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Banking Competition, Convergence and Growth

Across Macro-Regions of MENA

Abstract: This paper examines convergence of bank competition in Middle East and North Africa (MENA) and the impact of bank market power on growth. Using a sample from 16 countries over 2005-14 and forming macro-regions based on oil export allowances to capture intra-region country differences, our results suggest that banking competition has increased over the period under investigation. In addition, using alternative tests, we find clear evidence of convergence in banking competition across the three macro-regions as well as in MENA as a whole. Further, our evidence indicates that financial development facilitates economic growth through greater access to external finance in MENA especially in industrial sectors that are more dependent on external financing. Finally, our analysis points to a positive and significant effect of bank market power on economic growth in MENA and all macro-regions. This is in line with the relationship lending literature which suggests that in a competitive environment banks will be less willing to avail finance to informationally opaque firms.

Keywords: Bank Competition; Convergence; MENA; Economic Growth.

JEL classification: G21; D4; L11; N25.

1. Introduction

This paper examines the evolution and convergence of banking competition as well as the impact of market power on economic growth in the Middle East and North Africa (MENA) and three of its macro-regions.¹ Over the last few decades, MENA has experienced notable financial reforms favouring more financial freedom and deeper integration, with the World Bank playing an important role in supporting integration in the region (Naceur and Omran, 2011).² This follows the widely held view that integration enhances competition and increases financial markets' efficiency (Boyd and de Nicolò 2005; Casu and Girardone 2009). Increased competition in banking is traditionally expected to cause price reductions and lower loan rates which in turn might lead to more investments and potentially greater economic growth (Weill, 2013). Moreover, gains from integration are likely to be higher if there is a greater "level playing field" that implies more financial liberalization and convergence of competition levels across countries. Therefore, it is important to evaluate the evolution, convergence and nexus between bank competition and economic growth in MENA in order to assess the overall effect of increased integration and financial reforms in the region.

Conventional economic theories suggest that high banking market power negatively influences access to finance leading to lower investment opportunities, especially in sectors that are more dependent on external financing (Besanko and Thakor, 1992; Guzman, 2000). Consequently, a competitive banking system can have significant effects on firms' access to credit, therefore indirectly impacting economic growth (Vives, 2001). This is an area that should attract focus in MENA because, despite the recent developments in the region, access to finance is still limited due to several structural and regulatory weaknesses that reduce the banking system's potential to contribute to sustainable economic growth (Rocha et al., 2011a). Limited access to finance is suggested to be a major growth constraint for developing economies, particularly for small- and medium-sized businesses (Beck and

¹ According to the World Bank, MENA region includes 21 countries. However, due to geographical ambiguity, some other countries such as Mauritania, Somalia, Sudan, and Turkey are sometimes considered a part of the region.

² See Appendix A for a list of intra-MENA agreements.

Demirguc-Kunt, 2006). However, the theoretical literature on the effects of market power on the supply of funds is ambiguous. For example, in the context of relationship banking, where market power exists, banks tend to invest in information acquisition to establish long-lasting relationships with clients (Boot, 2000). This favours access to finance and lending by allowing for more efficient screening and monitoring activities and/or by requiring less collateral (Dell’Ariccia and Marquez, 2004). Petersen and Rajan (1995) suggest that in systems with high information asymmetries and agency costs, competition can reduce access to finance by reducing banks’ incentive for lending, especially to opaque borrowers. The empirical evidence on which of these views best describes the relationship between bank competition and/or financial development on economic growth has also been mixed (see e.g. Claessens and Laeven, 2005; Fernández de Guevara and Maudos, 2011; Hoxha, 2013; Love and Martínez Pería, 2015). Moreover, relatively little attention has been paid to test this relationship in developing regions (Leon, 2015). La Porta et al. (1998) suggest that benefits from greater competition in banking may not materialize in less developed countries due to weak legal systems and poor institutional infrastructure. Hence, bank market power often acts as substitute for strong legal protection of creditors and property rights. Therefore, in this paper, we shed new light on the relationship between bank competition, access to credit and economic growth by focusing on MENA; a less represented region in the relevant literature.

The combination of both resource-rich and resource-poor countries in MENA might be a hindering factor in the process of integration and affecting efforts to achieve gross harmonization of banking operations across the region. Some studies argue that the resource-poor countries benefit from such integration significantly more than their resource-rich counterparts, which makes these latter reluctant to integrate (see Venables, 2011 and Fouquin et al., 2006). On the other hand, the exercise of hegemonic power could be one reason why resource-rich countries might be interested to integrate with poorer ones. Hence, to capture intra-region country differences, it is important to focus our analysis not just on MENA as a whole but also on homogenous groups of countries within a region

that enjoys this much of resource diversification.

Our study contributes to the relevant literature in several ways. First, it provides evidence on the evolution of banking competition across 16 banking sectors in MENA over 2005-2014, and examines if and to what extent banking competition levels have converged over time. Although the market structure and bank competition levels in various MENA countries were addressed in several previous studies (e.g. Murjan and Ruza, 2002; Al-Muharrami et al., 2006; Turk-Ariss, 2009; Abuzayed et al. 2012) no studies, to our knowledge, have investigated the convergence of banking competition in MENA.

Second, in order to account for intra-region cross-country differences we create three homogeneous macro-regions reflecting these differences which are largely a function of the availability of natural resources, primarily oil (World Bank, 2008; Diop et al., 2012).³ To do so we follow the World Bank (2013)'s classification and create three homogenous macro-regions based on oil exports allowances: (1) six Oil Exporters namely the Gulf Cooperation Council (GCC hereafter) countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates; (2) five selected Developing Oil Exporters (DOE hereafter): Algeria, Iraq, Libya, Syria and Yemen; and (3) five selected Oil Importers (OI hereafter): Egypt, Jordan, Lebanon, Morocco, and Tunisia.

Third, in line with recent studies on banking competition (e.g. Berger et al., 2009, Turk-Ariss, 2010 and Weill, 2013), we use non-structural measures of competition: the Rosse-Panzar H -statistic the Lerner index and the Boone indicator. Our choice of convergence measures is the classical β -(beta) and σ -(sigma) convergence (Barro and Sala-i-Martin, 1991). Additionally, a panel unit root test proposed by De Blander and Dhaene (2012) is applied for the first time to banking data to examine the convergence hypothesis in a more robust fashion than in the literature to date.

³ MENA is the world's leading oil producer making it highly dependent on revenues from oil exports; a status that is likely to continue given the extent of the region's known oil reserves (almost 47.3% of the world's total at the end of 2015 according to British Petroleum, 2016).

Finally, to the best of our knowledge, this paper is the first to examine whether greater convergence in banking competition gives an advantage in terms of economic growth across different macro-regions of MENA. For this purpose, we use the approach of de Guevara and Maudos (2011) which offers an extension of the well-known Rajan and Zingales (1998)'s model. Last but not least, we contribute to the literature by providing an additional test to control for the effect of the political unrest affecting MENA since 2011 on the relationship between competition and growth in the whole region and across different macro-regions.

Our findings suggest that, over the period under study, monopolistic competition best describes MENA banking sectors and that the levels of banking competition appear to have increased on average in virtually all macro-regions of MENA. We also find evidence of significant convergence in banking competition in MENA as a whole and across all three macro-regions. This suggests that although there is no simultaneous enhancement in competition levels in MENA individual countries, due to e.g. differences in the level of banking sectors' development across countries, some evidence of integration can be identified through the convergence process towards similar levels of competition.

Our results also provide evidence favorable to the hypothesis that financial development facilitates economic growth suggesting that industrial sectors that are normally more dependent on external financing grow faster when there is greater financial development across macro-regions of MENA. Evidence also shows an inverse relationship between banking competition and economic growth across all macro-regions. This can be explained in the context of relationship lending, which suggests that banking competition might have a negative effect on the supply of credit for smaller, informationally opaque companies, thereby affecting growth. Finally, political instability had a negative effect on economic growth across all three macro-regions and in MENA as whole over 2011-2014.

The rest of the paper is structured as follows. Section 2 provides a review of the relevant literature. Section 3 presents the methods used for the empirical analysis and the data sources. Section 4 discusses the empirical findings. The final section concludes.

