AN ANALYSIS OF BANK EFFICIENCY IN THE MIDDLE EAST AND NORTH AFRICA

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Abstract

This paper reports institutional factor effects on bank efficiency in Middle Eastern and North African countries during a recent 14 years. The methods used are: Stochastic Frontier Analyses and second-stage Tobit regression to investigate the impact of institutional-cum-financial as well as bank-specific variables on efficiency. Overall, the analysis shows that banks could save 20 percent of their total costs if they were operating efficiently. Factors that affect production efficiency are: macroeconomic stability, financial development, the degree of market competition, legal rights and contract laws, better governance and political stability. Differences in technology seem to be crucial in explaining efficiency differences. Our findings point to the importance of policies that aim to build stronger institutions, promote more competition, and improve governance. Policies should be aimed at giving banks incentives to improve their capitalization and liquidity. Improvements in the legal system and in the regulatory and supervisory bodies would also help to reduce inefficiency, areas of immediate concerns for this vast region. Finally, increased investments and upgrading of the stock markets in the region would help banks improve their performance through market-based investor actions.

Key Words: Bank efficiency, Stochastic frontier analysis, Competition

JEL Classification: G21, O16

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1. Introduction

A large number of developed and developing countries have deregulated their banking systems over the past two decades: see Ariff and Can (2008). The primary objective of such reforms was to improve productivity, efficiency, and profitability of the banking systems and also to increase international competitiveness. In particular, developing countries, mostly following International Monetary Fund (IMF) and/or World Bank initiated programs, sought to improve performance

and efficiency of financial sectors to enhance their overall economic performance. Indeed, a strong and stable banking system has been advocated as being the cornerstone in many liberalization programs (Saunders and Sommariva, 1993). This is pertinent for the region studied.

The banking industry may have benefitted considerably from advances in both nonfinancial and financial technologies. Banks have used information processing to process deposit and loan customer information more efficiently and applied telecommunications technologies to transmit information and to process payments more quickly with less resources. Banks have also used new financial technologies to provide new services, to evaluate risks more efficiently, and to unbundle and repackage risks in new ways.

This paper uses bank level data to study the efficiency of the banking sectors in 19 MENA (Middle East and North Africa) countries. We focus on the cost efficiency of the banks, and rely on the stochastic frontier analysis (SFA) to compute the efficiency score document the difference between bank's actual cost efficiency levels relative to an economy's cost efficiency production frontier in the spirit of the studies that have focused on these newer research method away from accounting measures of efficiency. We find that, on average, banks would save about 20 percent of their total costs if they were operating on the frontier.

The MENA region is strategically located between Asian economies and the Western world. MENA countries were colonized by the French or the British until the middle of the past century. Major institutions including financial intermediaries were established on the line of Western institutions. Financial sectors these countries are generally still in the early phases of economic development. Capital markets are weak or almost non-existent, and financial markets are dominated by bank-financed credit mechanisms. In this framework, banks are the main suppliers of credit to private and public investment projects and they also finance government deficits (Turk-Ariss, 2009).

The major purpose of this paper is to find the common factors that could help explain the differences in efficiency among banks. The study focuses on the aggregate influence rather than bank or country-specific factors. Therefore, the findings of this paper could be seen as an initial step toward understanding the production efficiency of the banking sectors in these countries. Policy implications for specific countries, however, would certainly require more detailed follow-up country studies, which could be the next step in our research.

The paper is organized as follows. Section 2 reviews the literature on cost efficiency analysis. Section 3 provides an overview of the banking sector in the MENA countries. In section 4 are the results and discussion on the cost efficiency analyses while in section 5 the readers will see evidence on what determinants affect bank efficiency levels. The paper ends with a conclusion in section 6.

2. Literature on Production Efficiency

Efficiency can be defined as the extent to which a decision-making unit (DMU) meaning a bank can increase its outputs without increasing its inputs; or reduce its inputs without reducing its outputs. Efficiency is generally classified into three forms: scale efficiency; scope efficiency; and X-efficiency. X-efficiency measures whether banks are operating with an efficient mix of inputs, and has been the focus of recent bank efficiency studies. It represents the ability of management to control costs and use of resources to produce output. Measuring the efficiency levels of individual banks is usually the first step. After all, understanding the determinants behind the differences among banks' efficiency levels is more interesting, as is done in this paper.

