1	10
Qatar	3	3	3	3	3	3	3	3	3	3	30
Saudi Arabia	2	2	2	2	2	2	2	2	2	2	20
South Africa	1	1	1	1	1	1	1	1	1	1	10
Sudan	5	8	8	10	6	9	10	9	9	7	81
Tunisia	1	1	1	1	1	1	1	1	1	1	10
Turkey	3	3	3	3	3	4	4	4	4	4	35
UAE	3	3	3	3	4	4	4	5	5	5	39
Yemen	2	2	3	3	3	3	2	3	2	2	25
<b>Total Banks</b>	<b>44</b>	<b>48</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>57</b>	<b>57</b>	<b>58</b>	<b>57</b>	<b>53</b>	<b>524</b>

The full set of data was not available for all variables, as there can be missing observations. When this occurred the sample is adjusted suitably.

The variables used for this study include: total assets, liquid assets, cash & cash equivalents, total financing, total deposits, maturity of assets, maturity of liabilities.

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