Liquidity Transformation Factors of Islamic Banks:
An Empirical Analysis

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Abstract

Islamic banks face restrictions in refinancing due to the guidelines of the Shari´ah prohibiting financial contracts and transactions based on interest, gambling and speculation as same as due to the lack of liquidity sources such as an interbank market, a lender of last resort or an asset market. This is the first study with empirical cross-country results focusing on liquidity transformation of Islamic banks. Over the period from 2000 to 2007, we analyze the influence of specific financial system and institutional characteristics of Islamic banks on liquidity transformation. We include bank data from Gulf Cooperation Countries (GCC), Southeast Asia and further Brunei, Egypt and Turkey. Our results reveal that the liquidity transformation of Islamic banks is highly negatively determined by especially bank risk-taking and interbank demand compared with a control group of (interest-based) banks which conduct their business according to Western industrial countries.

Key Words: Islamic Banking, Liquidity Transformation, Bank Risk, Interbank Market

JEL classification: G21, G32, E51

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Islamic banks face restrictions in refinancing due to the guidelines of the Shari´ah prohibiting financial contracts and transactions based on interest, gambling and speculation as same as due to the lack of liquidity sources such as an interbank market, a lender of last resort or an asset market. This is the first study with empirical cross-country results focusing on liquidity transformation of Islamic banks. Over the period from 2000 to 2007, we analyze the influence of specific financial system and institutional characteristics of Islamic banks on liquidity transformation. We include bank data from Gulf Cooperation Countries (GCC), Southeast Asia and further Brunei, Egypt and Turkey. Our results reveal that the liquidity transformation of Islamic banks is highly negatively determined by especially bank risk-taking and interbank demand compared with a control group of (interest-based) banks which conduct their business according to Western industrial countries.

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1 Introduction

Islamic banking is one of the new trends of the international financial sector with double-digit growth rates since 2003/2004. In the four decades of its existence and with its geographical dispersion beyond the borders of the Islamic world, the estimated managed asset value has reached at least US$500 billion at the end of 2008 according to Booz & Company (see Vayanos et al., 2008) and IFSL research (2010). Due to the current financial crisis, Islamic Finance has reached a higher degree of attention in several aspects such as in questions of regulation or complementarities towards the Western financial system (Western in the following). The guidelines of Islamic finance stem from the Shari´ah, the unique and global legislation for Muslims with the Quran, Hadith (Sunna), Ijma and Qiyas as its four main sources. The Shari´ah prohibits interest, gambling and speculation in terms of riba, gharar and maysir for all contracts and transactions. Further fundamental principles of the Shari´ah are profit and loss sharing and real assets as basis of financial contracts. The involvement of assets in branches like defense or entertainment industry or in companies that do not fulfill additional capital structure criteria are also forbidden (see for the list of negative and financial screens Table 1 in the appendix, see also Quran: 2:275-2:280, Lewis and Algaoud 2001, Usmani 2002, Henry and Wilson 2004, Jaffer 2004, Mirakhor and Iqbal 2007).

The management of liquidity risk is actually one of the most important challenges for Islamic banks because it prohibits the use of interest-based instruments. There are only limited possibilities to refinance with an interbank money market, for instance a lender of last resort or with an asset market. Under these conditions they have no comprehensive possibilities to do in particular term and risk transformations as two of the main functions of a financial intermediary (see Bitz 2005, Oehler 2006). These intermediary functions also implicate liquidity

transformation (for distinguishing between them, see Bhattacharya et al. 1998, Berger and Bouwman 2009). Pioneering steps to solve the liquidity management restrictions of Islamic banks by including a money and capital market in conformity with the Shari´ah have been done in Bahrain, Malaysia and Saudi Arabia. However, the Islamic financial sector will need proceeding innovations on the product portfolio level, on the institutional level and in regulations to solve the restrictions in the refinancing of banks.

Although profit and loss sharing is a main principle of the Shari´ah, short-term fixed-income contracts typically dominate the product portfolio of Islamic banks. Its share can exceed 80% of the whole product portfolio on the asset side, thus the portfolio exhibits a low-diversification and low-risk structure. This is mainly because most Islamic banks intermediate in countries with relatively weak legal, institutional and financial environment. It usually leads to high degrees of asymmetric information and opportunistic behavior (moral hazard, hidden action) of market participants as well as to liquidity constraints and higher costs of capital for financial intermediaries resulting also from market segmentation (see Aggarwal and Yousef 2000, Chong and Liu 2007, Akacem 2008, Visser 2009, Al-Hassan et al. 2010, Hearn et al. 2010, Choudhury and Hoque 2006). As a consequence, the preference of Islamic banks is a rational and optimal reaction, even more to the alternative of equity financing contracts in a dual financial system with possible adverse selection between both. But the mark-up instruments used in practice are seen critically by Shari´ah scholars and economists because they are close to interest-based instruments and therefore there is no difference from the functional perspective (see Khan and Ahmed 2001, El-Gamal 2002, Rosly 2005, Sundararajan 2007, Chapra 2007, Cihak and Hesse 2008). Typically, in earlier studies and in our sample, Islamic banks have significantly higher equity ratios on the average (see in the appendix Table 6 and 7). Thus, the higher equity ratio is a response to limited refinancing sources, which then builds an additional capital buffer against

defaults. The restrictions in refinancing, the conservative credit policy and the higher holdings of equity capital create an interesting environment for research, especially to their liquidity creation function.

The purpose of this paper is to study the influence of restrictions concerning to financial instruments in conformity with the Shari´ah, refinancing sources and macroeconomic environment on liquidity transformation of Islamic banks. Our hypothesis is that Islamic banks face a negative relationship between leverage, bank risk-taking in the loan portfolio and interbank demand on the one hand and the amount of liquidity transformation on the other. Given this, the specific financial and business characteristics of an Islamic bank hinder them from undertaking an optimal functioning of liquidity transformation. For robustness and comparability we apply the model also to a control group of Western banks.

Although there have been prior studies that examined the Islamic interbank money market and the particular risk management requirements of Islamic banks, most of them are based on theoretical or on empirical analyses which are restricted to one country or which have a descriptive character (see Iqbal and Molyneux 2005, Khan and Ahmed 2001, Obiyathulla 2008, Rosly 2005, Brown et al. 2007). Our study attempts to fill this gap in the empirical literature on Islamic banking. To our knowledge, it is the first cross-country empirical analysis that focuses on the restricted refinancing sources and its influence on liquidity transformation of Islamic banks. We analyze the liquidity transformation determinants referring particularly to the financial ratios of bank risk, leverage and interbank demand from 2000 to 2007. Our dataset comprises 36 Islamic banks and it covers about 50 percent of the total Islamic banking assets in the world as of 2007.

Our results provide significant evidence for our hypothesis. Liquidity transformation is negatively determined by the special characteristics of an Islamic bank referring to solvency, bank risk and interbank demand. Further, we observe that Islamic banks' liquidity creation increases in size. Finally, we find evidence that increasing diversification in product portfolio of an Islamic bank with a higher share of more risky lending leads to a lower amount of liquidity transformation.

The remainder of the paper is organized as follows: Section 2 presents the review of the related literature on liquidity transformation function and liquidity risk of banks and how this study extends the existing work. In Section 3, we describe our dataset and methodology and discuss our results. Section 4 concludes our paper.

