

Islamic Banks and the Maturity Mismatch Exposure Evidence from the GCC Region

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Abstract: The global financial crisis of 2007-2008 pinpointed, once again, to a well-established fact about a major source that feed the systemic risk of the prevailing interest-based conventional financial system. It is the maturity mismatch practice; borrowing short and lending long. This practice attributed significantly to the fragility of not only the institutions involved but the whole system. Given the envisaged theoretical “aspired business model” of Islamic Banks (IBs) as a “special type of intermediaries” that should have matching or quasi-matching of the maturities of the assets and liabilities. This is because of the asset-backing principle that ties financing to the various activities of the real economy. Hence, it became of prime importance to assess the behavior of the “practiced business model” of this type of intermediaries. The paper utilizes quantitative methodologies such as the net liquidity criterion and the maturity mismatch curve to examine the behavior of IBs, with regard maturity transformation practice, in the pre- and post-crisis years in the GCC region. We found from this paper that the Islamic banks in the GCC region tended to add liquidity to rest of the economy by holding liabilities greater than monetary assets. The result indicates that all Islamic banks in the GCC region over the period 2000-2012 are performing the function of liquidity creation.

Key words: Islamic banking; liquidity risk; maturity mismatch; GCC region

JEL codes: G21

1. Introduction

Maturity mismatch, the gap between maturities of assets and liabilities is one of the intrinsic features of the modern banking system. Some claim that the maturity mismatch has a benefit of satisfying investors' interim liquidity needs, therefore it needs to be supported by the authorities (Diamond & Dybvig, 1983). Others show that this mismatch helps discipline bank managers (Calomiris & Kahn, 1991). It is often claimed, however, that such gap is one of the crucial fragilities of the financial system and excessive maturity mismatch was one of the reasons of the financial crises (Viñals et al., 2010). Additionally, Brunnermeier & Oehmke (2013) show that banks and their debt-holders are subject to incentives to shorten liability maturities and thus increase maturity mismatch beyond reasonable levels. Kotlikoff (2010) argues that government supported maturity mismatch is not only a serious threat to the economy, but it is simply unsustainable.

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Few companies or financial institutions have perfect matches between their assets and liabilities. In particular, the mismatch between the maturities of banks' deposits and loans makes banks susceptible to bank runs. On the other hand, "controlled" mismatch, such as between short-term deposits and somewhat longer-term, higher-interest loans to customers is central to many financial institutions' business model. Asset-liability mismatches can be controlled, mitigated or hedged.

Lacker J. M. (2014), the president of Federal Reserve Bank of Richmond mentions that a significant amount of maturity transformation has occurred outside traditional banking in the shadow banking sector, via financial products such as asset-backed commercial paper and repurchase agreements, or repos. Economic models generally assume that maturity transformation is socially valuable, a way to bring together savers and borrowers in order to fund useful economic activity. But maturity transformation can be risky: During the 2007-2008 financial crisis, the firms that were most stressed were those that relied on short-term, whole sale funding to finance portfolios of longer-term assets such as mortgage-backed securities.

The liquidity risk management is one of the most important challenges for Islamic banks concerning to the prohibition of interest-based instruments. Sources of refinancing over an interbank market, a lender of last resort or over an asset market are very limited. In such, they functions of an intermediary which implicate also liquidity transformation.

The deposit funding character causes an imbalance in the maturity of assets and liabilities and hinders Islamic banks from doing liquidity transformation like Western banks. Due to this imbalance, short-term fixed-income contracts usually dominate the product portfolio with about 80%, although profit and loss sharing (equity-based) is a main principle of the *Shari'ah*. Thus, the product portfolio exhibits a low diversification and a low risk structure, resulting also from weak legal, institutional and financial conditions, leading to high degrees of asymmetric information, opportunistic behavior and liquidity constraints as well as to higher capital costs which is also due to market segmentation.

This paper aims at examining maturity mismatch levels in Islamic banks in the GCC region. In order to derive some theoretical and practical implications, the paper addresses the following questions:

- Do Islamic Banks perform maturity transformation function?
- Can Islamic Banks be considered as liquidity distributors rather than creators?

