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The role of Islamic banks subsidiaries in the transmission of liquidity shocks across countries

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Abstract - This paper studies the international transmission of bank liquidity shocks from multinational Islamic bank-holding companies to their subsidiaries. Based on a total sample of 120 Islamic and conventional bank subsidiaries, we test whether foreign bank lending is determined by different factors for Islamic and conventional banks. We estimate a model that includes subsidiary and parent bank characteristics as well as host and home country variables. Our empirical findings show that conventional parent bank fragility negatively affects lending by their subsidiaries. Nevertheless, we show that the parent Islamic bank does not significantly affect lending by subsidiaries. Finally, we examine the existence of market discipline in relation to the transmission of liquidity shocks. We further find that reduction in foreign Islamic bank lending is stronger for those that are dependent on the interbank market. We find that the depositors react to a deterioration of bank performance and punish their institutions by withdrawing money. We show that market discipline plays a more important role for Islamic banks whereas liquidity needs determine the change in for conventional banks.

Keywords: Islamic banks, credit supply, market discipline
JEL Codes: F15, F34, D4, G21, L1, N25

1. Introduction

The transmission of liquidity shocks of banks has been a widely discussed issue for several years. Most studies have investigated this issue in the context of developed and emerging countries in periods of crisis (Claessens et al., 2001, Haas and van Lelyveld 2010, Allen et al., 2012). The management of liquidity risk is at the heart of the control of banking system stability for the monetary authorities. Cetorelli and Goldberg (2012) suggest that banks' liquidity management may globally increase the international propagation of domestic liquidity shocks. This risk is more note worthy through the presence of foreign subsidiaries in the economy. Indeed, another stream of literature has identified a transmission of liquidity shocks between countries through bank subsidiaries.

This issue is of major importance for monetary authorities mainly for two reasons. First, the transmission of liquidity shocks is a systemic aspect. Thus, the distress of a small number of banks can lead to a systemic risk that affects the entire banking sector in the country. Second, with the evolution of the number of international banks, the strategy of subsidiaries in hostile countries may be affected by loans and deposit policies of parent banks. Based on the imperfections noted in the contractual relationship between capital providers and borrowers, the literature has introduced a new transmission channel to explain the propagation of monetary shocks from financial sphere to the real economy.

In this article, we aim to analyze the determinants of lending behavior of foreign subsidiaries in Islamic countries. In this context, we compare the effect of conventional and Islamic subsidiaries for the transmission of liquidity shocks to the host country by testing whether loans of foreign subsidiaries of Islamic and conventional banks are determined by the same set of factors. Moreover, we are willing to detail further analysis by examining market discipline exerted by depositors on Islamic and conventional subsidiaries. We attempt to test whether the characteristics of the parent bank and subsidiaries may explain the behavior of depositors in host countries.

The problem of liquidity shocks' transmission, in the context of Islamic banks, is very important to be addressed for two reasons. First, the development of Islamic finance has largely been catalyzed by the development of Islamic subsidiaries in several countries and the weight of these foreign subsidiaries may destabilize the banking sector in the host country. Secondly, the effect of foreign Islamic subsidiaries on the transmission of liquidity shocks from the country of origin to host countries has not been tested in the literature.

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In an Islamic financial system – as depositors share the risk with the bank and loans are based on the nature of the assets – this may contribute to market discipline and banking stability. The liquidity management is also relevant to an Islamic bank that holds illiquid assets, while its debts are liquid, while maintaining the value of its liabilities. Thus, since Islamic banks have the same structure and characteristics of the balance sheet of commercial banks, they are not immunized against liquidity risk. The potential mismatch between deposits and investment financing exposes Islamic banks to liquidity problems. Generally, banks maintain liquidity too much to avoid falling into liquidity problems; this may affect its profitability. Thus, creating a balance between the two objectives of safety and efficiency is at the heart of the problem of liquidity management.

Certainly, Islamic finance prohibits the payment and receipt of interest at an in advance fixed rate and forbids speculation principles that promote the stability of the financial system. However, the Islamic banks in the financial system are fraught with risks that differ in many respects from those caused by conventional banks as a liquidity risk.

Since Islamic banks are based in their operation on the connection between financial transactions and economic assets in accordance with the *Shariah*, they perform the same activity of mediation as conventional banks, except they do it with more constraints. The inability to comply with fixed income associated with low availability of Shariah compliant products, further limiting liquidity management's fields to be less risky for the bank and therefore the economy. Our objective is to address the role of Islamic bank subsidiaries in the transmission of loan and deposit checks on host countries by using aggregate data. We also evaluate the market discipline exerted by depositors on conventional and Islamic subsidiaries mainly in a period of crisis. To our knowledge, no study in the literature review has focused on the study of the credit channel between Islamic parent banks and their subsidiaries.

The rest of the paper is organized as follows. The second section provides the basic background on the role of Islamic and conventional subsidiaries in the transmission of liquidity shocks. In this section we highlight also studies focusing on the market discipline exerted on Islamic banks. The third section describes the nature of the data and empirical methodology used in this study. The forth section presents the empirical findings. Section five concludes.

2. Lending shock transmission by Islamic bank subsidiaries and market discipline

In this section we present the theoretical framework in which the problem of transmission of credit through Islamic subsidiaries was studied. We also present a literature review of research interested in the study of market discipline in the context of Islamic banks.

Lending shock transmission by Islamic bank subsidiaries

Our study is related to growing literature documenting the role of bank lending channels in the transmission of liquidity shocks internationally. Bank subsidiaries may affect the economies of the host country in two ways. First, a crisis liability that often occurs as banks panic in response to the random nature of depositor's withdrawals. This is based on the polarization of depositors' expectations and surely marks the limits of the policy's deployment. Second, a crisis of assets which is due to the irreversibility of the lending relationship: if a negative shock affects the profitability or chronic repayments for loans already made, then the bank is facing a liquidity risk, which itself may cause a race to liquidity.

Brokering activities of Islamic banks can reduce the contagion of liquidity between parent banks and their subsidiaries. Indeed, the modes of charged credit by Islamic banks, based on sales, do not include direct loans, rather, purchase, sale or installment sale including real estate and services. Shariah law imposed a number of conditions for the validity of these transactions to ensure that the seller also shares part of the risk, and in order to prevent these modes, borrowing and lending are considered the foundation of interest. One of these conditions is that the seller must own the property for sale and that Shariah law does not allow the bank to sell it. Once the seller has acquired ownership of the property subject of the sale on credit, he assumes the risk. Therefore, all sales are automatically excluded from incomplete Islamic contracts. Islamic finance can grow along with the expansion of the real economy and thus assist in decreasing the excessive credit growth is one of the main causes of the instability of international financial markets.

Loans of subsidiaries contribute to the financing of the growing demand for domestic credit. Heavy dependence on external capital exposes the foreign subsidiaries to the risk of non-renewal funding, even at the risk of sudden withdrawal of capital. The experienced liquidity crisis by the global banking system during the financial year 2008–2009 had particularly affected Muslim countries. Financing difficulties of parent banks and risk premiums rising have reduced funding for subsidiaries. In addition, the deterioration of the general economic situation led foreign banks to re-evaluate the risks in host markets and tougher lending conditions abroad.

Concerning the faced risks by depositors in the banking system, the latter requires the creation of a certain psychological confidence to their banks in order to strengthen the relationship between the two. This requires, on the one hand, confidence in the macro-economic health of the economy, and, on the other hand, confidence in the safety and soundness of the financial system and institutions with which the depositors deal. The first condition can be assured by the implementation of healthy monetary, fiscal and exchange policies, while the second can be achieved by providing greater market discipline in the banking sector. These elements need to be further strengthened by prudential regulation and effective control, emphasizing a particular way on the capital adequacy assessment and appropriate management of risk, internal control and external audit trying to achieve further efficiency and transparency. It is also necessary to improve and streamline the administration of companies, so those funds received by banks and firms are used more effectively to the ultimate benefit of both the financer and the user.

Khan and Khanna (2010) and Baele, Farooq and Ongena (2010) argue that Islamic banks have particular specificities

to attract deposits and lend under interest free contracts that attract depositors and borrowers for religious reasons. These contractual characteristics and motivation on both liability and asset sides may allow Islamic banks to protect themselves from liquidity shocks.