2 Related Literature

In the framework of risk and term transformations of financial intermediaries, the latter undertake especially the tasks of liquidity creation and insurance for inter-temporal smoothing of income and consumption of economic agents. The insurance function of financial intermediaries against liquidity shocks as an explanation for their existence takes place through liquidity pooling of deposits in which there is a part as liquidity reserves and the rest is used for profitable illiquid investments (see e.g. Bryant 1980, Diamond and Dybvig 1983, Bhattacharya and Thakor 1993, Diamond and Rajan 2001, Kashyap et al. 2002). Liquidity risk can occur on the liability side and on the asset side of banks and it has an exceptional position in the regulation of banks. While the risk types of default, price and operation have to be securitized with minimum equity capital, liquidity risk underlies limited requirements. The external sources of liquidity transfers are the interbank money market, the asset market and typically the central bank's role of a lender of last

resort. In the literature there are numerous studies referring to the liquidity creation role of banks and the determinants of this function. Our paper is related to the large literature on the role of interbank markets and its influence on stability, regulation and on the incentive of banks to hold liquid assets (see among others Bhattacharya and Gale 1987, Goodfriend and King 1988, Allen and Gale 2004, Acharya et al. 2008a, Allen et al. 2009, Brunetti et al. 2009, Cai and Thakor 2009, Diamond and Rajan 2009, Freixas et al. 2009,). This paper is also related to the synergies between liquidity transformation and risk which can be influenced on the individual bank level by the diversification and structure of their product portfolios (see Diamond 1996, Acharya et al. 2006, Behr et al. 2007, Lepetit et al. 2008), by size or by capital structure (see Boyd and Runkle 1993, Diamond and Rajan 2000, Koziol and Lawrenz 2009) and on the macroeconomic level by the development and structure of financial sector institutions and refinancing sources (see Cole et al. 2008, Dinger and Von Hagen 2009).

Rochet and Tirole (1996) argue that an interbank market can make a contribution to bank regulation and supervision and also to market discipline and reduced systemic risk by creating incentives of peer monitoring by the interbank-lending banks. The market disciplining function of an interbank market depends on the assumption that banks have additional private information on risks of other banks. Likewise, it assumes that banks are responsible for their losses in interbank transactions and receive no intervention of a central bank. This will happen usually, and has to be clearly declared to the interbank participants. Dinger and Von Hagen (2009) can confirm this hypothesis empirically for a sample of Central and Eastern European countries with a focus on small banks whose interbank lending is characterized by longer maturities. Further researches justify however the central bank intervention by asymmetric information, monopoly power and moral hazard which lead to an incomplete interbank market (see Holmstrom and Tirole 1998, Gorton and Huang 2004/2006).

On the individual bank level there are different strands of the literature about optimal organization forms of banks. Traditional banking theory predicts infinite diversification benefits which are based on a delegated monitoring argument (for this theoretical argument see Diamond 1984, Boyd and Prescott 1986). Diversification benefits and therefore risk reduction for banks are supported by few studies on product portfolio level (interest and non-interest income) and on the level of asset-side and liability-side (see Kashyap et al. 2002, Gatev et al. 2005). However, the model of Diamond (1984) disregards agency problems that cause higher costs of monitoring with growing diversification and size. Thus, another strand of literature finds contrary results to the delegated monitoring argument. These find no diversification benefits and even diseconomies with increasing risk on the product portfolio level as well as on the level of the bank's asset portfolio (industrial and sectoral exposure) (see Hellwig 1998, DeYoung and Roland 2001, Stiroh 2004, Acharya et al. 2006). As a result, specialization outweighs the benefits of risk sharing in the sense of higher returns but these potentially exhibit higher volatility.

Empirical evidence based on measurement constructions of bank liquidity transformation can be found especially in two studies. First, Deep and Schaefer (2004) approximates liquidity creation as the scaled difference between liquid liabilities and assets. They ran a panel regression analysis on data of the 200 largest US banks in the ranking of total assets from 1997 to 2001. Yielding an unexpected low liquidity transformation of only about 20%, the function is explained rather with deposit insurance than with credit risk in loan portfolios. Second, a different and more generalized approach in the measurement construction of bank liquidity creation and in the application of data is done by Berger and Bouwman (2009). They differentiated between four measures in their classification of loans by category rather than maturity. In the panel regression analysis the authors included almost all US banks in business from 1993 to 2003 and found dependence of bank capital and liquidity creation differing for small, middle and large size

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intermediaries based on total assets. One of the main results of this study is the positive relationship between capital and liquidity creation for large banks while it is negative for small banks.

Our study further explores the existing studies at least in the following aspects. First, the liquidity transformation determinants are studied for Islamic banks which do not operate under comparable conditions on the financial system level, institutional level and product portfolio level. Within this framework we have the possibility to analyze banks in a developing Islamic financial system environment, wherein banks are mainly deposit-financed and practice a conservative strategy towards their leverage position and in their loan portfolio. Second, while most of the empirical studies related to this research field focus on US or European data, our study focuses on a cross-country sample of banks based in Middle East and Southeast Asia.

3 Empirical Analysis

3.1 Dataset

Our empirical analysis is based on a sample consisting of an unbalanced panel of annual and unconsolidated report data of Islamic banks between 2000 to 2007. The inclusion of annual accounting data is necessary since (x type of) data is frequently not available. 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 Bankscope.[1] In

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[1]Bankscope, Bureau van Dijk Electronic Publishing is a comprehensive and global database containing financial information on public and private banks. It is supplied by Bureau van Djik and is usually used in the academic research of banks.

our analysis we only include Islamic banks of states that operate in a dual financial system where the Islamic financial system and the financial system of Western industrial countries exist in parallel. A further characteristic of the dataset is that every bank is represented with annual reports of at least 2 years over this period. Furthermore, we limit our analysis to banks which are full-fledged Islamic banks, thus Western (interest-based) financial institutions with separate Islamic departments as so-called Islamic windows are excluded. A further criterion to data choice is that the banks are based in countries where Muslims form the majority of the population. Finally, for comparability under similar development conditions we restrict to Islamic banks from high-income or upper-middle-income economies according to the classification of the World Bank and from countries with the highest amount of Shari´ah compliant assets. The total sample which fulfills these criteria consists of 36 Banks from 10 countries.

Please insert Table 2 and 3 about here.

As Table 2 illustrates, 28 banks are from the region of the Gulf Cooperation Council[2] (GCC) and the remaining ones are from Brunei, Egypt, Indonesia, Malaysia and Turkey. Hence, the data set is focused on the Persian Gulf states of the GCC with a concentration of total assets of about 82 % in 2007. This focus on the GCC states represents also their high market position in the share of managed asset values by Islamic banks in the world which is about 60%. To distinguish between large and small banks we used Bankscope's criterion, which is also used widely in the literature (see e.g. Dinger and Von Hagen 2009, Lepetit et al. 2008). Therefore the sample contains 22 Islamic banks with total assets greater than US$ 1 billion on the average over the period 2000-2007 in which 16 of them are from countries of the GCC (see Table 3 for the size

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[2] The Gulf Cooperation Council (GCC) consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. It was founded 1981 in Abu Dhabi to cooperate in several fields as in economy, politics and culture.

ranking of Islamic banks in the sample). Over the whole period, 28 banks are publicly quoted banks in the sample, and are mainly privately owned. Macro level data are derived from the World Economic Outlook Databases of the International Monetary Fund and from Heritage Foundation/Wall Street Journal. These criteria leave us with a data sample that contains at most 288 reports (36 reports per year over the entire period of 8 years).

For the robustness of our results and to have a comparable basis, we considered a control group of Western banks particularly under the criteria of similar total assets and geographic distribution. This control group is also characterized by an unbalanced panel of annual and unconsolidated report data set consisting of at most 336 reports (42 reports per year over the entire period of 8 years) in total over the time period from 2000 to 2007. It includes 31 Western banks from member states of the GCC or 33 large banks with total assets greater than US$ 1 billion on the average over the entire period.

Please insert Table 4 and 5 about here.

From each report we collected financial ratios of liquidity, leverage, risk and interbank demand driven by the limited availability of data. Because of this restriction on data availability, we choose the intuitive and simple measurement construction of bank liquidity transformation by Deep and Schaefer (2004). The results of the following regression analysis and consequently their interpretations should be treated carefully due to the relatively small set of reported data available for Islamic banks fulfilling the criteria specified above. We take several econometric methods to achieve robust and valid results. The intention of this research is to empirically observe potential tendencies which can perhaps be verified in future studies with a more comprehensive dataset.