Efficiency studies using frontier approaches did not start until Sherman and Gold (1985) initiated a study: prior to this, the fashionable method was Malmquist's Data Envelopment Analysis. They applied the frontier approach to the banking industry by focusing on the operating efficiency of the branches of a saving bank. Since then, frontier approaches have become popular as measures of banking efficiency. There have been extensive studies on bank efficiency of the US and European countries and most of them focused on conventional banking (Berger and Humphrey, 1997; Goddard et al., 2001). Only few efficiency studies on Islamic Banking can be found (Elzahi Saaid, 2002; Hussein, 2003, Kabir Hassan, 2004; Hamim Mokhtar et al., 2006; Bader, et al., 2007). However, studies dedicated to some South Saharan countries remain limited (Demirguc-Kunt, et al, 2004 and Chuling Chen, 2009). MENA countries have been also studied for some periods (Olson and Zoubi, 2008; Chaffai and Dietsch,2006; Kobeissi, 2004;Srairi,2009;Sufian,2008).

The relationship between efficiency and market structure is not so clear-cut in those studies since the studies focused on efficiency only. Beck and Hesse (2006) find that market structure in Uganda played a limited role in determining bank efficiency, and structural impediments were more significant in lower spreads and margins charged. Demirguc-Kunt, et al. (2004) finds no

robust association between bank concentration and interest rate margins. However, the paper by Turk-Ariss (2009) attempted to examine competition structures of region, of which Tunisia is a part. Based on revenue elasticity to input prices, and retaining a set of market and contestability indicators, the degree of competition measured for the test period of 7 years demonstrates that the region is characterized, for the most part, by a monopolistic competition.

3. Overview of the Banking Sectors in MENA Countries

The Middle East and North African (MENA) region is strategically located between Asian economies and the Western world. Except for Turkey, MENA countries were colonized by the French or the British until the mid-last-century. The region is important for a number of reasons. It represents a bridge between Europe and Asia. In the current century, it is a fast growing region in terms of both population and wealth while its banking sector is relatively young with most banks being established since the 1970s. The region includes the rapidly expanding oil rich countries of the Gulf Cooperation Council (GCC) as well as the Arab countries of the Near East and North Africa. The world's largest Islamic banks are located in the MENA region such as in Bahrain and UAE and its mix of conventional and Islamic banks permits a comparison of efficiency and profitability by types of bank, a feat rarely done (see Bader et al. op cit).

Financial sectors are generally still in the early phases of economic development. Capital markets are weak or almost non-existent, and financial markets are dominated by bank-financed credit mechanisms. In this framework, banks are the main suppliers of credit to private and public investment projects while they also finance government deficits. While these features are common to many other emerging economies, banking sectors in this region are unique in three aspects.

First, the recent oil price hike marks the beginning of a new era that was last witnessed a quarter of a century ago. Investment opportunities in the United States using petrodollars coming from the Middle East became more restricted after 9/11 event, so that oil surplus funds have to be channeled to productive uses elsewhere in the world. Monetary authorities in these countries generally require banks to adopt international accounting standards as well as comply with international regulatory requirements such as Basel II and the anti-money laundering recommendations. Still, a major concern is raised regarding the absorptive capacity of banks in the region to recycle oil surplus funds. This is pointed by policymakers with appropriately

designing policies for more efficient and stable banking systems. The banking systems in the region have traditionally been very highly concentrated markets, meaning low competition.

In some countries where a large number of banks operate as in Lebanon, Turkey and the UAE, he large banks have sought to consolidate their position domestically before expanding in the region. In other countries (Jordan and Kuwait) leading banks are strategically investing across borders in order to enhance their growth potential. Ongoing consolidation of financial institutions within each country and regionally justly intensifies public policy debates on issues of concentration and competition in the banking industry.

Third, the governance structure of banks is evolving, following accession to the World Trade Organization (WTO) and greater commitment to financial liberalization. Traditionally, banking institutions were either mostly family-owned businesses managed by major shareholders who cater for their own personal interests, or dominated by state authorities, thus making it more difficult for new firms to compete in the industry. In the past two decades, however, ownership of large shares of the banking systems turned over from government to private control and from domestic to foreign control. Such changes occurred as governments privatized many of their state-owned banks while providing reduced barriers to entry in line with the WTO accession requirements. Foreign investors bring in state-of-the-art technology, sophisticated risk management techniques and qualified human capital thus forcing domestic banks to undergo major structural reforms in order to compete on an equal platform with their peers. Together, financial liberalization measures and incentives attract foreign banks accept better disclosure requirements which, together with better regulatory environment, ultimately should be a positive effect on growth performance (Turk-Ariss, 2008).

It is long believed that advanced economies are characterized by a sophisticated financial systems, although, this myth may be put to rest after the 2008 world crisis. Policy makers in developed and developing countries realized the importance of improving and restructuring their financial systems and MENA region has taken a lesson to do so. MENA countries have recognized the importance of financial sector reforms under the auspice of the International Monetary Fund (IMF) so that their banks could become modern financial operators to help allocating investment, enhance productivity and effectively participate in economic growth. More recent investment in the financial sector has surged in these countries and the size of their economy has increased significantly since 2000. The Gross Domestic Product (GDP) has increased from $ 709 billion in 2000 to $ 1,276 billion in 2006 (Cherif et al., 2008). However,

commercial banks are the dominant part in the MENA financial system (Al- Fayoumi and Abuzayed, 2010).