In this paper we aim to investigate the difference between Islamic and conventional bank subsidiaries' in the transmission of liquidity shock to host countries. Our work is related to a growing literature documenting the role of bank lending channels in the transmission of liquidity shocks internationally.

The majority of previous research studies interested in the role of subsidiaries and in the transmission of shocks have been conducted on conventional banks. Arvai et al. (2009) presented two different contagious channels that can be carried through inter-bank linkages and parent/subsidiaries relationships. In the case of the first channel, the problems of liquidity or solvency of a subsidiary may affect its parent, which feeds back on its other subsidiaries in other host countries through the channel of the common creditor. The parent banks of subsidiaries operating in host countries are in spin affected. A variant of this channel implies also that a subsidiary wants to reduce its exposure for reasons of portfolio diversification. This translates to withdrawals of deposits or the rising cost of financing the subsidiary, which can cause liquidity problems and affect, through the money market, other banks in the host country, as well as their parent and the markets in which they are active. In the case of the second channel, the problems of liquidity or solvency of the parent affect its subsidiaries, which is propagated by inter-bank linkages or through distrust in the banking system, the banks of the host country, in turn, impact their respective parent companies.

Shnabl (2011) suggests that the efficient market theory highlights that as long as investment opportunities are constant, shocks to financial institutions in one market should not affect lending in other markets. If financing frictions prevent financial institutions from accessing alternative financing sources to cover shortfalls, then liquidity shocks in one market may affect lending in other markets. Cetorelli and Goldberg (2012) show that the critical description of the bank lending channel is that banks' experience of a funding shock. If they cannot substitute liabilities with other external funding sources, such as by issuing certificates of deposit or attracting money market funds, the shock is transmitted to the asset's side of their balance sheets. Martinez Peria et al. (2002) and Haas and van Lelyveld (2006, 2010) suggest that subsidiary banks do not change their lending strategies in times of local crisis.

Bernanke and Blinder (1988), Bernanke (1983) and Bernanke and James (1991) tested the relationship between liquidity and changes in loans. They demonstrate that changes in the liquidity have real consequences on loan strategies of banks. However, these studies have ignored a number of variables such as economy-wide productivity shocks that affect both changes in supply and demand of loans at the same time. Loupias, Savignac and Sevestre (2003), Worms (2003) and Gambacorta (2005) show that liquidity positions of banks affect how banks react to a monetary shock in several European countries.

Claessens et al. (2001) suggest that foreign subsidiaries may be a factor of a financial instability. Infact, the relaxation of restrictions on foreign bank's entry can bring risks. Particularly, by increasing competition and thereby lowering the profits of domestic banks, foreign entry may reduce charter values of domestic banks, making them more vulnerable. This may have a destabilizing effect on the financial system, especially if the domestic prudential regulations and supervision are not sturdy.

From a public policy standpoint, Peek J. and E. Rosengren (1997) indicate that global bank credit flow is influenced by both domestic and foreign conditions. Moreover, a bank's capitalization will not be a sufficient statistic for predicting its willingness to lend. Nonperforming loans, even those yet to be reflected in capital ratios, or publicly disclosed, can alter the willingness of global banks to lend.

Several studies have addressed the role of conventional banks in the transmission of liquidity shocks. Kashyap and Stein (1999) find that, following a monetary contraction, small banks whose balance sheets are liquid reduce lending less than other small banks and large banks to maintain their lending irrespective of their liquidity positions.

In light of this synthesis, this paper contributes to the existing literature by exploring the role of foreign Islamic subsidiaries in the transmission of liquidity shocks. We also examine whether depositors exert market discipline effect on Islamic banks' subsidiaries. We address this issue by testing whether depositors are sensitive to the risk of Islamic subsidiaries in host country.

3. Market discipline of Islamic subsidiaries

Market discipline can be described as a situation in which depositors penalize riskier banks by withdrawing deposits. Both conventional and Islamic banks offer similar products and services, but the underlying contracts are different. For conventional banks, deposit and financing are based on the loan agreements. In contrast, Islamic banks provide their deposits and financing based on Islamic contract as *wadi'ah, Mudarabah, Musharakah* and *Murabahah*. The major reason why such practices are performed is that the interest is for bidden in Islam, and these products can prevent interest rates from being applied to transactions. Thus, this unique feature of Islamic finance has introduced a new way for the banking industry, and it affects all involved parties in the industry, including depositors, investors and borrowers.

Moreover, all these principles of Islamic finance are mainly based on risk-sharing between banks and their counter parties, which makes the risk's control adopted by the bank, one of the depositors' concerns. This allows us to prejudge that market discipline exerted by depositors on Islamic banks will be more pronounced than that exerted on conventional banks.

Market discipline was stated by the Basel regulatory framework as one of the three pillars required for the stability of the international financial system. The Islamic system is trying to achieve this discipline by ensuring that banks share risk with their depositors that contribute directly or indirectly to the risks of banking activities. Risk

sharing should help motivate depositors to carefully choose the bank where they invest their money and ask for more transparency of the chosen bank. It should also pressure banks to initiate an in-depth analysis of their credits and to make more effective management of their risks.

Heavy dependence on external capital exposes subsidiaries in host countries to the risk of non-renewal of funding (funding risk), even at the risk of sudden withdrawal of capital. The liquidity crisis experienced by the global banking system in 2008–2009 has particularly affected Muslim countries. Financing difficulties of parent banks and rising risk premiums have reduced funding for subsidiaries. In addition, the deterioration of the general economic situation led foreign banks to re-evaluate the risks in emerging markets and set tougher lending conditions abroad. Zaheer, Ongena and van Wijnbergen (2011) suggest that Islamic banks may be unable to buy wholesale deposits at a fixed rate and that these cannot be considered along with their Islamic loans substitutable securities that they hold in their portfolios. This can make the transmission of liquidity shocks across the Islamic banking segment more powerful.

Khaf (1996) illustrates that the proportion of deposits in Islamic banks is generally estimated to be higher than in conventional banks. Banks use the funds without remunerating the depositors. He suggested that Islamic banks must either share revenues with investors or reduce their dependence on these deposits. In addition, there must be someone who will bear the losses and ensure the safety of those deposits. Capital must be sufficient to absorb losses since most of banks are capitalized, and this lowers the charge on the depositors.

Depending on the funding strategy adopted, parents' banks can delegate more responsibility to their subsidiaries in terms of collecting deposits in host countries. Consequently, parent banks isolate their foreign subsidiaries by reducing the available funding. In many countries, the reduction in funding foreign subsidiaries may have destabilized the entire system. According to Herring (2007), the situation is even more serious when the foreign subsidiaries with significant shares in host markets become systemically important, while at the same time, they are not so important for the parent bank because of their small size relative to multinational banking groups.

Jacklin and Bhattacharya (1988) and Diamond and Dybvig (1983) support that failure to respond to liquidity problems can not only cause bank insolvency in the short term, but can also induce contagion effects. The risk undergoing by the banking system is that the failure of an insolvent bank can lead depositors of other banks to withdraw their deposits. Mokhtar, Smith and Wolfe (2003) argue that investment depositors at Islamic banks face the same things depositors of conventional banks face about loan loss provisions. They suggest that this is particularly of major interest because the investor would like to know the risks that their investments are exposed to. Habib (2003) discusses the implications of variable rate of return on the behavior of depositors and identifies a withdrawal risk that Islamic banks face. He argues that this risk introduces a market discipline's mechanism that reduces the moral hazardous problem in the bank operations.

Market discipline is widely adopted by regulatory authorities to limit bank risk-shifting incentives that are exacerbated through a financial safety net. We address this issue by asking the question: Do depositors require controlling risk-taking by Islamic subsidiaries in crisis period? The last global financial crisis has sparked a debate on incentives that may assist depositors to discipline risk-taking by their banks.

4. Methodology and data

In this study, we examine the relationship between parent banks and credit supply strategy of their foreign subsidiaries. De Haas and van Leyveld (2010) show that loan growth of foreign subsidiaries is not only determined by their own characteristics but also by the characteristics of their parent bank and the variables of host countries. Following their approach, we use the annual change of the logarithm of total loans of a subsidiary (ΔLoans) as the dependent variable of our estimation, which describes the evolution of loans of the subsidiaries.