2. Selected literature review

2.1 Competition studies on MENA banking sectors

Most empirical studies on banking sector conditions have focused on the US and Europe. However, the interest in MENA banks has increased in recent years as the market evolved as one of the largest in the emerging world where banking data have become more widely available. Several studies (e.g., Murjan and Ruza, 2002; Al-Muharrami et al., 2006; Turk-Ariss, 2009; Abuzayed et al. 2012; Elfeituri and Vergos, 2019) have examined market structure and bank competition levels in various MENA countries using the non-structural H -statistic. They all provide evidence that MENA's banking sector operates under monopolistic competition. Interestingly, Murjan and Ruza (2002) find that Gulf Cooperation Council (GCC) markets tend to be less competitive than non-oil producing countries. The authors suggest that this finding could derive from the increased focus on structural reform programs and from the deregulation process which started earlier in the non-Gulf countries and has helped to promote a higher degree of competition. Anzoátegui et al. (2010), Turk-Ariss (2010), Weill (2011) and Polemis (2015) use both the H -statistic as well as the Lerner Index of Monopoly Power to examine the level of bank competition in the MENA region. The former study finds that competition levels are lower relative to other developing regions; it also suggests that competitive conditions have not improved in recent years, and this is primarily due to the bad quality of credit information, strict regulations and practices governing bank entry, and low market contestability. Turk-Ariss (2010) and Weill (2011) perform cross-country analyses that include selected MENA countries; their results also confirm the monopolistic competition structure.⁴ Polemis (2015)'s study provides

⁴ These two studies mainly focus on Islamic banks as compared to their conventional peers.

sufficient evidence in favor of banking monopolistic competition across a selection of MENA countries. More recently, Albaity et al. (2019) also confirm low competition levels of MENA banks measured by the Lerner index and Boone indicator.

2.2 Convergence in the banking industry

The integration literature in MENA is limited and mainly dominated by income convergence studies which comprise two distinct strands: the first concentrates on analysing income convergence among MENA countries themselves;⁵ while the other focuses on how MENA countries converge to another income reference threshold.⁶ We are not aware of any studies that examine the convergence of market conditions in MENA's banking sector. However, a number of studies have examined convergence for different banking sectors including the US (Fung, 2006); Europe (Fernandez de Guevara et al., 2007; Mamatzakis et al., 2008; Evans et al., 2008; Weill, 2009, 2013; Casu and Girardone, 2010; Andrieş and Căpraru, 2012); and China (Matthews and Zhang, 2010). These studies focus on different types of convergence, including interest rates, bank efficiency and productivity. More recently, Olson and Zoubi (2017) examine the effect of the 2008 global financial crisis on convergence in performance between Islamic and conventional banks in MENA and Southeast Asia. They find that, although the convergence speed of Islamic banks is slower, all banks appear to be converging towards similar levels of profitability in the post-crisis period in MENA with lack of convergence in Southeast Asia.

Only few recent studies have focused on the evolution and convergence of banking competition in the European banking sector. Andrieş and Căpraru (2012) use the H -statistic and the Lerner index of market power and the measures of β and σ -convergence to investigate competition in the banking

⁵ See for example: Guétat and Serranito, 2007; Erlat, 2007; Pesaran, 2007; Tunalı and Yilanci, 2010; and Andreano et al. 2013.

⁶ Typically reference countries are southern European countries, including France (e.g. Guétat and Serranito, 2008; Serranito, 2010; Péridy and Bagoulla, 2012; Serranito, 2013). Recent empirical studies do not reach a consensus as to whether the income of MENA countries is converging or not.

systems of EU-27 as a whole, but also for both old and new EU member states over 2001 - 2009. Their results show a significant increase in competition in the new EU member states while a notable decrease was found for the old member states and the whole EU-27. The authors additionally provide evidence of convergence in bank competition among the EU member states. Weill (2013) examines the evolution and convergence of banking competition in all EU countries over the period 2002-2008 using the H -statistic and the Lerner index of market power and the measures of β and σ -convergence. The author provides evidence of a general improvement as well as convergence in banking competition. These findings are also observed with standard competition measures (Herfindahl-Hirschman index and profitability indicators) supporting the view that banking integration has taken place in the European Union. More recently, Zhang and Matthews (2019) use the H -statistic and the measures of β and σ -convergence to examine the ASEAN-5 banking markets. Their findings indicate that markets operate under monopolistic competition and show some evidence of both β and σ -convergence. They, however, suggest that the convergence process is easily distorted by the external economic environment.

2.3 Banking competition, financial development and economic growth

Although a number of studies have examined the effect of financial development on economic growth (Rachdi et al., 2011; Falahaty and Hook, 2013) the evidence on the impact on market conditions is still limited. Several studies examined this relationship in the context of large cross-country analyses that include selected MENA countries. In a study of 41 countries (5 of which are in MENA) over the period 1980-1990, Cetorelli and Gambera (2001) find that banking sector concentration has a dampening effect on overall economic growth, though it promotes the expansion of industries that depend heavily on external finance. Using the same data and methodology, Deidda and Fatouh (2005) find that banking concentration is only negatively associated with growth in low-income countries, while there is no significant relationship between the two variables in high-income countries.

Claessens and Laeven (2005) were the first to use an indicator of competition based on the industrial organisation theory, namely the *H*-statistic, to analyse the relationship between banking competition and growth for a sample of 16 countries (five in MENA) over 1980-1990. They find that greater competition in the banking system allows industries that are more dependent on external finance to grow faster. De Guevara and Maudos (2011) analyse the effect of banking competition on industry economic growth over the period 1993–2003 for a sample of 53 sectors in 21 countries using both structural and non-structural measures of competition (concentration ratios, Herfindahl-Hirschman Index, the *H*-statistic and Lerner index of market power). Their evidence indicates that financial development promotes economic growth, while bank monopoly power has an inverted-U-shaped effect on economic growth. This latter result is in line with the literature on relationship banking.

To the best of our knowledge, only Caggiano and Calice (2016) have investigated the relationship between competition in the financial sector and economic growth in the GCC countries using a panel of 23 manufacturing sectors drawn from the Industrial Statistics Database of the United Nations (UNIDO). Their analysis ends in 2010 and the sample included *all* banks thereby including institutions that function in the market place in a number of fundamentally different ways, for example Islamic banks. Their results suggest that greater competition allows financially dependent firms to grow faster. This is somewhat unexpected as benefits deriving from greater competition in banking may not be materialized in less developed countries due to their weak legal systems and poor institutional infrastructure (e.g. La Porta et al., 1998). In such countries, bank market power often acts as substitute for strong legal protection of creditors and property rights, so it can ultimately improve economic performance as also shown in a recent study by Coccorese (2017).

3. Methodology and Data

3.1 Measures of banking competition

For the purpose of this study, we use the non-structural H -statistic (Panzar and Rosse, 1987) and Lerner index of monopoly power (Lerner, 1934) and Boone indicator (Boone, 2008) to measure banking competition across macro-regions of MENA. These three indicators evaluate competitive conditions in the banking sector using non-structural approaches which have emerged in the context of the New Empirical Industrial Organization (NEIO) literature. Their major advantage is that they measure bank behavior directly rather than inferring the degree of competition from indirect proxies such as market shares and concentration ratios.⁷

3.1.1 The Panzar-Rosse H -statistic

The Panzar and Rosse H -statistic is garnered by estimating the following reduced form revenue equation for a panel data set of each banking sector using Ordinary Least Squares (OLS) with fixed bank-specific effects and time dummies:⁸

$$\ln(TR_{it}) = \alpha + \beta_1 \ln(P_{L,it}) + \beta_2 \ln(P_{F,it}) + \beta_3 \ln(P_{C,it}) + \gamma_1 \ln(EQAST_{it}) + \gamma_2 \ln(SIZE_{it}) + \gamma_3 \ln(LOANAST_{it}) + \varepsilon_{it} \quad (1)$$

The dependent variable TR_{it} represents total revenues measured by the ratio of interest and non-interest revenues to total assets (see Casu and Girardone, 2006; Turk-Ariss, 2010). $P_{L,it}$, $P_{F,it}$, and $P_{C,it}$ are the cost of labour represented by the ratio of personnel expenses to total assets, cost of funds measured by the ratio of interest expenses to total deposits, and cost of fixed capital represented by the ratio of other operating and administrative expenses to total assets, respectively. $EQAST_{it}$ is the ratio of total equity to total assets that reflect the bank's capitalisation level; $SIZE_{it}$ is total assets which captures

⁷ For studies showing the inadequacy of market concentration as an indicator of competition, see Berger et al., 2004; Claessens and Laeven, 2004; Maudos and Fernández de Guevara, 2007; among others.

⁸ The choice of the fixed effects versus random effects is confirmed by the implementation of the Hausman test and is consistent with previous studies (e.g. Claessens and Laeven, 2004; Casu and Girardone, 2006).

bank size; and finally, $LOANAST_{it}$ is the ratio of total loans to total assets which represents the banks' portfolio mix. All variables are in logarithmic form, and the subscripts i and t refer to bank i operating at time t .

The H -statistics is measured as the sum of the elasticities of banks' total revenues with respect to input prices. Therefore, it is calculated as the sum of the input price coefficients β_1 , β_2 , and β_3 from Equation (1) as follows:

$$H = \sum_{j=1}^J \beta_j \quad (2)$$

where $j=1 \dots J$, and J is the number of inputs included.

