What Drives Efficiency Of Islamic Banks Among Regions?

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ABSTRACT

Our study tries to determine what drives the efficiency of Islamic banks. To this purpose, we use the stochastic frontier analysis in one step. This allows us to take into account in the frontier function, explanatory variables which influence efficiency. We find that market power and profitability have a positive impact on Islamic banks efficiency, while it is the contrary for their size. Besides, Islamic banks display an average efficiency score of 92%, with Islamic banks settled down in Asia displaying the highest score (96%). Indeed, countries like Malaysia and Pakistan undertake reforms in order to allow banks to better cope with the existing financial system. On the contrary, Islamic banks operating in countries with Islamic banking as government legislation are not the most efficient ones.

Keywords: Islamic Banks; Efficiency; Stochastic Frontier Analysis

INTRODUCTION

Islamic banks have expanded significantly in recent years because of increasing petrodollars inflows, following the oil shocks. These banks are growing at a rate of 15% per year since the early 2000s. And wherever they settle, the authorities try to implement adequate regulation in order to enable them to integrate the banking system of these countries.

Although most of the Islamic banks are within Middle Eastern and Emerging countries, some universal banks based in developed countries have started to satisfy a large demand of Islamic financial products. It is the case in the United Kingdom and the United States. More recently, French monetary authorities began thinking about the possibility to allow Islamic banks operate in the French banking system. This renews interest in the question of the efficiency of Islamic banks and especially how the environment in which they evolve impacts Islamic banks efficiency.

Islamic finance has raised concern, these recent years. Given the amount of petrodollars that they collect and the context of globalization, several authors like Sudararajan and Errico (2002); Čihák and Hesse (2008) are interested in the risks Islamic finance may pose to international financial stability. Besides, many other studies examine efficiency of Islamic banks, given their proliferation outside the Middle East. First, Islamic bank efficiency is assessed, based on financial and management ratios, Samad (1999); Bashir (1999), Sarkar (1999), Samad and Hassan (2000), Samad (2004), Saleh and Zeitun (2006), Kader and al. (2007), Moin (2008). However, these studies are only interested in Islamic banks in one country. They don't allow inter-country comparisons. This is what a second group of studies will do using these ratios, Bashir (1999) and Bashir (2001), Hassan and Bashir (2003). However, these ratios although informative do not capture the multi-product banks function. In fact, banks are both financial companies looking for profit and good management, but they are also financial intermediaries. They are financial intermediaries that collect deposits to deliver credit in the economy. It is in this sense that several studies will use methods of efficiency frontiers to measure the efficiency of Islamic banks. Some studies such as Yudistira (2003) and Sufian (2007) used data envelopment analysis (DEA). It's a mathematical linear programming, which determines an envelopment surface composed of banks of best practices. The efficiency index is derived by reference to any deviation from the ideal surface. It allows taking into account, the multi-products of banks function. However, it doesn't allow separating between error terms and inefficiency. Thus, even though Yudistira (2003)

compares Islamic banks of Middle East, Asia and Africa, his sample doesn't encompass Islamic banks settled down in United Kingdom (UK). In addition, the efficiency scores he assessed using DEA are less accurate than those calculated with a parametric frontier method.

Other authors like Mokhtar and al. (2006), Hassan (2006) and Mohamad and al. (2009) use the Stochastic Frontier Approach (SFA) which is a parametric method, to measure efficiency of Islamic banks. It has the advantage of being more accurate than the nonparametric approach (DEA). Indeed, it allows separating the error term of the inefficiency term. It is therefore less sensitive to measurement errors and outliers. The study of Mohamad and al. (2009) make a comparison between Islamic and conventional banks using SFA. However, no attention is given to the differences due to the environment in which those banks operate and the characteristics of those banks.