In our work, we present a stylized model, which specifies the loan supply decision of bank subsidiaries in light of two types of variables; the first are specific variables of subsidiaries and their parent banks and the second are macroeconomic variables of both origin and host country. Specific financial variables banks for subsidiaries and parent banks include Return on Equity (*ROE*), equity to total assets (*equity*), assets liquid to total assets (*liquidity*) and we consider provisions for loan losses to net interest income (*Loan Loss Provisions*) as a proxy for credit risk following, among others, Gropp and Vesala (2004) and Nier and Baumann (2006). We expect the estimated coefficient of equity of Islamic subsidiaries to be positive, since credit transactions in Islamic finance are linked to effective and a real business, which is based on risk sharing between the bank and its customers. The estimate coefficient of non-performing loans' provision should have a negative sign, as banks reduce exposure in countries where they are experiencing problems.

We include a variable size (*size*), as a variable control, defined as the logarithm of total assets. Gambacorta (2005) shows that bank size is irrelevant; small banks are not more sensitive to monetary policy shocks than large banks. Finally, we include inter-bank report (Inter-bank ratio) defined as interbank lending to borrowing. The second group of variables consists of macro-economic variables of the host country. We include the growth rate of GDP (*GDP growth*) and the real exchange rate of the U.S. dollar (*real exchange rate*). We expect that lending by foreign banks increases with the local GDP and appreciation of the local currency.

The study of the effect of GDP on the credit supply is supported by the assumption that better economic conditions increase the investor's optimism. A higher exchange rate results in higher imports prices and, in turn, increased domestic prices. Accordingly, a higher exchange rate reduces exports' prices and thus leads to a higher demand for exports, Kia and Darrat (2007). As a result, the higher demand for resources creates a pressure on domestic prices and hence increases loans in Islamic banks.

In addition, to test whether the structure of the banking sector's liquidity affects the transmission of liquidity shocks

we include the variable (*concentration*). The concentration of the banking sector implies the importance of local banks in the host country. We estimate that more high concentration lower the role of foreign subsidiaries in the transmission of liquidity shocks.

The study of the transmission of liquidity shocks in the literature was very limited by the fact that it is very difficult to isolate the impact of credit supply shocks' credit application. Cetorelli and Goldberg (2009) suggest that the transmission of liquidity crisis through bank subsidiaries, including both cross-border lending, which has long been recognized as responding significantly to shocks at home or abroad, and internal capital-market lending, which is the internal flow of funds within a banking organization. Country-specific variables enable us to isolate loan demand effects to some extent. Moreover, we can potentially identify the external liquidity shock by including the inter-bank transactions of both home and host countries.

In a following step, to test the existence of market discipline and to identify its mechanism, we use the following variables. Firstly, we use the first difference of the log of time deposits, Δ*Time Deposits*. We expect a positive effect from the fundamentals of banks and term deposits. Indeed, existing studies have reported that depositors punish banks for excessive risk-taking by withdrawing their deposits. Similarly, we include that the change in bank deposits (ΔDeposits Bank) as the second market discipline measure.

We assume that a double evaluation of risks by both the counter-party and the bank should help introduce a healthy discipline in the whole banking business and eliminate a range of undesirable lending practices. Furthermore, the adoption of profit-loss sharing modes pressure Islamic subsidiaries into having adequate capital and sufficient loss-off setting and other reserves to provide an assurance to their depositors – particularly demand depositors – that their deposits are safe. We expect that the higher the capital and reserves are, the greater will be the ability of banks to attract deposits.

The sample used in this study focuses on banks' subsidiaries in the MENA region (Middle East and North Africa). Upon the period between 2000 and 2010, we collect financial data on 104 bank subsidiaries divided on 52 Islamic subsidiaries and 52 conventional subsidiaries. This paper combines financial data of subsidiaries and macroeconomic variables of both host and home countries to investigate determinants of loans shock transmission. The financial information on subsidiaries of conventional and Islamic banks was collected from IBIS (Islamic banks and financial institutions information) and Bank Scope database. Table1 provides descriptive statistics of our sample. The Z-statistic of the test for mean difference was also calculated to test the significance of differences in means of the variables between Islamic and conventional subsidiaries.

Our sample shows some difference between Islamic and conventional subsidiaries. In particular, Islamic subsidiaries are, on average, significantly greater than conventional banks. In terms of profitability, Islamic subsidiaries have lower return on equity. This may be due to their involvement in economic activities by offering different ranges of products based on the sharing of profits and losses, "*Moucharka* and *Moudharba*." These products are primarily based on a relationship of conviction between banks and a limited set of customers. Islamic subsidiaries show significantly higher liquidity. Conventional subsidiaries have higher loan provision than Islamic ones but the difference doesn't appear significant. These differences may affect the transmission of loan and deposit checks by the two types of subsidiaries.

In this study, we examine whether the transmission of a liquidity crisis Islamic banks and conventional multinational subsidiaries depend on the same financial and macro economic factors. We use a methodological approach similar to that of Haas and Van Lelyveld (2010). However, our work differs from their study by analyzing the effect of foreign Islamic subsidiaries in the transmission of liquidity shocks. Following Allen et al. (2010), we explore the effect of dependence of subsidiaries on the inter-bank market on their lending strategy. Then, we test the effect of parent banks on market discipline of their subsidiaries in host countries, taking into account the period of the last subprime crisis (2007/2008).

Table 1. Summary statistics of all subsidiaries – Islamic and conventional.

	All banks subsidiaries		**Islamic banks subsidiaries**		**Conventional banks subsidiaries**		
	Mean	**Std. dev**	**Mean**	**Std. dev**	**Mean**	**Std. dev**	**Z-statistic**
ΔLoan	0.286	1.501	0.623	2.212	0.027	0.279	0.788
ΔTime Deposits	0.381	1.237	0.422	1.304	0.161	0.766	0.984
ΔBank Deposits	0.179	0.947	0.194	1.401	0.169	0.388	1.233
Total Assets	5.11E+07	5.92E+08	7.79E+07	9.36E+08	3.69E+03	7586.427	3.782*
Loan Loss	180.829	540.082	146.242	86.502	278.631	690.004	0.161
Equity	1.47E+01	1.47E+01	1.96E+01	1.89E+01	1.17E+01	10.209	2.674*
ROE	7.84	26.571	6.211	24.258	8.867	27.913	0.129
Liquidity	37.143	36.749	40.208	22.039	35.096	43.821	3.581*
Interbank	153.659	222.338	135.273	200.838	692.96	129.829	0.171
Concentration	0.643	0.176	0.647	0.169	0.64	0.18	0.133
Cost to Income	74.267	74.026	94.284	103.144	57.832	25.797	0.003

*significant at 10%

5. Results and interpretations

Islamic subsidiaries and loan strategy

To test the impact of parent banks on lending strategies of foreign Islamic banks and conventional subsidiaries, we estimate the following model:

$$\Delta Loan_{it} = f(Bank_{it}, Country_{it}, ParentBank_{it}, ParentCountry_{it})$$

where $\Delta Loan_{it}$ is the change in the total loans of the subsidiary i in year t. $Bank_{it}$ and $ParentBank_{it}$ denote, respectively, vectors of variables specifics to the foreign subsidiary i and its parent bank. $Country_{it}$ is a vector of macroeconomic variables of the country where the subsidiary is located. $ParentCountry_{it}$ is a vector of macroeconomic variables of the country of the parent bank i.

The results of the panel model that describes the changes in the lending policies of subsidiaries ($\Delta Loan$) are shown in Table 2. The table summarizes the estimates for the entire sample, as well as separate estimations for Islamic and conventional subsidiaries. For each type of bank, we considered three specifications of different models. In the first specification, we consider only specific variables of subsidiaries as well as the macro-economic characteristics of their host countries. Then, we add in the following specification, the financial characteristics of the parent bank, and the origin country of the bank. In the third specification, starting from the observation that lending re-launching, during the last financial crisis, was censured by foreign banks funding, we introduce a new dummy variable (*crisis*), which characterizes the subprime crisis of 2007 and 2008. This variable takes the value 1 in the period of crisis (in 2007 and 2008) and zero otherwise. The variable (*crisis*) allows us to capture the direct effect of the recent financial crisis on the credit growth of Islamic and conventional subsidiaries. Khan (2010) found that Islamic banks enjoy substantially higher growth rate loans than other banks, including the crises period of 2008. In addition, we consider the interaction of this variable with the characteristics of each parent bank in order to explore the effect of parent banks during the recent financial crisis on both Islamic and conventional subsidiaries.

