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BANKING MARKET POWER AND ITS DETERMINANTS: NEW INSIGHTS FROM MENA COUNTRIES

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Banking market power and its determinants: New insights from MENA countries

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ABSTRACT

This paper evaluates the degree and determinants of banks' market power in 13 MENA countries for the years 2000 to 2018, with a special focus on customers' switching costs and banks' cost efficiency. We find that MENA banks enjoy a substantial degree of market power on the loan market, while their customers have to face remarkable costs in case of switching to other banks. Banking market power increases with the level of switching costs and is higher when credit institutions are more cost efficient, focus on the traditional intermediation activity, are smaller in size, and operate in countries where stock markets are less developed, banking markets are more concentrated, the inflation rate is lower, and GDP growth is poor. All our evidence is robust to alternative specifications and estimation techniques.

Keywords: Banking industry; Market power; Switching costs; MENA countries

JEL classification codes: C23; G21, L13

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1. Introduction

In the banking literature of the last years, one of the most important research topics concerns the appraisal of the level of market competitiveness. Actually, even if competition represents the most desirable market structure, due to both productive and allocative efficiency that is able to guarantee, it may represent an unfeasible or even harmful situation in case of market failures (caused by, e.g., externalities or asymmetric information), which require specific intervention for improving market outcomes. Moreover, the presence of switching costs (i.e., those costs – either fixed technical costs and opportunity costs – that customers need to face when they change their suppliers) can represent a significant source of bank rents that is often believed to increase market power, and as such calls for a careful exploration.

Existing literature has generally found that MENA banking industries operate under conditions of monopolistic competition, or that the degree of competition therein is much lower compared to other world regions (for example: Al-Muharrami et al., 2006; Turk Ariss, 2009). Other investigations on the banking sector of MENA countries have regarded the link between market power and stability (Turk Ariss, 2010a; Gonzales et al., 2017; Albaity et al., 2019), the relationship between competition and bank efficiency (Apergis and Polemis, 2016), the nexus between competition and economic growth (Issa et al., 2021).

Nonetheless, only a handful of papers has tried to estimate a bank-level indicator of market power in the form of the Lerner index (equal to the difference between output price and marginal cost, divided by the output price), and – when this has occurred – they have mostly computed an aggregated measure of the Lerner index (i.e., considering all bank activities as a whole, and normally proxied by total assets). This choice has been recently criticized by Shaffer and Spierdijk (2020), because it is likely to provide an inconsistent measure of banks' market power. The reason is twofold: first, they have noticed that some components of total assets can potentially overstate or understate total outputs for some banks (for example, fixed assets or deposits are included in total assets but are not considered as outputs); second, beyond the aggregation problem of total output, they observe that the aggregate Lerner index provides a consistent measure of market power only if the marginal product for all outputs is the same. As a result, they suggest testing for the separability assumption of the cost function before using an aggregate Lerner index.

This paper aims at exploring the determinants of Lerner index of market power for 13 MENA banking industries over the years 2000 to 2018 (200 banks, 2,852 observations). Our investigation contains several novelties with respect to the previous literature. Differently from most existing studies, rather than estimating an aggregate Lerner index, we calculate a product-specific Lerner index of banks' market power, which refers specifically to the loan market. This choice stems from the fact that lending represents the most important banking activity for commercial banks in MENA region: more precisely, 77.4% of their total income comes from the loan business.

Furthermore, after providing a measure of the switching cost that the customers of the region have to incur if they want to change their reference bank, we investigate the link between such costs and local banks' market power on loans. In our methodological approach we follow Egarius and Weill (2016), but our analysis makes one step further under three respects. First, we try to account for possible endogeneity between switching costs and market power by estimating a dynamic model with the GMM-system method. Second, we implement a simultaneous analysis through a one-step estimation of the Lerner index on loans and its link with switching costs by employing the Kumbhakar et al. (2012) model. Third, to account for the potential simultaneity between switching costs and banks'

market power, we estimate a two-equation system by means of the three-stage least squares estimation method.

Finally, as we believe that accounting for country heterogeneity is important when studying the MENA banking systems, we perform our analysis by splitting the countries into two sub-groups, namely the group of Gulf Cooperation Countries (GCC), whose relevant economic activity is linked to the oil production, and the group of non-GCCs.

The structure of the paper is the following. Section 2 reviews the main literature on banking competition and its measurement, with a special focus on MENA countries. Section 3 illustrates our way of calculating Lerner indices and switching costs in the banking markets. Section 4 discusses the variables and the data entering the regressions. Section 5 presents and discusses the empirical evidence, while Section 6 contains some robustness checks. Section 7 concludes.

2. Measuring the market power in the banking industry: a literature review

Assessing the degree of market power in the banking sector has always been a crucial issue in the economic literature. Actually, the behaviour of banks may have a significant impact on the stability of the financial system as a whole. According to the "competition-fragility" view, more competition among banks reduces their profits and therefore stimulates them to adopt risk-taking behaviour, with the likely effect of weakening the stability of the financial market (Berger et al., 2009). Consequently, there would be need of some market power for banks in order to avoid such scenario. The opposite "competition-stability" view maintains that, if banks enjoy significant market power, they will charge higher lending rates to firms and households, making the repayment of loans more difficult and also amplifying adverse selection and moral hazard problems. Hence, a higher degree of competition would benefit both banks and customers (Beck, 2015; Coccorese, 2017).

In order to quantify the degree of banks' market power – as well as the level of banking market competition, which can be regarded as the other side of the coin – the empirical literature makes use of two different methods. The first is the structural approach, relying on the traditional "structure-conduct-performance" (SCP) paradigm, which states that market power is higher in more concentrated markets because here it is simpler for banks to make agreements and thus gain superior profits. As a consequence, one would expect a direct relationship between industry structure and firms' earnings (Bain, 1951), i.e. between an indicator of market concentration and a proxy of performance (e.g. profits or prices). However, the empirical evidence of this strand of literature for the banking sector remains inconclusive (for some surveys, see: Gilbert, 1984; Weiss, 1989; Shaffer, 2004a), as it does not often provide clear support to such relationship.

The second method is the so-called "new empirical industrial organization" (NEIO) approach, which is based on the direct measurement of banks' conduct through theoretically-based methodologies that allow the estimation of behavioural parameters gauging the level of market power that banks are able to exercise. In this way, any indirect (likely ambiguous) inference about market power derived from concentration measures is ruled out, even if supplementary information on costs and demand are needed. The most frequently adopted NEIO methods within the banking studies include the mark-up test, the *H*-statistic, the Boone indicator, and the Lerner index.

With the mark-up test, a conduct parameter is estimated by means of a simultaneous equation model of demand and supply, which measures the degree of banks' market power. Particularly, it represents either a conjectural variation coefficient or the deviation of the perceived marginal revenue schedule of a bank in the industry from the demand schedule (Iwata, 1974; Bresnahan, 1982; Lau, 1982). Applications of this test to the banking sector include Toolsema (2002), Coccorese (2008), Delis et al. (2008), Rezitis (2010), Qin and Shaffer (2014), and Mirza et al. (2016).

The *H*-statistic has been introduced by Panzar and Rosse (1987) as the sum of the elasticities of revenues to factor prices, which come from the estimation of a reduced form revenue equation. On condition that firms operate at their long-run equilibrium, $H = 1$ means perfect competition (since changes in input prices are fully reflected in changes in output prices), $0 < H < 1$ denotes monopolistic competition (firms are only partially sensitive to cost changes in setting prices, hence enjoying an intermediate degree of market power over price), and $H \leq 0$ implies monopoly or collusive oligopoly (here the lack of competitive pressure allows firms to adjust prices with very little or no regard to changes in costs). It is probably the most used competition measure in recent banking studies (among others: Jeon et al., 2011; Liu et al., 2012; Weill, 2013; Anginer et al., 2014; Barbosa et al., 2015), even if latest works have questioned it as a reliable indicator of market power (Bikker et al., 2012; Shaffer and Spierdijk, 2015).

The Boone indicator (Boone, 2008) is calculated as the elasticity of firms' profits with respect to their costs: more negative values signal harsher competition as long as the latter enables more efficient firms (i.e., those with lower marginal costs) to earn relatively higher profits or market shares than less efficient competitors. It has been used for assessing the level of competition in banking markets by van Leuvensteijn et al. (2011) and Schaeck and Cihak (2014).