The current study strives to make a comparison of Islamic banks efficiency across different regions, encompassing in the efficiency frontier some characteristics of Islamic banks and the environment in which they operate. We assess the impact of the environment and the characteristics of Islamic banks on their efficiency. To this purpose, we use a methodology which intends to take into account the influence of variables related to islamic banks and their environment on their efficiency. Indeed, Battese and Coelli (1996) show that the estimate of efficiency in two steps introduced a bias in the measurement. Explanatory variables of efficiency that impact the level of efficiency should be taken into account in the efficiency frontier. In doing so, we are able not only to measure the efficiency of Islamic banks, but also to define the variables that influence it. Our study also differs from previous ones in that it includes in its sample, in addition to the banks of the Middle East, Asia and Africa, Islamic banks operating in the UK. By introducing them, we will be able to compare the efficiency of Islamic banks operating in UK and Islamic banks in other regions. We will therefore have an idea of the impact of the English regulatory environment on the efficiency of such banks. Our findings may be of particular interest since other Western countries like France are considering giving approval to their first Islamic banks.

Our results show that although it may be an advantage, banks operating in Islamic countries are not the most efficient. Characteristics of Islamic banks that positively impact their efficiency are profitability, market power, demand density and the maturity of the market in which they operate. Our findings lead us to make the following conjecture: new Islamic banks in western countries will tend to be less cost-efficient than their counterparts in Muslim countries. However, an adapted and regulatory environment will have a positive impact on those new Islamic banks.

The remaining of the paper is structured in the following way: Section (2) presents the methodology and data used to assess efficiency. Results are discussed in Section (3). We then conclude in Section (4).

MODEL SPECIFICATION AND DATA

Model

As announced in the introduction, the current study use thestochastic frontier analysis (SFA). As objective function, we choose a cost function. It allows taking into account the constraints of banks as financial companies, seeking to optimize their financial performance. Thereby minimizing the costs induced by the efficiency frontier, we will take into account these constraints. As functional form, we choose the Translog, as it best suits the multi-products characteristic of banking technology, involving multiple inputs and outputs, cf. Mester (1997), Bauer et al. (1998), Roger (1998) and Isik and Hasan (2002). We use the maximum likelihood method for the estimate.

In studies of efficiency measurement for production units, economists usually allow for a second step. It's set up to explain the determinants of efficiency. Battese and Coelli (1996) showed that the two-step estimate biases the efficiency scores. Indeed, the elements used in the second stage to explain efficiency influence its determination in the first step. Thus, by excluding them from the expression of the efficiency frontier function, the result is a measurement bias. Battese and Coelli advised therefore to introduce in the frontier function a vector of explanatory variables. Thus, the computed model will be as equation 1 that follows:

$$\ln CT_{ijt} = \alpha_0 + \sum_m^n \alpha_m \ln p_{m,ijt} + \sum_s^t \beta_s \ln y_{s,ijt} + 1/2 \sum_m^n \sum_n^m \alpha_{m,n} \ln p_{m,ijt} \ln p_{n,ijt} + 1/2 \sum_s^t \sum_t^s \beta_{s,t} \ln y_{s,ijt} \ln y_{t,ijt} + \sum_m^n \sum_s^t \delta_{m,s} \ln p_m \ln y_{s,ijt} + u_{ijt} + v_{ijt} \quad (1)$$

where p_m and p_n are input prices and y_s and y_t are outputs quantities. Because of the specific form of the cost frontier function, we impose constraints on symmetry, $\alpha_{m,n} = \alpha_{n,m}$ and $\beta_{s,t} = \beta_{t,s}$ homogeneity in prices $\sum_m^n \alpha_m = 1$ and adding-up $\sum_m^n \alpha_{m,n} = \sum_n^m \alpha_{n,m} = \sum_m^n \delta_{m,s} = 0$. We also consider homogeneity constraints by normalizing total cost, the labor price and physical capital price by financial capital price.

The composite error term also takes a specific functional form. The random components, v_{ijt} are independently and identically distributed according to standard normal distribution, $N(0;\sigma_v^2)$ while the bank inefficiency components, $u_{ijt} > 0$ are independently but not identically distributed according to a truncated-normal distribution. The Stochastic Frontier Analysis assumes that the inefficiency component of the error term is positive; that is, higher bank inefficiency is associated with higher cost.