H is equal to 1 in perfect competition, between 0 and 1 in monopolistic competition, and less than 0 in monopoly. In the Panzar-Rosse approach, banks should be observed from a long-run equilibrium perspective. This is justified by the fact that competitive markets will equalize the risk-adjusted Return on Average Assets (ROAA) across banks in equilibrium, so that the ROAA should not be statistically correlated with input prices. Following Claessens and Laeven (2004), the equilibrium test is performed by replacing total revenues in Equation (1) with ROAA and calculating the equilibrium statistic in the same way as done for the H -statistic. If the hypothesis that the equilibrium statistic is equal to zero, this implies that the banking market is in long-run equilibrium. If rejected, the market is assumed not to be in equilibrium. Results (not reported) show that the long-run equilibrium condition was satisfied for our sample on a *Wald F test*.⁹

3.1.2 The Lerner index

⁹ It should be noted that equilibrium does not mean that competitive conditions are not allowed to change during the sample period, but it only implies that changes are taken gradually.

Unlike the H -statistic, Lerner index provides a bank-level measure of competition and is defined as the difference between price (p) and marginal cost (mc) as a fraction of price (see e.g. Maudos and Fernandez de Guevara, 2007 and Delis and Tsionas, 2009). The index is usually taken as an indicator of market power because the larger the index, the larger the difference between price and marginal cost, hence, the larger the distance between price and the competitive price. The computation of the Lerner index requires the estimation of a translog cost function using Ordinary Least Squares (OLS) with bank fixed effects and time dummies as follows:¹⁰

$$\ln Cost_{it} = \beta_0 + \beta_1 \ln Q_{it} + \frac{\beta_2}{2} (\ln Q_{it})^2 + \sum_{k=1}^3 \gamma_{kt} \ln P_{k,it} + \sum_{k=1}^3 \varphi_k \ln Q_{it} \ln P_{k,it} + \sum_{k=1}^3 \sum_{j=1}^3 \delta_{kj} \ln P_{k,it} \ln P_{j,it} + \varepsilon_{it} \quad (3)$$

where $Cost_{it}$ stands for total costs, Q_{it} represents a proxy for bank output or total assets for bank i at time t , and $P_{k,it}$ are the three input prices defined in the previous section. The marginal cost is derived by differentiating equation (3) with respect to Q as follows:

$$MC_{TA,it} = \frac{Cost_{it}}{Q_{it}} [\beta_1 + \beta_2 \ln Q_{it} + \sum_{k=1}^3 \varphi_k \ln P_{k,it}] \quad (4)$$

Then the Lerner index is then computed as: $Lerner_{it} = \frac{P_{TA,it} - MC_{TA,it}}{P_{TA,it}}$ (5)

where $P_{TA,it}$ is the price of total assets represented by the ratio of total revenues to total assets for bank i at time t (using total assets as a proxy for bank production), and $MC_{TA,it}$ is the marginal cost of total assets for bank i at time t . The Lerner index ranges between 0 and 1, with higher numbers implying

¹⁰ The choice of the fixed effects is confirmed by the implementation of Hausman test.

greater market power. For a perfectly competitive firm (where $P=MC$), $LERNER = 0$; i.e. the firm has no market power.

3.1.3 The Boone Indicator

To check the robustness of our competition results, we also apply the Boone Indicator as an additional measure of the degree of bank competition across macro-regions of MENA. The indicator assumes that competition enhances the performance of efficient companies, which could be mirrored by higher profits or increased market share (Boone, 2008). It is calculated as the elasticity of profits to marginal costs and has been applied to the analysis of bank competition in several studies including Van Leuvensteijn et al. (2011) and Clerides et al. (2015). For the purpose of this study, the Boone indicator is calculated at bank-level as follows:

$$\ln \pi_{it} = \alpha + \beta_i \ln mc_{it} \quad (6)$$

Where π_{it} and mc_{it} are the profits and marginal cost of bank i at time t respectively. Profits are measured using banks' deflated profits before taxes, while marginal cost is calculated using a translog cost function similar to the one used in Equation (3). β_i is the Boone indicator and is expected to be negative reflecting that profits of banks with lower marginal costs are expected to increase. The larger is β (in absolute terms), the higher the level of competition in the market. Equation (6) is specified in log-linear terms in order to deal with heteroskedasticity and is estimated using systemic generalized method of moments (SYS-GMM) to remedy possible endogeneity problems.

3.1.4 Data for Competition Measures

To calculate our competition measures, we use consolidated accounting data for a sample of 141 commercial banks across 16 MENA countries over the period 2005-2014.¹¹ Balance sheet data is obtained from *BankScope*. The inclusion of commercial banks only ensures homogeneity in the comparison across macro-regions adopted in this paper. Table 1 reports the number of banks by country and macro-region and displays summary statistics for the bank-level variables adopted in the estimations. The OI countries have the highest number of banks, while the GCC countries have the highest value of total assets. At the country level, Lebanon dominates the sample in terms of number of banks, followed by Egypt and Algeria.¹² Saudi Arabia has the largest average total assets over the period under study, followed by United Arab Emirates, Qatar, Kuwait and Morocco.

<< Insert Table 1 about here >>

3.2 Modelling convergence

3.2.1 β and σ -convergence

In order to investigate the convergence in banking competition levels across the macro-regions of MENA we adopt the concepts of β - and σ -convergence (Barro and Sala-i-Martin, 1991) in a panel data setting as benchmark tests.¹³ β -convergence refers to the process in which poor regions grow faster than rich ones and, therefore, catch up on them. On the other hand, σ -convergence does not focus on detecting possible catching-up processes, but conversely emphasizes the reduction of disparities among regions over time. The former is a necessary but not sufficient condition for the latter.

¹¹ We found 200 active commercial banks operating in the countries included in our sample. However, due to a lack of bank-specific data needed for our study we had to exclude 49 banks. Further, 10 more banks were excluded due to having either a deposits/assets ratio of less 20% or a loans/assets ratio of less than 10%.

¹² For robustness and to avoid over-representation, we rerun all regressions excluding Lebanon but no significant changes of results are reported.

¹³ These two concepts were initially developed in a cross-section context and following criticism later extended to a panel setting. See Quah (1993, 1996), Bernard and Durlauf (1996), and Evans (1996). For applications of these panel measures in the banking literature see Casu and Girardone (2010) and Weill (2013).

In the case of β -convergence (also referred to as absolute convergence or catch-up effect), we estimate a univariate model to determine if there is absolute competition convergence across macro-regions of MENA over the period of our study as follows:

$$\ln COMP_{i,t} - \ln COMP_{i,t-1} = \alpha + \beta \ln COMP_{i,t-1} + \sum_{i=1}^{16} \text{Country dummies}_i + \varepsilon_{i,t} \quad (7)$$

where $COMP_{i,t}$ is the mean level of banking competition (proxied by the H -statistic, Lerner index and Boone indicator) of country i in year t . *Country dummies* $_i$ are dummies to control for country effects, $\varepsilon_{i,t}$ are the error terms, and α and β are the parameters to be estimated. There is β -convergence if the parameter β is negative; the higher the coefficient in relative terms the greater the tendency for convergence.

To estimate cross-sectional dispersion or σ -convergence, that is to estimate how quickly each country's competition levels are converging to the group average, we adopt the following model specification:

$$\Delta W_{i,t} = \alpha + \sigma W_{i,t-1} + \sum_{i=1}^{16} \text{Country dummies}_i + \varepsilon_{i,t} \quad (8)$$

where $\Delta W_{i,t} = W_{i,t} - W_{i,t-1}$, $W_{i,t} = \ln COMP_{i,t} - \widehat{COMP}_t$, $W_{i,t-1} = \ln COMP_{i,t-1} - \widehat{COMP}_{t-1}$, $\ln COMP_{i,t}$ and $\ln COMP_{i,t-1}$ are the logs of the mean levels of bank competition in country i at times t and $t-1$ respectively, and \widehat{COMP}_t and \widehat{COMP}_{t-1} are the means of $COMP_{i,t}$ and $COMP_{i,t-1}$ respectively. *Country dummies* $_i$ represent dummies to control for country effects, $\varepsilon_{i,t}$ is the error term, and α and σ are the parameters to be estimated. $\sigma < 0$ represents the rate of convergence of $COMP_{i,t}$ towards \widehat{COMP}_t ; the larger is σ in absolute value, the faster the rate of convergence.

The models in Equations (7) and (8) are estimated by pooled OLS regression with fixed effects followed by the estimation of a dynamic system Generalized Method of Moments (SYS-GMM)

model.¹⁴ This latter should help mitigating possible endogeneity problems and omitted variable bias (see Casu and Giradone, 2010 and Blundell and Bond, 1998). Following Arellano and Bond (1991), three additional conditions are checked to avoid model misspecification for the GMM model; a significant AR (1) serial correlation, lack of AR (2) serial correlation and a high Sargan test statistics.

