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Banking Efficiency and Economic Growth in the MENA Region

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Abstract

This paper examines the nexus between cost efficiency and economic growth in the Middle East and North Africa region. We apply a causality analysis between cost efficiency and financial deepening using the Generalized Methods of Moments and our findings show a significant and positive causality and reverse relationship between financial deepening and banking productivity. We introduce a set of control variables associated with the long run growth and find an interesting interaction with banking productivity and financial deepening suggesting that efforts should be focusing on the investments' efficiency and the increase of regulation to spur a more stable financial system and foster financial deepening in the future.

*JEL classification:*O11; O16; G21; L23

Keywords: Financial development; Economic growth; MENA, Causality analysis

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1 Introduction

This study focuses on seven countries in the MENA region in order to investigate the nexus between banking efficiency and economic growth. We consider the banking system with no distinction between conventional and Islamic banks, as our findings in the previous chapter suggest that the technology gap between the two banking systems is quasi-null.

In the latest two decades, the MENA region has witnessed important efforts of market liberalization and upgrade of the banking systems. The choice of the MENA region is motivated by the facts that there is no specific empirical evidence on the analysis of the relationship between cost efficiency and financial deepening and that many countries in the region have deliberately proceeded to the reform of their financial sectors aiming higher economic growth (Boulila and Trabelsi (2004)).

Hence we consider that analysing banking productivity for the selected MENA countries in our sample would help providing evidence on the causes of financial intermediary development and help policymakers design reforms that indeed promote growth-enhancing financial sector development.

2 Literature review

There exists considerable literature on the nexus between finance and economics growth. Since Schumpeter (1912) stressed the importance of financial services in promoting economic growth, a large number of studies was undertaken exploring the finance economic growth nexus in various regions of the world showing a general positive relationship between the two (Greenwood and Jovanovic (1990), King and Levine (1993a), DeGregorio and Guidotti (1995), Beck and Levine (2002), Levine, et al. (2000),Fung (2009)); other studies applied to developing countries, in line with the view of the World Bank (WorldBank (1989) and WorldBank (2005)), suggest that the relationship between financial development and economic growth cannot be generalized across countries because economic policies are country specific (Al-Yousif (2002)).

Inthe MENA region, a certain number of relevant studies investigated the impact of finance development on the economic growth and vice versa leading to mitigated conclusions.Boulila and Trabelsi (2004) investigated the causality between financial development and economic growth over a large time period from 1960 and 2002 in 16 countries and found little support that finance leads to long run economic growth but a tendency that causality runs from the real sector to the development of the financial sector whereas Abu-Bader and Abu-Qarn (2008) showed an empirical

evidence from six countries in the MENA region that strongly supports the hypothesis that finance leads to growth and criticized that in the study Boulila and Trabelsi (2004) it is difficult to account for a long run relationship since "for a large number of the countries, the number of observation did not exceed 25 years" (Abu-Bader and Abu-Qarn (2008), page 804).Abu-Qarn and Abu-Bader (2007) conducting a study on 10 countries over the period 1960 to 1998, investigated the factors leading to the long run economic growth considering productivity gains and factor accumulation, their results support that factor accumulation is a leading contributor to economic growth. Furthermore, at the country level,Abu-Bader and Abu-Qarn (2008) focusing on Egypt's case found a positive causality relationship from financial development to economic growth through a simultaneous increase in resources for investment and efficiency enhancement.These studies focusing mainly on the financial development of the economy as a whole do not specifically address any causality relationship between economic growth and financial institutions' efficiency. Interestingly, a studybyBolbol, et al. (2005)conducted at the country level considers the financial structure in Egypt and investigates its causality effect with the total factor productivity.Furthermore, Pasiouras, et al. (2009) investigated the relationship between bank efficiency and the regulatory and supervisory framework for 74 countries from 2000 to 2004, and included a set of control variables to assess the determinants of banking productivity.

To our knowledge there are no studies specifically investigating the causality between banking cost efficiency and financial deepening in the MENA region.

In order to assess the financial development in the MENA region we use a specific measure of financial deepening:credit to the private sector in terms of GDP (CPR), considered as one of the relevant indicators of the magnitude and the extend of financial intermediation broadly defined (Boulila and Trabelsi (2004), page 211) . This indicator has been used widely in the literature (King and Levine (1993a),Demetriades and Hussein (1996), DeGregorio and Guidotti (1995), Levine, et al. (1999), Guillaumont, et al. (2006)) and is supposed to delimitate more precisely the investment financing activity to the private sector as opposed to the credits to the government or public companies and credits issued by the central bank.

Furthermore, we use other macro-economic variables considered as associated with the long run economic growth such as GDP per capita, to measure the degree of wealth in a given country, Government expenditures in terms of GDP, to measure the degree of implication of the government in the economyand considered as one of the major variables commonly used in estimating growth

equations (Abu-Bader and Abu-Qarn (2008)), Consumer Price Index, measuring inflation level, Trade (exports and imports) in terms of GDP and the exchange rate for each country.