The inefficiency of bank i in country j at time t is defined as exp ($\hat{u}_{ijt}$) where $\hat{u}_{ijt}$ is the estimated value of u_{ijt}. However, only the composite error term $\varepsilon_{ijt} = v_{ijt} - u_{ijt}$ can be observed from estimation of the cost function. The best predictor of u_{ijt} is therefore the conditional expectation of u_{ijt} given $\varepsilon_{ijt} = v_{ijt} - u_{ijt}$, Jondrow et al. (1982). To investigate factors that are correlated with bank inefficiencies, we use the so called conditional mean model of Battese and Coelli (1993, 1995), which permits in a single-step estimation of the cost function and identification of the correlates of bank inefficiencies. The mean of the inefficiency term is modelled as a linear function of a set of bank-level variables. Specifically, the inefficiency terms, u_{ijt} are assumed to be a function of a set of explanatory bank-specific variables, z_{ijt} and a vector of coefficients to be estimated, θ. In other words,

$$u_{ijt} = z_{ijt} \theta + w_{ijt} \quad (2)$$

where the random variable, w_{ijt} has a truncated-normal distribution with zero mean and variance, σ_u^2. The point of truncation is $-z_{ijt} \theta$ so that $w_{ijt} > -z_{ijt} \theta$ and $u_{ijt} > 0$. The inefficiency component of the composite error term therefore has a truncated normal distribution, whose point of truncation depends on the bank-specific characteristics so that the inefficiency terms are non-negative.

Choice of Variables for the Cost Frontier Function

Estimating efficiency frontier requires the choice of inputs and outputs used and produced by Islamic banks. Following Isik and Hassan (2002) and Hassan (2005), we choose as inputs labour, physical capital and deposits. The prices of those inputs are measured respectively by personnel expenses/total assets (PERSONEXP), other expenses/ total assets (OTHEREXP) and income for deposits/total deposits (INTERESTEXP)[1]. For outputs, we have net loans (LOANS), net liquid assets (LA) and total earning assets (SECURITIES).

The variables influencing efficiency and therefore enabling to explain it, are related to characteristics of the banking firm and its production process, as well as the environment in which banks operate. The size of the bank has often been used in the literature as determinants of efficiency. Allen and Rai (1996) showed that large banks can take advantage on economies of scale by sharing costs in the production process. It is measured by the logarithm of total assets (SIZE). The same authors and more specifically, authors that have worked on Islamic banks such as Yudistira (2003) take into account regulatory and competitive conditions under which banks operate. Thus a variable used to catch profitability of banks is measured by net income/total assets (ROA) (or net income/equity

[1] This classification is justified by the fact that Islamic banks engage in other types of profitable activities, since they do not charge interest on loans and deposits.

(ROE)); and for Risk Taking Propensity (RISKTAKING) we used the ratio equity/total assets. Indeed, Islamic banks refrain from charging interests on loans and deposits to devote themselves to the principle of sharing profit and loss (SPL). This redefinition of the banking practices lead to new risks that conventional banks do not incur. Hence, there is a double interest here in our study to assess the impact of their risk taking propensity on efficiency.

Another variable that could have an impact on efficiency is the market share (MARKET POWER). It is measured by the ratio of total deposits of the bank/total deposits in the whole banking system. It can increase costs for the banking system in general because it results in slacks and therefore inefficiency that can not be solved. However, it can have a positive impact on efficiency, if it is the result of consolidation and market selection of the largest and most efficient banks. It appears therefore through lower costs, providing the market is contestable. The GDP per capita (GDPc) is a proxy of the level of development. It influences many factors related to demand and supply of banking services, mainly deposits and loans. Therefore, countries with a higher level of development are supposed to have more developed banking system, with more competitive interest rates and profit margins. Demand density (DENSITY) for banking products (measured by deposits per square kilometre), has a negative impact on costs. In countries with high demand density, banks support lower costs in the distribution of banking products. Again, the provision of banking services may be affected by population density (DPOP). In countries where this variable is low, banking costs are higher and banks are not encouraged to increase their efficiency. As those two last variables are highly correlated we test which one is significant, and we finally keep in the regression DPOP.