Although, restructuring initiatives in the region are not as energetic as those taking place in Eastern Europe or in some parts of Asia, several countries are witnessing new eras in privatization, bank regulation, and market-organizational structures. Serious steps have been taken to improve bank efficiency and corporate governance (Ben Naceur and Omran, 2008). A recent paper (Cherif et al., 2008) demonstrates that the MENA countries have relatively well developed financial systems compared with the European Accession countries using as judged by three measures of broad money to GDP ratio, domestic credit in the banking sectors to GDP ratio, and the ratio of private credit to GDP.

4. Efficiency Analyses

4.1. Methodology

Efforts to measure how efficiently a firm produces outputs with a given mix of inputs have led to the development of a number of efficiency concepts: scale efficiency, scope efficiency, economic efficiency, and X-efficiency. Economic efficiency builds on scale and scope efficiency by incorporating prices and thereby allowing the firm to react to price changes thus potentially gaining market power. The concept of X-efficiency or managerial efficiency goes one-step further in the sense that it measures efficiency in implementing an existing production plan with given prices and technologies.

There are several econometric (parametric) and linear programming (non-parametric) techniques used to measure efficiency: Berger et al. (1993) and Berger and Humphrey (1997). The parametric approach has the advantage of allowing noise in the measurement of inefficiency. However, the approach needs to specify the functional from for production, cost or profit. The non-parametric approach is simple and easy to calculate since it does not require the specification of the functional form (Coelli, 2004). To examine the efficiency of banks using frontier approaches, there are two models. Parametric technique, such as stochastic frontier analysis (SFA), thick frontier approach (TFA) and distribution free approach (DFA), uses econometric tools and specifies the function form for the cost or profit function. On the contrary, the non-parametric approaches (such as DEA) and free disposable hull analysis (FDHA) do not make an assumption concerning the functional form of frontier and use a linear program to

calculate efficiency level. In the present study, we use the SFA, as developed by Aigner et al. (1977), to estimate cost efficiency frontier. The main advantage of SFA over DEA is that it allows us to distinguish between inefficiency and other stochastic shocks in the estimation of efficiency levels. In addition, by using this model, it would be easier to add control variables, such as country-level variables, in the equation of this model than in non-parametric techniques. Hence, this approach allows us to compare efficiency between countries (Srairi, 2010).

Applying SFA approach in this paper is appropriate to estimate the efficiency frontier. The SFA approach is one of the structural approaches to study efficiency. It is based on the economics of cost minimization or profit maximization by banks. Thus it starts with a standard cost or profit function with factors of input, output, and their respective prices. It estimates the minimal cost or maximum profit based on these functions, and generates an efficiency frontier for the sample. The efficiency of each bank is then measured as the distance of its cost or profit to the frontier value (Chen, 2009).

A bank is labeled inefficient if it is behaving less optimally with respect to cost than the frontier value after taking out the random error.

A bank's total cost can be modeled as follows:

$$LTC = f(W, Y) + Ln\ U_c + Ln\ V_c \qquad\qquad (1)$$

where LnTC is the total cost variable, f denotes some functional form, Y is the vector of output variables, W is the vector of prices of input variables, $Ln\ U_c$ is the inefficiency factor that may raise cost above the best- practice optimal cost and $Ln\ V_c$ is the random error incorporated to capture the measurement error and luck, which may temporarily increase or decrease a bank s costs. Basically, the cost function above describes the relationship between the cost variables with prices of input variables, quantities of output variables plus the inefficiency and random error.

We estimate the following standard multi-product translog cost function:

$$Ln\,TC = \alpha_0 + \sum_{i=1}^{n} \alpha_i\, Ln\, Y_i$$

$$+ \sum_{j=1}^{n} \beta_j\, Ln\, W_j + 1/2 \left[\sum_{i=1}^{n}\sum_{j=1}^{n} \delta_{ij} Ln\, Y_i Ln\, Y_j + \sum_{i=1}^{n}\sum_{j=1}^{n} \gamma_{ij} LnW_i\, Ln\, W_j \right]$$

$$+ \sum_{i=1}^{n}\sum_{j=1}^{n} \rho_{ij} Ln\, Y_i\, Ln\, W_j + E_i \qquad (IV.2)$$

Where, LnTC= the natural logarithm of total costs; LnY= the natural logarithm of output quantities; LnW= the natural logarithm of input prices; E_i= V+U in equation (IV.1); α, β, δ and ρ are coefficient to be estimated.