The characterization of descriptive statistics in the following are based on both complete samples and on two subsamples for each under the criteria of geography and size. Beginning with the liquidity transformation (LTG) variable we can observe (as expected for the complete sample and for the subsample) high values in the range of 68.03% to 74.79% with the lowest for Islamic banks from GCC. These high values indicate more deposit financed banks than through other (re-)financing sources with illiquid loan portfolios for the most part. Banks from GCC differ in the LTG variable with lower values relating to higher market liquidity and the institutional foundations of money and capital markets in conformity with the Shari´ah. For the control group of Western banks we can observe a lower level of the LTG variable with a wider range lying in the interval of 63.47% to 73.26% and with the lowest value for the complete sample. Also observed in several other studies are the higher ratios of equity lying in the interval of 13.11% to 19.28% for the ratio of equity to total assets (EQ/TA) and 16.46% to 39.51% for equity to liabilities (EQ/LI) of Islamic banks compared to their Western counterparts (see e.g. Weill 2010). Similar to the analysis of Cihak and Hesse (2008) we can observe for the Islamic sample higher ratios of loan loss provisions to gross loans (LLP/GL) or loan loss reserves to gross loans (LLR/GL) for large banks compared to the whole sample or the GCC subsample. The levels of LLP/GL and LLR/GL are both higher for the Western sample indicating a more risky loan portfolio. A further striking fact of the descriptive statistics is the variable of net loans scaled by the sum of customer and short term funding (NL/CSTF) and lying in the interval of 73.56% to 85.36%. This proxy for illiquidity is the highest for banks from GCC where apart from Malaysia is the most comprehensive interbank market for Shari´ah-compliant financial intermediaries. As a result of the strong illiquidity which is also supported by the low ratios of liquid assets to total assets and alternatively by liquid assets to customer and short term funding (for brevity not listed in Table 6 and 7), they should have a higher risk to a classical bank run. Here we expect that they

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have higher liquidity ratios than their Western counterparts in terms of the restricted refinancing sources. We expect this for emerging markets where banks are usually confronted with stronger macroeconomic risk and volatility and a lack of legal and regulatory environment. Under these conditions it leads to difficulties in the enforcement of contracts and subsequently to liquidity hoarding by banks so that the intermediary functions cannot be fulfilled efficiently (see e.g. Aspachs et al. 2004, Acharya et al. 2008b, Bansal et al. 2010). One explanation why the liquiditiy ratios are different for the case of Islamic banks is that they practice a conservative strategy towards the leverage ratio and as well as in the credit policy with the domination of short-term fixed-income contracts. Comparing the relation of LTG and NL/CSTF in the Islamic and Western sample, we observe as expected the trade-off between the level of liquidity transformation and liquidity holding of a bank. Finally, regarding the relative homogeneity of macroeconomic variables, the intention to build a sample of Islamic banks with comparable institutional market environments is achieved by using data from high-income or upper-middle-income countries. The macroeconomic similarities are even more apparent for the subsamples of banks from GCC (see Espinoza et al. 2010).

Please insert Table 6 and 7 about here.

3.2 Methodology

In this section we explain the methodology of our empirical test on the unbalanced panel data. The analysis of the relation between LTG and the factors of leverage, risk and interbank demand of a bank is based on the estimation of the following equation:

$$LTG_{it} = \beta_1 + \beta_2\,Lev_{it} + \beta_3\,Risk_{it} + \beta_4\,IB_{it} + \beta_5\ln(Size_{it}) + \beta_6\,X_{it} + \varepsilon_{it}$$

wherein the liquidity transformation measure of bank i at time t, Lev_{it} is a variable for the leverage position, IB_{it} indicates the interbank demand, $\ln(Size_{it})$ proxies the size in natural logarithm, X_{it} is a vector of control variables at the macroeconomic level and finally ε_{it} as the error term. We take the natural logarithm of the bank size to account for non-linear relations.

The liquidity transformation gap variable is defined as the difference between liquid liabilities and liquid assets scaled by total assets. The idea behind this construction method of Deep and Schaefer (2004) is that a relatively high liquidity transformation function of a bank is then the case, if it is financed by mostly liquid deposits and holds a portfolio dominated by illiquid loans. In this manner the liquidity creation measure is rather a maturity than a category approach in the sense of loan portfolio classification (see Berger and Bouwman 2009). The values of LTG lie in the range of -1 and +1. Considering the case in which the LTG is zero means no liquidity transformation at all by a bank. An extreme LTG value of +1 indicates a bank financed completely by deposits and holding only illiquid loans. Equivalently it is for the another extreme value of a LTG of -1. Thus, the higher the LTG measure, the greater is the liquidity transformation by a financial intermediary. According to the definition of Bankscope liquid assets capture in general loans with less than three months to run to maturity and additionally quoted or listed government bonds and cash. Liquid liabilities from the perspective of a bank include customer and interbank deposits.

At the bank individual level we include the following explanatory variables: the leverage position of a bank is captured by the ratios of equity to total assets (EQ/TA) and alternatively equity to liabilities (EQ/LI). For measuring the (credit) risk in a bank's loan portfolio we use the ratios of loan loss reserves to gross loans (LLR/GL) and loan loss provisions to gross loans (LLP/GL) as a substitute (see Dinger and Von Hagen 2009, Holl and Schertler 2009). The

interbank demand position is proxied by the ratio of net loans to customer and short-term funding (NL/CSTF) (see e.g. Dinger and Von Hagen 2009). Net loan is defined as the sum of total customer loans and problem loans minus loan loss reserves and the denominator includes customer and interbank deposits of a bank (see Bankscope Glossary). For this ratio there is a negative relation because the higher they are the less liquid the bank is. To account for size effects at the bank individual level we choose typically the variable of total assets in natural logarithm. Furthermore, we consider at the country level the following three macroeconomic control variables to proxy the development status: per capital GDP (GDP/CAP), annual percentage change of GDP (ΔGDP) and an index of economic freedom (FI) by the Heritage Foundation/Wall Street Journal (see Dinger and Von Hagen 2009).[3] The index covers ten benchmarks of economic development such as business freedom, property rights, fiscal freedom, and so on, to approximate the institutional development of a country's financial system.

The econometric method for the panel regression analysis is panel ordinary least squares (OLS) with the specification of cross-section fixed effects. They were tested for models with pooling and cross-section random effects which can be both excluded. To check for robustness the estimations are run with alternative solvency and risk measures as explanatory variables. Further controls for robustness are the estimations for different subsamples under the criteria of size and geography focus. Finally, we apply the model to a control group of Western banks to analyze and interpret the specificities of Islamic banks towards their Western counterparts. Behind our hypothesis there are also the questions of which characteristics are attributable to Islamic banks and which result from the economic and institutional conditions under the dual financial system is taking place in a country. Separating the two effects is very difficult due to

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[3]Annual inflation is not regarded concerning to the restricted degrees of freedom and the very significant correlations to the macroeconomic development proxies ΔGDP, GDP/CAP and FI.

interdependencies and individual bank influences. With our methodological approach we also want to find a possible response to this question.

3.3 Results

3.3.1 Whole sample of Islamic banks

In our broad sample our hypothesis is strongly supported by nearly all regression specifications. The coefficients for leverage, interbank demand and bank risk have the expected negative signs and are in most cases even significant at the 1% level. Thus, according to the approximation method of liquidity transformation by Deep and Schaefer (2004), the specific characteristics of an Islamic bank are associated with a lower level of liquidity creation. So under typical circumstances an Islamic bank faces, the liquidity transformation as one of the main intermediary functions cannot be fulfilled optimally. Regarding the alternative variables, the highest significant influence specific to Islamic banks are primary from solvency and bank risk measures and then secondary by the proxy to interbank demand. For example a 10% increase of solvency, bank risk or interbank demand is associated with a drop of liquidity creation by at least 3.2%, 2.4% or 1%, respectively. Relying on lower leverage and needing also an additional capital buffer against defaults under restricted refinancing sources lower the liquidity transformation amount for Islamic banks. Every loan which is associated with additional risk or demand to interbank market hinders the liquidity creation function. The empirical results are also consistent with the theoretical notion that banks with higher equity capital are involved in less risky projects and so perform a lower degree of liquidity transformation. Referring to control variables on individual level, bank size is highly significant in two of the four regression specifications. According to the empirical results of Deep and Schaefer (2004) *and* Berger and Bouwman (2009)

larger banks create more liquidity. In the case of Islamic banks large institutions profit especially from widespread deposit-gathering networks. This financing advantage brings them in a situation in which they are more independent from interbank demand. Concerning the macroeconomic control variables, there are no significant impacts or nearly no impact in absolute values. One reason is of course the sample choice consisting of banks based in GCC countries in cases of ca. 3/4. The macroeconomic homogeneity under GCC members dominates the sample so that the variables indicating the economic development are absorbed.