The remainder paper is organized as follows: section 2 reviews the literature on Islamic and conventional banks maturities issues. Section 3 explains the asset-liability imbalance and maturity mismatch risks. Section 4 provides the data used in the empirical study. Section 5 contains the examination of the maturity mismatch of Islamic banks in the GCC region over the period from 2000 to 2012 and the finding results of the empirical study and section 6 conclude the paper.

2. Literature Review

This section reviews the literature on banks maturities issues. In the side of conventional banks, Rakhe P. B. (2012) mentions that a liquidity crisis may arise owing to the pattern of maturity profile of assets and liabilities; the study showed that over a period of time the financing of long term assets by short term liabilities has increased in the Indian banking sector leading to assets liabilities mismatch positive gap. Kochanski B. (2013) found that the maturity gap in Polish banking over the period 1996 to 2012 increased significantly and growing maturity mismatch in a particular bank may result in higher credit, liquidity, legal model, interest rate and other risks.

In the side of Islamic banks, Belouafi A. (1993) in his PhD thesis found that Islamic banks are performing the function of liquidity destruction rather than liquidity creation which he interpreted as those Islamic banks are borrowing on the aggregate medium to lend on the aggregate short and medium. Ismal R. (2010) also in his PhD thesis suggests that Islamic banking needs to develop its liquidity risk management environment as a practice of modern banking standards to ensure safe operations and maintaining business operations; he noted that the *Shariah* has provided a variety of methods and approaches for Islamic banking in managing maturity mismatch risk, considering barriers and challenges to be faced. In practice, he also found that in reducing liquidity risk, Islamic banking needs to develop an organizational approach and liquidity instruments from the perspective of the Islamic financial market and a regulatory framework in meeting ordinary and extraordinary liquidity needs.

Alman M. & Oehler A. (2012) state that liquidity transformation is affected negatively by the regulation of Islamic banks; also he found that liquidity transformation of Islamic banks is strongly positively determined by bank size as well as by loan portfolio risk taking. Hassan M. K. et al. (2013) mention that the both conventional and Islamic banks in OIC over the period 1997 to 2010 have negative short term gaps and positive long term gaps, which indicates that Islamic banks use short term deposits and funding to finance long term loans. Salman S. A. (2012) proposed that Islamic banking needs to create new instrument and infrastructure for liquidity risk and new approaches to manage liquidity risk.

Sulaiman A. (2013) found that macroeconomic control variables clearly influence the behavior of Islamic banking in managing liquidity, Islamic banking needs to determine the purpose and goals of the loan application to be consistent with the “bank’s financing policy” so as not to cause any problem in the future, Islamic banking should ensure adequate, stable and a competitive rate of return promised from time to time for the supply of bank deposits, the unstable deposits will affect the activities of Islamic financing of a bank and maturity period of short term deposits and long-term funding should also be reduced through appropriate measures.

Sabri M. (2013) mention that Islamic banks are obliged to have in place effective techniques, procedures and highly industrialized liquidity risk-management practices via appointment of a sufficiently qualified BOD, senior management and other personnel, efficient accessibility to adequate financial instruments is also significant for Islamic banks to meet their liquidity needs in a timely manner, and innovative approaches are essential in terms of the engineering of new financial instruments and the development of comprehensive regulations and policies.

3. Asset-liability Imbalance and Maturity Mismatch Risks

The two main causes of liquidity risk are asset-liability imbalance and maturity mismatch which can happen because of two conditions (Helmen et al., 1994): (a) liquid assets are available in larger portions than volatile liabilities, a scenario known as liquidity gap, or (b) the predicted amount of funds needed on the asset side is higher than the predicted amount of funds available on the liability side, a condition known as liquidity need. Identifying and mitigating these two causes of liquidity risk may eliminate: (1) the funding liquidity risk when the depositors withdraw their short-term deposits and (2) the market liquidity risk when there is a disruption in the financial markets which makes normally-liquid assets illiquid (Ismal R., 2010).