4.2. Data and Results

We obtain bank level data from *BankScope*, which covers 90 percent of banks worldwide. The study used 266 panel data from the reports of 19 Middle East and North Africa countries from 1995 to 2008. All the variables used in the cost function are obtained from the balance sheet and income statement information in the BankScope database.

The computer program FRONTIER Version 4.1, developed by Coelli, is used to obtain the maximum likelihood estimates of the parameters of technical and cost efficiency (Coelli, 1996 and Coelli et al., 1998). The program can accommodate cross sectional and panel data; cost and production function; half-normal and truncated normal distributions; time-varying and invariant

Table 1: Stochastic technical frontier OLS parameter estimates

Variables	Parameter	Coefficient	Standard Error	T-Ratio
Beta0	Intercept	5.723	1.218	4.697
Beta1	$Ln\,Y$	0.220	0.153	1.438
Beta2	$Ln(W_1/W_2)$	0.476	0.143	3.315
Beta3	LnYLnY	0.0531	0.0107	4.925
Beta4	$Ln(W_1/W_2)Ln(W_1/W_2)$	0.0267	0.00497	5.386
Beta5	$Ln(W_1/W_2)LnY$	-0.0388	0.00993	-3.913
Sigma-squared	$\sigma^2 = \sigma_v^2 + \sigma_u^2$	0.133	-	-
Log likelihood function	-	-106.72	-	-

Notes: Y= Total Earning Assets (Financing/Loans, Trading& Investment Securities and Placement to other financial institution). W1=Price of labor and capital, W2=Price of deposits.

Table 2: Stochastic cost frontier maximum likelihood parameter estimates

Variables	Parameter	Coefficient	Standard Error	T-Ratio
β_0	Intercept	3.4604	1.1646	2.971
β_1	$Ln\ Y$	0.5094	0.1462	3.483
β_2	$Ln(W_1/W_2)$	0.07967	0.1178	0.6758
β_3	$LnYLnY$	0.08458	0.01723	4.907
β_4	$Ln(W_1/W_2)Ln(W_1/W_2)$	0.02746	0.009726	2.824
β_5	$Ln(W_1/W_2)LnY$	-0.008357	0.01717	-0.4865
Sigma square	$\sigma^2 = \sigma_v^2 + \sigma_u^2$	0.1684	0.03710	4.540
Gamma	$\gamma = \dfrac{\sigma_u^2}{\sigma_v^2 + \sigma_u^2}$	0.6057	0.07765	7.801
Log likelihood function	-	-45.223	-	-

Table3: SFA Cost efficiency (CE) estimates by banking system

Country	Cost Efficiency
Algeria	0.7679
Bahrain	0.8438
Djibouti	0.7427
Egypt	0.8298
Emirate	0.8475
Iran	0.7246
Iraq	0.8046
Israel	0.7629
Jordan	0.7752
Kuwait	0.8693
Libya	0.8046
Lebanon	0.6902
Morocco	0.7307
Oman	0.8034
Qatar	0.8739
Saudi	0.8090
Syria	0.8883
Tunisian	0.7568
Yemen	0.8379
Mean	**0.80**

efficiencies; and functional forms which have a dependent variable in logged or original units. These features of Frontier 4.1 exhaustive, but provide an indication of its capabilities.

We first estimate the model by pooled Ordinary Least Squares (OLS) regression (regression 1), and then conduct the frontier analysis by making the assumption that μ_i follows half-normal distribution and by MLE regression (regression 2). We also estimate the model controlling for country specific effects (regressions 3). The estimation results for efficiency are reported in Table 1, Table 2 and Table3. The results show that individual inefficiency can explain a large part of the variance we see in the production process of the banks. The estimation also shows consistency in terms of the efficiency levels and ranking of the banks. The overall efficiency levels are about 0.8, meaning 20 percent of total cost can be saved if banks were operating efficiently.

5. Determinants of Efficiency

Having obtained the individual bank's cost efficiency; we next investigate if the efficiency levels can be explained by several different groups of country-specific or bank-specific factors. We will first determine the variables and then include them as explanatory variables in the following equation:

$$\text{COSTEFF}_{i,t} = \eta_0 + \eta M_{i,t} + \varepsilon_{i,t} \tag{V.1}$$

where $\text{COSTEFF}_{i,t}$, is the bank level cost efficiency score from the SFA analysis, and $M_{i,t}$ includes the variables that could have potential impact on the cost efficiency levels of the banks. More specifically, we consider two groups of variables. The first group includes factors that are more specific to individual banks, and the second encompasses the external environment that banks operate in, such as macroeconomic conditions, financial depth, market structure, regulatory framework, and overall institutions. Since we study cross bank-specific characteristics alone might not be enough to explain the difference in efficiency levels observed across the sample. In fact, there could be important country-specific factors that are omitted, but significantly correlated with both efficiency levels and the bank-specific characteristics we use. To disentangle the impact of bank-specific factors from that of environmental factors, we keep bank-specific variables in each regression. To avoid the possible multicollinearity between the different groups of variables, we also include each group of factors one at a time.