Regarding the estimates of the overall sample, we note that for each specification, the variable (*equity*) is significantly positive, implying that the size of the equity has a positive effect on the growth of the loan. Among macro-economic variables of the host country, only the variable *cost to income* appears significant. This shows that, generally, economic conditions of the host country have no direct effect on loan strategies adopted by foreign subsidiaries.

The effects of transmission of liquidity shocks through foreign subsidiaries of banks seems to be different between Islamic and conventional subsidiaries and do not depend on the same factors. Specifically, "lending-channel" is more relevant for conventional banks. More precisely, we find that the lending strategy of conventional subsidiaries is significantly related to its own specific financial variables. Thus, lending activities of conventional subsidiaries in host countries depends significantly on its own liquidity and size. While these two variables appear insignificant in the case of Islamic subsidiaries. In particular, we find that an Islamic subsidiaries' size is irrelevant; this means that small subsidiaries are not more sensitive to liquidity shocks than larger ones.

The results show also that capitalization affects how banks react to liquidity shocks. Higher capitalization reduces significantly lending of subsidiaries in host countries. Following Gambacorta and Mistrulli (2003), this result has two possible explanations. First, well-capitalized banks are less likely to suffer from liquidity crisis through loan losses since they are more risk-averse, as their borrowers are less risky. Second, well-capitalized banks can better absorb temporary financial difficulties on the part of their borrowers and preserve long-term relationship loans.

Concerning macro-economic variables of host countries, exchange rates matter only for conventional subsidiaries. This corroborates the results of Cook and Devereux (2011) who argue that the exchange rate exacerbates the impact of shocks in a liquidity trap for conventional banks that are increasingly affected by a systemic risk with the opening of capital markets. Contrary to the results of Classens and Horen (2009), we document that the income level of the home country does not significantly affect the supply of loans of conventional subsidiaries banks. While, the GDP level in the host country has an impact on the strategy of Islamic subsidiaries loans. In that case, a foreign Islamic subsidiaries presence could provide much needed stability to a country experiencing a severe domestic shock. Moreover, conventional subsidiaries appear significantly affected by the economic growth in the parent country. This confirms that the effect of liquidity shocks' transmission across countries is intensified by the foreign subsidiaries of conventional banks.

The coefficient of concentration appears insignificant for both Islamic and conventional subsidiaries. This result is contrary to that of Allen et al. (2010). This may be due to the different context of our study, which focuses on the concentration of Islamic foreign subsidiaries that are located in countries with a highly concentrated banking sector.

Another interesting result to deduce from this table is that we evidence the impact of parent characteristics on conventional subsidiary's lending during the last financial crisis 2007–2008. Indeed, loan loss' provision and liquidity of the parent bank significantly affects loans' growth of their subsidiaries in times of crisis. This shows that relative bank fragility reduces lending by subsidiaries.

Islamic subsidiaries do not seem significantly affected by financial variables of their parent banks in period of crisis. This result allows us to deduce that principles of Shariah allow Islamic banks to protect themselves against speculative shocks. Indeed, its precepts seem attractive especially in times of crisis. Islamic banks treat their customers as business partners. They have a vested interest to carefully assess the financial demands and assist debtors in difficult times, reducing the risk of liquidation of assets at bargain prices and the risk of systemic contagion. Finally, Islamic financial principles protect deposits and prevent excessive borrowing. The exercise of banking industry in an Islamic framework allows Islamic banks to reduce effects of the transmission of liquidity shocks across borders.

Table 2. Estimations of loan growth of Islamic and conventional subsidiaries.

	All banks			Islamic banks			Conventional banks		
	1	2	3	1	2	3	1	2	3
Subsidiary characteristics									
Loan loss	0.00002	−0.00003	−0.00002	−0.00007	−0.00416	−0.00634	−0.00006	−0.00005	−0.00004
(T–Student)	0.06	−0.07	−0.05	−0.01	−0.61	−0.87	−1.51	−1.37	−1.03
ROE	0.00384	0.00343	0.00255	**0.0479****	**0.0396***	0.03533	0.00022	−0.00001	−0.00030
	0.81	0.68	0.49	2.05	1.76	1.5	0.39	−0.02	−0.5
Equity	**0.0742*****	**0.0508****	**0.048****	**0.133*****	**0.0810***	0.06763	0.00519	**0.0086***	**0.0087***
	3.39	2.14	2	3.12	1.9	1.47	1.35	1.84	1.87
Liquidity	0.00033	0.00044	0.00054	−0.00855	0.01206	0.01242	**0.0004***	0.00030	0.00035
	0.13	0.19	0.22	−0.43	0.6	0.51	1.69	1.2	1.33
Size	0.15505	0.10711	0.13435	0.20344	0.19216	0.17448	**0.114*****	0.02506	0.03231
	0.94	0.67	0.72	0.69	0.68	0.5	2.74	0.57	0.59
Host country									
GDP growth	−0.00246	0.00042	0.00073	**−0.01*****	**−0.004****	**−0.009****	−0.00798	−0.00210	−0.00255
	−0.07	0.01	0.02	−2.56	−1.97	2.17	−1.47	−0.37	−0.45
Exchange rate	−0.04893	−0.01592	−0.01983	−0.06611	0.06092	0.11627	**−0.02*****	**−0.03*****	**−0.02*****
	−0.99	−0.3	−0.36	−0.6	0.47	0.79	−2.65	−3.23	−3.04
Concentration	−0.51085	−0.43611	−0.54415	−0.15852	0.10022	−0.29174	−0.61883	−0.07343	−0.17816
	−0.29	−0.25	−0.31	−0.05	0.03	−0.09	−1.29	−0.17	−0.41
Cost to Income	**0.00678****	0.00425	0.00388	**0.0114***	0.00838	0.00779	**0.0031*****	**0.003*****	**0.003*****
	1.97	1.28	1.14	1.86	1.4	1.26	3.02	2.86	2.82
Parent characteristics									
Loan loss		−0.00001	−0.00002		0.00152	0.00141		0.00000	0.00000
		−0.17	−0.19		0.31	0.17		0.05	−0.19
ROE		0.01415	0.02730		0.03379	0.05573		0.00278	0.00241
		1.09	1.41		1.03	1.28		1.48	0.74
Equity		−0.02142	−0.01980		0.00015	−0.01518		−0.00025	0.00152
		−0.76	−0.68		0	−0.26		−0.03	0.17
Liquidity		−0.00439	−0.00584		−0.04264	−0.04437		0.00056	0.00205
		−0.25	−0.26		−0.9	−0.81		0.24	0.56
Home country									
GDP growth		−0.01373	−0.01260		0.00610	0.02019		**0.027*****	**0.0064*****
		−0.4	−0.36		0.06	0.2		3.56	2.97
Crisis			0.34711			0.53218			0.11104
			0.49			0.27			0.85

(*Continued*)

Table 2 - *Continued*

	All banks			Islamic banks			Conventional banks		
	1	2	3	1	2	3	1	2	3
Interactions									
Crisis*P_Loan Loss			0.00039			0.00145			**0.00031*****
			0.48			0.14			2.8
Crisis*P_ROE			–0.01851			–0.04300			0.001219
			–0.92			–0.97			0.35
Crisis*P_Equity			0.00053			0.05689			0.008931
			0.02			0.65			1.41
Crisis*P_Liquidity			–0.00798			–0.04865			**–0.007*****
			–0.39			–0.61			–2.59
Constante	–1.74641	–0.99336	–1.23913	–4.11724	–5.26919	–5.21522	–0.22826	0.01938	–0.050639
	–0.76	–0.42	–0.47	–0.75	–0.92	–0.74	–0.47	0.04	–0.09
R-squared	0.01960	0.05550	0.04740	0.01540	0.02540	0.00880	0.02190	0.04900	0.0476

The table reports the fixed effects panel estimation results. The dependent variable is ΔLoans, yearly change in loans measured as the first difference of the log of total loans. ***, **, * T-student significant at 1%, 5% and 10%, respectively.