The Lerner index consists in "the ratio of the divergence of price from marginal cost to price" (Lerner, 1934, p. 169), hence derives firm's market power from the difference between price and marginal cost (divided by price): it should be zero when markets are perfectly competitive, but positive (up to the theoretical limit of one) when market power allows firms to set prices above marginal cost (the latter being estimated from a standard cost function). Unlike the previous indicators, the Lerner index has the advantage of providing a firm-level measure of market power, hence allows to disentangle differences in behaviour among firms operating in the same industry.

As to the banking context, Shaffer (2004b), Delis (2012) and Beck et al. (2013) have argued that the Lerner index is positively and statistically related to other NEIO measures of competition, thus concluding that it is a valuable indicator of market power. On the other hand, Vives (2008) claims that the Lerner index is not able to appropriately capture the degree of product substitutability, while Fernandez de Guevara et al. (2005) maintain that, when banks' risk taking is not accounted for, the Lerner index tend to overestimate market power, because banks that in relative terms spend more of their resources granting credits enjoy higher margins.

Many papers have tried to measure market power in the banking sector by means of the Lerner index (for example: Fernandez de Guevara et al., 2005, 2007; Berger et al., 2009; Carbo et al., 2009; Turk Ariss, 2010a; Anzoategui et al., 2012; Delis 2012; Beck et al., 2013; Coccorese, 2014; Efthyvoulou and Yildirim, 2014; Rakshit and Bardhan, 2019).

However, little evidence exists so far as regards the assessment of banks' market power in the MENA region by means of the estimation of aggregated Lerner indices.

Turk Ariss (2010a) investigates how banks' market power affects efficiency and stability in the developing economies by means of the estimation of conventional, efficiency-adjusted and funding-adjusted Lerner indices across the years 1999-2005. Regarding the conventional measure, among Middle East countries Saudi Arabia shows the highest value over the sample period (0.4312) and Lebanon the lowest (0.1031), while among North-African countries Tunisia exhibits a value of 0.2580. Overall, those figures are generally closely aligned across all the considered regions (around 0.30), except for Latin America and the Caribbean.

Through the study of a sample of banks across 13 Far East and Arabian Gulf countries during 2000-2006, Turk Ariss (2010b) examines the competitive conditions prevailing in Islamic and conventional banking markets. The estimation of Lerner indices indicates that a higher degree of market power prevails in the Islamic banking segment compared to the conventional one (the simple averages over the sample years are 0.51 and 0.47, respectively).

Anzoategui et al. (2010) explores the extent of bank competition in the MENA region during 1994-2008 by means of the *H*-statistic and the Lerner index, finding that banking competition in this area is lower than other regions and that it did not improve in those years. The aggregate Lerner index amounts to 0.320, but most of the MENA countries have witnessed an increase in its value, except Egypt (where it seems to have declined over time) and Morocco and Tunisia (where the hypothesis of no change cannot be rejected). In addition, the Lerner index for GCC countries is significantly higher than non-GCC countries (0.360 vs. 0.241).

Analogously, Polemis (2015) estimates both the *H*-statistic and the Lerner index for the banking sector of eight MENA countries (Algeria, Egypt, Israel, Jordan, Morocco, Oman, Saudi Arabia, and United Arab Emirates) over the period 1997-2012. The main evidence is that the prevailing regime for such industries is monopolistic competition, while the Lerner index has a mean value of 0.324 and ranges between a minimum of 0.021 (United Arab Emirates) and a maximum of 0.634 (Egypt).

Miah et al. (2020) explore the effect of switching costs on the market power and stability of Islamic and conventional banks operating in 17 countries with dual banking systems (including 8 MENA countries) for the period 2000-2016. They find that switching costs are lower for Islamic banks' customers when compared to those using conventional banks, and that higher switching costs determine more market power but less financial stability. On aggregate, the Lerner index shows a decreasing path especially in the second part of the sample period, and is higher for Islamic banks. To our knowledge, this is the only study that has examined the link between switching costs and market power in (a number of) MENA countries.

By means of three non-structural measures (Rosse-Panzar *H*-statistic, Boone indicator, Lerner index), Issa et al. (2021) investigate the evolution and convergence of bank competition for 16 MENA countries in the years 2005 to 2014. Regarding the aggregated Lerner index, the annual value ranges between 0.410 and 0.633, and is characterized by a decreasing trend for all macro-regions (GCC countries, developing oil exporter countries, and oil importer countries) over the sample period, which – supported also by the other estimated measures – indicates enhanced banking competition that is ascribed to the increased economic integration and the financial reforms adopted in the region over the last two decades.

3. Calculating Lerner indices and switching costs: the methodological approach

3.1. The unrestricted Lerner index on loans

As we discussed earlier, the Lerner index stands as a frequently used indicator for evaluating the level of competition/market power in empirical banking studies, especially because it has the advantage of providing a bank-level measure of competitive behaviour based on the gap between output price and marginal cost.

However, most of the existing studies do not take into account the multi-product structure of banking activities. Quite to contrary, they aggregate all outputs in just one product proxied by total assets, calculate its marginal cost, and compare it to an output price that is computed as the ratio between total revenue and total assets. In such way, they obtain an aggregate Lerner index for all bank activities (e.g.: Berger et al., 2009, Turk Ariss, 2010a; Polemis, 2015). There are, on the other hand, rather few studies in banking that estimate multi-output cost functions, from which they derive one Lerner index for each output, hereafter called 'product specific Lerner index' (e.g.: Forssbaeck and Shehzad, 2015; Huang et al., 2017; Wang et al., 2020).

Recently, Shaffer and Spierdijk (2020) have provided conditions based on a test strategy that allow to distinguish between the use of an aggregate Lerner index and the use of product specific Lerner indices. This issue appears particularly important for the purposes of this paper, where we aim at assessing the competitive behaviour of MENA commercial banks in the loans market, which

represent their most important activity as actors in the financial market: measuring an aggregate Lerner index, as done in previous studies, would actually be less informative as regards banks' market power in the region.

In order to calculate a Lerner index for each bank operating in the loans market, we consider a standard translog multiproduct cost function with two outputs and three inputs. In line with the intermediation approach, we assume that banks use labour (*l*), physical capital (*k*) and financial resources (*f*) to produce two outputs, loans (*Loans*) and other earning assets (*Other*). Input prices are measured by labour expenses over total assets (p_l), total capital expenditure over fixed assets (p_k) and interest expenses over total deposits (p_f), respectively. Total cost (*C*) is the sum of the expenses on labour, physical capital and deposits.

The cost function is assumed linearly homogeneous with respect to input prices. This condition is imposed by scaling total cost *C* and input prices by p_f. We can therefore write the translog cost function as:

$$\begin{aligned} &Log(C/p_f) = \beta_0 + \beta_{y1}\ln(Loans) + \beta_{y2}\ln(Other) + \frac{1}{2}\beta_{yy,1}(\ln(Loans))^2 + \frac{1}{2}\beta_{yy,2}(\ln(Other))^2 + \beta_{yy,12}\ln(Loans)\ln(Other) + \\ &\beta_{p1}\ln(p_l/p_f) + \beta_{p2}\ln(p_k/p_f) + \frac{1}{2}\beta_{pp,1}(\ln(p_l/p_f))^2 + \frac{1}{2}\beta_{pp,2}(\ln(p_k/p_f))^2 + \beta_{pp,12}\ln(pl/pf)\ln(pk/pf) + \\ &\beta_{yp,11}\ln(Loans)\ln(p_l/p_f) + \beta_{yp,12}\ln(Loans)\ln(p_k/p_f) + \beta_{yp,21}\ln(Other)\ln(p_l/p_f) + \beta_{yp,22}\ln(Other)\ln(p_k/p_f) + \\ &\beta_{y1,t}\ln(Loans)T + \beta_{y2,t}\ln(Other)T + \beta_{p1,t}\ln(p_l/p_f)T + \beta_{p2,t}\ln(p_k/p_f)T + \beta_t\mathrm{T} + \frac{1}{2}\beta_{tt}(\mathrm{T})^2 + \beta_e\mathrm{EQUITR} \end{aligned} \quad (1)$$

It includes a time trend (*T*) capturing technical change, and the equity-to-assets ratio (*EQUITR*) for taking into account banks' risk.