3.2.2 Unit root test for panel data with AR (1) and small T

In addition to the panel data estimations of the type applied in the previous section, the literature also implements recent advances in the panel unit root literature to test the level of long-run convergence in competition between countries.^{15,16} Many of these tests, particularly Levin et al. (2002) and Im et al. (2003), allow for a considerable degree of cross-sectional heterogeneity. However, one shortcoming of convergence studies that implement unit root tests is that they adapt to samples characterised by large cross-sections and a relatively long-time span; $N, T \rightarrow \infty$ (for an overview, see Breitung and Pesaran, 2008). Therefore, these tests tend to perform poorly for micro-economic panel datasets that often have large N and relatively small T . This motivated interest in tests for large N and fixed T (see Harris and Tzavalis, 1999 and 2004; Hadri and Larsson, 2005) and, more recently, for large N and small T (see De Blander and Dhaene, 2012) while still allowing for cross-sectional heterogeneity in the underlying model. Given our sample of 141 banks over 10 years we eschew the tests used to date in the extant literature and instead apply the panel unit root test of De Blander and Dhaene (2012) to test for banking competition convergence across macro-regions of MENA. This test has been shown to perform well when the number of available time-series observations is small. The model is a fixed-effect panel version of the augmented Dickey–Fuller (ADF) regression of order 1 requiring a balanced panel of observations, and is of the following form:

¹⁴ The choice of the fixed effects for OLS is confirmed by the implementation of Hausman test and is consistent with previous studies (see e.g. Weill, 2009 and Casu and Girardone, 2010).

¹⁵ See e.g. Quah (1994); Bernard and Durlauf (1995); Evans and Karras (1996); Evans (1998); Levin et al. (2002); and Im et al. (2003).

¹⁶ To the best of our knowledge, no studies have so far applied unit root tests to examine convergence of bank competition.

$$y_{n,t} = \alpha_i + \varphi y_{n,t-1} + \rho \Delta y_{n,t-1} + \varepsilon_{n,t} \quad (9)$$

where $y_{n,t} = \ln COMP_{n,t} - \ln COMP_{0,t}$ is the difference of the logarithms of the mean levels of banking competition (proxied by the H -statistic, Lerner index and Boone indicator) at time t , between country n and a base country. α_i measures the competition differences that remain constant over time. φ and ρ are the autoregressive parameters. Finally $\Delta y_{n,t-1}$ accounts for an AR(1) serial correlation in the error term $\varepsilon_{n,t}$ which is assumed to be *i.i.d* $(0, \sigma_\varepsilon^2)$ across n and t .

The model can be adjusted to mitigate the impact of cross-sectional dependence by cross-sectionally demeaning the data, i.e. subtracting the cross-sectional averages from the series.¹⁷ De Blander and Dhaene (2012) also derive Nickell bias-corrected estimators, $(\tilde{\varphi}, \tilde{\rho})'$, which are obtained as a function of the biased estimators, $(\hat{\varphi}, \hat{\rho})'$.¹⁸ This bias correction yields an asymptotically normal t -type test statistic under the null hypothesis of a unit root:

$$H_0: \varphi = 1, \quad (10)$$

$$H_1: \varphi < 1. \quad (11)$$

Finally, to implement the test we need to choose a base currency to test convergence against. In accordance with the Bank Regulation and Supervision Survey (Barth et al., 2013) and the Economic Freedom Index of the Heritage Foundation (2016), we choose Bahrain on the grounds that it has less financial restrictions and more economic freedom compared to other MENA countries in our sample.¹⁹

¹⁷ When the data is cross-sectionally demeaned before applying the test, results (not reported here) are very close to those without demeaning.

¹⁸ Nickell (1981) bias is a problem arises in the fixed-effects panel models particularly in the small T , large N setting. It mainly occurs due to the correlation between the regressors and errors that results from the demeaning process.

¹⁹ Both sources combined cover the period over which data was collected for this study.

3.3 Bank competition, financial development and economic growth

To analyse the effect of banking competition on economic growth across macro-regions of MENA we adopt the basic model introduced in Rajan and Zingales (1998) and the extensions of Claessens and Laeven (2005) and de Guevara and Maudos (2011). The approach adopted corrects for both country and sectoral effects by introducing the interaction of the countries' level of financial development and industries' level of dependence on external finance. Moreover, it takes into account how competition in the banking markets affects growth through firms' financial dependence. We also introduce a dummy variable to the model in order to control for the impact of the political unrest that has affected several MENA countries since 2011. Thus, the reference model to be estimated is as follows:

$$\begin{aligned} Growth_{j,k} = & Constant + \psi_1 Sector\ dummies_j + \psi_2 Country\ dummies_k + \\ & \psi_3 Sector\ share\ in\ value\ added_{j,k} + \psi_4 External\ dependence_j * Financial\ development_k + \\ & \psi_5 External\ dependence_j * Banking\ competition_k + \psi_6 Political\ Stability_t + \varepsilon_{j,k} \end{aligned} \quad (12)$$

where each sector and country are indicated by indices j and k respectively. Growth is proxied by the average annual real growth rate of value added of sector j in country k over the period of the study.

Political Stability_t is a dummy variable that measures political stability in MENA (1 if year t is 2011, 2012, 2013, 2014 and 0 otherwise). It is likely that the uncertainty associated with an unstable political environment could decrease investments and reduce the pace of economic development (see Alesina et al. 1996, Ades and Chua, 1997 and Aisen and Viegas, 2013), but equally poor economic performance may also lead to political unrest. Data on value added is obtained from the World Development Indicator (WDI) database published by the World Bank and includes aggregated data on the annual growth rate of value added in four sectors: Agriculture, Industry, Manufacturing and

Services.²⁰

Value added is calculated as the net output of a sector after adding up all outputs and subtracting intermediate inputs. Using this data enables us to capture the contribution of different parts of the economy to overall economic growth in a more targeted way than has been done to date in the MENA region. We use country and sector dummies to control for specific country and sector effects, respectively. Banking competition is specified as the mean levels of competition proxies; the Lerner index, *H*-statistic or the Boone indicator, in country *k*.

The sector share in value added at the start of the sample period (i.e. 2005) is used to control for the possible convergence effect at the sector level. Following de Guevara and Maudos (2011), financial development is proxied by the ratio of total capitalization to GDP, which is calculated using data obtained from the *WDI* database. De Guevara and Maudos (2011) suggest that the use of a financially developed country (in their case, the UK) as benchmark is one way to avoid the identification problem between the demand for and supply of external funds. In our setting, we also elect to use the UK as our benchmark country as it is amongst the most developed in the world where firms face the minimal friction in their access to finance. Thus, the amount of external finance used by UK firms in a specific sector is likely to be a relatively pure measure of firms' demand for external finance. Hence, it is used in this paper as a proxy for the desired amount of finance foreign firms operating in the same sector would have liked to raise had their financial markets been more developed. Detailed definitions and sources of variables are shown in Table 2.

<<Insert Table 2 about here>>

Following de Guevara and Maudos (2011), external financial dependence is proxied by means

²⁰ The industrial origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3, as explained in Appendix B.

of aggregated balance sheet data from the UK firms from the *Fame (Bureau van Dijk)* database and is defined as:

$$\textit{Extern Fin Dependence} = \frac{[\textit{Non-current liabilities}] + [\textit{current liabilities:loans}]}{[\textit{Total assets}] - [\textit{current liabilities:creditors}] - [\textit{other current liabilities}]} \quad (13)$$

To create this measure, information on 1069 UK firms are used to measure dependence on external finance across 19 major sectors in the UK as classified in *Fame* database and averaged and aggregated over 2005–2014 to match the ISIC classification and thus be comparable to the data on value added. Table 3 shows this sectors and aggregates. The sector showing the highest level of financial dependence is 'Transportation' (0.645) followed by 'Insurance Companies' (0.643), 'Publishing and Printing' (0.559) and 'Gas, Water and Electricity' (0.559). On the other hand, sectors that are least dependent on external finance are 'Banks' (0.154), 'Metals and metal products' (0.162) and 'Primary Sector' (0.266). Turning to the aggregated levels, Agriculture (comprising the Primary sector) seems to be the least dependent on external finance, followed by Manufacturing, Industry and, finally, Services which possesses the highest level of aggregated financial dependence with (0.461). Finally, the analysis in this section is not performed on Libya, Syria and Yemen due to a lack of available data, (Note: each comes from the DOE macro-region).

<<Insert Table 3 about here>>

Equation (12) is estimated using dynamic system Generalized Method of Moment (SYS-GMM) proposed by Arellano and Bond (1991). The GMM technique is efficient when estimating panel data with large number of cross sections and smaller time series dimension. It also helps eliminating any possible endogeneity issues.

4. Empirical findings

4.1 Trends in alternative measures of competition

We first analyze the trends of bank competition measured by the Panzar-Rosse H -statistic, Lerner index for Monopoly power and Boone indicator for the three macro-regions of MENA over the period 2005-2014. The results are displayed in Figure 1.²¹

<< Insert Figure 1 about here >>

Panel (a) shows increasing bank competition measured by the H -statistic for all macro-regions over the period of our study. In dynamic terms, this increase (if the H -statistic is interpreted as a continuous measure) points to greater levels of competition over time. Broadly speaking, monopolistic competition best describes the banking sectors across all macro-regions of MENA, with evidence that GCC markets tend to be less competitive than both the non-oil producing countries and developing oil exporters. These findings are in line with studies on the competitive conditions in MENA (see e.g. Murjan and Ruza, 2002; and Turk-Ariss, 2009).