We conclude that conventional bank's subsidiaries have larger lending channel effects than Islamic bank's subsidiaries. However, the loan supply of Islamic subsidiaries is less likely to react to changes in economic and currency policy. This can be justified in two ways. First, they have fewer investment opportunities and are more likely to sit on a lot of spare liquidity. Second, one of the peculiarities of Islamic finance is that credits are granted for specific purposes involving the purchase or lease of real assets and may only grow in harmony with the growth of transactions in goods and services. Therefore, the opening of Islamic banks to international funding does not seem to have been a source of propagation of the initial shock. This shows that the exposure to international funding source countries from extant, that were likely to suffer more from the shock are instead provided for multiple and independent channels of shock transmission.

In order to better investigate the role played by Islamic banks on the transmission of liquidity shocks, we test whether the intensity of transmission of shocks depends on the degrees of intervention of Islamic subsidiaries on the inter-bank market. For this purpose, we divide our Islamic subsidiaries' sample into two groups according to the ratio of the inter-bank subsidiary. The first group consists of banks with inter-bank ratio below one. This means that loans are lower than borrowing; this group of banks is considered more dependent on inter-bank loans. The second group includes banks with an inter-bank ratio higher than one. In this case, loans exceed borrowing, so this group of banks is considered to be less dependent on inter-bank loans.

In other words, this means that the first group of subsidiaries finances its foreign loans by massive intervention in the inter-bank market, which is a risky strategy that affected the financial situation of many banks during the last financial crisis. In contrast, an inter-bank ratio above one means that a foreign subsidiary is a net lender in the inter-bank market. Therefore, the subsidiary should not have to be limited in loan liquidity crisis during the recent crisis.

Following Allen et al. (2011) we hypothesize that the shock is transmitted through the inter-bank channel to subsidiaries. However, as direct transactions between the foreign subsidiaries and the parent banks are not available, we aim to capture this effect by including the *inter-bank* ratio of the parent bank in the last specification. In our estimations, we do not include liquidity and inter-bank ratio's variables at the same time because liquidity is potentially determined by the inter-bank lending and borrowing.

The result estimations are presented in Table 3. Our results show that loan strategies of Islamic subsidiaries that are strongly related to the inter-bank market are strongly related to the performance of parent banks. In particular, this category of subsidiaries reduces their credits when the parent bank has higher loss provisions, and higher inter-bank ratio. The return on equity appears positively significant, implying that the more the parent bank is profitable the more related subsidiary to the inter-bank market increases its credit.

The size seems to have a positive effect only on subsidiaries strongly related to inter-bank market. The importance of bank size allows easier intervention on the inter-bank market, which enables it to respond to the demand loans.

Table 3. Loan growth and interbank dependency.

	Interbank<1				Interbank>1			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Subsidiary characteristics								
Loan loss	0.00297	0.00219	0.00303	–0.00176	–0.00016	–0.0069	–0.0083	–0.0250
(T–Student)	1.38	0.95	1.13	–1.31	–0.02	–0.9	–1.01	–1.37
ROE	**0.0288***	0.01251	0.01925	–0.01343	**0.0496****	0.03325	0.03225	0.02128
	1.81	0.72	0.86	–1.25	2.01	1.41	1.32	0.67
Equity	**0.0408****	–0.00487	–0.00327	0.00342	**0.157*****	0.06165	0.05740	**0.092***
	2.12	–0.12	–0.08	0.18	3.06	1.12	1.01	1.87
Liquidity	0.00144	–0.00003	0.00072		–0.01222	0.01056	0.01228	
	1.22	–0.02	0.54		–0.59	0.5	0.49	
Size	**0.7174****	0.29479	0.35671	**0.605*****	0.19959	0.13479	0.15967	0.12398
	2.06	0.48	0.58	2.78	0.66	0.45	0.44	0.28
Host country								
GDP growth	–0.05313	–0.05526	–0.06509	**–0.03***	–0.03006	–0.0207	–0.0167	–0.0523
	–1.46	–0.58	–0.68	–1.8	–0.3	–0.2	–0.15	–0.34
Exchange rate	6.02955	–10.6262	–7.84602	–3.70227	–0.06390	0.05791	0.10316	–0.0277
	0.93	–1.14	–0.83	–0.82	–0.56	0.45	0.68	–0.15
Concentration	–0.14383	–4.80465	**–7.0965***	**–3.531****	**–0.081***	**0.0783***	**–0.224***	**–1.63****
	–0.02	–0.53	–1.77	–1.98	–1.83	1.73	–1.69	–2.24
Cost to Income	**0.024*****	–0.00145	0.00558	–0.00430	**0.011***	0.00881	0.00912	0.01079
	4.21	–0.14	0.41	–0.68	1.71	1.4	1.4	1.31
Parent characteristics								
Loan loss		–0.00058	–0.00438	**0.0040****		0.00298	0.00301	0.00830
		–0.13	–0.73	2.1		0.54	0.29	0.58
ROE		0.02554	0.03514	**0.039*****		0.04911	0.05114	0.04119
		1.2	0.76	2.96		0.99	0.82	0.47
Equity		–0.06109	**–0.234***	**–0.091***		0.01053	–0.0047	–0.0177
		–0.63	–1.64	–1.92		0.21	–0.07	–0.26
Liquidity		–0.05829	–0.02878			–0.0211	–0.0144	
		–1.06	–0.44			–0.41	–0.24	
Interbank				**0.0091*****				0.00177
				6.78				0.53
Home country								
GDP growth		**–0.3*****	**–0.31***	**–0.3*****		0.07946	0.08598	0.19127
		–2.71	–1.87	–6.28		0.71	0.66	0.93
Crisis				**–2.6*****			0.00503	–3.7907
				–2.88			0	–1.09
Interactions								
crisis*P_Loan Loss			**0.0283***	0.01153			–0.0002	0.03557
			1.68	1.56			–0.02	0.88
crisis*P_ROE			0.09870	**0.434*****			–0.0086	0.06906
			1.15	4.46			–0.13	0.6
crisis*P_Equity				**–0.3*****			0.05688	0.08947
				–2.55			0.61	0.97
crisis*P_Liquidity			0.02432				–0.0424	
			0.88				–0.43	
crisis*P_Interbank				**0.009*****				–0.0009
				3.19				–0.25
Constante	–13.81726	16.53713	15.23955	3.74248	–3.85401	–5.6036	–6.5814	–3.0353
	–1.17	0.88	0.83	0.45	–0.66	–0.91	–0.89	–0.35
Observations	54	35	35	44	134	117	117	87
R-squared	0.04880	0.01850	0.04640	0.05070	0.01320	0.02350	0.00740	0.14080

The table reports the fixed effects panel estimation results. The dependent variable is ΔLoans, yearly change in loans measured as the first difference of the log of total loans. T-student ***significant at 1%, **significant at 5%, *significant at 10%.

Bank capitalization seems to be crucial in establishing the potency of the bank lending channel, since the variable capitalization of subsidiaries appears positively significant for both groups. This confirms the results found in the previous table. Thus, the financial performance of the subsidiary and capitalization are two factors that allow the subsidiary to strengthen its credit as for conventional banks.

The effect of the turn on equity and the inter-bank parent bank's ratio on credit appears to be significant during the last financial crisis for both sub-groups. This can be explained by the substitution effect, which establishes that in times of crisis, funds are diverted from subsidiaries to parent banks that become more profitable. During the crisis, economic growth in the country of origin has an impact on lending by Islamic subsidiaries strongly linked to the inter-bank market. Islamic subsidiaries that are weakly linked to the inter-bank market seem unaffected by characteristics of parent banks even in times of crisis.

After this synthesis, we deduce that the loan strategy of Islamic subsidiaries weakly linked to the inter-bank market does not depend on the financial variables of parent banks, but mainly depends on the nature of the loans. We know that the transaction of Islamic banks are based on more accurate risk sharing and responds to *Shariah* rules, this is likely to affect their capitalization and refinancing structure.