A summary of the macro economic variables used in this study is presented in Table 1.

<< Insert Table 1 >>

3 Data and Methodology

3.1 Data

Table 2 provides a summary statistics of the variables used in this study split into bank based variables (usedfor the cost efficiency estimation) and the macro economic variables (used for the Generalised Method of Momentsestimation).

<< Insert Table 2 >>

3.1.1 Cost efficiency estimation

We gathered a total of 583 observations for seven countries in the MENA region over the time period 2000-2006. The data were compiled from the International Bank Credit Analysis Bankscope database and include the annual reports of conventional banks and fully pledged Islamic banks, excluding Islamic windows of conventional banks.

For comparability purposes, accounting standards used to compile to annual reports are specific for each industry considered, as for conventional banks' annual reports are established under the IFRS standards whereas for Islamic banks' annual reports are established under the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) Standards which are the specific accounting standards for the Islamic banking industry (Bankscope allows downloading the data in the AAOIFI standards under the "SupraNationalIslamnew"[1] Model format).

For conventional banks, we specify three outputs consisting of loans, securities and off balance sheet items. In order to find an analogy in the choice of variables for Islamic banks, we group under the Loans variable, as proposed byHussein (2004), the specific Islamic forms of debts (i.e. Murabaha, Salam and Quard fund for short term debts, and Sukuk, Leasing and Istisna for the long term debts),

1 The "SupraNationalIslamnew" Bankscope format includes in the depreciation: the amortization of goodwill which is not IFRS compliant,as well as the depreciation in physical capital that is bought for leasing.

we consider for the second output variable the equity financing (i.e. Securities, Mudaraba, Musharakah and other Investments) and for the third output variable the off-balance sheet items since they generate income as well as liabilities for the banks and therefore should not be ignored.

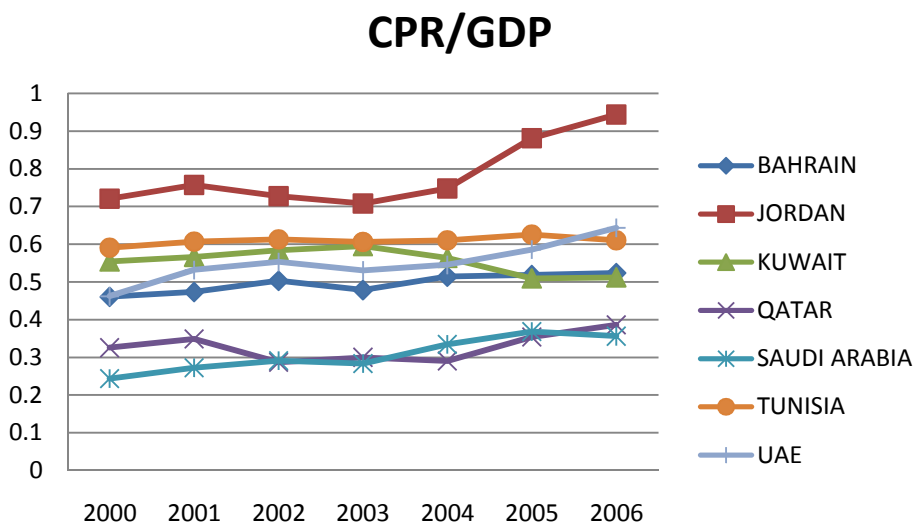
We specify three inputs variables for both conventional and Islamic banks: the price of labour, the price of funds and the price of physical capital and we include bank's equity capital as a fixed input. For Islamic banks, the price of funds is obtained by dividing the profits distributed to depositors and investors (the case of savings accounts for the former and the case of profit and loss sharing investment accounts for the latter) resulting from the Islamic banks' investing and financing activities (specifically labelled as "funding expenses" in Bankscope Database) over total funds. In fact, the returns on the deposits at Islamic banks (whether in savings or two-tier mudarabah mode) are determined ex-post depending on the economic return on investment in which the deposits were placed (accordingly to the Sharia' principles).

The dependant variable "Total Cost" is calculated as the sum of interest expenses (i.e. profits distributed to depositors and investors for Islamic banks under respectively savings accounts and profit and loss sharing investment accounts), commission expenses, fee expenses, trading expenses and total operating expenses for each year.

3.1.2 Generalised Method of Moments estimation

The macro economic variables data used for the GMM estimation have been downloaded from the IMF International Financial Statistics. The variables' levels show certain disparities, in fact the credit to the private sector (CPR) in Figure 1 shows various levels depending on the country with a mean value of 51%, a minimum value of 31% observed in Saudi Arabia and a maximum value of 78% observed in Jordan, this shows the differences in the degree of financial deepening between the selected countries in the sample and clearly sets the countries with high level of CPR as relying heavily on banks credits.