The trend in Panel (b) for the Lerner indices of market power indicates a decrease for all macro-regions. These results confirm the H -statistic findings implying that all macro-regions of MENA have witnessed enhancement in banking competition during the period of this study with OI and DOE countries benefiting from a higher increase in competition levels compared to the GCC (see Appendix C).

Panel (c) presents the estimates for the Boone indicator which we use to check the robustness of our results on bank competition. It shows similar trends to the H -statistic and Lerner index through the sample period. The movement of the indicator away from zero for all three macro-regions over the

²¹ Recall, higher levels of H -statistic are associated with higher competition while higher levels of the Lerner higher and Boone indicator imply greater marker power (i.e. lower levels of competition).

sample period coincides with similar moves toward more competition observed with the other indicators. The values of the Boone indicator, however, range between -0.2 and -0.6 for all macro-regions of MENA. This indicates generally low competition levels in the region which is consistent with what other measures used in this study suggest.

Rocha et al. (2011a) suggest that weak banking competition in MENA might be due to high levels of state ownership in some countries, entry and activity restrictions, limited access to information for smaller banks or lack of alternatives to banking in others. However, our evidence of increasing competition levels in the region, over the period of this study, might be an indicator that the financial reforms adopted in the region over the last two decades are positively affecting banking competition.

4.2 Convergence of banking competition levels across macro-regions of MENA

In this section, we present the results from our analysis of bank competition convergence beginning with the β -convergence and σ -convergence results for the H -statistic, Lerner index and Boone indicator which are reported in Tables 4 and 5 respectively by estimating Eq. (7) and (8) using OLS and GMM for the three macro-regions as well as whole MENA.

Addressing β -convergence first, the results using the H -statistic as a competition measure indicate that there is evidence of β -convergence in banking competition levels within each of the three macro-regions in our sample as well as in the pooled MENA region during the period of our study. This finding is confirmed across both estimated models and is supported by the β -convergence analysis using the Lerner index and Boone indicator as measures of bank competition. Thus, the results from Table 4 suggest that the most competitive banking sectors in 2005 have experienced lower improvements in competition than the least competitive ones, thereby providing preliminary evidence of competition catch-up across MENA macro-regions.

<< Insert Table 4 about here >>

Results of σ -convergence that estimate how quickly each country's competition levels are converging to the group average are reported in Table 5. Overall, they suggest an increase in the speed of convergence in MENA as a whole and in all three macro-regions, as the σ coefficients are all negative and statistically significant across both estimated models and all competition measures.²²

<< Insert Table 5 about here >>

The final test of convergence utilizes De Blander and Dhaene (2012)'s unit root test. Using the H -statistic, Lerner index and Boone indicator as measures of competition, we test the null hypothesis that there is no convergence in banking competition levels (i.e. the null hypothesis of a unit root) for the whole MENA and the three macro-regions. Table 6 reports the fixed effects OLS and the bias-corrected OLS estimates of φ and ρ . The null hypothesis of no convergence is rejected for the whole MENA and all three macro-regions supporting our previous findings of β -convergence and σ -convergence. Finally, we check the robustness of these results by running the unit root test replacing Bahrain with United Arab Emirates (UAE) as base currency to test convergence against; we find very similar results (not reported).²³

<< Insert Table 6 about here >>

²² Our results in Tables 4 and 5 show that the SYS-GMM results satisfy the three additional conditions: a significant AR(1) serial correlation, lack of AR(2) serial correlation and a high Sargan/Hansen test, suggesting that the GMM model is correctly specified.

²³ According to the Economic Freedom Index (2016) mentioned in section 3.2, UAE was the second economically free country in MENA. However, according to the 2020 index, UAE has now surpassed Bahrain and is ranked first.

The rejection of the null suggests that, despite the differences that might exist at the country level, some harmonization is occurring among countries of MENA as a whole and among countries within each macro-region as classified according to oil exports allowances. In fact, MENA countries are facing similar policy challenges such as privatization, increasing domestic and foreign investments, dealing with oil price shocks, protecting the rule of law and property rights, maintaining external, financial and political stability and liberalizing external trade and payments (World Bank, 2013; IMF, 2016).

4.3 Banking competition and growth across macro-regions of MENA

In this section, we present the results of the SYS-GMM estimation of Equation (12) where the dependent variable is the aggregated average growth rate of sectors' value added over 2005–2014. Table 7 shows the results of this estimation for the whole MENA and the three macro-regions in our sample and across the three proposed competition measures.

<< Insert Table 7 about here >>

Sector's share in value added is insignificant with mixed signs across all regressions. The interactive variable (External dependence * Financial development) is positive and statistically highly significant across all macro-regions as well as the whole MENA. This implies that industries which are relatively more dependent on external finance in MENA have the chance to grow significantly faster as the region's financial markets become more developed. This is in line with prior literature of Rajan and Zingales (1998), Claessens and Laeven (2005) and de Guevara and Maudos (2011) and, therefore, we provide extra support to the hypothesis that financial development facilitates economic growth through greater access to external finance.

On inspection of the interaction between competition and external dependence, with the former being proxied by the Rosse-Panzar H -statistic, we observe a negative and statistically significant relationship across all macro-regions as well as the whole MENA. This implies that greater market power generates greater economic growth in these regions. Table 7 also shows the results of the same interaction using the Lerner index and Boone indicator in place of the H -statistic. The significant terms for all macro regions and MENA as a whole (although only at 10% significance level) indicate the same qualitative findings, namely of a negative effect of banking competition on economic growth. The dummy for political stability exhibits negative coefficients across all estimated equations implying that political instability across all three macro-regions and MENA as a whole have had a negative influence on economic growth since 2011.²⁴ Results in Table 7 show that the SYS-GMM results satisfy the three additional conditions: a significant AR(1) serial correlation, lack of AR(2) serial correlation and a high Sargan/Hansen test, suggesting that the GMM model is correctly specified.

The findings of a positive link between the levels of market power and economic growth are in line with the results of de Guevara and Maudos (2011) who justify this link in the context of relationship banking. This is also in line with the results of a joint survey of the Union of Arab Bank and the World Bank conducted by Rocha et al. (2011b) which suggests that banks in MENA still rely on relationship lending in order to compensate for the deficient financial infrastructure, information asymmetries and the opaqueness of SMEs. For example, due to significant problems in the registration, enforcement and selling of collateral, lenders in MENA perceive high risks in SME lending that can only be partially offset through more reliance on relationship lending. According to Rocha et al. (2011a), although many countries in MENA have large banking systems and have made progress with regards to financial reforms, these reforms have been insufficient in many countries and the region still has high rates of credit concentration. On the other hand, our results are in contrast with those of

²⁴ It is also possible that political instability in neighboring countries has ultimately affected the whole region including countries in our sample. See Ades and Chua (2007).

Claessens and Laeven (2005) and Caggiano and Calice (2016) who support the conventional economic theories which suggest that higher banking competition facilitates access to external finance encouraging more investments and positively affecting economic growth especially in sectors that are more dependent on external financing. In a recent survey of the literature, Coccoresse (2017) demonstrates that without an adequate degree of market power banks cannot get enough information about borrowers and are less willing to engage in lending relationships with their customers. In turn, these phenomena may have an adverse impact on their lending activity and hence on the overall economic performance. In the less rich world, more banks' market power can be helpful in solving adverse selection and moral hazard between firms thereby acting as a substitute for strong legal protection of creditors and property rights (e.g. La Porta et al. 1998).

5. Conclusions

This study examines the convergence of banking competition and analyses the effect of financial development and bank competition on economic growth across three macro-regions of the Middle East and North Africa (MENA) over the period 2005-2014, controlling for the effect of political unrest affecting the region since 2011. Following the World Bank classification, our macro-regions are categorized according to oil export allowances in order to control for cross-country differences in the MENA region.

Our findings suggest that MENA banking sectors are best described by monopolistic competition, but we find evidence of enhanced levels of banking competition for all macro-regions and MENA as a whole over the period under investigation. This is one expected benefit of increased economic integration in MENA and a result of the financial reforms adopted in the region over the last two decades. Further reforms in areas such as bank ownership, banking market contestability, transparency and alternatives to banking finance would, therefore, be necessary in order to achieve higher levels of bank competition in MENA.

Using a battery of tests, we also find a novel evidence of the presence of a significant shift towards convergence in banking competition in MENA as a whole and across all three macro-regions. These results are robust across different competition measures and concepts of convergence and prove the existence of convergence “clubs” within the region. Our results indicate that convergence is due to “catching up” with best practice and that integration attempts in MENA seem to have had a positive impact on bank competition over the period of analysis.