3.1 Factors Triggering Asset-liability Imbalance and Maturity Mismatch Risks

The first factor is when depositors prefer placing their funds in the short-term tenor of deposits. The banks then use some of the funds to finance long-term investment projects. The asset-liability imbalance potentially occurs because the short-term tenors of deposits are liquid, while the long-term investments are illiquid. When the

depositors execute their short-term tenors of deposits, the banks may have to terminate their long-term investments in order to free up liquidity to meet the immediate demand. Indeed, the excessive reliance on short-term debts leaves the banks vulnerable to the occurrence of financial distress (Beakley H. & Cowan K., 2004).

The second factor is the combination of a high deposit rate to attract more funds from depositors and the high credit rate imposed on entrepreneurs. However, when a business faces a downturn, the high credit rate reduces the entrepreneur's ability to repay the interest and principal of the debts and leaves banks in a difficult position to repay the depositor's deposits. If banks continue not to have access to funds from the money market, this asset-liability imbalance problem could trigger a liquidity run.

The third factor occurs if big companies become the dominant depositors and locate funds in the short-term tenor of deposits. Banks would need immediate liquidity if the liquidity behavior of big companies is uncertain and unpredictable and these companies redeem their deposits without prior notice or immediately at the same time.

The final factor is an asymmetric or unequal distribution of information among depositors, banks, borrowers, and regulators. For example, where there is hidden information among parties involved in the bank's financing activities, or unorganized liquidity behaviors between depositors and banks, it is difficult to match the assets and liabilities (Greenbaum S. I. & Thakor A. V., 2007).

3.2 Related Risks Following Asset-liability Imbalance and Maturity Mismatch Risks

When the asset-liability imbalance and maturity mismatch risks take place, there may be related risks following these two risks. This might happen if the banks fail to handle asset-liability imbalance and maturity mismatch risks. Such risks, amongst others, bare insolvency risk, government takeover (bailout) risk and reputation risk (Ismal R., 2010):

Insolvency risk	<ul style="list-style-type: none"> • Which is the inability of banks to fulfill their obligations to depositors, occurs if banks fail to manage liquidity risk by not having enough liquidity reserves, selling liquid assets, or borrowing from the money market. In particular, insolvency risk is the condition where the bank's liabilities exceed the bank's assets, causing a negative net worth in the bank's balance sheet.
Government Takeover Risk	<ul style="list-style-type: none"> • As evident from the global financial crisis of 2008-2009 and other similar large-scale economic conditions such as the Asian economic crisis of 1997, governments commonly act as the lender of last resort for banks. They provide emergency liquidity for banks which face liquidity distress or even take over defaulting banks to save the entire economy from the adverse impact of the banks' failures.
Reputation Risk	<ul style="list-style-type: none"> • The bank's failures to balance the asset and liability sides, manage the demand for liquidity, and mitigate the unexpected liquidity pressures can drop their reputation in the eyes of depositors and stakeholders. In severe cases and especially where the bank is a key driving force behind the economy, a low banking reputation may not only downgrade the function of banks as financial intermediaries but also impact the performance of the economy.

4. Dataset

Our empirical analysis is based on a sample of 133 observations consisting of an unbalanced panel of annual and report data of 12 Islamic banks in the GCC region over the period from 2000 to 2012. The choice of this time period has the advantage that it covers a cyclical downturn and upturn in world economics and that Islamic

banking experienced the strongest growth with annual rates of 20% on the average. Another important fact is that the restriction to this time period is due to data availability. The source of the bank data used for the empirical estimates is from *Zawya* data base and annual reports of Islamic banks.

Country	Name of banks	Annual observations
UAE	Abu Dhabi Islamic Bank	13
	Emirates Islamic Bank	10
	Sharjah Islamic Bank	11
	Dubai Islamic Bank	11
Qatar	Qatar Islamic Bank	10
	Qatar International Islamic Bank	11
Bahrain	Bahrain Islamic Bank	13
	Shamil Bank of Bahrain	12
Saudi Arabia	Al Rajhi Bank	12
	Bank Al Bilad	8
Kuwait	Kuwait Finance House	11
	Kuwait International Bank	11
Total	12	133