Please insert Table 8 about here.

3.3.2 Subsamples of Islamic banks with geography and size focus

To check for robustness of our regression results through the complete sample, we build two subsamples. The first is a subsample consisting of GCC based banks. For this subsample there are similar significance as in the broad sample, with the main difference in the coefficient value of bank risk proxied by LLR/GL. In the case of banks from GCC countries, a 10% increase in bank risk is associated with a decrease of liquidity transformation of at least 18%. An explanation for the higher sensitivity of liquidity creation towards bank risk in this subsample is that Islamic banks have a more diversified product portfolio concerning to higher market liquidity and more financing sources in the member states of GCC (see GDP/CAP in Table 4). The domination of short-term and fixed-income contracts are also typical for this subgroup but not in a high degree (*to what degree then?*) as their counterparts outside the region of GCC. Therefore the share of long-term and equity based financial contracts is higher, implying a higher product portfolio risk. Regression results for control variables on the bank individual and on the macroeconomic level are very similar to those of the complete sample. Thus, the regressions of

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this first subsample supports our hypotheses and the results of the broad sample but only to a limited extent for the alternative variables of leverage (EQ/LI) and of bank risk (LLP/GL).

In the second subsample there are only banks included with an average size of more than US$ 1 billion from 2000 to 2007. The regression results support again our hypotheses. In comparison to the complete and the first subsample, the alternative specifications for leverage and for bank risk are also highly significant. Another characteristic of this subsample is the high sensitivity of the liquidity transformation measure towards the equity ratios. Regarding the descriptive statistic that large banks have (as expected) the highest leverage, this result is not surprising considering the access to higher liquidity sources and a more diversified product portfolio. Similar to the subsample before is the high sensibility of liquidity transformation towards both bank risk indicators. The second subsample proofs again the robustness of our results and specifications.

Please insert Table 9 and 10 about here.

3.3.3 Control Group of Western banks

In the complete sample we observe in our estimations for the case of Western banks a higher sensibility of the LTG variable towards both alternative leverage positions (EQ/TA and EQ/LI) at a significance level of 1%. The same is true for the subsamples of banks from GCC member states and of large banks. Contrary to the case of Islamic banks there is no significance at all for the approximations of interbank demand (NL/CSTF) and of loan portfolio risk (LLR/GL and LLP/GL). As in the following subsamples of this control group, there is no empirical evidence of an influence of the macroeconomic control variables. Beginning with the subsample of Western banks from GCC the main difference is the significance of NL/CSTF at a level

between 5% and 10% for the different estimation models. An increase in the interbank demand or a higher illiquidity is related with a stronger decrease for the liquidity transformation of a Western bank from GCC. In the subsample of large Western banks we observe only in two of the four estimation model specifications, a 10% percent significance level for NL/CSTF. A striking result for this subsample is the highly significant bank (credit) risk variable with a positive coefficient of LLR/GL, while there is no significance for the alternative indicator of LLP/GL.

Please insert Table 11 to 13 about here.

Thus, the regression results of the control group support also our hypothesis that the typical characteristics of an Islamic bank, especially interbank demand and loan portfolio risk, determine their liquidity transformation. The control group of Western banks reveals that these characteristics are not the dominant determination factors of explaining their liquidity transformation. Regarding the differences in significance levels of the bank individual explaining factors for the case of Islamic and Western banks, we conclude a possible interdependency between the institutional development of an Islamic financial system and the specificities of Islamic banks. Thus, the economic preconditions are in principle the same for both financial systems, but the institutional developments make the distinction under which banks have to function as intermediaries. For the case of Islamic banks the developing institutional conditions affect them in such a way that the liquidity creation function is particularly influenced by loan portfolio risk taking and by the interbank demand. We can interpret for the Islamic case a form of bank adaptation to the institutional development particularly for these two variables.

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4 Conclusions

The business of Islamic banking and finance is restricted under the guidelines of the Shari´ah, the unique and global legislation for Muslims. According to these guidelines, interest, gambling and speculation is prohibited and financial contracts and transactions have to be based in principle on real assets and on profit and loss sharing. Furthermore, financial investments underlie negative and financial screens which are comparable to a broader case of the so-called social responsible investments (SRI). The necessity to be in conformity with these criteria of the Shari´ah and according to restricted refinancing instruments and sources concerning an interbank market, to a lender of last resort or to an asset market, the loan portfolio of an Islamic bank is usually dominated by short-term fixed-income contracts. As a result, they do not optimally fulfill the intermediary functions especially in term and risk. The objective of this study is to analyze the liquidity transformation implications which stem from the special characteristics of an Islamic bank. Our hypothesis is that the specifics towards leverage, risk and interbank demand are negatively (inversely) related to liquidity creation. To test this hypothesis, we conducted an empirical analysis regarding a selected sample of Islamic banks focusing on accounting based liquidity, leverage, risk and interbank demand measures over the period of 2000 to 2007. For approximating the liquidity transformation we use the measure of Deep and Schaefer (2004). The results of our empirical panel analysis confirm our hypothesis and are robust for alternative specifications, subsamples and as well as for a control group of Western banks with comparable sample characteristics. Thus, liquidity transformation for Islamic banks decreases especially in bank (credit) risk taking and in interbank demand. Furthermore, we can indicate that liquidity creation increases in size and in product portfolio specialization in short-term and fixed-income credit policy strategy. With increasing size they profit from more deposits and also liquidity, which in consequence lowers the risk of equity and improves the independence of external

refinancing sources. The specific characteristic of Islamic banks' loan portfolio allows them to hold lower liquidity and to do their business more efficiently. Finally, we can conclude that independent of the economic environment, the institutional financial system development affects directly the liquidity creation function of Islamic banks.

Possible areas for further research in the future, especially when more comprehensive and valid data are available, is to determine how the behavior of Islamic banks in liquidity transformation will change when more innovation in financial instruments take place and when more competitive refinancing sources exist in the dimensions of depth and breath. The latter will depend in particular on financial sector development, so it would be interesting to observe the parallel processes. Will there be an adjustment to Western banks or will they continue to specialize and differ from their Western counterparts? These research questions can be proved by a comparison to a suitable peer group of Western banks. Further analyses and robustness tests could be done through alternative measure constructions of liquidity transformation.

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Appendix

Table 1

Shariah-compliant negative and financial screens.

1. Stage: Negative branch and company individual screens.

Tobacco industry
Weapons and defence Industry
(Interest-based) Financial intermediaries of Western industrial countries
Producing, selling, distilling or distributing alcohilic beverages
Producing, selling, slaughting or distributing pork
Entertainment industry (music, cinema, pornography, theatres, etc.)
Gambling activities (casinos, lotteries, betting)
Companies engaged in products related to aborted human foetuses or in human cloning
Pollutive companies
Employee dicsriminating companies

2. Stage: Financial ratio and leverage screens.

Debt /market value of equity < 33%
Liquid assets + interest bearing debt / market value of equity < 33%
Accounts payable from trade and delivery / market value of equity < 33%
Revenue generated in the above negative screens / overall revenue < 5%

Source: Own illustration.
The checking of Shari´ah-compliance of an asset underlying a financial contract is a two-step procedure according to the disqualifying criteria in the list above. The fulfillment of the first stage builds the precondition for the second stage. First, the spectrum of Shari´ah-compliant assets is restricted under qualitative branch and company individual criteria. The second step in the following checks mainly the fulfillment of leverage ratios differing in the maturity Additionally this step includes a criteria with a combination of qualitative and quantitative screening in which the isolated checking of an asset is left.

Table 2

Annual and geographic diversification of the Islamic bank sample.