Finally, our findings show that financial development facilitates economic growth through greater access to external finance but point to a positive effect of bank market power on economic growth in MENA and its macro-regions. This suggests that MENA banks still rely on relationship lending in order to compensate for the poor financial infrastructure, information asymmetries and the opaqueness of SMEs. More progress with regards to financial reforms to reduce credit concentration and enhance access to bank finance should remain a key focus of policy makers in the region.

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Appendix A: Intra-MENA agreements

Agreement	Type of Agreement	Member Countries	Date
The Arab League	A regional organization that helps facilitating political, economic, cultural, scientific, and social affairs among its members.	Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, UAE and Yemen.	22-03-1945
Pan Arab Free Trade Area (PAFTA)	Free trade agreement that aims at enhancing trade and economic activities among the Arab States and the establishment of a regional Free Trade Area. PAFTA has been a key trade initiative of the Arab League.	Bahrain; Egypt; Iraq; Jordan; Kuwait; Lebanon; Libya; Morocco; Oman; Qatar; Saudi Arabia; Sudan; Syria; Tunisia; United Arab Emirates; Yemen.	01-01-1998
Gulf Cooperation Council (GCC)	Political and economic union of Arab states bordering the Persian Gulf. *	Bahrain; Kuwait; Oman; Qatar; Saudi Arabia; United Arab Emirates.	01-01-2003
The Agadir Agreement (AGADIR)	An agreement between the Arabic Mediterranean Nations for establishing a Free Trade Zone.	Egypt; Jordan; Morocco; and Tunisia, with the potential to expand to Algeria, Lebanon, Libya, Mauritania, the Syria, and the West Bank and Gaza. The EU supported this agreement as a possible first step in the establishment of Euromed. **	01-01-2004
The Arab Maghreb Union (AMU)	A trade agreement aiming for an economic and future political unity among Arab countries of the Maghreb in North Africa.	Algeria; Libya; Morocco; Tunisia; Mauritania.	02-01-2012

Notes: This table displays the agreements that show integration progress in the Middle East and North Africa (MENA) over the last two decades.

* To accelerate integration efforts, the GCC countries have signed several agreements: An economic agreement (2001) that focuses on trade, investment, and various other economic issues; A customs union agreement (2003) to remove restrictions on internal trade and to establish common external tariffs; A common market status agreement (2008) to create a single environment where citizens of member countries enjoy equal rights and privileges. The establishment of the GCC single currency, planned for 2010, has been postponed.

** Euro-Mediterranean Free Trade Area Agreement (Euromed): Agreements between the EU and MENA's countries and FTAs. So far, six countries have signed the agreement namely Algeria, Egypt, Jordan, Lebanon, Morocco and Tunisia. Syria has initiated discussion in 2008.

Appendix B: Definitions of sectorial data, economic growth regression:

Aggregated sector	Definition
Agriculture, value added	Aggregated annual growth rate for agricultural value added. Agriculture corresponds to ISIC divisions 1-5 (Agriculture, hunting and forestry, Fishing).
Industry, value added	Aggregated annual growth rate for industrial value added. Industry corresponds to ISIC divisions 10-45 (Mining and quarrying, Manufacturing, Electricity, gas and water supply, Construction).
Manufacturing, value added	Aggregated annual growth rate for manufacturing value added. Manufacturing refers to industries belonging to ISIC divisions 15-37 (Manufacturing).
Services, value added	Aggregated annual growth rate for services value added. Services correspond to ISIC divisions 50-99 (Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods, Hotels and restaurants, Transport, storage and communications, Financial intermediation, Real estate, renting and business activities, Public administration and defense; compulsory social security, Education, Health and social work, Other community, social and personal service activities, Private households with employed persons, Extra-territorial organizations and bodies) .

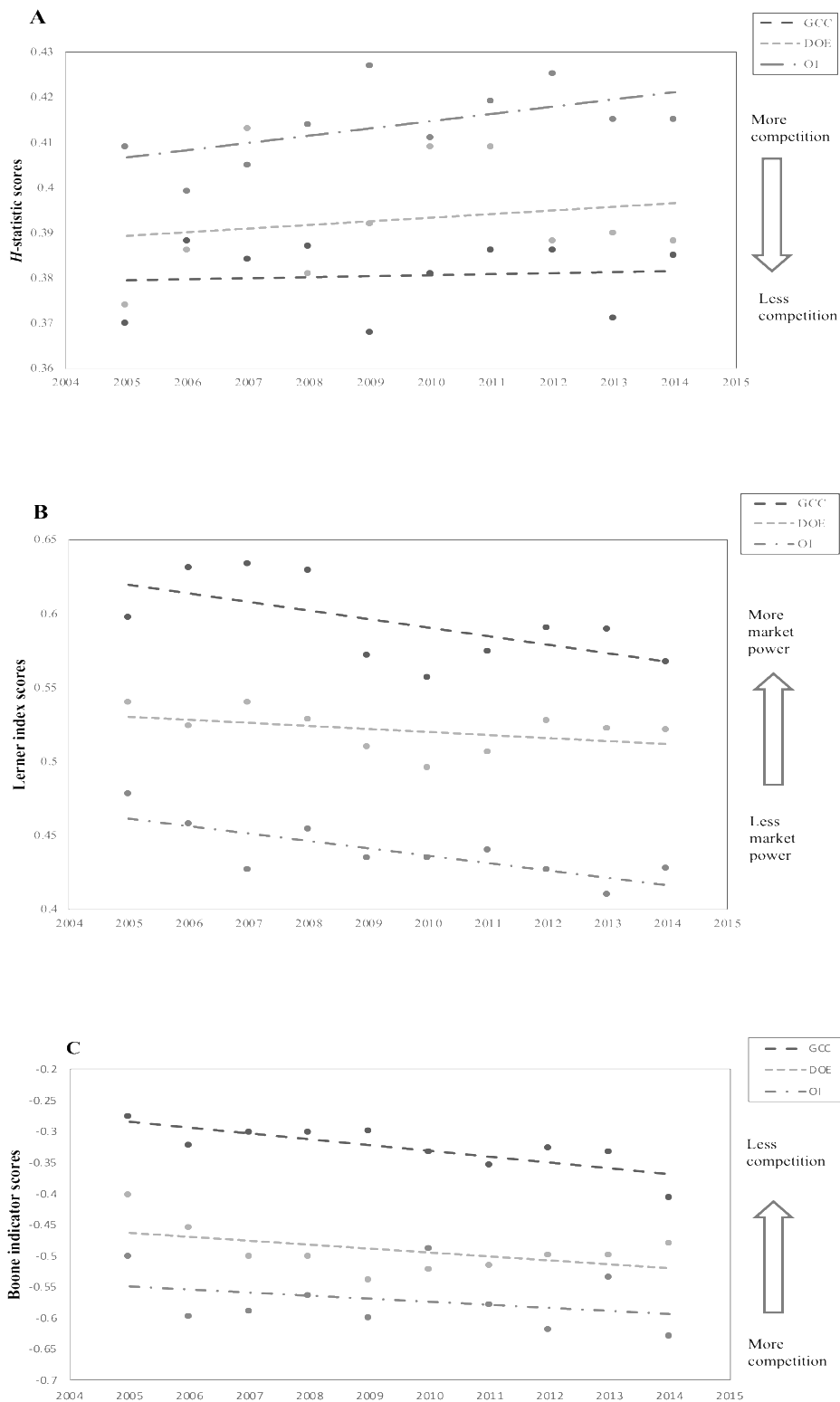
Notes: This table summarizes the value-added data used in Equation 12. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. In parentheses are the individual sectors for which the aggregated value added is calculated.

Appendix C: Evolution of bank competition across macro-regions of MENA 2005-2014

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	% change
<i>Panel A: H-statistic</i>											
GCC	0.370	0.388	0.384	0.387	0.368	0.381	0.386	0.386	0.371	0.385	0.1%
DOE	0.374	0.386	0.413	0.381	0.392	0.409	0.409	0.388	0.390	0.388	1.4%
OI	0.409	0.399	0.405	0.414	0.427	0.411	0.419	0.425	0.415	0.415	0.7%
<i>Panel B: Lerner indices</i>											
GCC	0.597	0.631	0.633	0.629	0.572	0.557	0.574	0.590	0.589	0.567	-3.1%
DOE	0.540	0.524	0.540	0.528	0.510	0.496	0.506	0.527	0.522	0.521	-1.6%
OI	0.478	0.458	0.427	0.454	0.435	0.435	0.440	0.427	0.410	0.428	-5.0%
<i>Panel C: Boone indicators</i>											
GCC	-0.277	-0.324	-0.302	-0.302	-0.299	-0.334	-0.354	-0.327	-0.333	-0.407	-0.13 %
DOE	-0.403	-0.455	-0.501	-0.501	-0.54	-0.522	-0.517	-0.499	-0.5	-0.48	-0.077 %
OI	-0.501	-0.599	-0.59	-0.565	-0.6	-0.489	-0.579	-0.62	-0.536	-0.631	-0.13 %

Notes: Sample: 2005-2014. Panel A displays the results of the *H*-statistic provided by the Panzar-Rosse model in Eq. (1) for each year and macro-region. Panel B shows the means of the Lerner indices as calculated in Eq. (5) for each year and macro-region. Panel C illustrates means of Boone indicators as estimated in Eq. (6) for each year and macro-region. All indices are in percentage form. % change is the difference between values in 2014 and 2005. DOE= Developing Oil Exporters, GCC= Gulf Cooperation Council, OI = Oil Exporters.

