

# Islamic Banks and the Maturity Mismatch Exposure

## Evidence from the GCC Region

Dr. Chaouki Bourakba (\*)

### Abstract

The global financial crisis of 2007-2008 pinpointed, once again, to a well-established fact about a major source that feeds 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. Historically, depository intermediaries have been the prime source for this exposure. However, the crisis identified shadow banking institutions as new players that have been heavily involved in the practice of maturity mismatching. In fact, few financial institutions have perfect matching between assets and liabilities; depository institutions in particular.

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. This paper aims at examining this issue 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?
- What will be the policy implications for such behavior?

The paper utilizes quantitative methodologies such as the net liquidity criterion and the maturity mismatch curve to examine the behavior of IBs, with regard to maturity transformation practice, in the pre- and post-crisis years in the GCC region.

**Key words:** Islamic banking, Islamic finance, financial crisis, liquidity risk, maturity transformation, maturity mismatch, GCC region.

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(\*) Assistant Professor, Faculty of Economics and Management, Al-Imam Muhammad Ibn Saud Islamic University, Riyadh, Saudi Arabia. E-mail: [chawki62000@yahoo.fr](mailto:chawki62000@yahoo.fr)

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### **Introduction:**

The maturity transformation role of banks generates funding liquidity risk. As banks' liabilities usually have shorter maturities than those of banks' assets, banks may have to repeatedly refinance their assets. This refinancing risk is larger the wider of the mismatch between assets' and liabilities' average maturities. In the run up to the global financial crisis, many banks were engaging in funding strategies that heavily relied on short-term funding (*Brunnermeier, 2009 and CGFS, 2010*) thus significantly increasing their exposure to funding liquidity risk. Nevertheless, this risk can be mitigated if banks hold a sufficiently large buffer of highly liquid and good quality assets, which they can easily use when it by unforeseen funding shocks.

In finance, an asset–liability mismatch occurs when the financial terms of an institution's assets and liabilities do not correspond. Several types of mismatches are possible. For example, a bank could have substantial long-term assets (such as fixed-rate mortgages) but short-term liabilities, such as deposits. This is sometimes called a maturity mismatch, which can be measured by the duration gap. Alternatively, a bank could have all of its liabilities as floating interest rate bonds, but assets in fixed rate instruments. Mismatches are handled by asset liability management.

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.

## Literature Review

Listed below were previous studies that have been done by other researchers relating to the subject of this paper :

**Table : List Literature Review**

No	Author s	Title	year	Main Findings
01	Rifki Ismal	The Management of Liquidity Risk in Islamic Banks: the case of Indonesia	2008	<ul style="list-style-type: none"> <li>• 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. Taking into account the characteristics.</li> <li>• The <i>Shariah</i> has provided a variety of methods and approaches for Islamic banking in managing liquidity risk, considering barriers and challenges to be faced.</li> <li>• 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.</li> </ul>
02	Salman Sayed Ali	State of liquidity management in Islamic financial institution	2012	<ul style="list-style-type: none"> <li>• Islamic banking needs to create new instrument and infrastructure for liquidity risk.</li> <li>• Proposes new approaches to manage liquidity risk.</li> </ul>
03		Liquidity Risk Management And Financial Performance In Malaysia: Empirical Evidence From Islamic Banks	2012	<ul style="list-style-type: none"> <li>• The financial crisis has little impact on the extent of liquidity risk in the Islamic banks.</li> <li>• the relationship between liquidity risk and financial performance is not always predicted by the conventional financial theory of "high risk-high return".</li> <li>• liquidity risk may lower ROA and ROE.</li> <li>• Liquidity management is difficult in Islamic banks due to the lack or limitation of practical instruments and the small number of participants on the money market Because most of the conventional liquidity tools are not according to <i>Shari'ah</i> Islamic banks sustain higher liquidity ratios compared to conventional banks.</li> <li>• the level of liquidity risk reporting is still at minimum.</li> </ul>
04	Ahmad Azam Sulaiman	How Islamic Banks of Malaysia Managing Liquidity? An Emphasis on Confronting Economic Cycles	2013	<ul style="list-style-type: none"> <li>• macroeconomic control variables clearly influence the behavior of Islamic banking in managing liquidity.</li> <li>• 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.</li> <li>• Islamic banking should ensure adequate, stable and a competitive rate of return promised from time to time for the supply of bank deposits.</li> <li>• Unstable deposits will affect the activities of Islamic financing of a bank.</li> <li>• Gap period of short term deposits and long-term funding should also be reduced through appropriate measures.</li> </ul>