5. Examining the Maturity Mismatch of Islamic Banks in GCC Region

5.1 The Application of Niehans Notion

Niehans (1978) stated that a bank supplies the rest of the economy (Including other banks) with money if its monetary liabilities (checking deposits) exceed its monetary assets (currency reserves and demand deposits with other banks). In the reserve case the bank reduces the money supply in the rest of the economy.

$$\begin{aligned} \text{Maturity} &= \text{Highly Liquid Liabilities} - \text{Highly Liquid Assets} \\ \text{Maturity} &= \text{Current and Call Accounts} - \text{Cash and Reserve with other Banks} \end{aligned}$$

Table 1 Liquidity Distribution of the Most Highly Liquid Assets and Liabilities of 12 Islamic Banks in the GCC Region Over the Period 2000 to 2012

Years	Average of Current and call Accounts (CCA)	Average of Cash and reserve with other Banks (CROB)	CCA-CROB
2000	3401628	1843226	1558402
2001	3991324	1923234	2068090
2002	4690775	2017557	2673218
2003	5500678	2269017	3231661
2004	7169668	2666905	4502763
2005	13743505	2628114	11115391
2006	18526831	5039534	13487297
2007	24767909	6093406	18674503
2008	26021484	2670908	23350576
2009	23033177	4971519	18061658
2010	23809297	4773285	19036012
2011	24204306	5612424	18591882
2012	25599699	6541285	19058414

Source: Author's calculations using ZAWYA data and Annual reports of Islamic banks

In the above Table 1, it is clear that the Islamic banks in the GCC region tended to add liquidity to rest of the economy by holding liabilities greater than monetary assets. We note that there is an excess of liquidity in Islamic banks, and that the general trend of the surplus in liquidity is in evolution during the years of the study, but in the year 2009 where the record decline can be traced due to the global financial crisis, and can be explained by a decrease in the current deposits.

To make clearer we can present the liquidity distribution of the most highly liquid Assets and liabilities of 12 Islamic Banks in the GCC region over the period 2000 to 2012 in the Figure 1.

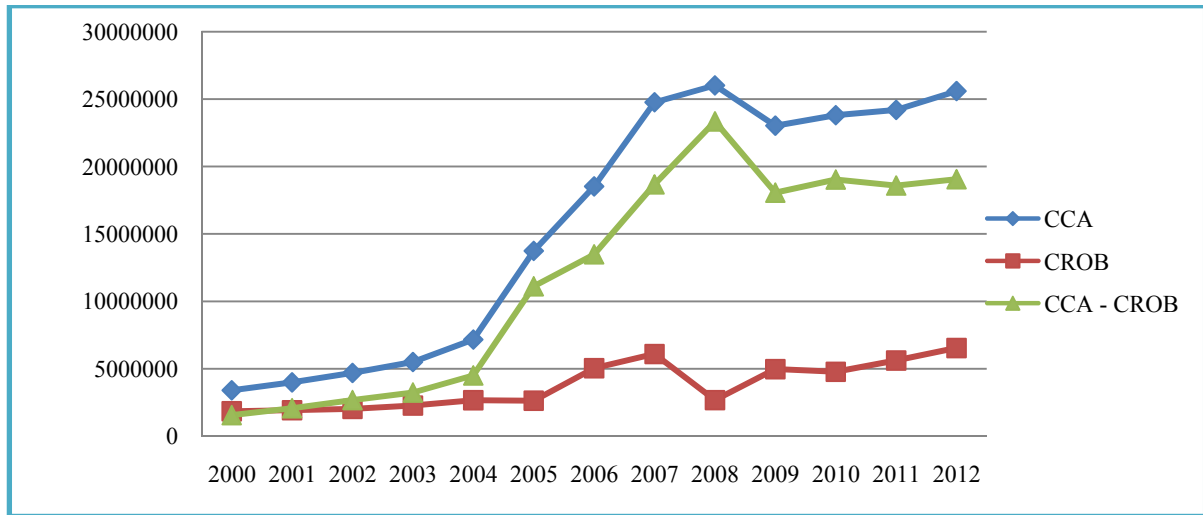


Figure 1 Maturity of Islamic Banks Application of Niehans' Notion 2000-2012

Source: Author's calculations using ZAWYA data and Annual reports of Islamic banks

In the above Table 1 and Figure 2, it is clear that the Islamic banks in the GCC region tended to add liquidity to rest of the economy by holding liabilities greater than monetary assets.