Data

We used data from balance sheets and income statements in their standard universal version of Database Bankscope, as we are dealing with different countries. The values of the variables are expressed in current dollars and have been deflated by the consumer price index of the current year in order to reflect macroeconomic differences among countries. The macroeconomic variables come from International Financial Statistics. Total deposits in each country for the calculation of market power were converted into dollars using market exchange rate end of period. Our regression is based on unbalanced panel data of 17 countries from the Middle East (Iran, Jordan, Kuwait, United Arab Emirates, Qatar, Bahrain, Lebanon, Saudi Arabia, Yemen), from Asia (Pakistan, Malaysia, Brunei), from Africa (Sudan, Egypt, Tunisia), but also from United Kingdom. This later country has a few Islamic banks where Muslims immigrants can have financial services. Including this banks in our sample allow us to see how well they perform relatively to their counterparts in country where Muslims are not the minority. The covered period is 2001-2008, which also allows us to analyze the impact of the subprime crisis on Islamic banks efficiency; and the total number of observations is 340, of 77 Islamic banks. Descriptive statistics are presented in Table 1.

Table 1: Statistics for the Arguments of the Cost-Frontier Function

Variable		Mean	Standard Deviation	Minimum	Maximum
lnTOTALCOST	overall	6,8564	2,1455	-0,4141	14,5537
	between		2,1481	2,1309	14,5537
	within		0,8524	2,9451	9,1508
lnLOANS	overall	5,1795	2,5465	-2,7988	10,4183
	between		2,4195	-2,1652	9,7068
	within		0,9667	-2,3657	7,7873
lnSECURITIES	overall	6,1571	2,1968	-2,5344	10,7905
	between		2,0720	0,7703	9,9131
	within		0,8574	0,5797	8,6233
lnLA	overall	4,5557	2,3734	-3,3302	9,3142
	between		2,1677	-1,5618	8,1801
	within		1,0172	-0,1042	7,8581
lnPERSONEXP	overall	0,0197	1,7043	-4,2028	17,8739
	between		2,2166	-3,5738	16,7185
	within		0,3832	-1,6673	2,4077
SIZE	overall	43,1454	333,6532	-1,6094	4986,9930
	between		253,9436	2,1570	2067,1260
	within		207,4721	-1538,0430	2963,0120
ROA	overall	0,0191	0,0733	-0,8000	0,5399
	between		0,0618	-0,2167	0,3326
	within		0,0531	-0,5642	0,3660
ROE	overall	0,1174	0,2909	-1,1514	4,6680
	between		0,2191	-1,1514	0,9374
	within		0,2411	-1,1628	4,2003
RISKTAKING	overall	0,2372	0,2318	0,2000	1,0000
	between		0,2090	0,0393	0,9461
	within		0,1184	0,3217	0,8567
MARKETPOWER	overall	0,1324	0,2006	0,0000	0,9758
	between		0,1825	0,0000	0,7408
	within		0,0655	0,1526	0,4372

EMPIRICAL RESULTS

Even if the temporal dimension of our panel is short and barely captures temporal effects, we enjoy other benefits of panel regression, ie flexibility in modeling differences between banks. Precisely to reflect the heterogeneity of data, we first led Haussmann test to determine the specification of the panel model. The probability of the test being greater than 10% threshold, it does not allow us to discriminate which of the fixed effects model or random effects model is best suited to the data. However, statistical properties allow us to choose the most appropriate model. For all variables in the model, the Within-variance is inferior to the Between-variance (see Table 1). Similarly, the short period of analysis leads us to prefer the random effects model. Our choice is reinforced by the idea that the random effects model allows us to take into account the one sided error term of the inefficiency for each Islamic bank. By this way, we will be able to capture the individual characteristics that are not captured by explanatory variables meant to explain efficiency.

We first estimate an efficiency frontier with the 3 inputs formerly presented in Section 2. However, the cost of deposits which is the income paid to depositors for Islamic banks, is not indicated in the financial statements provided by Bankscope for all banks in the sample. Therefore, estimate of the frontier, taking into account these three inputs reduces the number of available data and the γ coefficient is not significant. This means the efficiency frontier does not exist. Therefore, we cannot derive the efficiency scores. This leads us to estimate the efficiency

frontier by considering as inputs "Personal Expenses" and "Other Expenses", the latter used to normalize "Total costs" and "Personnel Expenses", in order to respect homogeneity constraints. At this level our estimation method is to incorporate in the estimation of the frontier, explanatory variables for efficiency, one by one taking into account their possible correlation.

