Does Banking Market Power Matter on Financial (In) Stability? Evidence from the Banking Industry in MENA Region

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Authors' contributions

This work was carried out in collaboration between both authors. Author WL designed the study, wrote the literature and the first draft of the manuscript. Author SM carried out the analysis and reviewed the draft manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

The various financial crisis incidents during the two last decades and particularly since the 2007-2008 Global Financial Crisis have revealed the complexity of the interaction between bank market structure, regulation and the stability of the banking industry. Due to its effects on financial stability, banking market structure has been a focus of academic and policy debates of which we prefer the market power paradigm. More precisely, the impact of competition and market concentration on the probability of financial crisis emerges as a crucial topic. Despite their importance, little is known about the relationship between Banking Market Power and Bank Soundness from banks of MENA region. This paper tries to overcome the tradeoff between banking market power and financial (in) stability among 157 commercial banks chosen from 18 countries of MENA region between 2000 and 2008. The results indicate that although the banks operate in a competitive market, they suffer from financial instability. The results also revealed a non-significant negative relationship between the rather low degree of market power and financial instability. In other words, we concluded that financial instability is not affected by competition in the banking market in the MENA region.

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1. INTRODUCTION

The different hypotheses on how financial instability is provoked in a context of a competitive and concentrated banking market theoretically justify why it is interesting to analyze the relationship between banking market power and financial stability, knowing that economic theory does not provide clear conclusions and this relationship is still unclear.

There are two main opposing theories on this matter are currently under debate. The "concentration – stability" or ("competition - fragility") view highlights that more concentrated market allows banks to earn higher profit ; thus creating a capital buffer against crisis and reducing bank's risk-taking behavior (Boyd and De Nicolo [1], Schaeck, Cihak and Wolfe [2] Uhde and Heimeshoff [3], Maudos and De Guevara [4]). In contrast, the "concentration – fragility" or ("competition – stability") view argues that higher market concentration increases financial fragility. Banks charge higher interest rates may enhance the risk taking behavior and raise the risk of default; consequently destabilizing the financial system (Boyd and De Nicolo [1], Schaeck Cihak and Wolfe [5]). In fact, the influence of a bank market structure on financial stability is not clear yet. In return, the relationship between market structure and bank soundness and focusing on concentration and competition was explained through a main channel which is the banking market power.

On the one hand, under the traditional "competition –fragility" (or «concentration-stability) hypothesis; competitive banking system is more fragile. According to the hypothesis of charter/franchise value, competitive banks are forced to undertake risk-taking behavior (Keeley [6]). In fact, larger banks in concentrated market have more market power and may earn higher profit.In a similar way, higher profit is associated with higher franchise value, deterring bank managers from excessive risk-taking. Since a higher (lower) market power makes banks generate more (less) profit and increase (decrease) their charter value (Xiaoqing Fu Yongjia, Molyneux [7]) this hypothesis is known as the "charter value" hypothesis (Keelly [6] and Soedarmono, Machrouh, Tarazi [8]).

In an environment of increased competition, each bank has a low market power that can lead to financial instability. Several arguments can explain this state of affairs such as the existence of a weak banking margin that forces banks to undertake risky projects to improve their profits, which may result banking fragility. This idea is empirically supported by Kelly [6] who showed that increasing competition in the American banking system after the 80s financial deregulation reduced profitability and increased risk-taking behavior and bank fragility.

Another argument which puts forward the negative effect of competition on financial stability is the franchise value of the bank, i.e. the bank's market value. If competition increases, profit decreases and causes a decrease in the bank's value, forcing it to take on more risk in order to recover these losses (Maudos and De Guevara [4]). This hypothesis reproduces the idea that an increase in competition leads to a degradation of the bank's market value and reveals a moral hazard that could lead the bank to increasingly opt for risky projects causing financial instability.

On the other hand, the alternative hypothesis known as the "competition -stability" hypothesis rejects the traditional relationship between market power and financial stability. If a bank has a strong market power, it will be able to set a high interest rate on loans (Boyd and De Nicolo [1]. However, it would be able to fix such rate if it was under perfect competition. Hence, the generated profits increase and a cushion or a "capital buffer" is constructed to absorb all external shocks in case of a financial crisis and at the same time to reduce liquidity shocks (Vives [9]). These additional generated profits could cost bankruptcy, encouraging banks to undertake risky projects. The latter will then increase the stability of the banking system and the financial sector in general. Therefore, a dominance position in a concentrated market has a stabilizing effect on the system.