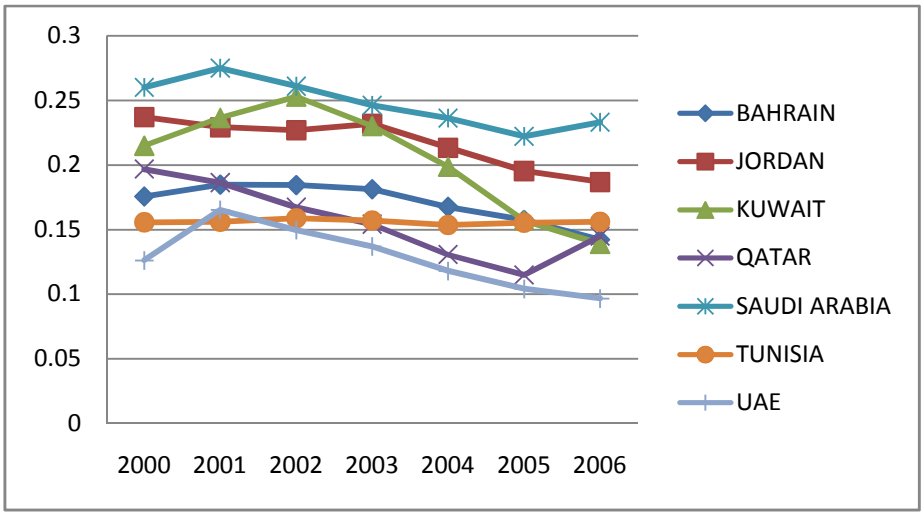
Figure 1 : Mean credit to the private sector in terms of GDP in the MENA region



Source: IMF international financial statistics

The inflation rate (CPI) shows an average value of 2.74% and maximum values observed in United Arab Emirates and Qatar where the inflation rate soared the subsequent years leading to a runaway two digits inflation rate. The TRADE in terms of GDP variable shows interesting results as it peaks at 157% for Bahrain and is relatively high for all the countries in the sample whereas the mean GOV/GDP value is relatively low with a mean value of 18% and as Figure 2 shows, the trend is rather oriented to lower government expenditures implying less implication from governments and more market liberalization.

Figure 2 : Mean government expenditures in terms of GDP in the MENA region



Source: IMF international financial statistics

3.2 Methodology

The methodology includes two steps. In the first step we estimate the cost efficiency scores of each country selected in the sample, for this we use the Stochastic Frontier Analysis to estimate the efficiency of each bank relative to a common best-practice frontier. In the second step we run a system of Generalized Method of Moments regression (GMM) to investigate the causality between banking efficiency and economic growth using in a first stage the Cost Efficiency as a dependant variable (answering the question: does financial deepening lead to more cost efficient banks?) and in a second stage the Credit to Private Sector as the dependant variable in order to investigate the reverse causality (answering the question: does banks cost efficiency lead to more financial depth?)

3.2.1 The stochastic Frontier Approach

The SFA was introduced quasi-simultaneously by Aigner, et al. (1977), Meeusen and Broeck (1977) and Battese and Cona (1977). The stochastic frontier model assumes that: 1) banks in the sample are assumed to compete in some way; 2) financial products offered by banks (outputs) are homogeneous; 3) the sample is limited to the firms that make use of the full range of inputs and outputs defined by the production set Berger, et al. (2000); 4) all firms operate under the same frontier in order to benchmark the differences in firm's efficiencies.

Following Aigner, et al. (1977), the cost efficiency function can be specified as

$$\ln TC_{kt} = x_{kt}\beta + \varepsilon_{kt} \qquad (1)$$

Where TC_{kt} represents the total cost of the bank k in period t, x_{kt} is a vector of input prices and output quantities and β is a vector of parameters to be estimated; we assume that the error of the cost function is

$$\varepsilon_{kt} = v_{kt} + u_{kt} \qquad (2)$$

With v_{kt} , the random error term that accounts for measurement errors, bad luck and other factors unspecified in the cost function and u_{kt} the cost inefficiency term represents the minimum cost.