The results are presented in Table 2, regression 1. We choose as a basis the model with three explanatory variables: size (logarithm of Total Assets) Return On Assets (Net Income / Total Assets) and Market Power (Bank Deposits/Total Deposits of the whole banking system). The size of the bank has a positive sign and therefore a positive impact on total costs. This implies that Islamic banks do not know how to benefit from economies of scale. This point could be explained by the peculiarity of Islamic financing that meets ethical standards according to the Shariah law. Thus, the inability to engage in certain conventional banking practices may limit the benefits of scale economies. ROA is a measure of banks profitability impact on efficiency. On a theoretical point of view the most profitable banks are the most efficient ones. The coefficient of this variable is negative, indicating a negative impact of profitability on total costs and therefore a positive one on efficiency. Therefore, it is consistent with theory. Lastly, "market power" is not significant.

We thereafter conduct robustness tests. Since 4 banks in our sample are located in United Kingdom, we proceeded to estimate the efficiency frontier without them. This regression is displayed in Table 2, regression 2. Although the explanatory variables of efficiency are not significant, the signs of the coefficients are the same.

A second robustness test consist in including in the regression explanatory variables related to the macroeconomic environment (following Hassan and Bashir, 2003) in order to control this aspect on the efficiency measurement. Despite, the strong correlation among the explanatory variables[2], we estimated the frontier including per capita GDP (GDPc), demand density (Dmde) or population density (DPOP) and the propensity to take risk (RISKTAKING). Results are shown in Table 2 (regression 3), and they are qualitatively the same than in regression 1. In addition, "market power" becomes significant with a negative coefficient. So when the macroeconomic environment is included in the regression, Islamic banks with important market power are more efficient in the distribution of Islamic financial services. GDP per capita is not significant, as well as the demand density (and alternatively the density of the population)[3]. On the contrary, the variable "RISKTAKING" depicts a small but significant negative coefficient. These qualitative results are the same when we remove from the sample, banks operating in United Kingdom, regression 4.

Based on those robustness checks, regression 1 is used for the estimate of efficiency scores. Our results are as follow. Islamic banks are efficient at 92.72% on average over the period 2001-2008. This efficiency differs depending on the region with maximum efficiency displayed by Islamic banks operating in Asia (96.21%). This level reflects the strong performance of Malaysian and Pakistani banks that constitute most of our Asian sample. Malaysia in particular is emerging as one of the most developed centers in Islamic finance, after Iran and Saudi Arabia. Since 1975 the government has reformed the financial system, so that it promotes the development of Islamic banking alongside conventional finance. This was especially possible through the Malaysian Islamic Banking Act of 1983. For the Pakistani case, since 1978, the government has fostered the transformation of the banking system through the constitution of Commission for Transformation of Financial System (CTFS), and the establishment of Islamic Banking Department by the State Bank of Pakistan. Thus the government accompanied and framed this transformation through an appropriate regulatory system.

Besides, Islamic banks operating in Africa displayed an average efficiency score of 93.34%, with 92.75% for Sudan whose banking system is essentially Islamic (government legislation). On the other hand, Islamic banks operating in United Kingdom have an efficiency of 93.25%. UK has made efforts to include in its banking regulation, specific rules for Islamic banks to better operate in the British environment. Therefore, those banks attract capital from Muslim immigrants and also petrodollars from the Middle East seeking investment opportunities. Finally, Middle East has an efficiency score of about 92.49%. Especially, Iran whose banking system is essentially Islamic (government legislation) displays an average efficiency of 94.38%.

[2] Correlation table is available upon request.
[3] To save space, we didn't present results with demand density, they are available upon request.