Country	BANK	2000	2001	2002	2003	2004	2005	2006	2007
GCC Countries									
Bahrain	ABC Islamic Bank (E.C.)	0	0	0	0	0	1	1	0
	Al Amin Bank	1	0	1	1	1	1	1	0
	Albaraka Islamic Bank BSC	1	1	1	1	1	1	1	1
	Albaraka Banking Group B.S.C.	0	0	0	1	1	1	1	1
	Arcapita Bank	1	1	1	1	1	1	1	1
	Capivest	0	0	0	0	0	1	1	0
	Gulf Finance House E.C.	1	1	1	1	0	1	1	1
	IIB-International Investment Bank B.S.C.	0	0	0	0	0	1	1	0
	Investors Bank BSC	0	0	0	1	1	1	1	1
	Kuwait Finance House (B)	0	0	1	1	1	1	1	1
	Unicorn Investment Bank BSC	0	0	0	0	0	1	1	0
	Shamil Bank of Bahrain B.S.C.	1	1	1	1	1	1	1	1
Kuwait	International Investor Company, K.S.C. (The)	1	1	1	1	1	1	0	0
	Investment Dar Co (The)	0	0	0	0	0	1	1	0
	First Investment Company K.S.C.C.	0	0	0	1	1	1	1	1
	Kuwait Finance House	1	0	0	0	1	1	1	1
	Amlak Finance	0	0	0	0	1	1	1	1
	A'Ayan Leasing & Investment Company	0	0	0	0	0	1	1	1
Qatar	First Finance Company (Q.S.C.)	0	0	0	0	0	1	1	0
	Qatar International Islamic Bank	1	1	1	1	1	1	1	1
	Qatar Islamic Bank SAQ	1	1	1	1	1	1	1	1
Saudi Arabia	Al Rajhi Bank	0	0	0	0	1	1	1	1
	Bank AlBilad	0	0	0	0	0	0	1	1
UAE	Abu Dhabi Islamic Bank - Public Joint Stock Co.	1	1	1	1	1	1	1	1
	Dubai Islamic Bank plc	1	1	1	1	1	1	1	1
	Emirates Islamic Bank	0	0	0	0	0	1	1	1
	Sharjah Islamic Bank	0	0	0	0	0	0	1	1
	Tamweel PJSC	0	0	0	1	1	1	1	1
Non GCC Countries									
Brunei	Islamic Bank of Brunei bhd.	1	1	1	1	1	1	0	0
Egypt	Egyptian Saudi Finance Bank	1	1	1	1	1	1	1	1
	Faisal Islamic Bank of Egypt	1	1	1	1	1	1	1	1
Indonesia	Bank Syariah Mandiri	0	0	0	1	1	1	1	1
Malaysia	CIMB Islamic Bank	0	0	0	0	0	1	1	1
Turkey	Albaraka Türk	0	0	0	0	0	1	1	1
	Kuwait Turkish	0	0	0	0	0	1	1	1
	Türkiye Finans Katilim Bankasi AS	0	0	0	0	0	0	1	1
	Observations per year	14	12	14	19	21	33	34	27

Source: Own illustration based on Bankscope, Bureau van Dijk Electronic Publishing
The Gulf Cooperation Council (GCC) consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. It was founded 1981 in Abu Dhabi to cooperate in several fields as in economy, politics, culture. The decision for this geographical distribution is concerning to the relative high macroeconomic homogeneity among these states and their comparable market shares in the assets managed by Islamic banks.

Table 3

Sample of Islamic banks in the descending order over the period from 2000 to 2007.

Observation	Bank	Average Total Assets in Mil. USD (2000-2007)
1	Kuwait Finance House (unconsolidated subsidiary in Bahrain)	139131.50
2	Al Rajhi Bank	26901.75
3	Kuwait Finance House	17691.60
4	Dubai Islamic Bank plc	9913.00
5	Albaraka Banking Group B.S.C.	6642.20
6	Abu Dhabi Islamic Bank - Public Joint Stock Co.	4857.50
7	Türkiye Finans Katilim Bankasi AS	3859.00
8	Bank AlBilad	3727.00
9	Investment Dar Co (The)	2981.00
10	Emirates Islamic Bank	2925.00
11	Faisal Islamic Bank of Egypt	2833.75
12	Sharjah Islamic Bank	2523.00
13	Qatar Islamic Bank SAQ	2484.63
14	Kuwait Turkish	2391.00
15	Albaraka Türk	2122.67
16	Aya Leasing & Investment	1677.34
17	Shamil Bank of Bahrain B.S.C.	1460.00
18	Arcapita Bank	1444.00
19	Qatar International Islamic Bank	1422.63
20	Amlak Finance	1419.00
21	CIMB Islamic Bank	1354.67
22	Islamic Bank of Brunei bhd.	1305.50
23	Bank Syariah Mandiri	882.40
24	Egyptian Saudi Finance Bank	863.88
25	Tamweel PJSC	768.00
26	ABC Islamic Bank (E.C.)	717.00
27	Gulf Finance House E.C.	674.86
28	Albaraka Islamic Bank BSC	507.25
29	First Investment Company K.S.C.C.	354.40
30	Al Amin Bank	265.67
31	First Finance Company (Q.S.C.)	265.00
32	International Investor Company, K.S.C. (The)	234.50
33	Unicorn Investment Bank BSC	221.00
34	Capivest	132.00
35	Investors Bank BSC	105.40
36	IIB-International Investment Bank B.S.C.	79.00
Total		247138.32

Source: Bankscope, Bureau van Dijk Electronic Publishing

Table 4

Annual and geographic diversification of the Western bank sample.

Country	BANK	2000	2001	2002	2003	2004	2005	2006	2007
GCC Countries									
Bahrain	Ahli United Bank BSC	1	1	1	1	1	1	1	1
	Bahrain Financing Company	1	1	1	1	1	1	1	1
	Bahraini Saudi Bank	1	1	1	1	1	1	1	1
	BBK B.S.C.	1	1	1	1	1	1	1	1
	Gulf International Bank BSC	1	1	1	1	1	1	1	1
	TAIB Bank B.S.C.	1	1	1	1	1	1	1	1
Kuwait	Bank of Kuwait & The Middle East (The)	1	1	1	1	1	1	1	1
	Boubyan Bank	0	0	0	0	0	0	1	1
	Commercial Bank of Kuwait SAK (The)	1	1	1	1	1	1	1	1
	Gulf Bank KSC (The)	1	1	1	1	1	1	1	1
Qatar	Ahli Bank QSC	1	1	1	1	1	1	1	1
	Doha Bank	1	1	1	1	1	1	1	1
	International Bank of Qatar	0	1	1	1	1	1	1	1
	Qatar National Bank	1	1	1	1	1	1	1	1
Saudi Arabia	Banque Saudi Fransi	1	1	1	1	1	1	1	1
	National Commercial Bank (The)	1	1	1	1	1	1	1	1
	Riyad Bank	1	1	1	1	1	1	1	1
	Samba Financial Group	1	1	1	1	1	1	1	1
	Saudi British Bank (The)	1	1	1	1	1	1	1	1
	Saudi Hollandi Bank	1	1	1	1	1	1	1	1
	Saudi Investment Bank (The)	1	1	1	1	1	1	1	1
UAE	Abu Dhabi Commercial Bank	1	1	1	1	1	1	1	1
	Al Masraf-Arab Bank for Investment & Foreign Trade	1	1	1	1	1	1	1	0
	Bank of Sharjah	1	1	1	1	1	1	1	1
	Commercial Bank International P.S.C.	1	1	1	1	1	1	1	1
	Emirates Bank International PJSC	1	1	1	1	1	1	1	1
	Mashreqbank	1	1	1	1	1	1	1	1
	National Bank of Abu Dhabi	1	1	1	1	1	1	1	1
	National Bank of Fujairah	1	1	1	1	1	1	1	1
	National Bank of Umm Al-Qaiwain	1	1	1	1	1	1	1	1
	BLC Bank (France) SA.	0	0	1	1	0	0	0	0
Non GCC Countries									
Egypt	Banque Misr SAE	1	1	1	1	1	1	1	1
	Egyptian American Bank	1	1	1	1	1	1	0	0
	Al Watany Bank of Egypt	1	1	1	1	1	1	1	1
Indonesien	Bank Sumitomo Mitsui Indonesia	1	1	1	1	1	1	1	1
	Bank Bumiputera Indonesia	1	1	1	1	1	1	1	0
Malaysia	Public Bank Berhad	1	1	1	1	1	1	1	1
	Citibank Berhad	1	1	1	1	1	1	1	1
	Affin Bank	1	1	1	1	1	1	1	1
Turkey	Sekerbank	0	1	1	1	1	1	1	1
	Eurobank Tekfen	1	1	1	1	1	1	1	0
	Turkish Bank A.S.	0	0	1	1	1	1	1	0
	Observations per year	37	39	41	41	40	40	40	36

Source: Own illustration based on Bankscope, Bureau van Dijk Electronic Publishing

Table 5

Sample of Western banks in the descending order over the period from 2000 to 2007.