We specify a translog functional form with 3-input and 3-output for the cost frontier model represented in logs as

$$\ln TC_{kt} = \beta_0 + \sum_{i=1}^{3} \beta_i \ln Y_i + \sum_{j=1}^{3} \alpha_j \ln P_j + \lambda_1 T$$

$$+ \frac{1}{2}\left(\sum_{i=1}^{3}\sum_{j=1}^{3} \delta_{ij} \ln Y_i \ln Y_j + \sum_{i=1}^{3}\sum_{j=1}^{3} \gamma_{ij} \ln P_i \ln P_j + \lambda_{11} T^2 \right) + \sum_{i=1}^{3}\sum_{j=1}^{3} \rho_{ij} \ln Y_i \ln P_i$$

$$+ \frac{1}{2}\tau_{EE} \ln E \ln E + \tau_E \ln E + \sum_{i=1}^{3} \beta_{iE} \ln Y_i \ln E + \sum_{j=1}^{3} \alpha_{jE} \ln P_j \ln E + \varepsilon_{kt} \qquad for\, i \neq j \quad (3)$$

Where TC_{kt} is the natural logarithm of total cost of bank k in period t, Y_i is the vector of output quantities, P_j are the input prices, E represents bank's equity capital and is included as a fixed input, specifying interaction terms with both output and input prices in line with recent studies [e.g. Altunbas, et al. (2000)Vander Vennet (2002), Fiordelisi and Ricci (2010), Radić et al. (2011)]. We specify the time trend T to capture technological change as in Altunbas, et al. (2000). The v_{kt} are assumed to be independently and identically distributed as two sided normal $v_{kt} \sim N(0, \sigma_v^2)$ and captures the effects of statistical noise. The error component u_{kt}, which captures the effect of technical inefficiency, is assumed to be distributed as half-normal $u_{kt} \sim |N(\mu, \sigma_u^2)|$, independently of v_{kt}, and to satisfy $u_{kt} \geq 0$. We follow Bos and Schmiedel (2007) who consider that u_{kt} is drawn from a non-negative distribution truncated at μ instead of zero (considering a half-normal distribution with mean zero implies that most banks are closely located to the frontier and with small level of inefficiency so we relax this a priori assumption to estimate u_{kt}directly from the data).

A point estimation of technical efficiency is given by $E(u_{kt}|\varepsilon_{kt})$, i.e., the mean of u_{kt} given ε_{kt}. To estimate bank specific cost efficiency, we calculate

$$CE_{kt} = \exp(-u_{kt}) \qquad (4)$$

The cost efficiency scores CE_{kt} take a value between zero and one, with one being the most efficient bank. For the estimation of the parameters of the stochastic frontier function we follow the development proposed by Stevenson (1980) for the normal-truncated normal model using the maximum likelihood method and re-parameterize σ_v^2 and σ_u^2 as in Bos and Schmiedel (2007) by taking $\sigma^2 = \sigma_v^2 + \sigma_u^2$ and $\lambda = \sigma_u / \sigma_v$

3.2.2 Generalized Method of Moments

Levine (2004) considers the GMM methodology as especially useful when analyzing the finance-growth relationship since it is argued that financial development is intrinsically related to greater economic performance. Based on Roodman (2006) pedagogic paper, the system GMM is specifically designed for panel data estimation where (1) N (number of observations) is large sample and T (time period) is small, (2) linear function relationship, (3) dynamic single left-hand-side dependant variable, (4) non strictly endogenous independent variables, (5) fixed effects model and (6) heteroskedasticity and autocorrelation within individuals but not across them. Thus the system GMM is considered as very reliable estimation methodology in the presence of endogeneity as it takes into account both the time and cross-sectional variations and gives the possibility to avoid any bias between cross country regressions. The use of instruments is considered as an advantage as outlined by Levine (2004) who considers that : 'to assess whether the finance-growth relationship is driven by simultaneity bias, one needs instrumental variables that explain cross-country differences in financial development but are uncorrelated with economic growth beyond their link with financial development.'(Levine (2004),page 43)

In their seminal paper, Arellano and Bond (1991)proposed the GMM methodology for panel data analysis and then developed by Blundell and Bond (1998).

We consider the following model:

$$y_{i,t} = \alpha y_{i,t-1} + \beta X_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$\varepsilon_{i,t} = \mu_i + \nu_{i,t} \quad (6)$$

With $E[\mu_i] = E[\nu_{it}] = E[\mu_i \nu_{it}] = 0$ (7)

Where y is the dependent variable, $y_{i,t-1}$ is the lagged dependent variable, $X_{i,t}$ represent a set ofexogenous variables (explanatory variables), $\varepsilon_{i,t}$ is the disturbance term containing two orthogonal components: the fixed effects, μ_i representing the unobserved country-specific effect, and $\nu_{i,t}$ representing the idiosyncratic shocks.*i* and*t*being the observations and time respectively.