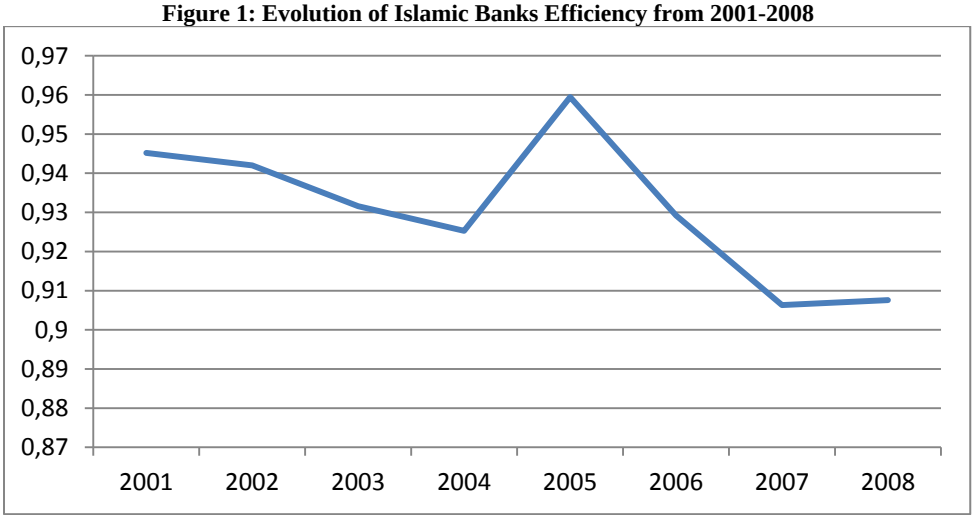
Table 2: Estimate for the Cost-Efficiency Frontier and Robustness Checks

	(1)	(2)	(3)	(4)	(5)
Constant 1	-0,0166	-0,0625	-0,0056	-0,0096	-0,0124
	(0,0039)***	(0,0499)	(0,0023)**	(0,0061)	(0,0083)
lnLOANS	1,277	2,5293	1,4493	0,3089	0,9609
	(0,1239)***	(0,7839)***	(0,1727)***	(0,1422)**	(0,2095)***
lnSECURITIES	-0,005	-1,1307	-0,5267	0,5638	-0,0881
	(0,116)	(0,7233)	(0,1192)***	(0,1499)***	(0,0652)
lnLA	0,4272	0,4528	0,6301	0,5785	0,7706
	(0,0856)***	(0,7496)	(0,1078)***	(0,1095)***	(0,0619)***
ln PERSONEXP	-0,3154	-0,433	-0,4583	-0,0228	-0,3127
	(0,0816)***	(0,8101)	(0,1016)***	(0,0403)	(0,1412)**
lnLOANS*lnLOANS	0,1358	0,3433	0,0817	0,0655	0,0221
	(0,0190)***	(0,2934)	(0,0247)***	(0,0310)**	(0,047)
lnLOANS*lnSECURITIES	-0,4229	-0,9799	-0,4241	-0,1322	-0,2602
	(0,0275)***	(0,4328)**	(0,0643)***	(0,0641)**	(0,0826)***
lnLOANS*LA	0,0579	0,1653	0,1711	0,0276	0,1461
	(0,0235)**	(0,2779)	(0,0090)***	(0,0134)**	(0,0210)***
lnSECURITIES*lnSECURITIES	0,2525	0,5365	0,3555	0,1047	0,2555
	(0,0244)***	(0,2121)**	(0,0311)***	(0,0414)***	(0,0289)***
lnSECURITIES*lnLA	-0,1058	-0,1186	-0,2438	-0,1356	-0,2449
	(0,0241)***	(0,2991)	(0,0233)***	(0,0336)***	(0,0288)***
lnLA*lnLA	-0,0045	-0,0321	0,0014	0,0232	0,0056
	(0,0078)	(0,0788)	(0,0078)	(0,0066)***	(0,0132)
lnPERSONEXP*lnPERSONEXP	0,1453	0,6393	0,3515	0,2885	0,2127
	(0,0329)***	(0,4496)	(0,0385)***	(0,0465)***	(0,0625)***
ln PERSONEXP*lnLOANS	-0,2991	-0,7617	-0,4907	-0,1574	-0,3221
	(0,0297)***	(0,7276)	(0,0225)***	(0,0701)**	(0,0545)***
lnPERSONEXP*lnSECURITIES	0,412	0,9515	0,5808	0,229	0,4405
	(0,0278)***	(0,5218)*	(0,0260)***	(0,0433)***	(0,0786)***
lnPERSONEXP*lnLA	-0,0988	-0,2476	-0,0195	-0,0125	-0,0477
	(0,0233)***	(0,2927)	(0,0148)	(0,0248)	(0,0237)**
Constant 2	-2,7578	-0,0963	-4,0654	-3,844	-1,6478
	(0,2162)***	(0,1345)	(0,3480)***	(0,4988)***	(0,0500)***
SIZE	0,4988	0,0783	0,746	0,7678	0,4692
	(0,0343)***	(0,096)	(0,0495)***	(0,0378)***	(0,1121)***
ROA	-16,3537	-0,0771	-27,3961	-19,7588	-6,4732
	(2,1147)***	(0,7692)	(3,7700)***	(3,5437)***	(0,9813)***
MARKET POWER	0,1526	-0,0728	-1,1569	-2,0684	-3,4723
	(0,2653)	(0,7532)	(0,5545)**	(0,6920)***	(0,6496)**
DPOP			0,0000	0,0000	
			(0,0000)	(0,0000)***	
GDPC			0,0008	-0,0030	
			(0,0016)	(0,0016)*	
RISKTAKING			-0,0001	-0,0001	
			(0,0000)***	(0,0000)***	
D_Middle_East					-2,47E-06
					(0,0000)**
D_UK					0,0042
					(0,0020)**
D_islamicbkgsystem					-3,01E-08
					(0,0000)***
D_subprime					0,0439
					(0,5053)
Gamma	0,9992	0,9969	0,9999	0,9999	0,9996
	(0,0002)***	(0,0063)***	(0,0000)***	(0,0002)***	(0,0007)***
Log-likelihood Ratio	1032,3	235,23	1270,12	1186,42	855,8
Number of observations	277	261	277	270	267