5.1. *Bank-Specific Factors*

The characteristics of a typical bank, such as size, ownership, organization forms, service quality and so on, can affect bank efficiency. In this research we are particularly interested in

specific factors: risk profile, business specialty, and service quality. These factors are interrelated. The amount of risk a bank takes on can change the efficiency results significantly. Banking service quality may considerably change a bank's efficiency. In this study the ratio of loan loss provisions to total loans (LOSS) and the loan-to-asset ratio (Loan/Asset), and the ratio of total other operating income to total asset (Other Income) are proxy for the risk level, the

Table 5: Second stage regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	***0.78	***0.803	***0.77	***0.73	***0.791	***0.81	***0.86	***0.76
	(0.013)	(0.012)	(0.047)	(0.019)	(0.032)	(0.007)	(0.02)	(0.015)
Loss	-0.090	0.093	0.020	0.097	-1.324	0.075	***-0.1	0.038
	(0.11)	(0.304)	(0.102)	(0.145)	(1.18)	(0.397)	(0.08)	(0.15)
Loan/asset	***0.046	***-0.08	***0.08	***0.08	0.052	***-0.1	-0.015	***0.073
	(0.012)	(0.015)	(0.015)	(0.015)	(0.089)	(0.023)	(0.017)	(0.015)
Other income	***-0.65	*-0.60	***-0.9	-0.33	***-7.41	-0.69	-0.03	***-0.84
	(0.22)	(0.38)	(0.32)	(0.29)	(1.62)	(0.54)	(0.14)	(0.22)
GDP per capita		***0.0024						
		(0.001)						
Inflation		***-0.001						
		(0.0006)						
Political stability			***0.01					
			(0.003)					
Concentration				**0.036				
				(0.018)				
Competition					***0.062			
					(0.027)			
Financial depth						***0.01		
						(0.009)		
Credit right							***0.01	
							(0.003)	
Enforcement of contract							-003.***	
							(0.001)	
Rule of law								***0.015
								(0.007)
R Squared	0.093	0.12	0.16	0.35	0.86	0.11	0.051	0.14
Adjust R squared	0.08	0.099	0.14	0.34	0.80	0.096	0.035	0.13
F test	7.052	5.31	9.64	27.49	13.36	6.89	1.07	8.12

Notes: Standard error in bracket. *, ** and *** correspond to 0.10, 0.05, and 0.01significance levels, respectively.

impact of the difference in product and services a bank offers, and the bank's investment preferences between loans and other earning assets respectively. The ratio of total other

operating income to total asset (Other Income) is a index for Banking service quality. Data are obtained directly from *BankScope.*

Results (Table 5) show that higher levels of loss provision mean lower cost efficiency for banks, although this variable is statistically insignificant across all regressions. The loan to- asset ratio exhibits a positive relationship with cost efficiency, indicating that for banks in our sample, loan products are more cost-efficient than other types of earning assets. This could, however, also indicate that higher market power might exist in the loan product market than other product markets (Berger and Master, 1997). Higher total other income, however, is found to lower the cost efficiency of banks, implying that higher income from sources such as fees and commissions, could reflect a higher cost of providing such services.

When we include other groups of variables in regressions, the bank-specific factors show a consistent pattern. The loss provision variable is insignificant, while the loan-to asset ratio and ratio of total other income to assets are found to be significant in most regressions except in those with macroeconomic variables or overall institution variables.

5.2. *Macroeconomic Conditions*

We next consider if cost efficiency levels can vary systematically across countries due to differences in the macroeconomic environment. Two macroeconomic variables are used: logarithm of per capita GDP and inflation. So, this study gives issues concerning the relationship between inflation and per capita GDP and efficiency banking system for MENA region countries. Both per capita GDP and inflation data are obtained from the International Monetary Fund's *World Economic Outlook* (WEO).

Per capita GDP is used to reflect the general income level. A higher income level is more likely to be associated with a more developed banking sector. Our estimation shows that it can also bring higher cost efficiency. Over the past two decades or so, economic growth in countries in the MENA region has generally lagged behind those of the major emerging market economies in Asia, Latin America and Central and Eastern Europe (Nabli and Véganzonès-Varoudakis (2004)). Figures 1 shows that real per capita GDP growth rates have picked up in the MENA region over the past decade. However, in the period since 1998, emerging market economies in Asia and in Central and Eastern Europe have continued to perform significantly better, while sub-Saharan Africa has achieved an even more impressive acceleration in real per capita GDP growth.