05	Sabri Moham mad	Liquidity Risk Management in Islamic Banks: A Survey	2013	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Efficient accessibility to adequate financial instruments is also significant for Islamic banks to meet their liquidity needs in a timely manner.</li> <li>• Innovative approaches are essential in terms of the engineering of new financial instruments and the development of comprehensive regulations and policies.</li> </ul>
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## 1/Definition of Maturity Mismatch

In finance, an asset–liability mismatch occurs when the financial terms of an institution's assets and liabilities do not correspond. Several types of mismatches are possible, for example, a bank could have substantial long-term assets (such as fixed-rate mortgages) but short-term liabilities, such as deposits. This is sometimes called a maturity mismatch, which can be measured by the duration gap. Alternatively, a bank could have all of its liabilities as floating interest rate bonds, but assets in fixed rate instruments. Mismatches are handled by asset liability management.

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.

## 2/Methods used to estimate Maturity Mismatch

### 2-1- The Niehans notion

*Niehans*(1978) states 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.

**Maturity = Highly Liquid Assets - Highly Liquid Liabilities**

**Maturity =Cash and Reserve with other Banks- Current and Call Accounts**

### 2-2- The net liquidity criterion

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:

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

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

### 2-3- The Lorenz Curve

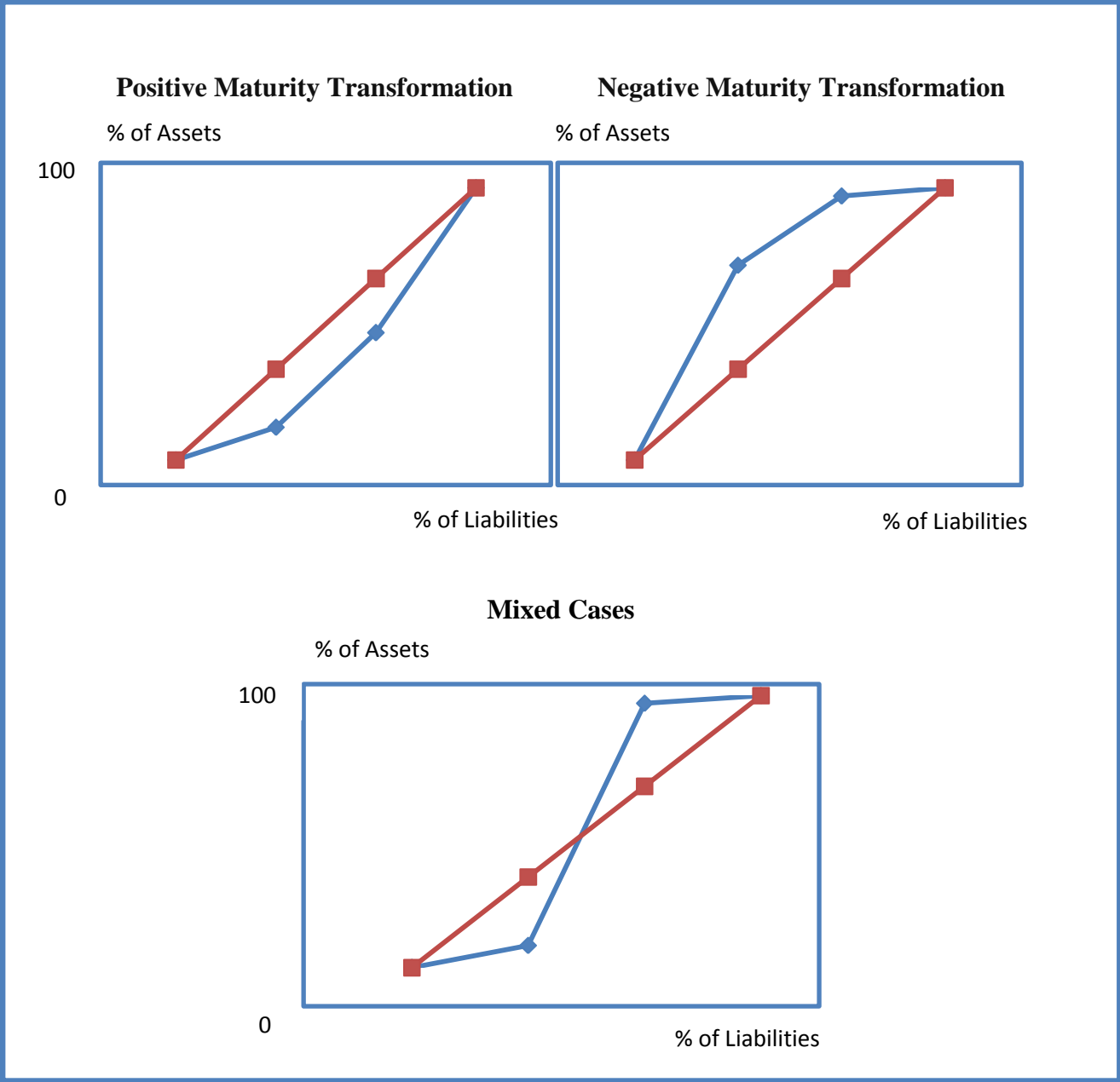
A graphical representation of wealth distribution developed by American economist Max Lorenz in 1905. On the graph, a straight diagonal line represents perfect equality of wealth distribution; the Lorenz curve lies beneath it, showing the reality of wealth distribution. The difference between the straight 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 transformation) 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:

- **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 upward to the line of equality.
- **Negative maturity transformation;** that the bank on the aggregate is borrowing to lend short. This is to be the case where the mismatch curve is concave downwards 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.

These three possible cases of maturity transformation are presented diagrammatically in Figure (01).

**Figure(01): Mismatch Curves for different types of maturity transformation**



### 3/ Examining the maturity transformation of Islamic Banks

#### 3-1- The application of Niehans notion

**Maturity = Highly Liquid Liabilities - Highly Liquid Assets**

**Maturity = Current and Call Accounts- Cash and Reserve with other Banks**

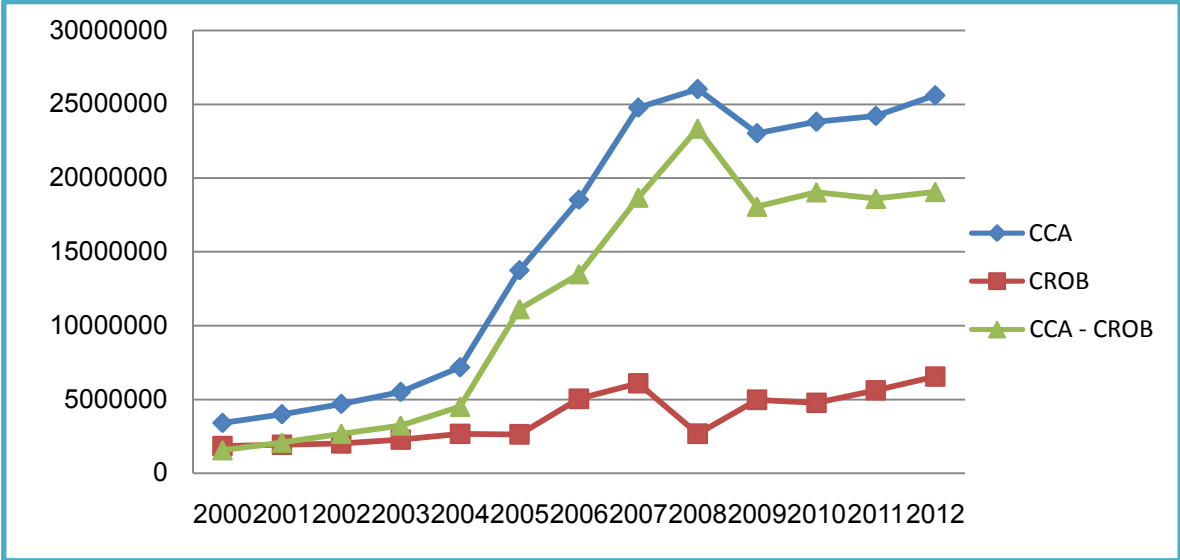
**Table(01): Liquidity distribution of the most highly liquid Assets and liabilities of 12 Islamic Banks in the GCC region over the period 2000 to 2012.**