The marginal cost on loans MC_L is calculated by taking the derivative of the cost function with respect to loans:

$$MC_L = \frac{\partial\ln(C)}{\partial\ln(Loans)}\frac{Loans}{C} = (\beta_{y1} + \beta_{yy,1}\ln(Loans) + \beta_{yy,12}\ln(Other) + \beta_{yp,11}\ln(p_l/p_f) + \beta_{yp,12}\ln(p_k/p_f) + \beta_{y1,t}(T))\frac{Loans}{C} \quad (2)$$

Hence, the Lerner index on loans ($Lerner_L$) is computed as

$$Lerner_L = \frac{w_L - MC_L}{w_L} \quad (3)$$

where w_L is the price that banks charge on loans, measured by the ratio between interest revenue and loans. According to Equation (3), the difference between the observed loan price and the estimated marginal cost, and consequently the Lerner index on loans, is not necessarily positive, but it may come out to be negative in certain cases and for some observations. Shaffer and Spierdijk (2020) report three possible explanations for this outcome: (i) the marginal cost may be estimated with errors for these firms; (ii) the average price may itself be subject to measurement errors; (iii) some firms may deviate from profit maximization for some time periods.

It should be noted that in our framework it is also possible to calculate the derivative of the cost function with respect to the second output, *Other*, and derive the Lerner index on the second output, $Lerner_O$, in the same way as in Equation (3), on condition that we have data on the price for *Other*, w_O. Unfortunately, specific data for the price of earning assets different from loans are not available for MENA banks, and, when employing the ratio of total non-interest revenues and other earning assets as a proxy for w_O, we get several proxies that are much lower than the marginal cost for the second output, MC_O, thus getting a negative Lerner index for this output in 43.5% of sample banks. As a result, we will not consider $Lerner_O$ in our analysis, also because we aim at focusing on the determinants of just the Lerner index on loans.

Shaffer and Spierdijk (2020) show that, if the outputs are aggregated by whatever function and then such aggregate cost function is estimated, the resulting aggregated Lerner index is equivalent to the weighted-average of product-specific Lerner indices, were the multiproduct cost function separable

in total output.[1] For our cost model specification with two outputs, separability implies to test for the following six restrictions on the parameter estimates of Equation (1):

$$\beta_{y1} = \beta_{y2}, \beta_{yy,11} = \beta_{yy,12}, \beta_{yy,22} = \beta_{yy,12}, \beta_{yp,11} = \beta_{yp,12}, \beta_{yp,21} = \beta_{yp,22}, \beta_{y1,t} = \beta_{y2,t} \qquad (4)$$

If the tests reported in (4) reject the null assumption, the aggregate Lerner index could be not informative on banks' market power (Shaffer and Spierdijk, 2020), particularly in case the aim is to check for the determinants of market power.

To sum up, in order to estimate the Lerner index, the strategy followed in this study is first to start by estimating the multiproduct cost function, i.e. Equation (1), then to test the restrictions on parameter estimates as reported in (4). If separability is not rejected, we can re-estimate an aggregate cost function where bank activities are proxied by one output, namely total assets, so as to derive an aggregate Lerner index that would provide a consistent measure of market power for the banking sectors under study. If separability is rejected, estimating specific Lerner indices as shown in Equation (3) is more appropriate. In a second step, we will regress the obtained Lerner index on its determinants.

3.2. The restricted Lerner index on loans

Unlike the previous (unrestricted) Lerner index, the restricted Lerner index imposes positivity to the Lerner index within an estimation framework employing the stochastic frontier analysis (SFA) methodology. This model has been proposed by Kumbhakar et al. (2012) and used in several papers (for example: Coccorese, 2014; Huang et al., 2017). In addition to the possibility of obtaining positive values of the Lerner index (in line with the theory), this approach also allows a one-step estimation of both the index itself and its link with possible factors affecting it by means of the Battese and Coelli (1995) SFA model.

So as to get the restricted Lerner index on loans, we follow Kumbhakar et al. (2012) and start from the inequality between output price and marginal cost of loans:[2]

$$w_L \geq MC = \frac{\partial C}{\partial Loans} \quad \text{and} \quad w_L \frac{Loans}{C} \geq \frac{\partial \log(C)}{\partial \log(Loans)} \qquad (5)$$

We add a one-sided error term $u \geq 0$ in (5) in order to transform it into an equality. This term is called 'mark-up' and actually measures the gap between output price and marginal cost. Using the cost function shown in Equation (1), we get the following equation that allows the direct estimation of the restricted Lerner index:

$$\frac{w_L Loans}{C} = \beta_{y1} + \beta_{yy,1} \ln(Loans) + \beta_{yy,12} \ln(Other) + \beta_{yp,11} \ln(p_l / p_f) + \beta_{yp,12} \ln(p_k / p_f) + \beta_{y1,t}(T) + u \qquad (6)$$

Kumbhakar et al. (2012) define the degree of market power as a fraction of the mark-up to marginal cost, a coefficient called $\theta = (w_L - MC)/MC$, which is obtained from Equation (6) as follows:

$$\theta = \frac{u}{(\beta_{y1} + \beta_{yy,1} \ln(Loans) + \beta_{yy,12} \ln(Other) + \beta_{yp,11} \ln(p_l / p_f) + \beta_{yp,12} \ln(p_k / p_f) + \beta_{y1,t}(T))} \qquad (7)$$

The restricted Lerner index on loans is finally calculated as:

$$Lerner_L = \frac{\theta}{(1+\theta)} = \frac{\mathrm{u}}{(\beta_{y1} + \beta_{yy,1} \ln(Loans) + \beta_{yy,12} \ln(Other) + \beta_{yp,11} \ln(p_l / p_f) + \beta_{yp,12} \ln(p_k / p_f) + \beta_{y1,t}(T)) + u} \qquad (8)$$

[1]The multiproduct cost function is separable if $C(y_1,..,y_M, p) = C(\sum y_i, p)$. For the translog case, y_i are the logs of the outputs, and p the log of the price inputs. See Shaffer and Spierdijk (2020).

[2] As told, since we do not have a precise measure of the price of the second output, we will not examine the similar equation needed to estimate the restricted Lerner on other earning assets.

To sum up, we can estimate the restricted Lerner index from Equation (6) by means of a standard SFA model, adding the usual random error terms *v* to capture all other optimization errors out of the bank's control. The asymmetric error term *u* captures the mark-up: the higher is this component, the higher is the Lerner index on loans.

As noted, before in the mark-up specification it is also possible to include the determinants of the Lerner index, thus estimating them simultaneously. Following the Battese and Coelli (1995) SFA model, the mark-up component *u* is assumed to follow a truncated normal distribution $N^{+}(\delta_0 + Z'\delta, \sigma_u^2)$ [3], where *Z* is a vector that includes the determinants of the mark-up (i.e., of the Lerner index). A positive (negative) sign of each determinant can be directly interpreted on the mark-up. However, for the magnitude of the impact of each determinant, it could be calculated by taking the derivative $(\partial u / \partial z_j)$ in Equation (8). A non-significant coefficient of a given determinant suggests that it has no impact on the Lerner index.

The estimation of the model is obtained by maximum likelihood, and the mark-up component is based on the familiar conditional Jondrow et al. (1982) method.

3.3. Switching costs in banking

Switching costs – hereafter *SC* – include all the costs that any bank customer faces when, for some economic reason, he decides to switch to another bank. Typically, such costs may include, for example, fixed technical or procedural costs for changing the bank (e.g., charges for closing accounts or opening new ones), which are observable at least at the customer level. It also includes other important opportunity costs for the customer (time to identify the cheaper and most appropriate bank and to close her/his position) and any other additional charges involved by unobserved extra costs associated with porting (such as the inconvenience of setting up new banking references and communicating new account details to relevant parties). The higher are these costs, the lower is the probability of the customer to change his current bank.

Switching costs appear to be high in the banking industry. Shy (2002) has estimated depositor *SC* for the three largest banks in Finland in 1977, which range between 11% and 20% of the value of deposits. Using the same approach, Egarius and Weill (2016) focus on the switching costs on loans for three European countries banks over the period 2006-2012, finding that their level is 4.70% of the value of loans in Italy, 5.84% in France, and 6.14% in Germany.

In this paper we employ Shy (2002)'s model. Consider a market with *N* competitors, providing the same products with different prices. Assuming zero production costs for firms, their profit function will depend on their own price and on those of their competitors in the market. Unable to find a Nash equilibrium in pure prices, Shy (2002) builds his own equilibrium concept called Undercutting Proof Property (UPP). In this way, equilibrium in prices across firms is reached when no firm in the market would undercut[4] the other firms to capture all customers in the market. The model then links *SC* for each customer to market share N_i and the prices P_i charged by each firm *i*.