Inflation is an indicator of macroeconomic stability, and is directly related to the interest rate levels and, thus, interest expense and revenue. Macroeconomic instability would, in general, have an adverse impact on banking sector performance. A bank's ability to manage interest rate risk under inflationary conditions can also affect its cost structure. Globally, we find that inflation has a negative and significant incidence on cost efficiency in banking system. Figure (2) gives an overall picture on the evolution of inflation in MENA as a group and a comparative inflation performance at regional level.

Figure1: GDP Per capita growth rate (percent)
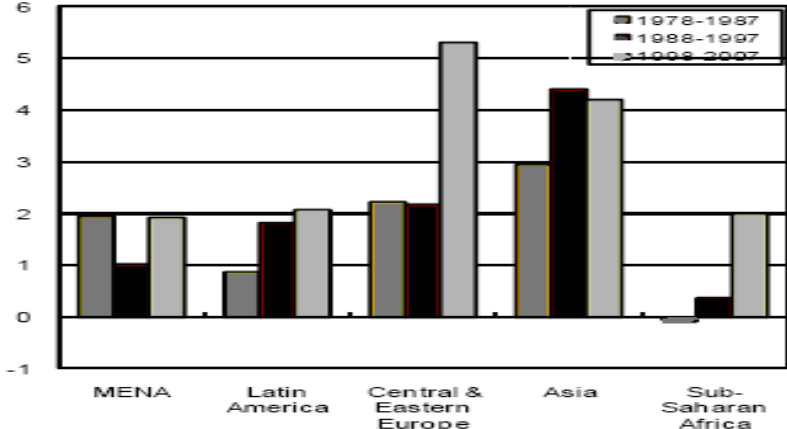
Source: World Development Indicators Database

Figure 2: Evolution of inflation in MENA (1980-2007)
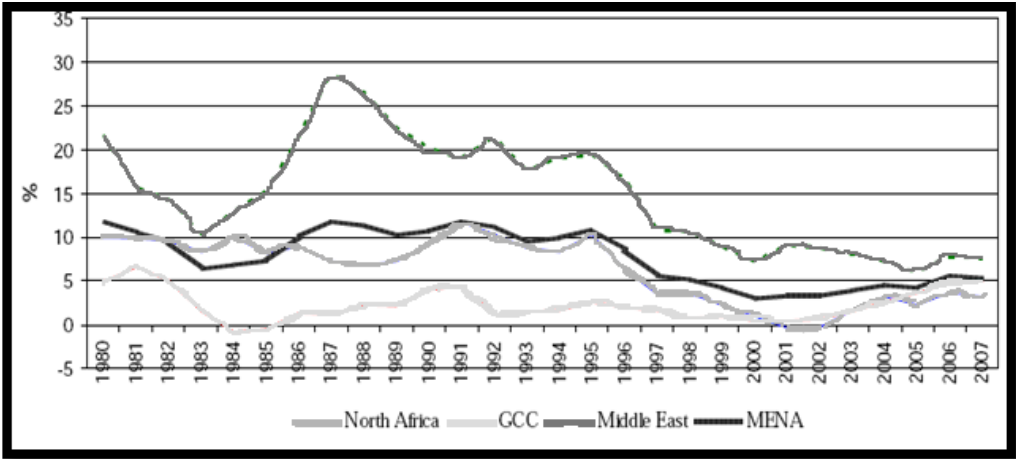
Over the past three decades, the dynamic process of inflation is affected by a combination of global and domestic factors. At the beginning of 1980s, inflation showed a declining trend culminating ultimately in price collapse. However, at the end of 1985 the situation changed rapidly. The inflation surged extremely fast and became more volatile till mid-1990s, the ongoing geopolitical tension, as like the Iranian-Iraqi a wars in 1988, Gulf war 1990-1991 was in

cause. In the late of 1990s and early 2000s, inflation has declined from double to signal digits, reflecting improvements in the terms of trade and stronger demand management policies.

The level of financial development is also crucial to bank efficiency. Higher levels of financial depth could contribute to the better performance and higher efficiency levels of banks. We use bank deposits to GDP to capture the cross-country differences in financial depth. We find the relationship between cost efficiency and bank deposits to GDP to be positive. This indicates that more financial intermediation in the form of bank deposits tends to help reduce costs of bank operations.

5.3. Market Structure

The relationship between market structure and efficiency is an important aspect that this paper explores. The usual indicator for market structure is market concentration, often expressed by a Herfindahl index. There are basically two views on the relationship between market structure and bank efficiency. One view holds that concentration and restrictions generate market power and, thus, monopolistic profits. In this case, one often observes a positive relationship between concentration and profitability, which might not mean higher efficiency. The other view, however, argues that market structure is a result of competition whereby more efficient banks dominate the less efficient ones and, thus, market concentration is a result of higher efficiency. Empirical studies have also found an ambiguous relationship between market concentration and bank efficiency, which, as recognized by many, indicates that simple market structure indicators, such as concentration ratios, are not good proxies of market structure (Chuling Chen, 2009).