Islamic Banks	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**

To make more clear 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(02)

**Figure(02): Maturity of Islamic Banks application of Niehans notion 2000-2012**



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

In the above table(01) and figure(02), 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. This may due to several factors. One of the possible explanation is the fact that Islamic banks in GCC region has concentrated most of their investment in construction sector in early years, so it may now be renting out a considerable amount of property that can help in generating a permanent income.

**3-2- The application of net liquidity definition Islamic Banks**

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(02):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	<b>40,54%</b>	-974201,67	<b>-29,72%</b>	-384542,556	<b>-10,82%</b>
Bank Al Bilad	3926030	<b>72,47%</b>	-915214,25	<b>-34,98%</b>	-1317715,25	<b>-37,49%</b>
Al Rajhi Bank	24557947	<b>80,02%</b>	-4977339,1	<b>-34,03%</b>	-13262992,1	<b>-45,99%</b>
Bahrain Islamic Bank	253422,1	<b>18,57%</b>	285400	<b>3,30%</b>	-295498,889	<b>-21,87%</b>
Dubai Islamic Bank	11005058	<b>52,97%</b>	-1257778,9	<b>-29,62%</b>	-3689756,14	<b>-23,35%</b>
Emirates Islamic Bank	2588222	<b>63,90%</b>	207342,33	<b>-16,45%</b>	-802311,333	<b>-44,52%</b>
Faisal Islamic Bank of Egypt	3090272	<b>49,04%</b>	-128440,63	<b>-48,29%</b>	35082,625	<b>-0,75%</b>
Kuwait Finance House	19656546	<b>74,29%</b>	-10704959	<b>-53,51%</b>	-3353481,29	<b>-20,77%</b>
Qatar International Islamic Bank	1088067	<b>47,25%</b>	-440931,71	<b>-38,69%</b>	-180975,857	<b>-8,56%</b>
Qatar Islamic Bank	3162493	<b>56,73%</b>	-1940126,3	<b>-50,84%</b>	-645924,333	<b>-5,89%</b>
Shamil Bank of Bahrain	344578,1	<b>4,96%</b>	-132751,63	<b>-14,28%</b>	-48261,5	<b>9,32%</b>
Sharjah Islamic Bank	1680346	<b>71,14%</b>	-1214555,7	<b>-60,73%</b>	-128988,571	<b>-10,41%</b>
Average	6258678	<b>52,66%</b>	-1849463,1	<b>-33,99%</b>	-2006280,43	<b>-18,43%</b>

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

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
<b>S.T</b>	<b>0.60</b>
<b>M.T</b>	<b>0.40</b>
<b>L.T</b>	<b>0.2</b>