Let the ordered market shares of the *I* firms in the market be:

$$N_1 > N_2 > ..... > N_I \qquad (9)$$

[3] This is the so-called mean equation inefficiency determinant. It is also possible to include the determinants in the mean and variance equations. Wang (2002) suggests that the *u* term follows a truncated heteroscedastic normal distribution, $N^{+}(\delta_0 + Z'\delta, \exp(\phi_{u0} + Z'\phi_u))$.

[4] Firm *i* is said to undercut firm *j* if it sets its price at a level $P_i < P_j - SC$, where *SC* represents the switching costs of firm *j*'s customers.

It is assumed that each firm $i \neq I$ fears to be undercut by the smallest firm *I*, and for this reason it will set its price equal to the one fixed by firm *I*. According to the previous assumptions of the model, firm *i* will set its price such that its profit is:

$$\pi_i = P_I N_I \geq (P_i - SC_i)(N_i + N_I) \qquad (10)$$

while the smallest firm *I* will set its price such that its profit is:

$$\pi_i = P_i N_i \geq (P_I - SC_I)(N_i + N_I) \qquad (11)$$

In both cases, each firm of the right side of the inequality will set its highest price subject to the constraint that the firm of the other side of the inequality will not find it profitable to undercut.

So as to solve the two-equation system, Shy (2002) takes the limiting case of the equality of Equations (10) and (11). He deduces that, for all firms that do not have the lowest market shares, firm *I* being the reference from equation (9), *SC* is equal to:

$$SC_i = P_i - \frac{N_I P_I}{N_i + N_I} \qquad \text{for i} = 1,2,....\text{I-1} \quad (12)$$

while for the firm which has the lowest market share *SC* is equal to:

$$SC_I = P_I - \frac{N_1 P_1}{N_1 + N_I} \qquad \text{for i} = \text{I} \quad (13)$$

where firm 1, which holds the highest market share, is the reference for firm *I*.

To sum up, to estimate the switching costs *SC* for each bank in the sample, and according to Equations (12) and (13), we just need the market share and the output price of each product. For example, Shy (2012) defines the market share in terms of the number of bank accounts, while output price is measured by the average fees per account. Unfortunately, this information is not available to us (as they are missing in Bankscope/BankFocus database). However, more recent studies (Egarius and Weill, 2016; Yin and Matthews, 2016) employ an aggregate price at the bank level, calculated as the ratio between either total income and total assets or interest income and total loans.

4. Assessing the determinants of banks' market power: variables and data

In line with previous studies on banking competition in MENA region that employ the Lerner index (e.g.: Turk Ariss, 2010a; Polemis, 2015; Miah et al., 2020; Issa et al., 2021), we focus on a sample of commercial banks belonging to 13 MENA countries that are observed between 2000 and 2018. Accounting data come from banks' statements available from the Bankscope/BankFocus database and have been complemented by information drawn from banks' website when missing for some years. Macroeconomic data are taken from the World Development Indicators database managed by the World Bank.

After cleaning the data, dropping duplicated information, excluding financial institutions that are not commercial banks, we end up with an unbalanced panel that includes 200 banks, for a total of 2,852 observations. This final sample is then used to estimate a cost frontier and the Lerner indices, particularly the unrestricted Lerner index from Equation (3) and the restricted Lerner index – based on Kumbhakar et al. (2012)'s model – from Equation (8), along with their determinants.

4.1. The Lerner index on loans

In the first step of our estimation process for getting the Lerner index of MENA banks, we have checked whether it is more appropriate to estimate an aggregate cost function or a multiproduct cost function. Therefore, we have estimated Equation (1) using a SFA model, and tested the separability assumption, as shown in (4), by using a Wald test.

Cost inefficiency is assumed to follow a half normal distribution, while the SFA model, which takes into account the panel structure of the data, is based on the True Fixed Effect Model of Greene (2005) in order to consider unobserved heterogeneity among banks.

The test for cost function separability is highly rejected in the sample (the Wald statistics is equal to 1569.18, with a reported *p*-value of 0.000). We can therefore conclude then that cost function for MENA banks is better represented by a multiproduct cost function, rather than an aggregate function of outputs. Consequently, the degree of competitiveness of the market is better assessed through specific Lerner indices rather than a global Lerner index that considers a single aggregated output proxied by total assets.

In a second step, we have estimated the specific Lerner index for loans. Table 1 reports the average estimates of both the unrestricted (*LERNER1*) and restricted (*LERNER2*[5]) measures by country. The overall average of the unrestricted Lerner index on loans is equal to 42.7%, which suggest a moderate competitive environment in MENA region. However, differences in loan market competition across countries emerge. Tunisia and Morocco have the most competitive banking markets, while banks in Qatar and Lebanon enjoy much more market power.

The results for the restricted Lerner index show an average of 25.9% over the whole sample. They slightly differ in magnitude from the unrestricted version of the indicator, possibly due to the truncated nature of such index but also to the fact that, by construction, this index accounts for random shocks, which may impact the price-cost margin. This may also explain the slight difference in the ranking of the countries with respect to the competitiveness of the loan market: actually, now Algeria and Qatar are among the least competitive countries, but Tunisia and Morocco still exhibit the lowest Lerner index. However, Huang et al. (2017) also provide estimates of the Lerner index on loans that are based on both unrestricted and restricted estimation methods for European countries, and show that the magnitude of the two indices differ, even if the ordering of countries is robust.

Table 1: Lerner index on loans by country, 2000-2018

Country	*Unrestricted Lerner index* (LERNER1)*				*Restricted Lerner index (LERNER2)*			
	Mean	*Min*	*Max*	*%*	*Mean*	*Min*	*Max*	*%*
Algeria	.426	.010	.704	-2.7	.341	.041	.754	-1.1
Bahrain	.376	-.015	.649	-2.6	.215	.048	.668	-2.7
Egypt	.430	.185	.597	3.3	.221	.053	.627	5.0
Jordan	.454	.294	.563	0.4	.274	.083	.502	1.8
Kuwait	.470	.305	.615	-1.6	.289	.067	.503	-0.3
Lebanon	.497	.314	.695	-0.8	.26	.081	.725	-1.2
Morocco	.305	.086	.555	-6.1	.165	.059	.354	-4.8
Oman	.371	.109	.533	-3.6	.258	.06	.451	-3.2
Palestine	.407	.135	.658	-4.0	.318	.101	.568	-3.8
Qatar	.511	.336	.677	-0.9	.337	.1	.683	-1.8
Saudi Arabia	.485	.196	.631	-0.6	.302	.069	.65	0.8
Tunisia	.231	-.009	.489	-3.0	.162	.06	.443	-1.0
United Arab Emirates	.431	.185	.633	-1.5	.286	.05	.647	-1.4
Average	*.427*	-.015	.704	*-1.1*	*.259*	*.041*	*.754*	*-0.2*

% is the average percentage growth rate of the Lerner over the period 2000-2018[6]

** Unrestricted Lerner indices have been winsorized at the 5th and the 95th percentiles by country.*

[5] The markup *u* term is assumed to follow a half normal distribution. SFA frontier is estimated using equation (6) and LERNER2 is estimated using equations (7) and (8).

[6] The average growth rate of the Lerner index by country is the coefficient obtained by regressing the logarithm of the Lerner indices on the trend.

We have also calculated the average growth rate of the Lerner indices (fifth and ninth columns of Table 1). We observe a slight decrease in most of the countries, suggesting a slight improvement in competition in the loan market. Moroccan and Palestinian banks exhibit the most decreasing growth rate path, while Egypt is the only country where competition on loans seems to have deteriorated (the increase is 3.3% and 5%, according to the way of calculating the Lerner index). The magnitude of the annual growth rates of the market power indices also shows minor differences according to the definition of the Lerner index.

Overall, the evidence that we draw on the level of competition is in line with the previous literature on MENA region, even if the latter normally relies on aggregate Lerner indices and therefore provides evidence on the 'global' competition characterizing the banking systems of the area.

For example, Haque and Brown (2017), who consider a sample of 12 MENA countries for the period 2002-2012, report an average index of 0.51, and do not check whether competition has improved or not over the sample years. By considering a larger sample including 15 MENA countries over the period 2005-2014, Issa et al. (2021) find that the Lerner index in this region ranges between 0.37 and 0.40, and that its evolution over time shows a decreasing trend ranging from -1.6% to -5% according to the sub-groups of countries.

However, our estimates are much higher than those reported by Miah et al. (2020), who consider a large group of countries (11 MENA countries plus 6 other Asian and African countries) and report an average aggregate Lerner index of 0.147 for the period 2002-2016.