Figure 1: Bank Competition trends across Macro-regions of MENA over 2005-2014



Notes: Panel A of the chart shows scores of the Panzar-Rosse H -statistic across macro-regions of MENA calculated as the sum of the input price coefficients in Eq. (1) for the period 2005 – 2014 (trendline significance: R^2 is 0.324, 0.336 and 0.72 for OI, DOE and GCC respectively). Panel B shows scores of the Lerner Index of market power calculated as in Eq. (5) for the same period (trendline significance: R^2 is 0.389, 0.348 and 0.612 for GCC, DOE and OI respectively). Panel C illustrates scores of the Boone Indicator estimated as in Eq. (6) for the same period (trendline significance: R^2 is 0.619, 0.337 and 0.695 for GCC, DOE and OI respectively). DOE = Developing Oil Exporters; GCC = Gulf Cooperation Council; OI = Oil Importers.

Table 1: Summary statistics by country and macro-region for the bank-level variables adopted in the estimations of the *H*-statistic, Lerner index and Boone indicator

Country	Number of banks	Number of observations	Total assets	Total loans	Total revenues	Total costs	Price of labour	Price of funds	Price of fixed capital
Algeria	14	120	5,961.57	2,365.83	203.92	109.63	0.94	1.79	1.58
Bahrain	9	78	9,930.67	4,336.96	523.23	358.92	0.82	2.46	0.49
Egypt	19	180	7,377.94	2,075.75	443.52	238.19	1.43	4.93	1.29
Iraq	4	40	4,813.64	1,073.31	74.80	26.04	1.85	2.42	1.75
Jordan	10	98	9,501.30	4,224.59	358.56	338.70	1.09	2.91	1.08
Kuwait	5	45	20,683.47	12,247.63	939.16	198.87	0.57	1.82	0.85
Lebanon	20	188	7,331.51	5,458.02	342.19	189.46	0.86	4.29	0.73
Libya	4	34	8,210.50	2,822.46	130.66	114.88	0.45	0.68	0.83
Morocco	4	40	17,538.23	9,699.15	669.50	533.65	0.88	1.95	1.24
Oman	6	60	5,719.72	3,895.62	748.75	259.71	1.10	2.20	0.57
Qatar	5	45	21,379.51	13,623.45	813.84	735.39	0.59	1.38	0.54
Saudi Arabia	8	88	36,558.36	20,602.47	1,414.16	406.32	0.73	1.89	0.50
Syria	6	56	1,004.15	460.06	65.72	35.26	0.82	5.53	0.92
Tunisia	12	104	2,879.84	1,800.87	143.97	130.04	1.56	3.12	1.01
UAE	12	112	22,729.98	15,982.47	694.76	533.61	0.79	2.57	0.50
Yemen	3	30	567.25	149.02	94.59	24.90	1.45	7.61	0.79
DOE	31	280	4,946.75	1,280.59	135.26	115.98	0.981	2.16	1.34
GCC	45	428	20,950.04	11,927.24	760.59	551.52	0.56	2.21	0.79
OI	65	610	7,368.52	2,663.89	237.09	343.85	1.23	3.89	1.05
Average (MENA)	141	1318	11,088.44	5,316.51	377.65	337.12	0.92	2.75	1.06

Notes: Sample: 2005-2014. Figures in US\$ millions. Numbers are obtained by authors' calculation based on data retrieved from Bankscope. MENA= Middle East and North Africa; DOE= Developing Oil Exporters, GCC = Gulf Cooperation Council, OI= Oil Importers.

Table 2: Definition and source of variables: banking competition, financial development and economic growth

Variable	Description and sources
Growth	Average annual real growth rate of value added in a particular sector in each macro-region over the period 2005 – 2014. We use aggregated data for four sectors namely Agriculture, Industry, Manufacturing and Services. Source: <i>World Bank indicators (WDI)</i> .
Sector Share in value added	The value added of each sector expressed as a percentage of the total value added in the initial year (2005). Source: <i>World Bank indicators (WDI)</i> .
Financial development (Total capitalization/GDP)	Sum of the credit to private sector and stock market capitalization to GDP. Source: <i>World Bank indicators (WDI)</i> .
Financial dependence	The ratio of long-term debt and short-term debt distinct from creditors to capital employed. This ratio is calculated for the UK firms across different sectors and then aggregated to be in line with the Growth data. Source: <i>Fame (Bureau Van Dijk)</i> .
Banking competition (<i>H</i> -statistic)	The Rosse-Panzar <i>H</i> -statistic is estimated from a revenue function for each country in the period 2005–2014, and then averaged by macro-region. Source: own calculation using information from <i>BankScope (Bureau Van Dijk)</i> .
Banking competition (Lerner index)	The Lerner index of market power is calculated by estimating average prices of banking activity (as the ratio of total revenue to total assets) and marginal costs (specifying a translog costs function) per bank and year over 2005-2014, and then taking the weighted average of the indices obtained over the period for each macro-region. Source: own calculation using information from <i>BankScope (Bureau Van Dijk)</i> .
Political stability	A dummy variable that measures political stability in MENA (1 if year (t) is 2011, 2012, 2013, 2014 and 0 otherwise).

Notes: This table illustrates the definitions and data sources of the variables used in Equation (12) on banking competition, financial development and economic growth.

Table 3: External dependence across 19 major sectors in the UK

Sectors (<i>Fame</i>)	Financial Dependence
Individual sectors	
1. Banks	0.154
2. Chemicals, rubber, plastics and non-metallic products	0.402
3. Construction	0.443
4. Education and health	0.454
5. Food, beverage and tobacco	0.491
6. Gas, water and electricity	0.520
7. Hotels and restaurants	0.511
8. Insurance companies	0.643
9. Machinery, equipment, furniture and recycling	0.364
10. Metals and metal products	0.162
11. Other services	0.408
12. Post and telecommunications	0.519
13. Primary sector	0.266
14. Public administration and defense	0.451
15. Publishing and printing	0.559
16. Textiles, wearing apparel, leather	0.277
17. Transportation	0.645
18. Wholesale and retail trade	0.364
19. Wood, cork and paper	0.316
Aggregates	
Agriculture	0.265
Industry	0.445
Manufacturing	0.355
Services	0.461

Notes: The measures of external dependence in each sector are firm averages 2005-2014. Aggregates are calculated by aggregating the averages of individual sectors following ISIC classification in order to be in line with growth data used. Source: own calculation using data made available by *Fame (Bureau Van Dijk)* database.

Table 4: β -convergence for bank competition across macro-regions of MENA 2005 - 2014

	DOE		GCC		OI		MENA	
	Pooled OLS	GMM	Pooled OLS	GMM	Pooled OLS	GMM	Pooled OLS	GMM
<i>Panel A: H-statistic</i>								
β_H	- 0.138*** (2.72)	- 0.340*** (2.83)	- 0.305*** (4.89)	-0.511*** (5.02)	- 0.075*** (5.9)	-0.262*** (6.02)	- 0.107*** (3.32)	-0.302*** (3.5)
Adjusted R^2	0.127	-	0.280	-	0.047	-	0.059	-
AR(1) p -value	-	0.082	-	0.091	-	0.087	-	0.062
AR(2) p -value	-	0.273	-	0.242	-	0.276	-	0.263
Sargan/Hansen p -value	-	0.305	-	0.311	-	0.398	-	0.298
<i>Panel B: Lerner indices</i>								
β_L	- 0.501*** (3.74)	-0.688*** (3.86)	- 0.841*** (3.75)	-0.992** (3.91)	- 0.309*** (3.68)	-0.523** (3.77)	- 0.049*** (2.82)	-0.240*** (2.93)
Adjusted R^2	0.228	-	0.181	-	0.157	-	0.049	-
AR(1) p -value	-	0.061	-	0.092	-	0.084	-	0.071
AR(2) p -value	-	0.282	-	0.307	-	0.298	-	0.274
Sargan/Hansen p -value	-	0.340	-	0.352	-	0.426	-	0.322
<i>Panel C: Boone indicator</i>								
β_B	- 0.134** (2.47)	- 0.444** (2.66)	- 0.357** (3.94)	-0.670** (4.80)	- 0.113* (2.91)	- 0.423* (3.02)	- 0.116** (2.28)	-0.421** (2.43)
Adjusted R^2	0.236	-	0.181	-	0.197	-	0.150	-
AR(1) p -value	-	0.058	-	0.083	-	0.074	-	0.061
AR(2) p -value	-	0.381	-	0.399	-	0.287	-	0.266
Sargan/Hansen p -value	-	0.336	-	0.363	-	0.405	-	0.312

Notes: Sample: 2005-2014. The table displays results of β -convergence test using Pooled OLS and System-GMM. In panels A, B and C, the H -statistic, Lerner index and Boone indicator are used as proxies of bank competition levels respectively. β_H , β_L and β_B are the β -convergence coefficients. t -values are in parentheses. *, **, *** denote the statistical significance at the 10%, 5%, and 1% levels respectively. Country dummies and constants are not reported. AR (1) and AR (2) are tests for first- and second-order serial correlation. Sargan/Hansen is a test of the over-identifying restrictions for the GMM estimators. DOE= Developing Oil Exporters, GCC = Gulf Cooperation Council, OI= Oil Importers, MENA = Middle East and North Africa.