5.2 The Application of Net Liquidity Definition of Islamic Banks

This criterion was elaborated by Niehans & Hewson (1976) in examining the maturity transformation of Euro-Banks. This notion can be explained as follows: A bank accepts deposits of various maturities D_0, D_1, \dots, D_n ; subscripts indicate the maturity, with D_0 signifying checking deposits. The bank uses these deposits to make loans L_0, L_1, \dots, L_n (L_0 includes central bank reserves), subscripts refer to the same maturity classes as for deposits.

Net liquidity is given by the following formula:

$$NL = \sum_{i=0}^n \lambda_i D_i - \sum_{i=0}^n \lambda_i L_i = \sum_{i=0}^n \lambda_i (D_i - L_i)$$

Liquidity creation requires mismatched assets and liabilities in the sense that the bank borrows short to lend long. Under this definition three distinct cases exist:

- (a) Positive maturity transformation \implies Bank borrows short and lends long \implies
Money supply increased.
 - (b) Negative maturity transformation \implies Bank borrows long and lends short \implies
Money supply reduced.
 - (c) Zero maturity transformation \implies Assets are matched with liabilities
- In order to apply this criterion, assets and liabilities are classified as follows:

- Short-Term (ST): included in this category are assets and liabilities that have maturities less than one year (< 1 year maturity).
- Medium-Term (MT): included in this category are assets and liabilities that have maturities between one year and three years (1 year < maturity ≤ 3 years).
- Long-Term (LT): included in this category are assets and liabilities that have maturities more than three years (maturity > 3 years).

Table 2 Maturity Structure of Islamic Banks in the GCC Region over the Period 2000-2012

Banks	Short Term	Short Term%	Medium Term	Medium Term%	Long Term	Long Term%
Abu Dhabi Islamic Bank	3751149	40.54%	-974201.67	-29.72%	-384542.556	-10.82%
EmiratesIslamic Bank	2588222	63.90%	207342.33	-16.45%	-802311.333	-44.52%
Sharjah Islamic Bank	1680346	71.14%	-1214555.7	-60.73%	-128988.571	-10.41%
DubaiIslamic Bank	11005058	52.97%	-1257778.9	-29.62%	-3689756.14	-23.35%
Qatar Islamic Bank	3162493	56.73%	-1940126.3	-50.84%	-645924.333	-5.89%
Qatar International Islamic Bank	1088067	47.25%	-440931.71	-38.69%	-180975.857	-8.56%
BahrainIslamic Bank	253422.1	18.57%	285400	3.30%	-295498.889	-21.87%
Shamil Bank of Bahrain	344578.1	4.96%	-132751.63	-14.28%	-48261.5	9.32%
Al Rajhi Bank	24557947	80.02%	-4977339.1	-34.03%	-13262992.1	-45.99%
Bank Al Bilad	3926030	72.47%	-915214.25	-34.98%	-1317715.25	-37.49%
Kuwait Finance House	19656546	74.29%	-10704959	-53.51%	-3353481.29	-20.77%
Kuwait International Bank	3090272	49.04%	-128440.63	-48.29%	35082.625	-0.75%
Average	6258678	52.66%	-1849463.1	-33.99%	-2006280.43	-18.43%

Source: Author's calculations using ZAWYA data and Annual reports of Islamic banks

Through the above table we note that the short term maturity of Islamic banks during the period 2000-2012 is positive, which it can be explained by the fact that short-term liabilities greater than the short-term assets, and this means that Islamic banks have excess liquidity in the short term. While we note that the medium and long maturity are negative which it can be explained by the fact that medium and long liabilities are less than the medium and long assets. This means that part of a long-term assets financed by sources of short-term funds and this is what leads to the problem of maturity mismatch, but to make sure it has to calculate the net liquidity criteria

To apply the net liquidity definition, after establishing the maturity class of assets and liabilities, one needs to know the liquidity coefficient related to each maturity class of assets and liabilities. Analysis of Islamic banks data in GCC region indicate that the operations of Islamic banks are dominated by short and medium term operations, the following liquidity coefficients are assigned arbitrary for each maturity class of assets and liabilities.