We finally note that the magnitude of our estimated Lerner indices on loans is broadly comparable to those obtained for other regions. As an example, in their analysis on banks of five West European countries between 1998 and 2010, Huang et al. (2017) find an average value for the Lerner index on loans ranging from 0.195 (Switzerland) to 0.82 (Germany).

4.2. Switching costs

Table 2 reports the two measures of average value of switching costs (*SC*) by country for the period under inspection. They are based on the estimation of the Shy (2002)'s method, according to Equations (12) and (13). The key variables for calculating *SC* are banks' market share on loans and the price of loans (given by the ratio of interest expenses to total loans), which deliver us what we call '*SC* on loans', in the spirit of Shy (2002). In addition, following Egarius and Weill (2016), who consider an alternative measure of *SC* based on the market share of banks calculated on total assets, we also calculate '*SC* on all banks' activities'.

Table 2: Switching costs by country, 2000-2018

Country	*SC on loans*			*SC on all banks' activities*		
	Mean	*Sd*	*%*	*Mean*	*Sd*	*%*
Algeria	.073	.037	-2.7	.072	.042	-4.5
Bahrain	.068	.056	-5.4	.066	.063	-4.6
Egypt	.157	.103	2.6	.159	.111	2.6
Jordan	.084	.036	-3.3	.085	.037	-3.4
Kuwait	.059	.059	-2.7	.054	.060	-1.9
Lebanon	.227	.169	-1.7	.227	.184	-2.5
Morocco	.054	.161	-2.2	.088	.165	-5.4
Oman	.044	.023	-2.7	.044	.023	-2.1
Palestine	.052	.047	-11.1	.050	.047	-10.4
Qatar	.053	.036	-4.4	.051	.037	-4.5
Saudi Arabia	.057	.037	-4.7	.050	.059	-4.6
Tunisia	.052	.016	0.1	.051	.018	0.2
United Arab Emirates	.060	.028	-0.3	.057	.039	-1.4
Average	.106	.116	-2.4	.107	.123	-2.7

% is the average percentage growth rate of the SC over the period 2000-2018[7]

The average value of the switching costs on loans activities in MENA region is equal to 0.106, which suggests that, on average, for a given customer in MENA, switching to another bank would cost quite 10.6% of the amount of loans he has with that bank. *SC* are much higher for Lebanese and Egyptian customers, but very low in Palestine and Morocco.

The two measures of *SC* are rather similar in magnitude and provide also very close results for the ranking of countries in terms of *SC*. One possible explanation is that (as we have noticed before) the main activity of commercial banks in MENA is lending: actually, in our sample the correlation coefficient between the markets shares in terms of loans and in terms of total assets amounts to 0.98.

We can compare our findings on *SC* with those of Egarius and Weill (2016), which employ the same methodology for a group of countries belonging to the Eurozone during the period 2006-2012. They find that, on average, *SC*'s on loans are 0.061, 0.041 and 0.047 for Germany, France and Italy, respectively. In other words, for a representative European customer it will cost quite 50% less to switch to another bank, compared to an average MENA customer.

From Table 2, we can also see that *SC* in MENA has decreased at an average annual rate of about 2-3%. We ascribe this outcome mainly to the overall improved competition in the loan markets, as figured out from the evidence coming from Table 1. The only exception to this trend is Egypt, where *SC* increased at the significant growth rate of 2.6% per year. Again, from Table 1 we deduce that this country has also suffered from a poor competition in the banking sector, as the increasing Lerner index proves.

A major question arising from our previous data inspection, therefore, is the following: what is the link between switching costs and banking competition in the MENA region?

Customers' switching costs have been often found as a relevant factor that is able to increase banks' market power. As told, they exist when it is costly for consumers to switch from one seller to another, implying a substantial inertia of the clientele to the advantage of firms' overall business (Klemperer, 1995; Shy, 2002). In the banking industry, switching costs are often to be ascribed to asymmetric information in favour of banks linked to the specific bank-borrower relationships. Banks know the characteristics of their borrowers better than their rivals, and can therefore 'lock-in' them and thus charge higher prices, since a switch to other banks of customers is likely to impose them even worse conditions (Kim et al., 2003; Yin and Matthews, 2016). All the above foreshadows a positive link between switching costs – here derived using the methodology suggested by Shy (2002), which deliver a bank-level indicator of such costs – and market power, and the variable *SC* represents the first determinant that we use for explaining the behaviour of the Lerner indices of MENA banks.

4.3. Other determinants of the Lerner index

The previous discussion has highlighted the importance of investigating, among the determinants of market power of MENA banks, as proxied by our estimated Lerner indices, the role of switching costs.

Banks' market power can derive also from a higher level of efficiency on the cost side (Berger, 1995; Corvosier and Gropp, 2002; Fernandez de Guevara et al., 2005). Actually, for most efficient banks it is easier to gain more customers by slightly reducing prices, at the same time gaining higher profits since efficiency normally translates into lower costs. So as to measure cost efficiency, we avoid the use of accounting measures (like, for example, cost-to-income ratios), and employ a stochastic

[7]Like in Table 1, here the average growth rate of the switching costs by country is the coefficient obtained by regressing the logarithm of *SC* on the trend.

frontier approach that allows the estimation of bank-level efficiency scores. We expect that the latter are positively correlated to the Lerner indices. As mentioned in Section 4.1, our cost efficiency scores (*COSTEFF*) are estimated from a pooled country cost frontier, using the true fixed effect model of Greene (2005).

Another determinant of market power for banks, that we regard as important to be considered in our framework, is associated to the degree of diversification (*DIV*) characterizing their business activity. Actually, even if lending still remains the main activity for banks (and guarantees also relatively stable returns), in the recent years they have enlarged the provision of other services that help to increase their revenue especially when loan interest rates are low. However, non-traditional activities are normally characterized by a higher degree of competition among banks, because they are not affected by the specificities deriving from lending relationship and hence are to be considered as quite homogeneous across sellers. Therefore, we expect that a higher diversification, here measured by the share of non-interest income over total operating income, has a negative relationship with market power.

In our estimations we also consider a group of control variables. We include the logarithm of total assets of banks (*SIZE*) to capture the role of bank size. Larger banks are likely able to enjoy higher margins because of the exploitation of economies of scale and the access to cheaper sources of funds (Delis, 2012), but smaller banks may count on close and long-lasting relationships with borrowers, due to the presence of asymmetric information, which reduces competition coming from other credit institutions. Hence, the sign of the coefficient of this variable is not predictable.

In order to assess whether there is some competition in the financial system that banks face from capital markets, and that may reflect on their market power, we consider the ratio between stock market capitalization and GDP in each country (*MKTCAP*).

Another important variable that enters our regressions is the market share of the three largest banks (*CR3*). It represents a proxy for the level of banking markets concentration, and is useful in assessing whether, as maintained by the structure-conduct-performance paradigm (Bain, 1951), more concentrated industries allow operating banks to rely on a higher degree of market power.

As macroeconomic controls, we include inflation rates (*INFL*) and GDP growth rates (*GDPGR*). The presence of high inflation signals a higher instability and may be associated with lower market power of banks because it determines an increase of cost that induces them to raise prices for the clientele as well, even if to a lesser extent so as to only partially exploit customers' willingness to pay in order to remain competitive. The annual rate of GDP growth helps to take into account the role of local economic development.

Finally, we add two specific dummy variables for capturing the specific impact of foreign banks (*FOREIGN*) and Islamic banks (*ISLAMIC*) on the level of the Lerner index. With respect to the first variable, a positive sign is expected in case foreign banks enter the market through the acquisition of local banks already enjoying market power, which likely ensures its preservation. By contrast, we will get a negative sign if foreign banks are able to enter markets through de novo entries or greenfield investments. In this situation, they can stimulate competition in domestic markets by making much more efforts to downwards prices and margins in order to gain market power (Delis et al., 2016). With respect to the *ISLAMIC* dummy variable, we are not able to predict its sign, since the impact of Islamic banks on the Lerner index may depend on further characteristics such as the importance of Islamic finance in the country and the competition between conventional banks and Islamic banks. Finally, the peculiarity of each national market is captured by means of a set of country dummies.

5. Empirical evidence

5.1 Results from the main model

Before proceeding with the analysis of the empirical results, we need to check the potential endogeneity between *LERNER* and the main other variables under consideration, namely *SC*, *COSTEFF* and *DIV*. Since all the above variables involve important decision aspects of bank management, any shock affecting market power may reverberate on the other variables, thus we have to be careful in handling the evidence drawn from the data.