Moreover, increase in interest rates on loans granted by dominant banks has a significant effect on borrowers (Beck, Demirguc-kunt and Levine [10]). When the cost of financing is high, borrowers choose risky projects with a high bankruptcy probability (Maudos and De Guevara [11]). Furthermore, portfolio quality plays an important destabilizing role. With these high interest rates, bank customers stop borrowing at that rate, leading to a deterioration in the loan

portfolio of the bank. Because only the most risky projects are known by their high efficiency, borrowers will continue to borrow at that rate which will increase bankruptcy probability. Studying the relationship between competition and financial stability, Coccorese [11] show that the banking system is more concentrated when the loan portfolio is risky.

However in a concentrated banking market, having a strong market power is taken as an insurance that these banks are "too big to fail", which encourages them to take more risks. Mishkin [12] found that such insurance creates a perverse incentive for banks which tend to choose risky assets and loans as these latter are known by their higher returns. This confidence expressed by dominant banks in a concentrated market is summed up in the premise that they will be recurred in the event of a crisis. This is actually a threat to financial stability. Therefore, from a theoretical point of view, the relationship between market power and financial stability remains ambiguous but requires more empirical investigations.

To shed light on these two fundamental hypotheses, we have organized our paper as follows. In the first section, we present the contributions of the literature on the topic of market power. Then, in the second section we present market power and the hypotheses of financial instability provocation. The third section presents, discusses and interprets the regression results.

2. BANKING MARKET POWER

In this section we present a brief review of the literature on banking market power through examining several studies that focused on determining market power and its components as given in Table 1. We review research that either validates market power hypotheses that examines the impact of market power on financial stability.

In this review we start with examining research on market power theory. The theory can be summarized in two basic hypotheses, namely the structure-conduct-performance (SCP) and the relative market hypotheses. Several studies examined market power in order to validate these hypotheses like those of Samad [13], Ariss [14] and Sallami and Chaffai [15].

Ariss [10] on a sample of 60 countries and 821 banks found results that support the "quiet life"

hypothesis. Coccorese and Pellecchia [16], using data on the Italian banking sector for the period 1992-2007, tested the quiet life hypothesis according to which powerful firms in the market are less efficient. Their findings support the "quiet life" hypothesis. Maudos and De Guevara [4] studied a sample of 92 Spanish banks over the period 1986-1988. The results show that the more concentration increases in a market, the more the cost of collusion decreases and results in higher profits for all banks. Their findings support the SCP hypothesis.

Besides the several measurement techniques used in market power research, we notice a significant number of studies using various methods and techniques to measure degree of competition in the banking system. As an example of measurement, we mention the conjectural variation model developed by Bresnahan [17]. This model has been used by several researchers in various banking studies such as Suominen [18], Shaffer [19], Berg and Kim [20], and Coccorese [11].

Suominen [18] over a period of four years between 1986 and 1990 applies the model of co linearity variation to measure competition in the Finnish banking sector. The author found a monopolistic power in the pricing of banking services. Shaffer [19] used a model of co linearity variation to estimate degree of competition in the Canadian banking sector over the period (1965-1989) and pointed to the existence of a perfect competition in the sector. Uchida and Tsutsui [21] use almost the same approach as Shaffer [19] on a sample of Japanese banks over the period 1974 and 2000. Their results indicate that competition has become very intense between 1995 and 1997. Moreover, using the co linearity variation model to study Norwegian banks between 1990 and 1992, Berge and Kim [17] found that there is an oligopolistic behavior in both the retail and corporate sectors.

Another measurement method of market power is the H –statistics of Panzar and Ross [5]. Many studies have used this model of which we mention those of Molyneux et al. [22], Shaffer [19], Vesala [23], Bikker and Groeneveld [24], Bikker and Haaf [25], De Bandt and Davis [26].

Molyneux et al. [22] used the H-statistic to assess competitive behavior in a number of European banking markets (German, French, Italian, Spanish, British banks) during the period from 1986 -1989. The results indicate the existence of monopolistic competition in the UK

banking market. The same study by Molyneux et al. [22] on the Japanese banking market found a collusive behavior among banks. Thus, Shaffer [19] was the first to apply this approach on a sample of American banks. The results strongly reject the existence of a collusive behavior between these banks. Vesala [23] applied a similar approach to test the level of competition among Finnish banks during the period 1985 - 1992. The results point to the existence of a monopolistic competition.