Instead of focusing on the concentration ratios, we investigate the degree of competition in the market within which the banks are operating. This is because competition pressures might be more effective in improving efficiency, and a concentrated banking market could also be competitive and efficient. We explore whether the difference in market competition pressures can explain the variation in efficiency across countries. First, we follow Panzar and Rosse (1987) and estimate the reduced form revenue equations to formally test the level of competition for each country. This statistical analysis requires the estimation of the reduced form of bank revenue. The quantity and price of the equilibrium determining total revenue equilibrium depend on costs, demand and conduct. Accordingly, all determinants of costs and demand must be included in banks' revenues functions. A particular attention will be devoted to the price of factors. In the elaborated model, we preserve the linear form of the relationship between

dependant and independent variables. The works of Claessens and Laeven (2004), Prasad and Ghosh (2005), Yuan (2006), Gutiérrez de Rozas (2007) and Turk- Ariss (2009), have established its theoretical basis.

The reduced form of the following specification is:

$$\ln REVN_{it} = \alpha + \beta_1 \ln INTC_{it} + \beta_2 \ln LC_{it} + \beta_3 \ln OTHC_{it} + \gamma_1 \ln LOAN_{it} + \gamma_2 \ln CAP_{it} + \gamma_3 \ln TA_{it} + \varepsilon_{it} + trend \qquad (V.1)$$

Where *it REVN* is the ratio of total interest revenue to total assets for bank *i* at time *t, it INTC* is the total interest expenses to total deposit, *LC* is the ratio of personnel expense to total assets, and *OTHC* is the ratio of total other operating expenses to total assets. We also include the following variables to control for bank-specific characteristics: *LOAN* is the ratio of total loans to total assets, *CAP* is the ratio of equity to total assets, and *TA* is total assets.

For robustness, we also estimate models with total revenue as a dependent variable, where other operating revenue such as commission and fee income is included. In order to measure competitiveness of the banking industry, Panzar and Rosse (1987) define the competitiveness *H* measure as the sum of the elasticities of the reduced form bank revenue equations with respect to the bank's input prices. Specifically, the *H*-statistic measures the percentage of change in the equilibrium revenue of a bank generated by a change of 1 percent in entry costs. In a case of a perfect competition, the *H*-statistic is 1. This situation might emerge with an oligopoly operating in a contestable market. If the market, in which banks operate, is characterized as being a monopole, then the *H*-statistic is inferior or equal to zero. We estimate the *H* -statistic for each country using both fixed effects and random effects models. The results are reported in Table 4.

Table4: Tests of conditions of competition in total interest revenues

Variable	Coefficient	Standard Error	T-Ratio
Constant	-0.83	0.27	-2.99
Log(INTC)	0.38	0.016	22.39
Log(OHTC)	0.23	0.027	8.66
Log(LC)	0.15	0.021	7.18
Log(LOAN)	0.27	0.041	6.57
Log(CAP)	-0.08	0.028	-2.77
Log(TA)	0.065	0.016	3.90
R Squared	0.99		

Note: All coefficients are statistically significant at or above 0.05 levels.

The four specifications generally provide consistent estimates for the H-statistic for each country. Most of the countries report an H-statistic between 0 and 1, which suggests that monopolistic competition best describes the level of competition in the banking sector. We then include the average of the H-statistics from the different specifications in the second stage regression to determine the effect of the market structure. We found that higher levels of competition in the market will boost the cost efficiency in various specifications of the model.

5.4. *Legal Framework*

The quality of the legal framework with regard to enforcement of contracts and protection of property rights is important for banking sector efficiency. For example, in their study of financial deepening in SSA, McDonald and Schumacher (2007) find that after controlling for financial liberalization and macroeconomic variables, countries with stronger creditor rights and information sharing have deeper financial systems (Chuling Chen,2009). We include two variables that reflect the quality of the legal framework in our study strength of credit rights and enforcement of contracts, both obtained from the World Bank's Doing Business Indicators.

To assess the power theories of credit, we construct a measure of legal rights of creditors in these countries, the "creditor rights" index first proposed by La Porta et al. (1997, 1998), for every year during this period. A score of one is assigned when each of the following rights of secured lenders is defined in laws and regulations: First, there are restrictions, such as creditor consent or minimum dividends, for a debtor to file for reorganization. Second, secured creditors are able to seize their collateral after the reorganization petition is approved, i.e. there is no "automatic stay" or "asset freeze."