We therefore implement a Durbin-Wu-Hausman (DHW) test to verify the presence of endogeneity between each pair of variables. The results of this test are reported in Table 3, where we note the presence of strong endogeneity between *LERNER* and all the other variables.

Table 3: The Durbin-Wu-Hausman, DHW test for endogeneity

Variables pair	Measures of the Lerner index	Quality of Instruments Fisher Test	*p*-value of the DHW test	Conclusion
*LERNER*vs.*SC*	*LERNER1* *LERNER2*	F(14, 2987) = 115.67	0.000 0.000	Endogeneity Endogeneity
*LERNER*vs.*COSTEFF*	*LERNER1* *LERNER2*	F(14, 2798) = 13.00	0.000 0.000	Endogeneity Endogeneity
*LERNER*vs.*DIV*	*LERNER1* *LERNER2*	F(14, 2795) = 45.24	0.000 0.000	Endogeneity Endogeneity

LERNER1 and *LERNER2* are the unrestricted and restricted Lerner indices, respectively.
COSTEFF cost efficiency estimated pooled countries cost frontier using the true fixed effect model.
The null hypothesis states that right hand variable in each variables pair is exogeneous.

We can now analyse the empirical evidence on the link between the Lerner index and the aforementioned determinants, which is based on the estimation of a dynamic panel model through the GMM-system method. Compared to a static model, the GMM-system approach allows to take into account the endogeneity of the variables.

Table 4 provides the results for the two versions of the Lerner indices (unrestricted and restricted). Three models are estimated: Model (1) considers only banks' characteristics, Model (2) adds macroeconomic variables, and Model (3) includes also bank-type dummy variables. Estimating different specifications allows to check for the sensitivity of the results, with particular reference to banks' characteristics. The test on the validity of the instrument, as well the test on the absence of correlation at the second order, both provided at the bottom of this table, reassure us on the validity of the estimation method here used.

First of all, our regression results emphasize the important role played by switching costs in allowing market power. Actually, the coefficient of *SC* is positive and significant at the 1% level in all regressions, proving that, when customers find it costly to switch providers of banking services, banks are able to charge higher prices relative to their costs. This result matches with the general findings of the existing literature (e.g.: Ioannidou and Ongena, 2010; Barone et al., 2011; Egarius and Weill, 2016).

As expected, more efficient banks are characterized by higher Lerner indices, hence by stronger market power, the coefficients of *COSTEFF* being positive and highly significant (in line with, among other: Fernandez de Guevara et al., 2005; Cubillas and Suarez, 2013; Ghosh, 2018; Aguilar and Portilla, 2020). Therefore, banks that better manage their cost structure benefit also from higher prices.

As to diversification, since the coefficient of *DIV* is negative and always significant at the 1% level (Cubillas and Suarez, 2013; Aguilar and Portilla, 2020), we find evidence that banks focusing particularly on the traditional intermediation activity (i.e., characterized by a lower share of revenues coming from non-interest sources) enjoy more market power, to be ascribed mainly to the personal lending relationship with customers and the related information asymmetries.

Turning to the control variables, bank size (*SIZE*) appears to have a negative and significant effect on Lerner indices. This means that smaller banks enjoy a higher degree of market power, possibly because they are rooted in local markets where they have strong ties with residents (including tight lending relationships) and their economic activities.

Table 4 makes also clear that the coefficients of bank-level variables do not change in the various models, thus proving that our results are robust whatever is the specification used.

The coefficient of *CR3* is positive and significant at least at the 5% level in three over four regressions. Therefore, there is evidence that more concentrated banking markets allow banks to exploit more market power in the loan market. This result contrasts with the recent banking studies (e.g.: Fernandez de Guevara and Maudos, 2007; Delis, 2012; Efthyvoulou and Yildirim, 2014; Rakshit and Bardhan, 2019), which provides no support to the structure-conduct-performance paradigm, and signals that in this case structural measures of competition (like market concentration) may work as reliable proxies of competition.

Table 4: The determinants of the Lerner index (two step GMM-system estimations)

Variables	*Unrestricted Lerner (LERNER1)*			*Restricted Lerner (LERNER2)*		
	(1)	*(2)*	*(3)*	*(1)*	*(2)*	*(3)*
LERNERt-1	0.8029***	0.8122***	0.8048***	0.8093***	0.8277***	0.8213***
	(0.0062)	(0.0062)	(0.0066)	(0.0027)	(0.0041)	(0.0054)
SC	0.0747***	0.0713***	0.0743***	0.0446***	0.0356***	0.0416***
	(0.0061)	(0.0063)	(0.0063)	(0.0033)	(0.0039)	(0.0039)
COSTEFF	0.0970***	0.0910***	0.0934***	0.0990***	0.0781***	0.0949***
	(0.0075)	(0.0080)	(0.0088)	(0.0051)	(0.0065)	(0.0075)
DIV	-0.0802***	-0.0748***	-0.0760***	-0.0693***	-0.0620***	-0.0605***
	(0.0033)	(0.0033)	(0.0038)	(0.0018)	(0.0018)	(0.0025)
Size	-0.4649***	-0.3733***	-0.3996***	-0.6855***	-0.6766***	-0.6507***
	(0.0306)	(0.0394)	(0.0396)	(0.0266)	(0.0280)	(0.0256)
CR3	0.0322***	0.0433***	0.0386***	0.0224***	0.0522***	0.0503***
	(0.0063)	(0.0084)	(0.0097)	(0.0054)	(0.0055)	(0.0061)
Macro-variables						
MKTCAP		-0.0131***	-0.0142***		-0.0178***	-0.0190***
		(0.0017)	(0.0018)		(0.0014)	(0.0016)
INFL		-0.0672***	-0.0671***		-0.0660***	-0.0615***
		(0.0078)	(0.0087)		(0.0074)	(0.0093)
GDPGR		-0.0020	-0.0040		-0.0602***	-0.0595***
		(0.0102)	(0.0112)		(0.0104)	(0.0120)
Bank Type						
FOREIGN			0.4590***			0.5861***
			(0.0988)			(0.0732)
ISLAMIC			-1.1108***			-0.9466***
			(0.1655)			(0.1139)
Constant	6.4911***	4.6091***	5.3318***	8.1007***	7.4202***	5.6227***
	(0.8608)	(0.9424)	(1.2564)	(0.8072)	(1.0425)	(1.0925)
# Observations	2,529	2,525	2,525	2,516	2,512	2,512
# Banks	200	200	200	200	200	200
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Ar2_pvalue	0.937	0.939	0.933	0.385	0.366	0.355
Hansen_pvalue	0.614	0.743	0.738	0.667	0.761	0.734

COSTEFF, *SC* and *DIV* are considered as endogeneous in the GMM-system estimation.
Standard errors in parentheses. Significance levels: *** = 0.01, ** = 0.05, * = 0.10.

The level of stock market capitalization within the country (*MKTCAP*) turns out to have a negative impact on banks' market power. Hence, in MENA region more developed capital markets act as a substitute for bank lending, which reduces the importance of banks and their ability of setting prices.

The coefficient of *INFL* show a negative and significant sign. Hence, inflation – and the related economic instability – reduces banks' ability to charge price higher than costs. Finally, the growth rate of GDP (*GDPGR*) is also negatively associated with the restricted Lerner index only, meaning that banks' market power tends to be lower with better macroeconomic conditions (Rotemberg and Saloner, 1986; Toolsema, 2004), when the economy asks for more loans and competition among banks increases, thus reducing mark-ups.

The dummy variable *FOREIGN* exhibit a positive and significant coefficient. Hence, foreign banks enjoy a higher degree of market power, all else equal. This result may be ascribed to a (at least perceived) higher service quality or may result from banking market consolidation when foreign banks enter MENA banking industries by acquiring local banks (in this hypothesis, their entry does not increase the number of banks, which may render the market more competitive). By contrast, the *ISLAMIC* dummy variable is negative and significant, meaning that Islamic banks' presence has a significant impact on lessening banks' market power in MENA region. This result could be explained by the fact that, contrary to foreign banks, Islamic banks in MENA are de novo entry to the market: in order to stimulate the market and attract more customers, they need to make more pressure on prices and margins. Overall, this evidence conflicts with the result of Turk Ariss (2010b), who finds a positive impact of the dummy variables associated to Islamic banks on the global Lerner index. Several explanations for such discrepancy can be provided: first, her analysis covers an earlier period of time (2000-2006); second, she used a sample of GCC countries extended to other Asian countries; third, the estimation of the Lerner index is based on an aggregated measure that considers all banks' activities, i.e. total assets.