Maturity class	Liquidity coefficients
S.T	0.60
M.T	0.40
L.T	0.2

Applying the above coefficients to the maturity structure of Islamic banks in the GCC region produces the following results:

Table 3 Net Liquidity of Islamic Banks 2000-20012

Net Liquidity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average
Abu Dhabi Islamic Bank	12%	15%	10%	7%	15%	8%	7%	6%	11%	9%	8%	11%	12%	10%
EmiratesIslamic Bank	/	/	/	35%	28%	25%	19%	18%	13%	12%	13%	14%	15%	19%
Sharjah Islamic Bank	/	/	13%	12%	26%	17%	13%	14%	18%	16%	17%	13%	14%	16%
DubaiIslamic Bank	/	/	15%	15%	16%	15%	13%	14%	19%	11%	11%	12%	11%	14%
Qatar Islamic Bank	/	/	/	17%	15%	-8%	15%	17%	18%	13%	14%	16%	17%	13%
Qatar International Islamic Bank	/	/	11%	15%	16%	13%	6%	7%	10%	8%	7%	8%	10%	10%
BahrainIslamic Bank	6%	7%	10%	12%	-9%	20%	9%	9%	10%	6%	5%	8%	9%	8%
Shamil Bank of Bahrain	/	-19%	-21%	-16%	-6%	23%	8%	12%	10%	9%	9%	11%	12%	3%
Al Rajhi Bank	/	18%	18%	19%	21%	30%	32%	32%	31%	30%	28%	25%	27%	26%
Al BiladBank	/	/	/	/	/	16%	19%	22%	30%	26%	28%	24%	23%	24%
Kuwait Finance House	/	/	15%	20%	22%	21%	19%	18%	18%	13%	16%	14%	12%	17%
Kuwait International Bank	/	/	8%	12%	9%	10%	14%	13%	16%	16%	12%	13%	10%	12%
Average	9%	5%	9%	13%	14%	16%	15%	15%	17%	14%	14%	14%	14%	13%

Source: Author's calculations using ZAWYA data and Annual reports of Islamic banks