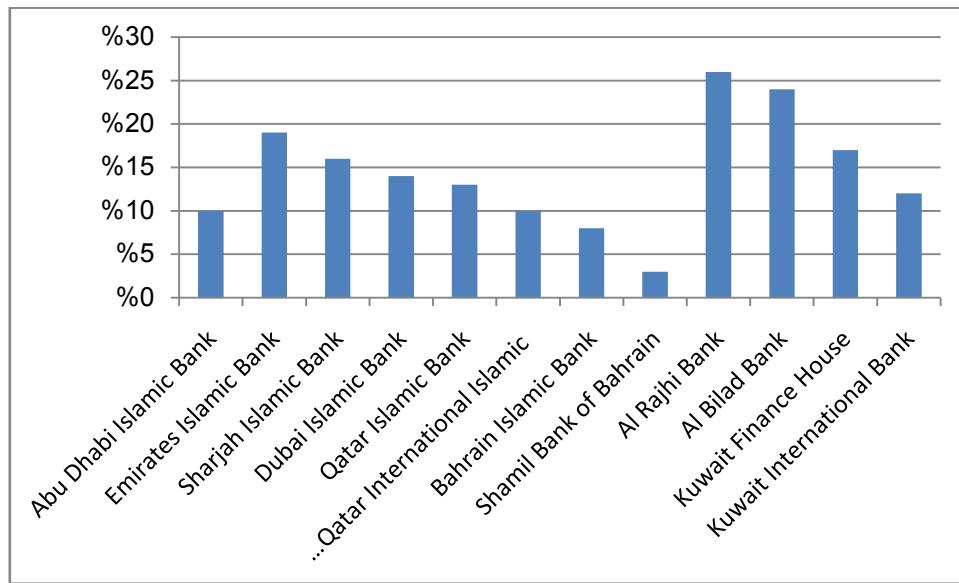
Applying the above coefficients to the maturity structure of Islamic banks in the GCC region produces the following results:

**Table(03): Net Liquidity of Islamic Banks2000-20012**

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%
<b>Average</b>	<b>9%</b>	<b>5%</b>	<b>9%</b>	<b>13%</b>	<b>14%</b>	<b>16%</b>	<b>15%</b>	<b>15%</b>	<b>17%</b>	<b>14%</b>	<b>14%</b>	<b>14%</b>	<b>14%</b>	<b>13%</b>

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

**Figure(03): Net Liquidity of Islamic Banks 2000-2012**



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

The Table (01) and Figure (01) shows Net liquidity for 12 Islamic banks from 6 countries during the period 2000-2008, 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 indicate 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.

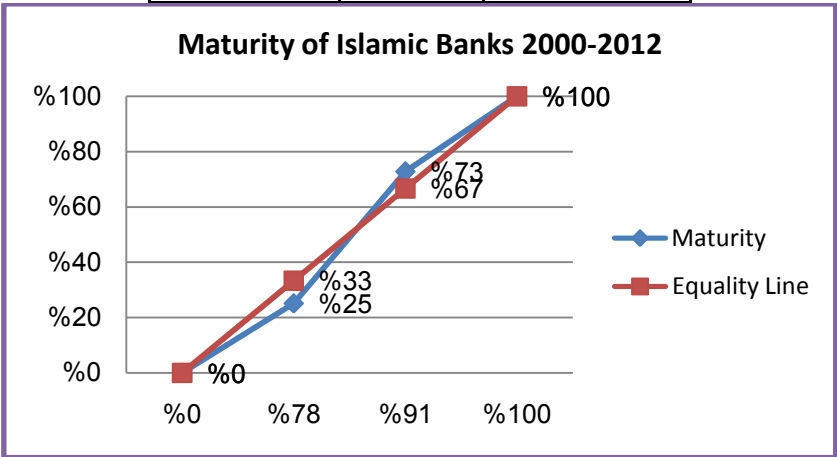
The above results for net liquidity may be interpreted as that Islamic Banks in the GCC region over the period 2000-2012 as that borrowing on the aggregate short and medium to lend long. This can be referring to table() which show that

**3-3- The utilization of Lorenz Mismatch curve for Islamic Banks**

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. The percentage ratios are taken from Table(02). The mismatch curve for Islamic banks is plotted in the figure(04):

**Figure(04): Net Liquidity of Islamic Banks 2000-2012**

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



The general impression that can be gained from figure(04) is that the maturity of Islamic banks in the GCC region over the period 2000-2012 falls in the third category (Mixed Maturity transformation). So we can conclude that 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. This result support the findings of the previous section, where we it was found that the overall contribution of Islamic banks in the GCC region is liquidity creation rather than destruction.

## Conclusion:

In this paper we consider 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. The result indicate 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.

The maturity of Islamic banks in the GCC region over the period 2000-2012 falls in the third category (Mixed Maturity transformation). we find that 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. 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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