5.2 Controlling for country heterogeneity

We now re-estimate the previous dynamic model for assessing the main determinants of the Lerner index in MENA region by looking at more homogeneous groups of countries. In particular, sample countries are split into two sub-groups: Gulf Cooperation Countries (GCC), including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, and the remaining countries (non-GCC). Members of the GCC group are quite particular countries, whose economies are largely based on oil extraction with abundant liquidity, whose GDP per capita is outstanding, with high living standards, much stable economic environment (currency and prices), a booming Islamic finance and – as a result – whose banking systems are to be considered as more developed.

The results of the new estimations are provided in Table 5. They broadly confirm what we discovered in Table 4, except for the impact of *SC* on the restricted Lerner index for the GCC group, which is not significant[8]. We also note that, when significant, the magnitude of the *SC* coefficient is much higher for the GCC group than for the non-GCC group, with particular reference to the restricted Lerner index. This means that the same (absolute) increase of switching costs in GCC countries allows a higher increase of banks' market power, possibly showing a more fundamental role of credit institutions (and in general of the banking sector) in such countries. Nonetheless, the average estimated *SC* is lower for the GCC group than for the non-GCC group (0.06 vs. 0.13).

Finally, for the most cases ownership structure and bank type seem not to have a significant and different impact on the Lerner indices by sub-groups of countries. The impact of foreign banks is not significant for the GCC group, but significant and positive for the non-GCC group. This could be

[8] We recall that the one-step estimation method characterizing the Kumbhakar et al. (2012)'s model does not consider the potential endogeneity of the variables *SC*, *COSTEFF* and *DIV* as well as their impact on the parameter estimates. The endogeneity issue will be treated later in the robustness checks.

explained by the fact that in most of foreign banks in the GCC, except Bahrain, there are strong limits on foreign ownership as well on the number of branches (which is restricted to one: Al-Hassan et al., 2010). However, Islamic banks have a negative impact on the Lerner index only in the GCC, while this is not the case for non-GCC countries. Overall, whereas the impact of banking variables on the Lerner index proves to be robust in the MENA region, some differences are found particularly with respect to bank ownership or bank type.

Table 5: The determinants of the Lerner index by sub-region (two step GMM-system estimations)

Variables	*Unrestricted Lerner (LERNER1)*		*Restricted Lerner (LERNER2)*	
	GCC	*Non-GCC*	*GCC*	*Non-GCC*
$LERNER_{t-1}$	0.6625***	0.7637***	0.7477***	0.7650***
	(0.0094)	(0.0082)	(0.0045)	(0.0179)
SC	0.2580***	0.0917***	-0.0598	0.1515***
	(0.0356)	(0.0050)	(0.0416)	(0.0143)
COSTEFF	0.5870***	0.2368***	0.3157***	0.4531***
	(0.0281)	(0.0071)	(0.0231)	(0.0199)
DIV	-0.0846***	-0.0417***	-0.1220***	-0.0630***
	(0.0086)	(0.0044)	(0.0069)	(0.0075)
Size	-0.6004***	-0.4037***	-0.7023***	-0.9474***
	(0.1107)	(0.0447)	(0.0826)	(0.0748)
CR3	0.0835***	-0.0043	0.0322	-0.0340*
	(0.0267)	(0.0083)	(0.0233)	(0.0203)
Macro-variables				
MKTCAP	-0.0310***	-0.0158***	-0.0386***	-0.0114***
	(0.0043)	(0.0017)	(0.0028)	(0.0028)
INFL	-0.2558***	0.0378***	-0.2932***	0.0386***
	(0.0187)	(0.0077)	(0.0159)	(0.0134)
GDPGR	0.0126	0.1675***	-0.0251*	0.0554
	(0.0084)	(0.0150)	(0.0128)	(0.0342)
Bank Type				
FOREIGN	0.4076	0.4981***	-0.2321	1.0117***
	(2.3816)	(0.1366)	(0.2142)	(0.2173)
ISLAMIC	-2.6299***	0.3706	-1.8062***	0.7748**
	(0.4731)	(0.3965)	(0.2795)	(0.3708)
Constant	-29.3765***	-4.4170***	-4.6156**	-14.5199***
	(2.3552)	(1.1663)	(1.8527)	(2.3365)
# Observations	996	1,466	996	1,453
# Banks	83	132	83	132
Country dummies	Yes	Yes	Yes	Yes
Ar2_pvalue	0.532	0.516	0.218	0.773
Hansen_pvalue	0.445	0.756	0.616	0.210

COSTEFF, *SC* and *DIV* are considered as endogeneous in the GMM-system estimation.
Standard errors in parentheses. Significance levels: *** = 0.01, ** = 0.05, * = 0.10.

6. Robustness checks

6.1. Using a one-step estimation procedure

So as to assess the reliability of our findings, we conduct a couple of robustness checks. First, we check the validity of the results with respect to the econometric method used for investigating the role of the Lerner index determinants. Particularly, instead of using a two-step GMM panel dynamic

model, we switch to a one-step setting, i.e. where the Lerner index and the determinants are simultaneously estimated in the same step.

The so-called restricted Lerner index is considered, where the determinants are included in the mean of the one-sided error term of the mark-up. In addition, as shown in Table 3, the endogenous determinants (SC_{t-1}, $COSTEFF_{t-1}$ and DIV_{t-1}) enter as lagged regressors to avoid possible simultaneity problems in the estimation results. We estimate this model for the whole sample as well as for the two sub-groups (GCC and non-GCC). The empirical results are presented in Table 6.

Table 6: The determinants of the Lerner index (one step estimations)

Variables	All countries	GCC	Non-GCC
Log(Loans)	0.0726***	0.2264***	0.0540***
	(0.0055)	(0.0201)	(0.0056)
Log(Other)	-0.0261***	-0.0287*	-0.0229***
	(0.0048)	(0.0155)	(0.0048)
Log(pl/pf)	-0.0505***	0.0438**	-0.0657***
	(0.0079)	(0.0186)	(0.0084)
Log(pk/pf)	-0.0351***	-0.0062	-0.0273***
	(0.0062)	(0.0122)	(0.0075)
T	0.0002	-0.0131***	0.0018*
	(0.0009)	(0.0033)	(0.0010)
Constant	0.1036	-1.9453***	0.2961***
	(0.0833)	(0.4110)	(0.0784)
Country dummies	Yes	Yes	Yes
Mark-up determinants			
SC_{t-1}	0.0070**	-0.0007	0.0071*
	(0.0027)	(0.0055)	(0.0043)
$COSTEFF_{t-1}$	0.0182***	0.0176***	0.0141**
	(0.0044)	(0.0051)	(0.0064)
DIV_{t-1}	-0.0081***	-0.0115***	-0.0128***
	(0.0017)	(0.0021)	(0.0036)
SIZE	-0.0342*	-0.2408***	0.0157
	(0.0198)	(0.0262)	(0.0443)
CR3	0.0026	-0.0083*	0.0141*
	(0.0039)	(0.0048)	(0.0076)
MKTCAP	-0.0025**	0.0033***	-0.0119***
	(0.0010)	(0.0010)	(0.0041)
INFL	0.0087	-0.0088	0.0297***
	(0.0058)	(0.0062)	(0.0111)
GDPGR	0.0112*	0.0025	0.0074
	(0.0059)	(0.0047)	(0.0223)
FOREIGN	0.1660***	-0.2683***	0.5741***
	(0.0517)	(0.0849)	(0.1480)
ISLAMIC	-0.1730***	-0.2961***	-0.4276**
	(0.0584)	(0.0564)	(0.1912)
Country dummies	Yes	Yes	Yes
#Observations	2528	1006	1518

Overall, the results prove to be qualitatively robust when compared to those presented in Table 5: particularly, *SC* and *COSTEFF*[9] have a positive impact on the mark-up, hence on the Lerner index, while *DIV* and SIZE negatively affects banks' market power. With respect to bank type and ownership, the conclusion is the same as the one reported in Table 4 for all countries. Slight differences are found if we consider countries subgroups. Foreign banks have a negative impact on Lerner for the GCC group while it was non-significant in Table 5, Islamic banks have a negative impact on Lerner for non GCC group while it was not significant.

6.2. Simultaneity of switching costs and Lerner indices

A second robustness check is built on the idea that the Lerner index and switching costs are simultaneously determined. Hence, instead of regressing just the Lerner index on its determinants, we estimate a system including two equations, one for *LERNER* and one for *SC*, in order to take into account of this interdependence. This two-equation system is estimated by three stage least square (3SLS).