Bikker and Groeneveld [24] examined monopolistic competition behavior in European banks by applying Panzar and Ross's model on some European Union banks during the period 1989 -1996. Bikker and Haaf [25] applied the same model as De Bandt and Davis [26] on a sample of 23 countries (Australia, Canada, Netherlands, Great Britain and the United States). The results show the existence of a monopolistic competition.

Other studies that sought to explore market power are studies that tried to examine the relationship between market power and financial stability, of which we mention the studies of Sallami and Chaffai [15], Soedarmono, Machrouh and Tarazi [27], Maudos and De Guevara [4]. Below we present a summary table of the different studies of market power:

3. MARKET POWER: FINANCIAL INSTABILITY ROVOCATION HYPOTHESES

3.1 Concentration versus Competition

In economics literature two traditional hypothesis have been forward to explain this axiom. On the one hand, we have the traditional theory of Industrial Economics which claims that concentration discourages competition (Sallami and Chaffai [15]) and the theory of contestable markets (Baumol [28]) which assumes that if the input and output are free, competition may exist even if the market is concentrated.

As far as concentration is concerned, traditional theory describes this structure by the existence of a small number of firms which have a strong market power and the existence of a less competitive behavior. This idea leads us to the classic argument of industrial organization that shows the existence of a positive relationship between market structure, firms' behavior in pricing and profits as well as the degree of

market power. This idea is known as the paradigm Structure -Conduct-Performance (Bain [29]).

This paradigm tries to establish a relationship between market structure and market power. Knowing the extent of market power is based on profit and costs, economics indicate that there is a positive relationship between concentration and profit, i.e. Developed concentration in a market where firms have higher market power allows firms to generate more profits.

Another hypothesis supports the same view regarding the positive relationship between concentration and profits. However, this hypothesis, known as Structure-Efficiency hypothesis assumes that an efficient firm generates more profits and gains more market share and plays a role in increasing market concentration. Hence, concentration is not determined solely by market power but by efficiency of firms. Therefore, it is clear that concentration and competition are two distinct elements, i.e. the choice of concentration as a proxy for competition can be criticized (Schaeck, Cihak, Wolfe [2].

Then, as for the theory of contestable markets (Baumol [28]), it supports the idea that competition may exist even in a concentrated market by liberalizing input and output. This theory aims at renewing and extending the classical theory of competition in industrial economics. It defines degree of economic contestability of a present operator in one market by its exposure to the threat of entry of new operators in the market (Sallami and Chaffai [15])

Several studies seek to study the complexity of such a relationship. Bikker [30] noted that concentration may have an impact on competition in that an increase in firm financial size can enormously affect financial stability. Bikker and Haaf [25] examined this relationship on a sample of 23 industrialized countries and found that increasing concentration discourages competition. However, Claessens and Laeven [31], studying a sample of 50 countries, found that there is a positive relationship between concentration and competition. However, the results and conclusions of Claessens and Laeven [31] show that concentration is a poor indicator of competition (degree of market power) in a competitive environment in which the banks operate.