Third, secured creditors are paid first out of the proceeds of liquidating a bankrupt firm, as opposed to other creditors such as government or workers. Finally, if management does not retain administration of its property pending the resolution of the reorganization. The index ranges from 0 (weak creditor rights) to 4 (strong creditor rights). (Djankov, McLiesh and Shleifer (2006)). The index for enforcement of contracts reflects the effectiveness of the court system in terms of the time, cost, and number of procedures involved for a plaintiff to get actual payment after filing a dispute. We obtain the ranking of each country among a total of 178 countries, where a higher number indicate a lower ranking in terms of effectiveness in enforcing contracts.

The estimation results show that a better legal framework is indeed beneficial to improving cost efficiency of banks. High quality collateral and bankruptcy laws could effectively protect the banks' rights as lenders, as well as those of borrowers, and higher efficiency in enforcing contracts could reduce costs for banks. We also estimate the impact of the legal framework while controlling for other groups of variables (Table 5) and results are consistent across all specifications.

5.5. Political Environment

The political stability and quality of public services are also influential factors in some developing countries such as Mena countries. These variables are perhaps more relevant to the countries in than elsewhere, given the frequency of episodes of internal conflict. We obtain data on overall institutional quality from the World Bank's Worldwide Governance Indicators (WGI). A higher score indicates a more stable political environment (Figure 4).

Figure 4: Political stability in MENA countries
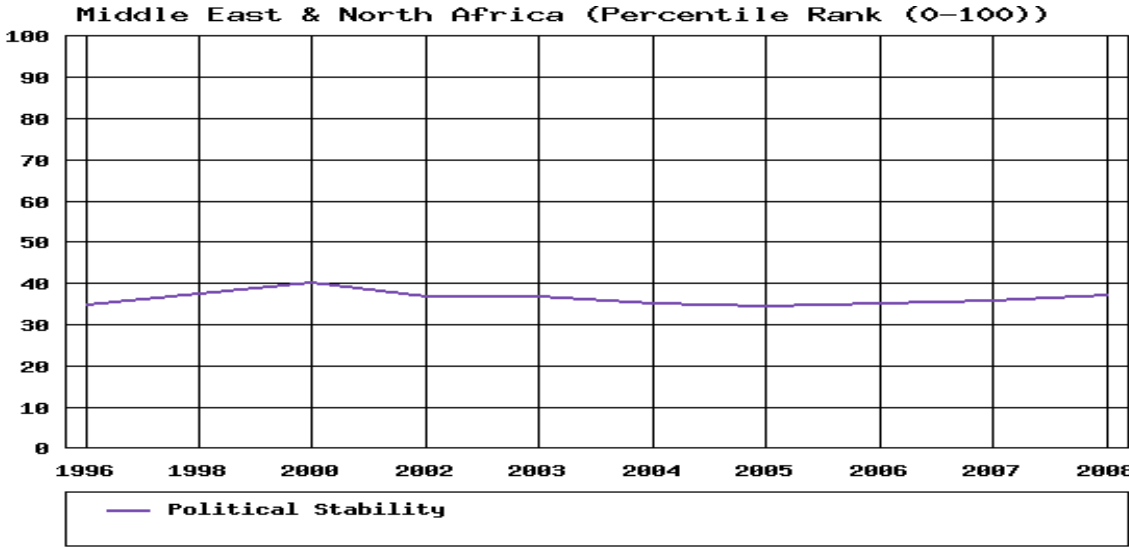
Source: Kaufmann D., A. Kraay, and M. Mastruzzi 2009: Governance Matters VIII: Governance Indicators for 1996-2008

The findings show that banks enjoy higher efficiency with more political stability. The coefficient is statistically significant in most specifications. To see if the results remain valid with effects from other variables, we also conduct regressions with other groups of variables (Table 5). We find the results to be consistent across all specification.

6. Conclusions

Because of deficiency in capital market and other financial institutional operations and development, MENA country banks play a central role in the financial intermediation process. Hence, knowing how efficient the banking sector is efficient relative to the production frontier estimated for the region did reveal the state of play across an important region straddling Europe and Asia. Efficiency is important since the region almost totally depends on the banking intermediation for capital allocation. To understand how efficient they are, and more importantly, what determines their level of efficiency, thus, is important to help strengthen the financial intermediation function of banks, as well as the overall financial market.

We find banks are operating 20 percent below the cost efficiency frontier we also find that a stable macroeconomic environment, deeper financial development, higher degrees of market competition, and stronger institutions would help improve the bank efficiency levels. The literature suggests that the more mixed financial markets with longer history operate slightly better at around 90 percent meaning the inefficiency is less than in the MENA region. While acknowledging the economic fact that no system could be 100 percent efficient given the need in production sector to have slack for variations in demand and supply, we are of the view that there is room for improving the inefficiency from its current level to more like a 10 percent through careful fine-tuning of competition rules, and de-regulations.

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