The issue in this model is that the lagged dependent variable $y_{i,t-1}$ is correlated with the fixed effects μ_i contained in the disturbance term, which Nickell (1981) identifies as the "dynamic panel bias"

since ‘using the standard within-group estimator for dynamic models with fixed individual effects generates estimates which are inconsistent as the number of "individuals" tends to infinity if the number of time periods is kept fixed’ (Nickell (1981), page 1417). Hence a first transformation called “Difference GMM estimator” is proposed by Arellano and Bond (1991) in order to eliminate the fixed effect, which gives:

$$\Delta y_{i,t} = \alpha \Delta y_{i,t-1} + \beta \Delta X_{i,t} + \Delta \nu_{i,t} \quad (8)$$

Arellano and Bond (1991)suggest to use the lagged values of the exogenous variables as instruments to correct their endogeneity, with the assumption that there is no serial correlation in the error term $\nu_{i,t}$ and that $X_{i,t}$ are weakly exogenous. They use the following moment conditions:

$$E\left[X_{i,t-s}.\nu_{i,t} - \nu_{i,t-1}\right] = 0 \quad (9)$$

For s≥2 ; t=3,...,T

They propose then to create a two step GMM estimator. In the first step the error terms are assumed to be both independent and homoskedastic across countries and over time, and in the second step they construct a consistent estimate of the variance co-variance matrix using the residuals obtained from the first step obtaining the *difference estimator* (Beck, et al. (2000)).

However, even after purging the fixed effects $y_{i,t-1}$ may still be endogenous as correlation persists between $y_{i,t-1}$ and $\nu_{i,t-1}$ in equation (8). The same applies for the explanatory variables as they might become potentially endogenous due to their correlation with $\nu_{i,t-1}$ .Consequently, a second transformation is proposed by Arellano and Bover (1995) using a *system estimator* in order to eliminate the problems related to the difference estimator namely biasness and imprecision.

In this study, we follow Roodman (2006) using*xtabond2*with the STATA package to estimate the GMM system for it powerful features to provide on one hand the model testing results(the Hansen J-test and the second order autocorrelation) and on the second hand allows the use of a two-step robust estimation as proposed by Windmeijer (2005). Considering our sample of 583 observations, whereas Arellano and Bond (1991)consider that caution should be advisable in making inferences based on the two-step estimator alone in samples of medium size, Windmeijer (2005) uses a corrected variance estimate to approximate the finite sample with more accurate inference.

The first stage of our estimation is the causality between Cost Effiency (CE) and financial deepening (CPR) using the following equation:

$$CE_{i,t} = \alpha_{i,t} + \beta_1 CE_{i,t} + \beta_2 CPR_{i,t} + \beta_3 CPR_{i,t-1} + \beta_3 CPR_{i,t-2} + \beta_5 CPI_{i,t}$$

$$\beta_6 TRADE_{i,t_t} + \beta_7 GOV_{i,t} + \beta_8 XRATE_{i,t} + \beta_8 GDPpercapi\,ta_{i,t} + \mu_i + \nu_{i,t} \quad (10)$$

Then, in a second stage, we estimate the reverse causality represented by the following equation

$$CPR_{i,t} = \alpha_{i,t} + \beta_1 CPR_{i,t} + \beta_2 CE_{i,t} + \beta_3 CE_{i,t-1} + \beta_3 CE_{i,t-2} + \beta_5 CPI_{i,t}$$

$$\beta_6 TRADE_{i,t_t} + \beta_7 GOV_{i,t} + \beta_8 XRATE_{i,t} + \beta_8 GDPpercapi\,ta_{i,t} + \mu_i + \nu_{i,t} \quad (11)$$

Where the variables used in the GMM system are listed and defined in the table 3

<< Insert Table 3 >>

In order to test the robustness of our results, we run 6 models considering for:

1. Model 1: the endogenous dependent variableCE;
2. Model 2: the endogenous dependent variable CE with its lag CE_{t-1};
3. Model 3: The lagged endogenous dependent variables only CE_{t-1} andCE_{t-2};
4. Model 4: the endogenous dependent variable CPR;
5. Model 5: the endogenous dependent variable CPR with its lag CPR_{t-1}; and
6. Model 6: The lagged endogenous dependent variables only CPR_{t-1} and CPR_{t-2}.

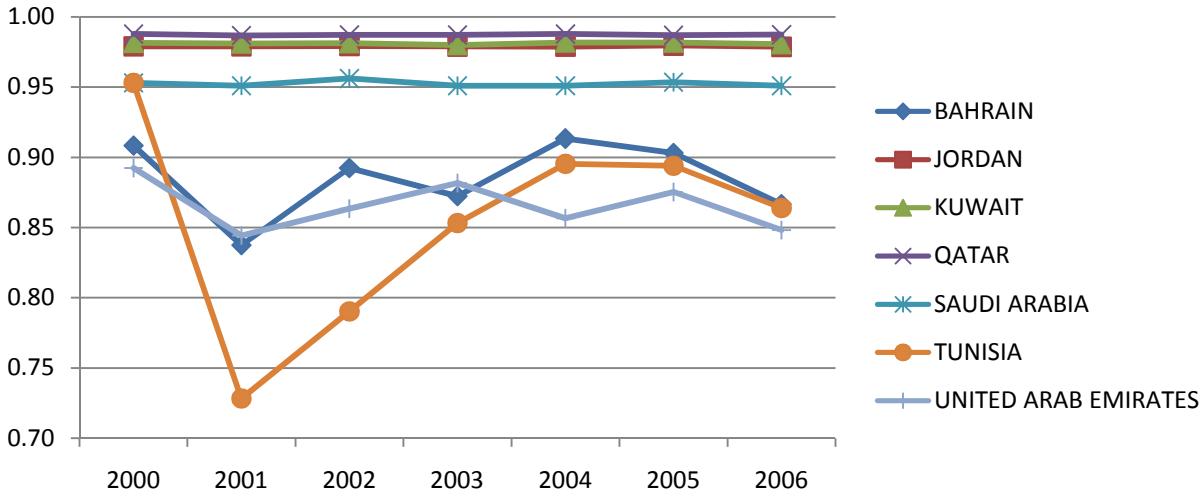
Finally, we analyse two tests to assess the GMM methodologyas explained byCameron and Trivedi (2009):