*, ** and *** significant at levels 10%, 5% and 1% respectively. (1) Cost-efficiency frontier with the whole sample of Islamic banks. (2) Cost-efficiency frontier without Islamic banks in UK. (3)Cost-efficiency frontier with the initial sample and macroeconomics variables (4)Cost-efficiency frontier with macroeconomics variables without Islamic banks in United Kingdom (5) Cost-efficiency frontier with the initial sample and dummies variables.

Because of these differences in scores efficiency across regions, we integrate in the regression dummies, see Table 2, regression 5. The dummy variable related to Middle East (*D_middle_East*) and to the Islamic banking system as government legislation (*D_islamicbkgsystem*) have very weak negative coefficient but significant. These results mean that operating in those countries for Islamic banks is less costly. Conversely, the dummy related to the United Kingdom (*D_UK*) has a positive and significant impact on the cost frontier, meaning that operating in United Kingdom is more costly. We can make a conjecture by saying that because of the specificity of the market compounded of a minority of muslim immigrants, Islamic banks settled down in western countries could face higher costs.

Figure 1: Evolution of Islamic Banks Efficiency from 2001-2008



As a whole, Islamic banks efficiency has a decreasing trend over the period of analysis with a peak in 2005. Besides, the lowest levels of efficiency appear in 2007 and 2008. This period corresponds to the subprime crisis. Using a dummy variable (*D_subprime*), we try to check the impact of the subprime crisis. However, it was not significant, see Table 2, regression 5. Despite the decrease of Islamic banks efficiency during this period, we cannot assert that this is due to this crisis.

CONCLUDING REMARKS

In this article, we use the method of stochastic frontier in one step to assess Islamic bank efficiency (Battese and Coelli, 1996). This allows us to integrate in the cost frontier explanatory variables of efficiency.

Our study shows that in general Islamic banks are efficient with an average efficiency score of 92%. However there are differences across regions. Banks operating in countries with an Islamic banking system as government legislation are not necessarily the most efficient. The most efficient region is Asia (96%), with especially Pakistani and Malaysian banks, which constitutes the bulk of our Asian sample. Those countries took gradual reforms to allow Islamic banks to better cope with the banking system. Especially, Malaysia first allows the development of window Islamic banks then full-fledge ones, through the Malaysian Islamic Banking Act of 1983. This gradual establishment of Islamic banking could be a good strategy for other countries which want to favor establishment of Islamic banks.

Another interesting result is that operating in a country where Islamic banking is government legislation or in Middle East is less costly for Islamic banks. Moreover, profitability has a positive impact on efficiency, which is consistent with the literature. Market power has a positive impact on efficiency: the more clients Islamic banks have, the more efficient they are. We observe the decrease of efficiency at the end of the period (ie 2007-2008). Although this period corresponds to the subprime crisis we found no evidence that it was due to the crisis.

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