However, the prohibition of interest does not allow Islamic banks to re-schedule unpaid loans by negotiating a higher remuneration of credits. Such a situation is likely to encourage borrowers in a weak financial situation to delay their payments voluntarily, which increases credit risk in Islamic banks. The *Foukahas* have not yet agreed on an alternative solution for this specific risk.

6. Islamic subsidiaries and market's discipline

To examine the existence of market discipline on Islamic and conventional bank subsidiaries, we estimate the following model:

$$MarketDiscipline_{it} = f(Bank_{it}, Country_{it}, ParentBank_{it}, ParentCountry_{it})$$

The same set of variables will be used to explain the variables of market discipline. We measure market discipline respectively by Δ*Time Deposits* and Δ*Bank Deposits*. The market must have the power to restore stability to the banking system through the behavior of depositors against the outstanding risk. The reaction of depositors results in an effect on deposits of subsidiaries. In particular, the Islamic system has features that can enhance market discipline since the relationship between the bank and depositors is based on risk sharing.

We expect that the sign of the variable loan loss provision will be negative. That is, any increase in provisions for loan losses should be associated with a higher expected write-off and therefore should indicate a riskier bank.

Table 4 presents the results for the entire sample of Islamic and conventional banks. The results confirm the existence of market discipline exerted by depositors on their subsidiaries. Market discipline seems more affected by their specific variables subsidiaries rather than the characteristics of their parent banks. In particular, we find that well capitalized subsidiaries can increase their time deposit. This may be explained by the fact that strengthening the capital of the bank is likely to reassure depositors and make more credible the message of a convergence of interests. The size of the subsidiary as well as the level of liquidity exerts a significant positive effect on time of the deposit. The *return on equity* has statistically significant effects on deposit growth during the period of crisis. This result highlights the role of the parent bank in a period of crisis in supporting their subsidiaries, which reassures depositors.

The results show, also, that an increase in loan loss' provisions of parent banks reduces deposits of subsidiaries in times of crisis. The negative sign of *loan loss' provisions* is consistent with our expectations. This may be due to the fact that problems encountered by the parent bank on its loan portfolio leads it to reduce its funding to its subsidiaries. Thus, if the parent bank seeks to preserve its liquidity crisis in the country of origin, their subsidiaries generally experience a reduction in their deposits.

On further analysis, an increase in loan loss provisions should be associated with a higher expected write-off and therefore should indicate a riskier institution. So, higher level of loan loss provisions is not viewed as a better protection.

It is also important to note that liquidity of parent banks significantly increases the deposits in foreign subsidiaries in the period of crisis. This may be explained by the fact that depositors can expect that the parent bank supports their subsidiaries by providing them with a sufficient liquidity in order to fulfill their obligations at maturity. Being persuaded to withdraw their funds without incurring losses, the depositors increase their deposits in subsidiaries.

Macroeconomic variables appear, globally, uninformative about the mechanism through which depositors exert market discipline on their banks. Thus, only the GDP of the home country appears significantly negative in the equation of the effect on time deposit, which implies that parent banks tend to support their subsidiaries during local economic contraction.

Table 5 reports the results of separate estimates for conventional and Islamic subsidiaries. Taken together, the results show that depositors exert a more significant market discipline effect on Islamic subsidiaries. This can be explained by the fact that customers of Islamic banks are related to their banks not only for financial transactions, but in that they trust that investment products offered by subsidiaries comply with Islamic rules of *Shariah* and believe that their banks do not take speculative risk which may affect the safety of their deposits. It appears that market discipline, which is an essential factor for banking stability, is not very pronounced in the conventional banks and may be explained by other possible factors such as the prudential banking regulations. The finding that the depositors exert higher market discipline on Islamic subsidiaries shows that they would be more motivated to monitor their banks than depositors of conventional banks.

Table 4. Market discipline of the entire sample.

	ΔTime deposits			ΔBank deposits		
	1	**2**	**3**	**1**	**2**	**3**
Subsidiary characteristics						
Loan loss	0.00285	0.00033	0.00153	–0.00014	–0.00016	–0.00018
(T–Student)	0.75	0.09	0.38	–0.73	–0.7	–0.78
ROE	–0.00181	0.01292	0.03341	–0.00171	–0.00171	–0.00153
	–0.08	0.55	1.34	–0.51	–0.46	–0.41
Equity	**0.06128****	**0.0618****	**0.0685****	0.00521	**0.00999****	**0.01190****
	2.05	2.22	2.31	0.34	2.12	1.91
Liquidity	0.00584	**0.0283****	**0.04169*****	0.00108	0.00085	0.00117
	0.45	2.24	2.66	0.64	0.47	0.62
Size	**0.33824***	**0.30960***	**0.3949****	0.05081	0.07562	**0.1548*****
	1.79	1.76	2.05	0.47	0.62	3.89
Host country						
GDP growth	–0.03543	–0.05017	**–0.0358****	–0.01290	–0.03836	–0.03949
	–0.53	–0.74	–1.94	–0.54	–1.31	–1.32
Exchange rate	**–0.1102***	0.00019	0.06419	–0.02775	–0.01887	–0.01083
	–1.69	0	0.66	–0.87	–0.47	–0.27
Concentration	–0.30815	0.71142	1.32277	–0.20303	0.11027	–0.06757
	–0.18	0.42	0.77	–0.17	0.08	–0.05
Parent characteristics						
Loan loss		0.00014	0.00358		0.00002	0.00000
		0.06	0.81		0.34	0.02
ROE		**0.03288***	0.02711		0.00414	–0.00433
		1.75	1.07		0.34	–0.27
Equity		0.07208	0.04719		0.02493	0.03503
		1.46	0.87		1.13	1.51
Liquidity		–0.02615	**–0.078****		–0.01438	–0.02168
		–0.71	–1.92		–1.05	–1.23
Home country						
GDP growth		–0.01078	–0.02728		0.00417	0.00880
		–0.25	–0.64		0.15	0.31
Crisis			**–2.647****			–0.62838
			–1.85			–1.08
Interactions						
crisis*P_Loan Loss			**–0.00464***			**–0.00044***
			–1.81			–1.71
crisis*P_ROE			–0.01126			0.00959
			–0.48			0.54
crisis*P_Equity			**0.2001***			–0.01672
			1.86			–0.61
crisis*P_Liquidity			–0.00354			**0.01761****
			–0.07		3.12	2.12
Constante	–2.85353	**–6.892****	**–8.9****	0.31758	–0.14173	–0.76382
	–0.86	–2.24	–2.28	0.22	–0.08	–0.4
Observations	93	80	80	326	278	278
R-squared	0.00330	0.08440	0.03700	0.00050	0.00000	0.00050

The table reports the fixed effects panel estimation results. The dependent variables are ΔTime Deposits, yearly change in time deposits and ΔBank Deposits, yearly change in bank deposits.T-student ***significant at 1%, **significant at 5%, *significant at 10%

The table shows that depositors of Islamic subsidiaries respond to banks' risk-taking. In particular, we find that a higher capital adequacy ratio leads to an increase in deposit growth, while a rise in the ratio of *loan loss provisions* has a significantly negative effect on deposits. In fact, an increase in loan loss provisions should be associated with a higher expected write-off and therefore should indicate a high level of risk for the bank. Our results of conventional banks are in line with those of Martinez Peria and Schmukler (2001) who find that depositors punish banks for risky

Table 5. Market discipline of islamic banks and conventional banks.