Table 1. Studies of banking market power

Authors	Measurement methods	Sample	Period	Results
Soedarmono Machrouh and Tarazi, [32]	The authors use the Lerner index as a measurement of market power and the Z-score as a measurement of financial instability.	Asian countries	1994–2009	A high degree of market power is related to an increase in capital ratio, returns volatility and a higher insolvency risk.
Sallami and Chaffai [15]	Both authors use a structural model which is the collinearityvariation model to measure degree of banking market power.	MENA region	2002-2009	Estimates show that the banking sector in the region is far from being a monopoly or competitive.
Soedarmono Machrouh and Tarazi [27]	The authors use the Lerner index as a measure of degree of market power and the Z-score as a measure of financial instability.	12 asian countries	2001-2007	The existence of a high degree of market power generates a high degree of financial instability.
Ariss [14]	Ariss uses the Lerner index to measure degree of banking competition at the sample country level and the Z-score to test financial stability.	Africa, East and South Asia and the pacific	1999-2005	The results show that increasing degree of market power led to a remarkable financial stability.
Maudos and De Guevara [4]	These authors measure the degree of market power using the Lerner index and the z -score to measure financial instability	25 countries of the European Union, the United States, Canada and Japan	2001-2008	The results show that an increase in market power negatively affects stability of the banking sector.
Uhde and Heimeshoff [3]	In this study, the authors choose concentration ratio to measure degree of market power and the Z-score to measure financial stability.	25 countries of the European union	1997-2005	The results show that there is a negative relationship between concentrated banking markets and financial stability.
Schaeck, Cihak and Wolfe [2]	This study seeks to examine the relationship between market power and banking system fragility. These authors use the H-statistic of Panzar and Ross (1987) as a measure of competition in the sample countries.	38 countries	1990-2003	The results show that a high degree of market power in the banking sector reduces the risk of producing a systemic crisis.
De Guevara, Maudos and Perez [33]	These authors attempt to study the evolution of market power in the banking sector of European countries using the Lerner index as a measure of market power degree.	Germany, France, Italy Spain and the Uk	1992-1999	The estimation results show that there is heterogeneity of the results between countries.
Uchida and Tsutsui [21]	They use a collinearity variation model to estimate degree of competition	Japan	1974-2000	The results show that competition has become very intense between 1995 and 1997.

Coccorese [11]	The author studied competitive behavior between eight major Italian banks during the period 1988-2008 using a pricing model.	Italy	1988-2008	The results show the existence of a perfect competition during this period.
Maudos, De Guevara [4]	The authors tried to determine the variable components of market power. For this purpose they use the Lerner index to measure market power and HHI to measure market concentration.	Spain	1986-2002	The results show that the variables used in the measurement of the Lerner index are significant while concentration is a poor indicator of market power.
Berge and Kim [20]	using a collinearity variation model, Berge and Kim (1998) examine the degree of competition in Norwegian banks.	Norway	1990-1992	These banks have oligopolistic behavior in both the retail and corporate sectors.
Bikker and Groeneveld [24]	The authors apply the model of Panzar and Ross on some European Union banks.	European Union countries	1989-1996	There is a monopolistic competition behavior in most of European banks.
Molyneux et al [22]	The authors used the H-statistic to measure competitive behavior in some European banking markets.	Germany, France Italy spain and the Uk	1986-1989	The results show the existence of monopolistic competition in the UK banking market.
Suominen [18]	The author applies the collinearity variation model to measure competition in the Finnish banking sector.	Finland	1986-1990	The author notes the existence of a monopoly power in the pricing of banking services.
Shaffer [19]	The author estimates a collinearity variation model to measure degree of competition in the Canadian banking sector.	Canada	1965-1989	The results show the existence of a perfect competition in this sector.

Source: The authors

3.2 Concentration and Financial Stability

Theoretically and empirically, the impact of banking market concentration on financial stability remains ambiguous and without conclusive results. In the economics literature, we found two views that represent the two basic hypotheses of this concentration and stability axiom.

On the one hand, there is the "concentration-stability" hypothesis which assumes the presence of a positive relationship between concentration and financial stability. Indeed, in a concentrated banking system, banks generate more profits leading to a cushion or a "capital buffer" that absorbs all macroeconomic shocks and external liquidity shocks (Boyd and De Nicolo [1]). Similarly, Benston, Hunter and Wall [34] studied USA bank's consolidations and

found that the resulting concentration contributes to financial stability.

The same result is found by Craig and Santos [35] for American banks, examining profitability and risk before consolidation. Thus, Boyd and Prescott [36] showed that a concentrated banking system consisting of a small number of large banks mitigates risk through effective portfolio diversification.

Secondly, with respect to the second hypothesis, we find that there is a negative relationship between concentration and stability known by the "concentration-fragility" hypothesis (Uhde and Heimeshoff [3]; Mishkin [12]) found that in a banking system with a limited number of banks not to go bankrupt represents a public or a national interest. This is known as the "too big to fail" principle according to which although the

bank is large, it has a warranty to absorb all external shocks and not to go bankrupt.

According to this view every large bank may undertake riskier investments that may subsequently affect financial stability. The Subprime crisis in 2007 is an example when several banks despite their giant size went bankrupt like the Lehmann Brother bank. Moreover, Boyd and De Nicolo [1] showed that an increase in the interest rate for loans may encourage risk-taking behavior among investors, which leads to increased probability of bank failure and significantly affects financial stability.