Observation	Bank	Average Total Assets in Mil. USD (2000-2007)
1	National Commercial Bank (The)	35376,50
2	Samba Financial Group	26492,88
3	Public Bank Berhad	25579,38
4	Riyad Bank	21383,13
5	Gulf International Bank BSC	20072,00
6	National Bank of Abu Dhabi	18098,75
7	Banque Misr SAE	17294,38
8	Banque Saudi Fransi	16114,25
9	Saudi British Bank (The)	15915,00
10	Emirates Bank International PJSC	15018,38
11	Qatar National Bank	13547,13
12	Abu Dhabi Commercial Bank	13333,75
13	Mashreqbank	10808,88
14	Ahli United Bank BSC	10608,38
15	Gulf Bank KSC (The)	9498,00
16	Saudi Hollandi Bank	9081,38
17	Citibank Berhad	8581,25
18	Commercial Bank of Kuwait SAK (The)	8026,00
19	Saudi Investment Bank (The)	7544,88
20	Affin Bank	6158,63
21	Bank of Kuwait & The Middle East (The)	5382,88
22	BBK B.S.C.	3787,75
23	Doha Bank	3655,25
24	Sekerbank	3294,14
25	Boubyan Bank	2238,00
26	Egyptian American Bank	1714,17
27	Al Masraf-Arab Bank for Investment & Foreign Trade	1602,00
28	Ahli Bank QSC	1546,38
29	Al Watany Bank of Egypt	1433,38
30	National Bank of Fujairah	1429,00
31	Commercial Bank International P.S.C.	1292,13
32	Bank of Sharjah	1247,00
33	International Bank of Qatar	1085,40
34	National Bank of Umm Al-Qaiwain	911,00
35	Bank Sumitomo Mitsui Indonesia	604,30
36	Bahraini Saudi Bank	485,00
37	TAIB Bank B.S.C.	457,63
38	Turkish Bank A.S.	325,04
39	Bank Bumiputera Indonesia	319,08
40	Eurobank Tekfen	236,50
41	BLC Bank (France) SA.	103,50
42	Bahrain Financing Company	48,50
Total		341730.96

Source: Bankscope, Bureau van Dijk Electronic Publishing

Table 6

Descriptive statistics on average for the sample of Islamic banks over the period from 2000 to 2007.

	LTG	EQ/TA	EQ/Li	LLR/GL	LLP/GL	NL/CSTF	TA	GDP/CAP	FI	ΔGDP
Sample 1: Complete										
Mean	71.5	16.8957	33.4235	4.4614	0.71	84.4536	1.00E+10	24004.01	64.9905	7.276917
Median	74.79	13.11	16.46	3.53	0.49	77.895	2.06E+09	22962.94	64.9	6.4955
Std. Dev.	17.2212	13.1163	65.1803	3.7720	0.7356	49.4605	5.11E+10	16335.21	7.0629	3.5616
Maximum	92.1071	72.79	398	15.84	3	384.53	4.68E+11	70754.28	76.3	17.723
Minimum	16.6423	2.97	3.07	0	-0.31	21	69000000	1099.670	51.5	1.695
Observations	84	84	84	84	84	84	84	84	84	84
Sample 2: GCC Countries										
Mean	68.0284	19.2754	39.5102	4.3475	0.5835	85.3607	1.20E+10	29196	67.5324	7.8595
Median	70.9520	15.9	18.91	3.465	'0.41	73.565	2.10E+09	27312.55	66.45	7.549
Std. Dev.	17.2773	13.4552	71.1520	3.9484	0.6207	544.377,00	5.67E+10	13650.49	5.1529	3.6828
Maximum	88.6228	72.79	398	15.84	2.14	384.53	4.68E+11	70754.28	76.3	17.723
Minimum	16.6423	6.94	7.61	0	-0.31	21	69000000	11126.52	60	1.695
Observations	68	68	68	68	68	68	68	68	68	68
Sample 3: Large Banks										
Mean	72.89	15.3708	21.6239	4.8287	0.583	78.3893	1.24E+10	26653.27	66.1478	7.5039
Median	74.4334	14.17	16.51	3.71	0.42	73.82	2.51E+09	27006.04	65.2	6.653
Std. Dev.	14.6164	8.3958	18.5483	3.8223	0.5604	35.695	5.71E+10	15735.20	6.4296	3.8595
Maximum	92.1071	44.83	97.77	15.84	2.14	210.2	4.68E+11	70754.28	76.3	17.723
Minimum	16.6423	2.97	3.07	0.33	-0.31	21	4.89E+08	1136.620	51.5	1.695
Observations	67	67	67	67	67	67	67	67	67	67

Source: Own illustration based on Bankscope, Bureau van Dijk Electronic Publishing

Variable definitions: LTG = liquidity transformation gap; EQ/TA = equity to total assets; EQ/LI = equity to total assets; NL/CSTF = net loans to customer and short term funding; LLR/GL = loan loss reserves to gross loans; LLP/GL = loan loss provisions to gross loans; log(TA) = natural logarithm of total assets; FI = Heritage Foundation/Wall Street Journal economic freedom index; GDP/CAP = gross domestic product per capital; ΔGDP = annual change of gross domestic product. The subsample of GCC countries consists of 28 banks and includes 16 large banks with total assets > 1 Billion US-Dollars. The subsample of large banks consists of 22 banks in which 16 are from countries of GCC.

Table 7

Descriptive statistics on average for the sample □f Western banks over the period 2000-2007.

	LTG	EQ/TA	EQ/LI	LLR/GL	LLP/GL	NL/CSTF	TA	GDP/CAP	FI	ΔGDP
Sample 1: Complete										
Mean	63.49689	13.91547	17.36701	8.043□13	0.872292	65.13709	1.05E+10	19644.95	65.49199	6.457478
Median	70.3□526	12.34500	14.19000	4.265000	0.530401	65.76000	6.67E+09	16386.95	65.20000	5.644000
Maximum	90.47086	45.19000	82.44000	54.37000	21.24685	156.1700	5.57E+10	70754.28	76.30000	17.72300
Minimum	-22.83776	3.260000	3.370000	0.200000	-14.35556	5.020000	91800000	772.6600	51.50000	0.128000
Std. Dev.	24.29799	7.021253	11.58927	9.027609	2.031493	21.19952	1.10E+10	14456.45	6.443179	3.852.668
Observations	278	278	278	278	278	278	278	278	278	278
Sample 2: GCC Countries										
Mean	68.44860	14.98071	18.78662	8.374178	0.755215	64.07796	9.74E+09	23615.60	67.41378	6.771196
Median	73.26387	12.92000	15.00000	4.260000	0.474611	64.14000	6.41E+09	21685.14	66.40000	6.323000
Maximum	90.47086	45.19000	82.44000	54.37000	21.24685	156.1700	5.57E+10	70754.28	76.30000	17.72300
Minimum	-3.565363	4.070000	4.240000	0.200000	-14.35556	5.020000	91800000	8736.410	60.00000	0.128000
Std. Dev.	18.16554	6.864810	11.69386	9.593447	2.101596	21.07256	1.02E+10	13214.32	5.215065	4.140771
Observations	225	225	225	225	225	225	225	225	225	225
Sample 3: Large Banks										
Mean	65.16096	12.43739	14.79429	6.654202	0.793262	64.26160	1.22E+10	20703.31	65.51597	6.503307
Median	71.06841	11.88000	13.51500	4.105000	0.528326	64.78500	8.48E+09	18215.09	64.60000	5.709500
Maximum	90.47086	33.43000	50.21000	38.59000	8.284000	119.6900	5.57E+10	70754.28	76.30000	17.72300
Minimum	-22.83776	3.260000	3.370000	0.200000	-1.008586	23.97000	2.87E+08	1136.620	51.50000	0.128000
Std. Dev.	23.83186	4.997368	7.453871	6.364698	1.099007	17.12313	1.11E+10	14645.78	5.712249	4.046414
Observations	238	238	238	238	238	238	238	238	238	238