	Islamic banks						Conventional banks					
	ΔTime deposits			ΔBank deposits			ΔTime deposits			ΔBank deposits		
	1	2	3	1	2	3	1	2	3	1	2	3
Subsidiary characteristics												
Loan loss	0.028	0.027	**0.012**	−0.08	**−0.023**	**−0.001**	0.052	0.0080	0.073	−0.01	−0.090	−0.015
(T–Student)	0.72	1.07	2.28	−0.17	−2.41	−2.2	1.24	1.62	1.33	−0.24	−0.93	−0.02
ROE	−0.015	0.0124	0.033	−0.0095	−0.0069	−0.005	0.013	0.003	0.036	−0.03	−0.004	−0.0043
	−0.09	0.49	1.21	−0.63	−0.4	−0.28	0.43	0.93	0.83	−0.81	−1.52	−1.2
Equity	**0.06***	**0.06****	**0.06**	**0.018***	**0.0036***	**0.08***	−0.09	−0.005	−0.04	**0.02**	**0.017**	**0.019**
	1.95	2.02	2.01	−2.57	−1.99	−2.68	−0.84	−0.45	−0.3	6.17	2.62	2.87
Liquidity	0.005	**0.02****	**0.4****	0.02204	0.02057	0.024	0.064	0.00050	0.060	0.019	0.022	0.00029
	0.42	2.12	2.56	1.6	1.26	1.21	1.39	1.03	1.07	0.55	0.62	0.7
Size	**0.34***	0.304	**0.7****	0.04536	0.09519	0.174	0.102	0.07514	0.087	0.254	0.231	0.257
	1.72	1.62	1.91	0.22	0.4	0.61	0.75	0.5	0.51	0.63	1.08	1.56
Host country												
GDP growth	−0.03	−0.046	−0.02	−0.057	−0.0771	−0.086	−0.03	0.00395	0.083	−0.07	−0.011	**−0.014**
	−0.5	−0.62	−0.3	−0.84	−0.94	−1	−0.2	0.23	0.04	−1.16	−1.43	−1.78
Exchange rate	−0.110	0.002	0.082	−0.020	0.06744	0.057	−0.03	0.00276	0.062	−0.01	**−0.024**	**−0.026**
	−1.62	0.02	0.77	−0.26	0.6	0.45	−0.21	0.16	0.33	−1.26	−1.95	−2.11
Concentration	−0.238	0.590	0.953	0.47920	0.59060	0.544	**−1.8***	**−2.11***	**−1.9***	−0.58	−0.915	**−0.958**
	−0.12	0.31	0.49	0.22	0.24	0.21	−1.92	−2	−1.71	−1.1	−1.59	−1.64
Parent characteristics												
Loan loss		−0.01	**−0.04**		−0.003	−0.001		0.02	0.048		−0.024	−0.0273
		1.06	−1.87		−0.75	−0.2		0.17	0.56		0.2	−0.22
ROE		0.0330	0.027		0.00061	−0.069		−0.003	−0.08		0.003	0.0024
		1.61	0.95		0.02	−0.55		−0.71	−0.98		0.83	0.53
Equity		0.0737	0.053		0.03894	0.054		−0.019	−0.06		0.0034	0.008
		1.38	0.91		0.96	0.92		−0.76	−0.22		0.29	0.61
Liquidity		−0.026	**−0.09**		−0.031	−0.028		−0.003	−0.01		−0.006	−0.806

	–0.62	–1.83	–0.95	–0.61	–0.6	–0.94	–0.31	–1.43
Home country								
GDP growth	–0.010	–0.03	0.04520	0.074	–0.0001	–0.01	–0.004	–0.004
	–0.18	–0.61	0.47	0.69	–0.01	–0.09	–0.79	–0.66
Crisis		**–2.66**		–0.974		–0.23		–0.098*
		–1.69		–0.54		–0.67		–2.48
Interactions								
crisis*P_Loan Loss		–0.05		–0.001		–0.01		0.00171
		–0.89		–0.3		–0.51		0.01
crisis*P_ROE		–0.01		0.023		0.05		–0.072
		–0.5		0.58		0.58		–0.07
crisis*P_Equity		**0.05***		–0.021		–0.01		–0.003
		1.72		–0.1		–0.65		–0.33
crisis*P_Liquidity		–0.01		0.024		0.069		**0.0028***
		–0.02		0.3		0.69		2.69
Constante	–2.923	**–7.027**	–0.5163	–2.4603	–3.918	0.811	1.41482	1.406	**–1.17**	–0.43	–0.320
	–0.81	–2.06	–0.14	–0.54	–0.7	0.66	1.03	0.84	–2.28	–0.73	–0.44
R-squared	0.003	0.0955	0.026	0.00410	0.00260	0.014	0.091	0.03180	0.001	0.003	0.015	0.015

The table reports the fixed effects panel estimation results. The dependent variable is ΔLoans, yearly change in loans measured as the first difference of the log of total loans. ***, **, * T-student significant at 1%, 5% and 10%, respectively.

behavior, by withdrawing their deposits. Mokhtar, Smith and Wolfe (2003) support the information about loan loss provision is very important because investors would like to know the risks that their investments are exposed to. This will allow depositors to supervise the bank in order to help in the bank's discipline.

Table 5 also shows that for Islamic subsidiaries, market discipline depends on both their specific characteristics and their parent bank conditions. However, conventional subsidiaries do not seem significantly affected by variables of parent banks. Loan loss provision of parent banks negatively affects the time deposit of Islamic subsidiaries. This means that deterioration in the performance of the parent may have induced the participants in the interbank market to decrease their lending to the subsidiary. This confirms the view that depositors react to a deterioration of bank performance and punish their institutions by withdrawing their savings.

Conventional subsidiaries appear inversely affected by the liquidity of parent banks during crisis periods. This may have two possible explanations. First, conventional subsidiaries should seek other sources of funding in times of economic shocks, because their parent banks assume them more responsibility for the collection of deposits in the host country. Second, It is possible that following bank interventions and malfunction, depositors may become more aware of the risk of losing deposits, so they may start exercising stricter market discipline. So, Islamic subsidiaries can be a source of stability in the banking sector in the receiving country, unlike the conventional subsidiaries that can destabilize the banking sector by exerting more aggressive deposit gathering behavior in a period of crisis as they try to meet growing loan demand.

These results confirm the fact that on the liability side, demand deposits are guaranteed in Islamic banks. Indeed, one of the distinctive characteristics of Islamic banks is the use of sharing-risk of profit and loss principle to reward depositors. Singh et al. (2000) argue that Islamic banks will be more stable compared to conventional banks, as any shock on the asset side would be absorbed by the risk-sharing nature of the liability side. The religious prohibition of interest rates that include a return charged in a loan contract has important implications regarding the nature of deposits in Islamic banks. The contracts of *Qard* and *Mudarabah* are among the fundamental pillars of Islamic banking on the liability side. The current or checking accounts in these banks are considered *Qard Hasan* (interest-free loans), and these have to be fully returned to depositors on demand. Investment deposits in Islamic banking takes the form of *Mudarabah*, the investor named (*Rab al-mal*) assigns to the bank (*Mudarib*) the management of its funds under the principle of risk-sharing. The return on investment of the funds is uncertain, and neither the principle nor income is guaranteed. So, the depositor will be more risk averse and opt for a low risk/return deposit contracts.

Although the nature of risk sharing investment deposits will improve market discipline and increase the solidity of banks, these deposits do not constitute a permanent basis to the funds of the bank. These deposits can increase or decrease depending on the degree of confidence of depositors in the banks' profitability. Even if depositors

Table 6. Market discipline and interbank dependency.