Recall that we have taken the same specification employed for assessing the determinants of the Lerner index (see the list of variables in Table 3). Since the two-equation system is not based on any theoretical model explaining the relationship between *SC* and *LERNER*, we do not impose any exclusion restriction. In addition, as the system is not identifiable, we introduce additional external instruments, namely the lagged variables of *SC*, *COSTEFF* and *DIV* (which also have been used previously) as well as the average loan price of the group of competitors of each bank for each country and year (*AVRpy1*).

The results of the above estimations are shown in Table 7. For the *LERNER* equation, the evidence is in line with what we discovered in the baseline model (Tables 4 and 5), particularly for the variables *SC*, *COSTEFF* and *DIV*. For most of the other control variables (particularly, *SIZE*, *MKTCAP* and *ISLAMIC*) the results also prove to be robust.

On the contrary, the coefficient of the variable *CR3* is not significant, while the macroeconomic variables *INFL* and *GDPGR* have now a positive impact on *LERNER*. Such differences could be ascribed both to the fact that they do not have any firm-specific dimension and to the static characteristics of the 3SLS model specification. However, the impact of bank type and ownership characteristics is quite robust.

A significant evidence that we observe from the empirical results of *SC* equations (second, fourth and sixth columns) is that market power has a positive impact on switching costs, and that the magnitude of this impact is much more sizeable than the reverse (i.e. from *SC* to *LERNER*, as shown in the first, third and fifth columns), especially when we consider the estimation results on MENA or the non-GCC group.

We also find a positive impact of *DIV*, *SIZE*, *MKTCAP* on switching costs: hence, larger and more diversified banks are better able to lock in their customers and increase the switching costs, and the same happens in countries with more developed financial markets. However, foreign banks seem to apply lower switching costs compared to domestic banks, while the opposite happens for Islamic banks. The latter evidence may derive from the product specificity of this type of banks, based on Sharia and partnership loans between banks and borrowers and thus likely to make the bank-customer relationship tighter and more lengthy, which reinforces the lock-in of these banks. In addition, and according to Weill (2011) and Olsen and Zoubi (2008), Islamic banks customers, once acquired, are pre-disposed to pay higher prices adhering to religious principles, which explains why the switching

[9]Here the cost efficiency variable, *COSTEFF*, is based on the estimation of pooled country frontier. We obtain similar results when cost efficiency scores are derived from specific countries frontier. To save space, they are not reproduced here, but could be obtained from the authors upon request.

costs are higher. Overall, our results on *SC* are in line with the recent studies (e.g.: Yin and Matthews, 2016; Miah et al., 2020).

Table 7: The determinants of the Lerner index
(simultaneous estimation of LERNER and SC equation, three stage least squares estimation results)

Variables	All countries		GCC		Non GCC	
	LERNER1	*SC*	*LERNER1*	*SC*	*LERNER1*	*SC*
LERNER1	-	2.120***	-	0.313***	-	2.011***
		(0.0263)		(0.0644)		(0.0274)
SC	0.472***	-	2.141***	-	0.497***	
	(0.00522)		(0.158)		(0.00628)	
COSTEFF	0.153***	-0.324***	1.171***	-0.416***	0.704***	-1.415***
	(0.0257)	(0.0544)	(0.173)	(0.0758)	(0.0876)	(0.175)
DIV	-0.400***	0.848***	-0.178***	0.0343	-0.325***	0.653***
	(0.0250)	(0.0540)	(0.0386)	(0.0233)	(0.0307)	(0.0621)
Size	-0.906***	1.921***	-1.339***	0.473***	-1.601***	3.219***
	(0.204)	(0.431)	(0.305)	(0.112)	(0.226)	(0.454)
CR3	0.0480	-0.102	-0.112	0.0758***	-0.0499	0.100
	(0.0503)	(0.106)	(0.0853)	(0.0272)	(0.0651)	(0.130)
Macro-variables						
MKTCAP	-0.0378***	0.0801***	-0.0190	0.0108**	-0.0513***	0.103***
	(0.0101)	(0.0214)	(0.0167)	(0.00511)	(0.0123)	(0.0247)
INFL	0.141**	-0.299**	-0.199*	0.0479	0.281***	-0.566***
	(0.0649)	(0.137)	(0.114)	(0.0396)	(0.0731)	(0.147)
GDPGR	0.250***	-0.531***	0.0947	-0.00309	0.240*	-0.483*
	(0.0730)	(0.155)	(0.0858)	(0.0311)	(0.141)	(0.282)
Bank Type						
FOREIGN	1.442***	-3.057***	-1.263	0.249	3.273***	-6.583***
	(0.536)	(1.134)	(1.061)	(0.353)	(0.603)	(1.212)
ISLAMIC	-7.792***	16.52***	-6.830***	1.823***	-3.977***	7.999***
	(0.696)	(1.483)	(0.879)	(0.630)	(1.302)	(2.610)
Constant	48.94***	-103.8***	-40.88**	16.89***	12.67	-25.47
	(5.188)	(11.02)	(17.37)	(5.348)	(9.213)	(18.49)
#Observations	2,517	2,517	1,006	1,006	1,509	1,509
R-squared	0.447	0.14	0.28	0.06	0.55	0.24
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes

LERNER1 is the unrestricted Lerner, *COSTEFF* is the efficiency estimated from specific country frontiers. The regressions consider *SC*, *COSTEFF* and DIV as endogeneous variables. We use the following additional instruments: lagged variables of *DIV*, *COSTEFF*, *SC*, and of the average loan prices of all the competitors of each bank within each country and year (*AVRpy1*).
R-squared is calculated by the squared correlation coefficient between observed and predicted dependent variable in each equation.

7. Conclusions and policy implications

In recent years, MENA region has undergone important reforms with the aim of fostering economic growth and achieving a higher degree of well-being. Such reforms have also concerned the local banking sectors, which normally represent a crucial channel through which fueling the economy. Under this respect, a matter of debate in the relevant literature is the role of competition among banks, particularly the extent to which it can promote or hinder their role of loan providers to firms and households. Actually, if stronger competition might imply higher risks for banks, thus reducing the overall stability of the sector, it is believed that less competitive markets generate welfare losses and worse conditions for customers, causing economic activity to contract.

In this paper we have tried to gauge the degree of market power – hence the overall level of competition – that has characterized the banking sector of 13 MENA countries in the years 2000 to 2018, as well as to identify the relevant factors affecting it, with a specific focus on customers'

switching costs and banks' cost efficiency. Unlike the majority of similar previous studies, which calculate industry-level indicators of competitiveness (e.g., concentration indices, *H*-statistic, Boone indicator), we estimate bank-level Lerner indices that explain market power on the specific business segment of loans (representing the most important source of revenue for banks), rather than computing Lerner indices which assume that all banking activities are aggregated into a single indicator, namely total assets.

Our results clearly show that MENA banks enjoy a substantial degree of market power on the loan market, as the average mark-up of the price of loans on marginal cost is about 43% of the former, while bank customers have to face remarkable costs in case they choose for switching to other lending suppliers, on average amounting to over 10% of their current loans (and with notable differences among countries). Under this respect, it comes out a significant positive association between switching costs and Lerner indices, meaning that banks can fix higher loan rates when their customers are locked in to their current banking relationships.

Banks' market power appears to be higher also when credit institutions are more cost efficient, focus especially on the traditional intermediation activity, are smaller in size, and operate in countries where stock markets are less developed, banking markets are more concentrated, the inflation rate is lower, and GDP growth is poor. All our evidence is robust to alternative specifications and estimation techniques.

Our results have important policy implications. If competition in banking markets is regarded as beneficial for the overall economic performance, it is crucial to favour a reduction of switching costs imposed by banks on customers, without locking them in through imposing significant explicit costs or tightening relational ties. Under this respect, switching costs may represent a yardstick for regulators in their mission of disciplining bank behaviour and limiting their market power, which guarantees important rents. Lower switching costs can result from making information more effortless for customers who desire to switch (with respect to loan redemption conditions, loans redemption costs, takeover prices and conditions of competitors, etc.) or reducing the 'bureaucratic' barriers to the switching from one bank to another (for example, enabling the account number portability).

Of course, other important factors facilitating competition are the encouraging of new entries, so any substantial barrier should be eliminated, and a strong deregulation should be pursued, as well as the support to every action that increases bank efficiency, whose fruits may then be passed on to customers in the form of lower prices and better service conditions.

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