- The Hansen J-test: evaluates the correct identification of the variables used in the model and rejects the null hypothesis that the over-identifying restrictions are valid, so if the p-value > 0.05 the model is valid; and
- The second order autocorrelation assumption testing: for consistent estimation, the estimators require that the error termbe serially uncorrelated.

4 Results and discussion

Table 4 reports the cost efficiency results the selected countries in the sample. Overall banks in the MENA region show high cost efficiency scores and are comparable with previous studies on banking cost efficiency in the region (Al-Shammari and Salimi (1998), Iqbal and Molyneux (2007), Pasiouras, et al. (2009)).Figure 2 shows that for Tunisia, the United Arab Emirates and Bahrain mean cost efficiency scores are rather lower than the other 4 countries in the sample, this can be explained by the fact that in the last decade, these countries witnessed strengthening regulation which caused for the banks an increase in the costs of compliance (for more details see Naceur (2003);Creane, et al. (2004)).

Figure 2 :Mean cost efficiency trends in the MENA region



Source: computed by the author

The next step of our analysis is to investigate the causality and reverse causality between cost efficiency and financial deepening.

In table 5, the results show the causality relationship from financial deepening towards the Cost Efficiency being the dependant variable.

<< Insert Table 5>>

We find a positive relationship between CE and CPR.The CPR coefficient in the main model is significant and shows that an increase by 1% in the CPR impacts the CE by an increase of 16%. This can be explained by the fact that a greater financial deepening shifts up the level of outputs at the

banks' level leading to an increased banking productivity. However, we consider this causality as relatively weak, as the main model validates the hypothesis that greater financial deepening implies greater banking productivity for the selected MENA countries in our sample while in the robustness testing models in table 6 the CPR variable is not statistically significant.

<< Insert Table 6 >>

Investigating the control variables, the main model, supported by the robustness models results, shows the TRADE variable as significant and negatively impacting banking cost efficiency. The MENA countries in our sample present the particularity of containing four of the largest oil exporting countries, when digging at the level of imports and exports for each country we find that the level of exports is relatively high. Hence the results suggest that banks evolving in expanding markets sustained by high levels of oil exports would be less constrained to control their expenses and thus become less cost efficient. The remaining control variables do not seem to have any significance in the main model, although in the robustness testing models the GOV has a significant positive impact on cost efficiency(models (a) and (b)) implying that government expenditures in the form of financial incentives boost banking productivity. CPI and XRATE in models (a) and (b) of the robustness tests are both statistically significant but have very weak impact. We can consider that an increment in inflation may increase interest rates, particularly lending rates, boosting banking performance and productivity.

The next stage of our analysis is the reversed causality. We investigate the impact of banking cost efficiency the financial deepening, or put it differently: does banking productivity improve financial deepening? We keep in this model the control variables in order to assess their effect on financial deepening.

The results provided by table 7validate the Hansen J-test with a p-value above 5% so we consider our results as conclusive. We find a positive causality relationship running from CE and its lag CE_{t-2} to CPR.

<< Insert Table 7 >>

Although not validated by the robustness models (d) and (f) in table 8, these results are very interesting since they show that banking productivity has both an immediate and a lagged effect on financial development in the selected MENA countries, model (e) validates these findings at the lagged CE_{t-1} value.