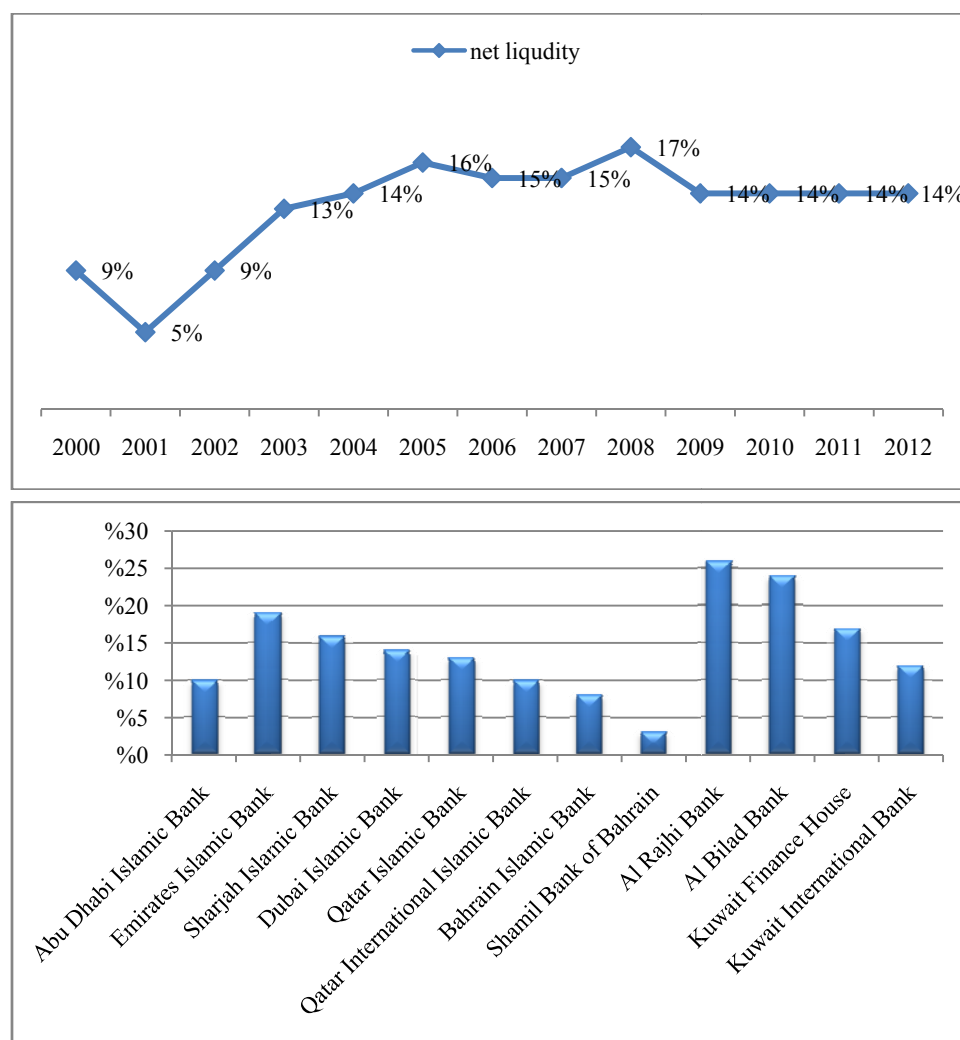


Figure 3 Net Liquidity of Islamic Banks 2000-2012

Source: Author's calculations using ZAWYA data and Annual reports of Islamic banks

Table 3 and Figure 3 represent Net liquidity for 12 Islamic banks from 6 countries during the period 2000-2012, where it is clear that Al Rajhi Bank, achieves the largest proportion in net liquidity at an average of (26%), while Shamil Bank of Bahrain achieve a smaller percentage of net liquidity at an average (3%), the Islamic banks combined under study have achieved an average net liquidity about (13%).

The result indicates that all Islamic banks in the GCC region are performing the function of liquidity creation, they adding the volume of money supply in circulation. The meaning of these results is that for every US Dollar of total deposits, liquidity creation amounts to 0.13 US Dollar. The above results for net liquidity may be interpreted as that Islamic Banks in the GCC region over the period 2000-2012 as that borrowing on the aggregate short and medium to lend long.

5.3 The Utilization of Lorenz Mismatch Curve for Islamic Banks

A graphical representation of wealth distribution developed by American economist Max Lorenz in 1905. On the graph, a straight diagonal line represents perfect equality of wealth distribution; the Lorenz curve lies beneath it, showing the reality of wealth distribution. The difference between the straight line and the curved line is the amount of inequality of wealth distribution, a figure described by the Gini coefficient.

In this study the curve is used to compare bank inequality distribution (maturity mismatch) between assets and liabilities of a bank. In order to construct this curve one should express the percentages of assets and liabilities in each maturity class as percentages of aggregate assets and liabilities, cumulating these percentages for both assets and liabilities and then plotting these cumulated percentages, (say assets on the vertical axis and liabilities on the horizontal axis), allows comparison of the resulting curve, which called the mismatch curve, with the diagonal which is the arithmetic mean relationship (perfect equality), each asset and liability class has the same degree of maturity. The larger the area between the mismatch curve and the diagonal, the more unequal is the distribution of assets relative to the distribution of liabilities. Within this context one can end up with one of the following three cases (Belouafi A., 1993):

- **Positive maturity transformation:** that is the bank on the aggregate is borrowing short to lend long. This is to be the case where the mismatch curve is concave downwards to the line of equality.
- **Negative maturity transformation:** that the bank on the aggregate is borrowing long to lend short. This is to be the case where the mismatch curve is concave upwards to the line of equality.
- **Mixed case:** that the curve can be a combination of the other two cases. This could arise where there is an excess of assets over liabilities at both short and long term maturities, in which case the mismatch curve would cross the equality line.

To construct the mismatch curve the cumulated percentage ratios of assets and liabilities for each maturity are plotted on the vertical and horizontal axes respectively.