Table 5: σ -convergence for bank competition across macro-regions of MENA 2005 - 2014

	DOE		GCC		OI		MENA		
	Pooled OLS	GMM	Pooled OLS	GMM	Pooled OLS	GMM	Pooled OLS	GMM	
<i>Panel A: H-statistic</i>									
σ_H	-0.132*** (2.74)	- 0.333*** (2.92)	-0.279*** (4.68)	- 0.480*** (5.01)	-1.047*** (6.01)	-1.223*** (6.20)	-0.107*** (3.24)	- 0.318*** (3.33)	
Adjusted R^2	0.129	-	0.262	-	0.084	-	0.056	-	
AR (1) (p -value)	-	0.077		0.090	-	0.067	-	0.067	
AR (2) (p -value)	-	0.282		0.262	-	0.265	-	0.242	
Sargan/Hansen (p -value)	-	0.312	-	0.321	-	0.402	-	0.290	
<i>Panel B: Lerner indices</i>									
σ_L	- 0.504*** (2.00)	- 0.711** (2.40)	- 0.886*** (4.04)	- 1.002** (4.55)	- 0.032*** (3.02)	-0.398** (3.87)	- 0.050*** (2.84)	-0.259** (3.99)	
Adjusted R^2	0.230	-	0.206	-	0.156	-	0.050	-	
AR (1) (p -value)	-	0.057	-	0.062	-	0.094	-	0.076	
AR (2) (p -value)	-	0.295	-	0.327	-	0.288	-	0.283	
Sargan/Hansen (p -value)	-	0.324	-	0.332	-	0.413	-	0.302	
<i>Panel C: Boone indicator</i>									
σ_B	- 0.201* (1.28)	- 0.423* (2.47)	- 0.118* (1.46)	- 0.499* (2.66)	- 0.431** (3.81)	- 0.580** (5.02)	- 0.018* (02.56)	- 0.503* (2.75)	
Adjusted R^2	0.239	-	0.226	-	0.189	-	0.150	-	
AR(1) p -value		-	0.086	-	0.073	-	0.085	-	0.066
AR(2) p -value		-	0.322	-	0.377	-	0.398	-	0.299
Sargan/Hansen p -value		-	0.367	-	0.375	-	0.402	-	0.319

Notes: Sample: 2005-2014. The table displays the results of the σ -convergence test using Pooled OLS and System-GMM. In panels A, B and C, the H -statistic, Lerner index and Boone indicator are used as proxies of bank competition levels respectively. σ_H , σ_L and σ_B are the σ -convergence. t -values are in parentheses. *, **, *** denote the statistical significance at the 10%, 5%, and 1% levels respectively. AR (1) and AR (2) are tests for first- and second-order serial correlation. Sargan/Hansen is a test of the over-identifying restrictions for the GMM estimators. Country dummies and constants are not reported. DOE= Developing Oil Exporters, GCC = Gulf Cooperation Council, OI= Oil Importers, MENA = Middle East and North Africa.

Table 6: Unit root test for banking competition convergence across macro-regions of MENA 2005 - 2014

	N	Coefficient	OLS	Bias-corrected OLS
<i>Panel A: H-statistic</i>				
MENA	141	φ	- 0.078***	0.547***
		ρ	0.004	0.629
DOE	31	φ	- 0.498**	0.660**
		ρ	0.013	- 0.432
GCC	45	φ	- 0.484***	0.731***
		ρ	0.114	- 0.304
OI	65	φ	- 0.045***	0.579***
		ρ	0.113	0.738
<i>Panel B: Lerner indices</i>				
MENA	141	φ	- 0.076***	0.549***
		ρ	0.016	0.641
DOE	31	φ	- 0.774**	- 0.146**
		ρ	0.360	0.456
GCC	45	φ	0.017***	-0.642***
		ρ	0.404	-0.359
OI	65	φ	- 0.612***	0.969***
		ρ	0.169	- 0.074
<i>Panel C: Boone indicator</i>				
MENA	141	φ	- 0.055***	0.532***
		ρ	0.023	0.603
DOE	31	φ	- 0.723**	- 0.126**
		ρ	0.260	0.445
GCC	45	φ	0.033***	0.531***
		ρ	0.410	-0.327
OI	65	φ	- 0.642***	0.762***
		ρ	0.147	- 0.072

Notes: Sample: 2005-2014. The table displays the results of the De Blander and Dhaene (2012) test. The test is carried out using the H -statistic (panel A), Lerner index (panel B) and Boone indicator (panel C) as proxies for banking competition levels. *, **, *** indicate that the null hypothesis of a unit root ($H_0: \varphi = 1$) is rejected at 10%, 5% and 1% levels respectively. DOE= Developing Oil Exporters, GCC = Gulf Cooperation Council, OI= Oil Importers, MENA = Middle East and North Africa.

Table 7: Economic growth, financial development and banking competition across macro-regions of MENA 2005 - 2014

	GCC (1)	GCC (2)	GCC (3)	DOE (1)	DOE (2)	DOE (3)	OI (1)	OI (2)	OI (3)	MENA (1)	MENA (2)	MENA (3)
Constant	0.414*** (0.009)	0.302** (0.032)	0.355** (0.042)	- 0.157 (0.348)	0.135 (0.361)	0.142 (0.345)	0.352** (0.014)	0.307*** (0.009)	0.342*** (0.003)	0.413*** (0.005)	0.170*** (0.009)	0.263*** (0.007)
Sector Share in value added 2005	0.772 (0.253)	0.543 (0.475)	0.577 (0.402)	-0.624 (0.110)	- 0.627 (0.109)	-0.643 (0.103)	0.434 (0.105)	0.402 (0.119)	0.413 (0.134)	0.341 (0.155)	- 0.549 (0.423)	-0.423 (0.399)
External dependence *	0.256*** (0.003)	0.212** (0.012)	0.224** (0.032)	0.421* (0.057)	0.413* (0.063)	0.444* (0.070)	0.169*** (0.002)	0.163*** (0.009)	0.171*** (0.002)	0.131*** (0.007)	0.152*** (0.008)	0.134*** (0.002)
Financial development												
External dependence * <i>H</i> -statistic	- 0.323** (0.016)			- 0.123* (0.051)			- 0.121** (0.037)			- 0.112** (0.043)		
Financial dependence * Lerner index		0.376* (0.083)			0.402* (0.086)			0.312* (0.070)			0.287* (0.097)	
Financial dependence * Boone indicator			0.382* (0.066)			0.414* (0.173)			0.399* (0.070)			0.299* (0.069)
Political Stability	- 0.520* (0.061)	- 0.543* (0.091)	- 0.536* (0.082)	- 0.512** (0.034)	- 0.318** (0.018)	-0.344** (0.023)	- 0.405** (0.046)	- 0.410** (0.039)	-0.387** (0.043)	- 0.524** (0.043)	- 0.523** (0.044)	-0.392** (0.043)
AR (1) (<i>p</i> -value)	0.094	0.086	0.079	0.072	0.079	0.069	0.067	0.098	0.082	0.059	0.64	0.072
AR (2) (<i>p</i> -value)	0.525	0.362	0.356	0.375	0.422	0.404	0.349	0.296	0.312	0.255	0.186	0.222
Sargan/Hansen	0.313	0.322	0.327	0.435	0.420	0.415	0.345	0.365	0.355	0.402	0.411	0.399

Notes: Dependent variable is the average annual real growth rate of value added for each sector in each macro-region over the period 2005—2014. Regressions are estimated using SYS-GMM and include sector and country dummies (not reported). *p*-values in parentheses. *, **, *** represent significant at 10%, 5%, and 1% significance level respectively. AR (1) and AR (2) are tests for first- and second-order serial correlation. Sargan/Hansen is a test of the over-identifying restrictions for the GMM estimators. DOE= Developing Oil Exporters, GCC = Gulf Cooperation Council, OI= Oil Importers, MENA = Middle East and North Africa.