	Inter-bank 1						**Inter-bank > 1**					
	Δtime deposits			ΔBank deposits			ΔTime deposits			ΔBank deposits		
	1	2	3	1	2	3	1	2	3	1	2	3
Subsidiary characteristics												
Loan loss	0.0056	−0.005	−0.004	−0.00018	0.003	0.022	0.0624	0.0181	0.0428	0.00196	0.019	0.014
(T−Student)	0.02	−0.18	−0.17	−0.32	0.04	0.33	1.35	0.36	0.81	0.4	0.03	0.02
ROE	−0.001	−0.002	−0.00093	0.0041	0.005	0.008	0.0084	0.027	**0.053***	−0.040	−0.02	−0.01
	−0.46	−0.59	−0.26	0.61	0.57	0.92	0.3	0.9	1.74	−0.28	−0.13	−0.11
Equity	**0.022***	0.0350	0.0393	−0.005	−0.06	−0.06	0.0624	**0.0***	**0.096***	0.00497	0.017	0.015
	1.75	1.2	1.24	−0.2	−0.98	−1.08	1.41	1.81	1.9	0.15	0.41	0.34
Liquidity	0.037	0.006	0.008	−0.030	−0.01	−0.01	0.002	**0.02***	**0.04****	**0.0236***	0.021	0.02
	0.42	0.07	0.77	−0.17	−0.59	−0.59	0.16	1.75	2.23	1.77	1.36	1.45
Size	0.137	0.131	0.3207	−0.0027	−0.43	0.11	**0.353***	**0.37***	**0.44****	0.11149	0.15	0.27
	0.52	0.29	0.59	−0.01	−0.44	0.12	1.68	1.71	1.98	0.56	0.69	1.02
Host country												
GDP growth	0.017	−0.042	−0.04838	0.04357	0.25	0.290	−0.041	−0.019	0.007	−0.093	−0.11	−0.10
	0.62	−0.55	−0.66	0.79	1.39	1.63	−0.57	−0.23	0.08	−1.44	−1.44	−1.36
Exchange rate	0.0297	0.066	0.1208	−0.0221	−0.01	0.160	**−0.144**	0.026	0.090	−0.051	0.015	0.030
	0.39	0.75	1.35	−0.13	−0.05	0.6	−1.96	0.26	0.74	−0.69	0.15	0.26
Concentration	0.819	0.200	1.3934	−0.64961	−4.53	3.1	−0.25	0.498	1.472	0.92769	1.261	1.089
	0.37	0.08	0.49	−0.14	−0.69	0.41	−0.13	0.24	0.7	0.47	0.55	0.46
Parent characteristics												
Loan loss		−0.0012	−0.00515		0.004	−0.03		−0.010	0.065		−0.15	0.017
		−0.35	−1.07		0.39	−0.31		−0.3	0.82		−0.36	0.22
ROE		0.0264	0.00033		0.037	−0.10		0.025	0.010		−0.01	−0.05
		1.32	0.01		0.66	−1.17		0.71	0.23		−0.04	−0.01
Equity		−0.025	−0.053		−0.02	0.090		0.056	0.050		0.033	0.042
		−0.54	−0.83		−0.2	0.56		0.9	0.78		0.86	0.77
Liquidity		−0.03	−0.0231		−0.09	0.051		−0.060	**−0.155**		−0.02	−0.02
		−0.84	−0.44		−0.92	0.42		−1.1	−2.41		−0.69	−0.51

Home country									0.01	0.012
GDP growth	0.025	–0.057		0.295	0.041		–0.061	–0.088		
	0.39	–0.44		1.01	0.13		–0.72	–0.89	0.18	0.12
Crisis								–2.960		0.265
								–0.86		0.14
Interactions										
crisis*P_Loan Loss		0.01155			0.007			–0.008		–0.0 3
		0.73			0.27			–0.87		–0.41
crisis*P_ROE		0.06916			0.180			–0.028		–0.02
		1			1.2			–0.47		–0.47
crisis*P_Equity		0.13838						0.2059		–0.01
		0.63						1.38		–0.18
crisis*P_Liquidity		–0.08596			–0.04			0.028945		0.00091
		–0.83			–1			0.32		0.01
Constante	–2.348	–3.429	0.59579	7.77	–7.35	–2.144	**–7.97**	**–10.2**	–1.272	–3.52	–5.89
	–0.67	–0.49	0.08	0.56	–0.49	–0.54	–1.96	–2.33	–0.35	–0.78	–1.09
Observations	53	40	55	41	41	77	64	64	132	115	115
R-squared	0.0369	0.0091	0.00000	0.015	0.019	0.0067	0.0551	0.0266	0.00180	0.008	0.002

The table reports the fixed effects panel estimation results. The dependent variable is ΔLoans, yearly change in loans measured as the first difference of the log of total loans. ***, **, * T-student significant at 1%, 5% and 10%, respectively.

could support investment losses up to a certain degree the capital of the bank will provide a high damping capacity. Generally, capital adequacy is important for Islamic banks, which constitute the basis that ensures its credibility.

The size of the bank also affects significantly the growth of deposits of Islamic subsidiaries. Since small banks cannot diversify their portfolios as well as the big banks, they need higher capital relative to their assets to strengthen the confidence of their customers to maintain their transactions core over the long term. For this reason, regulatory authorities in Islamic countries should encourage banks to reinforce their capital or initiate mergers to ensure greater financial strength.

As a synopsis of this table, we can deduce the attractions of Islamic deposits by subsidiaries cannot be explained just by a better performance or better service, but additionally by religious motivations of depositors. For lack of more advantageous alternative consistent with the *Shariah*, several depositors accept a low income or even no income. In addition, Islamic banks enjoyed, in the last years, the monopoly of the market for Islamic finance. Currently, the situation is altering in the future since Islamic banks are faced with competition growing increasingly among conventional banks, including multinational Western banks.

To explore more in depth the behavior of depositors, we test the market discipline of Islamic subsidiaries according to the importance of their intervention in the interbank market. In the following, we repeat the approach adopted in the previous section by dividing the sample of Islamic subsidiaries according to the inter-bank ratio. The first group contains the Islamic subsidiaries with inter-bank ratio below one. While the second group contains subsidiaries whose inter-bank ratio exceeds one. The results of estimations are resumed in Table 6.

The results show that bank capitalization affects differently the two groups of subsidiaries. Indeed, highly capitalized subsidiaries that are strongly related to inter-bank market have lower time deposit. While the nature of the risk-sharing investment deposits will improve market discipline and strengthen the soundness of subsidiaries heavily linked to inter-bank market, these deposits are not a permanent part of bank capital.

The level of deposits depends mainly on the degree of depositor's confidence in the strength and profitability of banks. Even if investment depositors would absorb losses to a certain extent, it is the capital of the bank that provides a high capacity for shock absorption. Capital adequacy is important for Islamic banks. It is the basic element that depends on the strength and soundness of banks. We find also that during the crisis period, the liquidity of parent bank plays a significant role in the market discipline of Islamic subsidiaries. Loan loss provision of parent banks leads to a decrease of both groups of banks.

Regarding the group of Islamic subsidiaries heavily related to an interbank market, we find that market discipline depends more on the characteristics of parent banks in the period of crisis. In fact, the size of the subsidiary has a significant effect on the growth of its deposits. This is

consistent with the expectation that larger institutions are perceived to be safer and more attractive to depositors.

Deposit growth of subsidiaries weakly related to the interbank market seems to be less affected by the characteristics of the host country. This shows that the structure of these subsidiaries deposits depends mainly on their financial performance and the financial situation of their parent banks. The nature of deposit contracts is based on real investment that ensures risk-sharing between the bank and its customer, rather than a simple financial transaction based interest rates.

When an Islamic bank faces a global crisis, specific depositors share with it the risk so that the likelihood of bank failure or panic is reduced. This ensures greater stability of Islamic banking and the superiority of Islamic finance to guarantee stability of the global financial system but risks being hypothetical if Islamic banks are not freed from the tendency to approach, sometimes overtly, modes and the operating logic of the conventional finance. It is particularly important that the Islamic banks find appropriate solutions to the obstacles that stand in front of a wider use of participatory financing in accordance with the hypothetical model of Islamic finance.

7. Conclusion

This paper discussed the role of Islamic subsidiaries in the transmission of Bank Liquidity Shocks in Loan and Deposit Markets. We tried to test whether foreign bank lending is determined by different factors for Islamic and conventional banks. Islamic banks differ from conventional banks with regards to participation in profits and funding methods used. This characteristic alters the nature of the risks incurred by Islamic banks and affects their strategies of lending and deposit collection. Based on a model including subsidiary and parent bank characteristics as well as host and home country variables, we show that the effects of transmission of liquidity shocks through foreign subsidiaries of banks seem different than Islamic and conventional subsidiaries. We found that the "lending-channel" is more relevant for conventional banks. Particularly, conventional parent bank fragility negatively affects lending by their subsidiaries. Nevertheless, we show that parent Islamic bank do not significantly affect lending by subsidiaries.

In a second part, we examined the existence of market discipline exerted by depositors on Islamic and conventional subsidiaries. Our main result shows that depositors of Islamic subsidiaries exert a greater market discipline on Islamic banking subsidiaries. We found that depositors react to a deterioration of bank performance and punish their institutions by withdrawing their deposits.

The greater market discipline that the Islamic system has the potential of introducing in the financial system cannot, however, eliminate the need for regulation and supervision. We conclude that market discipline also requires a standardized accounting framework and appropriate policies for the dissemination of information regarding both the assets and liabilities of Islamic subsidiaries. Special requirements of accounting modes of Islamic finance also need to be clarified in detail. This requires the establishment of uniform standards of transparency in the Islamic banking sector.

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