Source: Own illustration based on Bankscope, Bureau van Dijk Electronic Publishing

Variable definitions: LTG = liquidity transformation gap; EQ/TA = equity to total assets; EQ/LI = equity to total assets; NL/CSTF = net loans to customer and short term funding; LLR/GL = loan loss reserves to gross loans; LLP/GL = loan loss provisions to gross loans; log(TA) = natural logarithm of total assets; FI = Heritage Foundation/Wall Street Journal economic freedom index; GDP/CAP = gross domestic product per capital; ΔGDP = annual change of gross domestic product. The subsample of GCC countries consists of 31 banks and includes 26 large banks with total assets > 1 Billion US-Dollars. The subsample of large banks consists 33 banks in which 26 are from countries of GCC.

Table 8: Complete Sample of Islamic Banks.
OLS estimations with the specification of cross-section fixed effects for the whole sample over the period from 2000 to 2007. We perform here four regression models to test for robustness with alternative measures for risk and for leverage.

Dependent variable: LTG

	(1)	(2)	(3)	(4)
Bank individual variables				
EQ/TA	-0.402566***		-0.326442**	
	(0.0044)		(0.0363)	
EQ/LI		-0.127259**		-0.069045
		(0.0487)		(0.3450)
NL/CSTF	-0.148389***	-0.109014**	-0.184548***	-0.169024***
	(0.0000)	(0.0123)	(0.0000)	(0.0010)
LLR/GL	-0.260499***	-0.240578***		
	(0.0001)	(0.0009)		
LLP/GL			-0.593996*	-0.544220
			(0.0984)	(0.1487)
Log(TA)	4.270347***	4.014481***	1.451725	1.872440
	(0.0001)	(0.0005)	(0.6598)	(0.5874)
Macro variables				
FI	-0.215568	-0.325717	-0.553809	-0.667559
	(0.4512)	(0.2616)	(0.1880)	(0.1225)
GDP/CAP	-0.000746***	-0.000767***	-0.000588	-0.000651***
	(0.0000)	(0.0000)	(0.0057)	(0.0033)
ΔGDP	-0.006418	-0.064143	-0.208016	-0.242049
	(0.9811)	(0.8172)	(0.4767)	(0.4200)
Constant	27.08575	33.61144	112.5592	107.8517
	(0.3619)	(0.2687)	(0.1976)	(0.2311)
Observations	112	110	93	93
Adjusted R²	0.943	0.9349	0.8685	0.861

***.** and * indicate significance respectively at the 1%. 5%. 10% levels.

p Values are in parantheses.

Variable definitions: LTG = liquidity transformation gap; EQ/TA = equity to total assets; EQ/LI = equity to total assets; NL/CSTF = net loans to customer and short term funding; LLR/GL = loan loss reserves to gross loans; LLP/GL = loan loss provisions to gross loans; log(TA) = natural logarithm of total assets; FI = Heritage Foundation/Wall Street Journal economic freedom index; GDP/CAP = gross domestic product per capital; ΔGDP = annual change of gross domestic product. The subsample of GCC countries consists of 28 banks and includes 16 large banks with total assets > 1 Billion US-Dollars. The subsample of large banks consists of 22 banks in which 16 are from countries of GCC.

Table 9: Subsample of Islamic banks from GCC.

OLS estimations with the specification of cross-section fixed effects for the subsample for Islamic banks from GCC countries over the period from 2000 to 2007. We perform here four regression models to test for robustness with alternative measures for risk and for leverage.

Dependent variable: LTG

	(1)	(2)	(3)	(4)
Bank individual variables				
EQ/TA	-0.392324***		-0.299779*	
	(0.0023)		(0.0842)	
EQ/LI		-0.108098*		-0.055636
		(0.0701)		(0.4973)
NL/CSTF	-0.129265***	-0.101431**	-0.185490***	-0.175255***
	(0.0000)	(0.0183)	(0.0000)	(0.0023)
LLR/GL	-1.891029***	-1.828754***		
	(0.0000)	(0.0000)		
LLP/GL			-0.616748	-0.581806
			(0.1226)	(0.1654)
Log(TA)	3.893861***	3.570554***	1.945541	2.496614
	(0.0003)	(0.0017)	(0.6509)	(0.5810)
Macro variables				
FI	0.157466	0.005456	-0.533328	-0.645479
	(0.5821)	(0.9853)	(0.2827)	(0.2033)
GDP/CAP	-0.000602***	-0.000626***	-0.000618**	-0.000688**
	(0.0000)	(0.0000)	(0.0203)	(0.0137)
ΔGDP	-0.074236	-0.144743	-0.191475	-0.218423
	(0.7630)	(0.5765)	(0.5673)	(0.5247)
Constant	1.796089	28.62351	102.3100	95.40135
	(0.5601)	(0.3746)	(0.3649)	(0.4139)
Observations	82	80	76	76
Adjusted R²	0.9159	0.8795	0.8397	0.8314

***.** and * indicate significance respectively at the 1%. 5%. 10% levels.

p Values are in parantheses.

Variable definitions: LTG = liquidity transformation gap; EQ/TA = equity to total assets; EQ/LI = equity to total assets; NL/CSTF = net loans to customer and short term funding; LLR/GL = loan loss reserves to gross loans; LLP/GL = loan loss provisions to gross loans; log(TA) = natural logarithm of total assets; FI = Heritage Foundation/Wall Street Journal economic freedom index; GDP/CAP = gross domestic product per capital; ΔGDP = annual change of gross domestic product. The subsample of GCC countries consists of 28 banks and includes 16 large banks with total assets > 1 Billion US-Dollars. The subsample of large banks consists of 22 banks in which 16 are from countries of GCC.

Table 10: Subsample of large Islamic banks with total assets > 1 Billion US-Dollar.

OLS estimations with the specification of cross-section fixed effects for the subsample of large banks over the period from 2000 to 2007. We perform here four regression models to test for robustness with alternative measures for risk and for leverage.

Dependent variable: LTG

	(1)	(2)	(3)	(4)
Bank individual variables				
EQ/TA	-0.457682***		-0.536995**	
	(0.0071)		(0.0397)	
EQ/LI		-0.307082***		-0.480816***
		(0.0001)		(0.0000)
NL/CSTF	-0.178987***	-0.114928***	-0.290584***	-0.158248***
	(0.0000)	(0.0021)	(0.0000)	(0.0001)
LLR/GL	-1.584484***	-1.120860***		
	(0.0000)	(0.0013)		
LLP/GL			-0.987751***	-0.736902**
			(0.0046)	(0.0126)
Log(TA)	3.896053***	3.018253***	5.572271	2.989257
	(0.0001)	(0.0016)	(0.2008)	(0.3906)
Macro variables				
FI	0.093232	0.103387	-0.301002	-0.073003
	(0.7294)	(0.6705)	(0.4531)	(0.8310)
GDP/CAP	-0.000550***	-0.000442	-0.000561**	-0.000253
	(0.0000)	(0.0002)	(0.0488)	(0.2615)
ΔGDP	-0.052450	-0.076958	-0.099877	-0.141951
	(0.8146)	(0.7119)	(0.7167)	(0.5428)
Constant	23.70404	32.12534	16.42586	42.43628
	(0.3969)	(0.2166)	(0.8785)	(0.6233)
Observations	82	82	74	74
Adjusted R²	0.891	0.9037	0.8327	0.8803

***,** and * indicate significance respectively at the 1%, 5%, 10% levels.

p Values are in parantheses.