<< Insert Table 8 >>

The control variables show that TRADE has a significant impact on financial deepening. The level of trade is normally associated with greater financial development, through for example, a greater demand for new financial products, which could help with risk diversification. Bonfiglioli (2008) suggests that the degree of openness affects the efficiency in the economy through several channels such as specialization, comparative advantage, access to larger markets, and increased competition. Inflation and foreign exchange rate have significant coefficient but present a very low impact on financial deepening. We find a significant positive effect of government expenditures on financial deepening in the three robustness models but not in the main model, in this context, these results corroborate Bonfiglioli (2008) findings who argues that increases in government expenditure, focused on stimulating the financial sector, crowds out private investments which could in turn increase financial deepening and economic growth. Finally, and interestingly, the per capita GDP variable has a statistically significant but negative impact on financial deepening. This result is obtained under other specifications (models (e), (d) and (f)) and appears to be robust when estimated in the main model. At first glance this evidence may appear puzzling, butDeGregorio and Guidotti (1995) find similar results when analyzing the causality between financial deepening and long term growth in Latin America. They suggest that the negative relationship between CPR and the long run growth proxy GDP per capita comes from a negative effect on the efficiency of investments and is the result of financial liberalization in a poor regulatory environment.Moreover, they consider that the high level of financial intermediation could be a sign of a fragile and overexposed financial system, rather than one that was efficiently allocating credit. In the MENA region, the recent debt crisis in Dubai, one the seven states of the United Arab Emirates, is a true example of the lack of efficiency in investments. The real estate bubble starting in year 2000 has propelled a frenetic expansion on the back of borrowed cash and speculative investment andburst in 2009 leading to a collapse in the whole middle-eastern economy where Dubai is a leading financial centre for real estate development.

Our results are thus supportive of a positive causality and reverse causality relationship between cost efficiency and financial deepening for the seven MENA countries in our sample.

5 Conclusion

This paper fills the gap in the banking cost efficiency literature in the MENA region and analyses the causality relationship between banking productivity and financial deepening in seven MENA

countries from 2000 till 2006. We first estimated banking cost efficiency for each of the countries using the stochastic frontier approach methodology. Then,we tested for the causality and reverse causality relationship between banking productivity and financial deepening. Our empirical results show a significant and positive causality and reverse relationship between financial deepening and banks' productivity suggesting that financial deepening has an important influence on banking productivity which has in turn a direct positive impact on financial deepening. We introduced a set of control variables associated with the long rungrowth, used in the literature following other studies and found that the degree of openness has a negative impact on banking productivity in the selected countries whereas it has a positive effect on financial deepening along with government expenditures and inflation. Our results, supported by previous findings in the literature, show a very interesting evidence of the negative impact of the GDP per capita on financial deepening in a poorly regulated environment where the investments in the economy are not efficient. Therefore, the results we show in this study, can be considered as an important argument to increase financial deepening in the selected MENA countries in order to achieve higher banking productivity. We consider that efforts should be focusing on the investments' efficiency and the increase of regulation to spur a more stable financial system to foster financial deepening in the future which can lead to a virtuous cycle between financial deepening and banking productivity.

Tables and Figures

Table 1 – Mean values of the macro economic variables in the MENA region

	CPR/GDP	GDP PER CAPITA (USD)	TRADE/GDP	GOV/GDP	CPI %	XRATE
BAHRAIN	0.496036	15204.37	1.57527	0.170374	0.876041	0.376
JORDAN	0.783767	2047.791	1.252713	0.217193	2.715622	0.708998
KUWAIT	0.554767	22225.96	0.875003	0.204062	2.015829	0.298822
QATAR	0.327221	37259.14	0.94697	0.156374	4.725101	3.64
SAUDI ARABIA	0.307261	10678.21	0.757159	0.247652	0.259392	0.192528
TUNISIA	0.608916	2551.684	0.967496	0.155999	2.931406	0.539026
UNITED ARAB EMIRATES	0.550348	26732.84	1.501876	0.128041	5.657143	0.19653

Source: IMF International Financial Statistics

Table 2 – Descriptive statistics

	MEAN	STANDARD DEVIATION	MIN	MAX
Bank Based Variables				
PRICE OF LABOUR	0.0119	0.0087	0.0017	0.0859
PRICE OF FUNDS	0.0308	0.0168	0.0026	0.1405
PRICE OF ASSETS	0.7662	1.0705	0.0034	8.8333
LOANS (in USD)	2,654,402	3,832,375	2,805	24,107,477
OTHER EARNING ASSETS (in USD)	2,235,902	3,320,306	1,320	17,944,246
OFF BALANCE SHEET ITEMS (in USD)	1,807,536	3,230,672	100	32,277,549
Macro Economic Variables				
CPR/GDP	0.5183	0.1646	0.3073	0.7838
GDP PER CAPITA (in USD)	16,671	12,957	2,048	37,259
TRADE/GDP	1.1252	0.3203	0.7572	1.5753
GOV/GDP	0.1828	0.0417	0.1280	0.2477
CPI %	2.7401	1.9425	0.2594	5.6571
XRATE	1.9694	1.6418	0.2988	3.7489

Source: IMF International Financial Statistics and Bankscope (values computed by author)

Table 3 – Variables used to assess the causality between cost efficiency and economic growth

Variable	Description
CE	Cost Efficiency
CPR	Credit to the private sector in terms of GDP.
CPI	Annual percentage change in inflation; measured as the change in the consumer price index.
TRADE	The summation of exports and imports in terms of GDP.
GOV	Government expenditure in terms of GDP.
XRATE	Logarithm of the annual average exchange rate. (national currency to USD)
GDP per capita	Logarithm of the average GDP per capita.