Table 4 Average Cumulative of Assets and Liabilities of Islamic Banks 2000-20012

Assets	Liabilities	Equality Line
0%	0%	0%
78%	25%	33%
91%	73%	67%
100%	100%	100%

Source: Author's calculations

The mismatch curve for Islamic banks is plotted in the Figure 4:

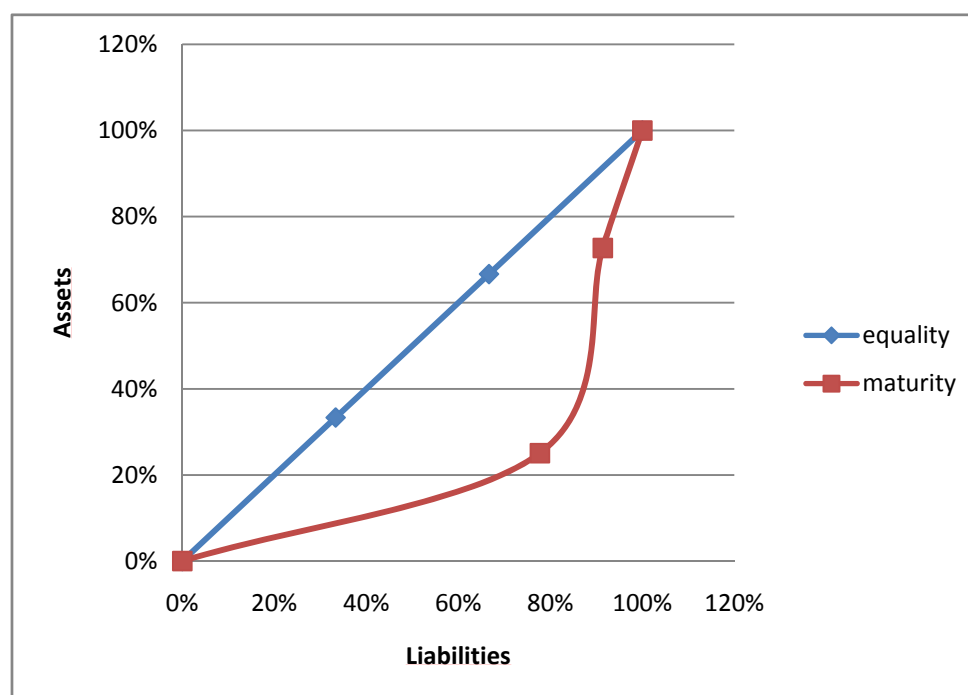


Figure 4 Lorenz Mismatch Curve of Islamic Banks in GCC Region from 2000-2012

Source: Author's calculations using ZAWYA data and Annual reports of Islamic banks

The general impression that can be gained from Figure 4 is that the maturity of Islamic banks in the GCC region over the period 2000-2012 falls in the first category (**Positive maturity transformation**). So we can conclude that Islamic banks on the aggregate is borrowing short to lend medium and long. This result support the findings of the previous sections, where it was found that the overall contribution of Islamic banks in the GCC region is liquidity creation rather than destruction.

6. Conclusion

In this paper we consider that one source of potential fragility in the banking system is the maturity mismatch. That became greater made up an increasing portion of bank assets while cash assets declined. However, we present evidence that equity markets perceived bank assets as having become effectively shorter term relative to liabilities during that time. Economists have long-recognized maturity mismatch as a source of fragility in modern financial systems. If market participants underestimated maturity mismatch — especially if it actually became more pronounced may be correct in calling the current crisis “one of wide-scale maturity mismatch.”

We can conclude from this paper that the Islamic banks in the GCC region tended to add liquidity to rest of the economy by holding liabilities greater than monetary assets, they adding the volume of money supply in circulation. The meaning of net liquidity is that for every one US Dollar of total deposits, liquidity creation amounts to 0.13 US Dollar. The above results for net liquidity may be interpreted as that Islamic Banks in the GCC region over the period 2000-2012 as that borrowing on the aggregate short to lend medium and long.

The maturity of Islamic banks in the GCC region over the period 2000-2012 falls in the first category (Positive maturity transformation). So we can conclude that the overall contribution of Islamic banks in the GCC region is liquidity creation rather than destruction.

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