Variable definitions: LTG = liquidity transformation gap; EQ/TA = equity to total assets; EQ/LI = equity to total assets; NL/CSTF = net loans to customer and short term funding; LLR/GL = loan loss reserves to gross loans; LLP/GL = loan loss provisions to gross loans; log(TA) = natural logarithm of total assets; FI = Heritage Foundation/Wall Street Journal economic freedom index; GDP/CAP = gross domestic product per capital; ΔGDP = annual change of gross domestic product. The subsample of GCC countries consists of 28 banks and includes 16 large banks with total assets > 1 Billion US-Dollars. The subsample of large banks consists of 22 banks in which 16 are from countries of GCC.

Table 11: Complete Sample of Western Banks.

OLS estimations with the specification of cross-section fixed effects for the whole sample over the period from 2000 to 2007. We perform here four regression models to test for robustness with alternative measures for risk and for leverage.

Dependent variable: LTG

	(1)	(2)	(3)	(4)
Bank individual variables				
EQ/TA	-1.0434***		-1.0917***	
	(0.0000)		(0.0001)	
EQ/LI		-0.6144***		-0.6017***
		(0.0000)		(0.0001)
NL/CSTF	-0.0651	-0.0703	-0.0769	-0.0900
	(0.4561)	(0.4195)	(0.3351)	(0.2582)
LLR/GL	0.1067	0.1393		
	(0.5441)	(0.4327)		
LLP/GL			-0.1927	-0.0327
			(0.6474)	(0.9376)
Log(TA)	-3.2735	-3.0978	-4.2929	-3.924
	(0.3476)	(0.3722)	(0.2307)	(0.2705)
Macro variables				
FI	-0.0823	-0.1372	-0.1303	-0.1828
	(0.7833)	(0.6473)	(0.6652)	(0.5457)
GDP/CAP	-0.0001	-0.0001	-0.0001	-0.0001
	(-0,6453)	(0.6384)	(0.6972)	(0.6612)
ΔGDP	0.1612	0.1523	0.1374	0.1247
	(0.5020)	(0.5250)	(0.5697)	(0.6058)
Constant	160.451*	156.4664*	188.8049**	180.28**
	(0.0627)	(0.0684)	(0.0317)	(0.0391)
Observations	284	284	279	279
Adjusted R²	0.7505	0.7508	0.7513	0.7509

***,** and * indicate significance respectively at the 1%. 5%. 10% levels.

p Values are in parantheses.

Variable definitions: LTG = liquidity transformation gap; EQ/TA = equity to total assets; EQ/LI = equity to total assets; NL/CSTF = net loans to customer and short term funding; LLR/GL = loan loss reserves to gross loans; LLP/GL = loan loss provisions to gross loans; log(TA) = natural logarithm of total assets; FI = Heritage Foundation/Wall Street Journal economic freedom index; GDP/CAP = gross domestic product per capital; ΔGDP = annual change of gross domestic product. The subsample of GCC countries consists of 31 banks and includes 26 large banks with total assets > 1 Billion US-Dollars. The subsample of large banks consists of 33 banks in which 26 are from countries of GCC.

Table 12: Subsample of Western Banks from GCC.

Dependent variable: LTG

OLS estimations with the specification of cross-section fixed effects for the subsample for Islamic banks from GCC countries over the period from 2000 to 2007. We perform here four regression models to test for robustness with alternative measures for risk and for leverage.

	(1)	(2)	(3)	(4)
Bank individual variables				
EQ/TA	-1.0343***		-1.0117***	
	(0.0002)		(0.0005)	
EQ/LI		-0.6471***		-0.598***
		(0.0000)		(0.0002)
NL/CSTF	-0.1922*	-0.1962*	-0.2264**	-0.24**
	(0.0698)	(0.0618)	(0.0210)	(0.014)
LLR/GL	0.1628	0.2218		
	(0.4284)	(0.2852)		
LLP/GL			-0.0013	-0.0002
			(0.7788)	(0.9709)
Log(TA)	0.0786	-0.0509	-0.5376	-0.8976
	(0.9867)	(0.9913)	(0.9079)	(0.8464)
Macro variables				
FI	0.1279	0.0645	0.0869	0.0143
	(0.7053)	(0.8482)	(0.7951)	(0.9658)
GDP/CAP	-0.0002	-0.0001	-0.0002	-0.00014
	(0.5497)	(0.6017)	(0.5218)	(0.5811)
ΔGDP	0.1978	0.1997	0.1825	0.1727
	(0.4439)	(0.4366)	(0.4794)	(0.5007)
Constant	86.719	89.8195	106.923	116.223
	(0.4486)	(0.4290)	(0.3381)	(0.2966)
Observations	225	225	225	225
Adjusted R²	0.5286	0.5342	0.5272	0.5313

***,** and * indicate significance respectively at the 1%, 5%, 10% levels.

p Values are in parantheses.

Variable definitions: LTG = liquidity transformation gap; EQ/TA = equity to total assets; EQ/LI = equity to total assets; NL/CSTF = net loans to customer and short term funding; LLR/GL = loan loss reserves to gross loans; LLP/GL = loan loss provisions to gross loans; log(TA) = natural logarithm of total assets; FI = Heritage Foundation/Wall Street Journal economic freedom index; GDP/CAP = gross domestic product per capital; ΔGDP = annual change of gross domestic product. The subsample of GCC countries consists of 31 banks and includes 26 large banks with total assets > 1 Billion US-Dollars. The subsample of large banks consists of 33 banks in which 26 are from countries of GCC.

Table 13: Subsample of large Western banks with total assets > 1 Bill. US-Dollar.

OLS estimations with the specification of cross-section fixed effects for the subsample of large banks over the period from 2000 to 2007. We perform here four regression models to test for robustness with alternative measures for risk and for leverage.

Dependent variable: LTG

Variable

	(1)	(2)	(3)	(4)
Bank individual variables				
EQ/TA	-0.9008**		-1.11***	
	(0.0129)		(0.0042)	
EQ/LI		-0.6710***		-0.7811***
		(0.0071)		(0.0031)
NL/CSTF	-0.0844	-'0.0784	-0.1772*	-0.1758*
	(0.4120)	(0.444)	(0.0782)	(0.08)
LLR/GL	0.7249***	0.7395***		
	(0.006)	(0.0049)		
LLP/GL			-1.149	-1.1078
			(0.2643)	(0.2792)
Log(TA)	-4.0004	-3.7624	-4.7889	-4.3838
	(0.3034)	(0.3308)	(0.2439)	(0.2837)
Macro variables				
FI	-0.3033	-0.3058	-0.2986	-0.3047
	(0.3564)	(0.3502)	(0.3784)	(0.3676)
GDP/CAP	0.0002	0.0001	-0.0004	-0.0005
	(0.5153)	(0.5382)	(0.8822)	(0.8221)
ΔGDP	0.1809	0.1927	0.125	0.1325
	(0.4764)	(0.4476)	(0.6319)	(0.6111)
Constant	182.9535*	176.0914*	219.2906**	208.4774**
	(0.059)	(0.0679)	(0.0321)	(0.0405)
Observations	244	244	238	238
Adjusted R²	0.7307	0.7321	0.7229	0.7236

***,** and * indicate significance respectively at the 1%, 5%, 10% levels.

p Values are in parantheses.

Variable definitions: LTG = liquidity transformation gap; EQ/TA = equity to total assets; EQ/LI = equity to total assets; NL/CSTF = net loans to customer and short term funding; LLR/GL = loan loss reserves to gross loans; LLP/GL = loan loss provisions to gross loans; log(TA) = natural logarithm of total assets; FI = Heritage Foundation/Wall Street Journal economic freedom index; GDP/CAP = gross domestic product per capital; ΔGDP = annual change of gross domestic product. The subsample of GCC countries consists of 31 banks and includes 26 large banks with total assets > 1 Billion US-Dollars. The subsample of large banks consists of 33 banks in which 26 are from countries of GCC.