Source: IMF International Financial Statistics and Bankscope

Table 4 – Cost Efficiency mean scores

	2000	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***
BAHRAIN	0.91	0.84	0.89	0.87	0.91	0.90	0.87
JORDAN	0.98	0.98	0.98	0.98	0.98	0.98	0.98
KUWAIT	0.98	0.98	0.98	0.98	0.98	0.98	0.98
QATAR	0.99	0.99	0.99	0.99	0.99	0.99	0.99
SAUDI ARABIA	0.95	0.95	0.96	0.95	0.95	0.95	0.95
TUNISIA	0.95	0.73	0.79	0.85	0.90	0.89	0.86
UNITED ARAB EMIRATES	0.89	0.84	0.86	0.88	0.86	0.88	0.85

Source: computed by the author

Table 5–Main model: Causality results, Cost Efficiency as a dependent variable

	CE (main model)	
CE lagged(t-1)	0.486	***
CPR	0.164	**
CPR lagged(t-1)	-0.096	
CPR lagged(t-2)	-0.030	
CPI	-0.001	
TRADE	-0.038	***
GOV	0.201	
XRATE	-0.009	
GDP per capita	0.006	
Cte.	0.421	
AR(1)	-2.630	
p-value	*0.009*	
AR(2)	-0.160	
p-value	*0.873*	
Hansen J test	55.380	
p-value	*0.821*	
Observations	321	

Source: computed by the author

** p-value<0.1; ** p-value<0.05; ***p-value<0.01*

Table 6 – Robustness testing models: Causality results, Cost Efficiency as a dependent variable

	CE (model a)		CE (model b)		CE (model c)	
CE lagged(t-1)	0.454	***	0.472	***	0.533	***
CPR	0.047		-0.001			
CPR lagged(t-1)			0.048		0.065	
CPR lagged(t-2)					-0.060	
CPI	0.003	**	0.003	**	0.001	
TRADE	-0.038	***	-0.034	***	-0.030	***
GOV	0.489	***	0.497	**	0.193	
XRATE	-0.009	***	-0.008	**	-0.008	
GDP per capita	0.010		0.010		0.001	
Cte.	0.336		0.313		0.429	
AR(1)	-2.680		-2.680		-2.670	
p-value	*0.007*		*0.007*		*0.008*	
AR(2)	-0.780		-0.760		-0.180	
p-value	*0.434*		*0.444*		*0.857*	
Hansen J test	80.180		79.040		59.970	
p-value	*0.928*		*0.930*		*0.716*	
Observations	441		441		321	

Source: computed by the author

** p-value<0.1; ** p-value<0.05; ***p-value<0.01*

Table 7 – Main model: Reverse causality results, Credit to the private sector (CPR) as a dependent variable

	CPR (main model)	
CPR lagged(t-1)	0.895	***
CE	0.146	***
CE lagged(t-1)	-0.084	
CE lagged(t-2)	0.124	***
CPI	0.007	***
TRADE	0.067	***
GOV	0.164	
XRATE	0.001	**
GDP per capita	-0.018	***
Cte.	-0.071	
AR(1)	-4.340	
p-value	*0.000*	
AR(2)	-0.760	
p-value	*0.446*	
Hansen J test	81.150	
p-value	*0.099*	
Observations	321	

Source: computed by the author
** p-value<0.1; ** p-value<0.05; ***p-value<0.01*

Table 8 – Robustness testing models: Reverse causality results, Credit to the private sector (CPR) as a dependent variable

	CPR (model d)		CPR (model e)		CPR (model f)	
CPR lagged(t-1)	0.896	***	0.895	***	0.896	***
CE	0.025		0.001			
CE lagged(t-1)			0.056	***	-0.023	
CE lagged(t-2)					0.141	***
CPI	0.007	***	0.006	***	0.007	***
TRADE	0.069	***	0.070	***	0.063	***
GOV	0.384	***	0.357	***	0.184	***
XRATE	0.002	*	0.003	**	0.000	
GDP per capita	-0.015	***	-0.016	***	-0.018	***
Cte.	0.020		-0.001		-0.006	
AR(1)	-4.210		-4.240		-4.890	
p-value	*0.000*		*0.000*		*0.000*	
AR(2)	-1.790		-1.670		-1.690	
p-value	*0.073*		*0.096*		*0.091*	
Hansen J test	104.590		105.020		81.880	
p-value	*0.357*		*0.320*		*0.104*	
Observations	441		441		321	

Source: computed by the author

** p-value<0.1; ** p-value<0.05; ***p-value<0.01*

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