Another mechanism of financial instability provocation is presented by Cetorelli and others [37] where they showed that the effect of diversification of risk may affect managerial efficiency by increasing the likelihood of operational risk and subsequently provoking financial instability (systemic risk).

From an empirical point of view, several studies have been conducted to examine the relationship between concentration and financial stability. During a 7-year period from 1993 to 2000, De Nicolo et al. [38] showed that for an increasingly concentrated banking system, level of systemic risk increases. Over the period 1999 to 2004 and on a sample of 10 European countries including Switzerland, Schaeck and Cihak [39] and Schaeck, Cihak and Wolfe [2] showed that in a more competitive environment banks generate more capital buffering. Uhde and Heimeshoff [3] studied a sample of 2,600 banks in 25 European countries over the period 1997 to 2005 found that a concentrated domestic banking market has a negative effect on financial stability.

3.3 Competition and Financial Stability

As given in Table 2, in addition to the hypotheses on the concentration -stability relationship, the study of the relationship between competition and financial stability bear on two basic points of view. On the one hand, there is the "competition-stability" hypothesis that highlights a positive relationship between competition and financial stability, and on the other hand there is the "competition - fragility" hypothesis which highlights a negative relationship between competition and stability.

The "competition - fragility" hypothesis supports the idea that an excess of banking competition leads to financial instability for several reasons. If

the bank margin is low, banks are forced to invest in risky projects in order to increase their profits resulting in increased bank fragility (Maudos and De Guevara [4]). Another reason is presented by the franchise value of a bank. If competition increases, profit of each bank decreases, which leads to a degradation in the bank's market value. To recover these losses each bank will be forced to undertake riskier activities and collect less capital increasing thus financial instability.

Keeley [6] supported the idea that competition between larger banks after the late 80s financial deregulation encouraged banks to take more risks which reduced the charter value of a bank (charter value hypothesis). Smith [40] highlighted a theoretical model of how increased competition for deposit banks may result in an increase in banking system vulnerability. Beck et al. [10] supported the competition -fragility hypothesis and they showed that countries with a less competitive banking system are the least affected by banking crises than countries with high banking competition. Similarly, Besanko and Thakor [41] showed that banks seek riskier portfolios when competition increases. [Matutes and Vives [42] found that intense competition provides for a maximum increase of bank risks.

Hellman, Murdoch and Stiglitz [43] proposed that an acceleration of competition forces financial institutions to engage in risky investments.

Vives [9] tried to investigate this hypothesis through looking into mechanisms of financial instability provocation in a context of competition in a banking market. He found that competition affects financial stability through two mechanisms: the first is through the increasing problem of coordination among depositors and investors liabilities-wise and through liquidity and bank panics which can be systemic. The secondly is through increased incentives for risk-taking and likelihood of bankruptcy.

As for the first mechanism, Vives [9] found that competition is not responsible for the fragility and vulnerability in any market structure [Matutes and Vives [42]. In general, liquidity shocks take place after a massive withdrawal of deposits by individual depositors, while the modern liquidity shocks are the result of non-renewal of short-term credits in the interbank market. Similarly, the second mechanism assumes that banks will have excessive incentives to take risks in the presence of a limited liability where there is a lack of funds and capital and in the presence of

Table 2. Studies on concentration, competition and financial stability

Hypotheses	Authors	Results
Concentration-competition relationship	Bikker and Haff [25]	According to a study of 23 industrialized countries, the authors find that concentration discourages competition.
	Claessens and Laeven [31]	The two authors show that concentration is a poor indicator of competition.
Concentration-stability hypothesis	Benston, Hunter and Wall [34]	A study of the banking system of the United States shows that concentration contributes to financial stability.
	Craig and Santos [35]	By analyzing profitability and risk of US banks, the authors show that concentration contributes to financial stability.
	Schaeck and Cihak [39]	A study of 10 European countries over the period 1999 to 2004 shows that in a competitive environment, the most dominant banks generate more "capital buffer" profits which contributes to financial stability.
Concentration-fragility hypothesis	Matutes and Vives [42]	The authors show that banks under a monopole context tend to offer risky credits that may increase banking failure probability.
	De Nicolo et al [38]	A study conducted between 1993 and 2000 shows that in a concentrated banking system, systemic risk increases.
	Uhde and Heimeshoff [18]	A study of 25 European countries over the period 1997 to 2005 shows that a concentrated banking market has a negative effect on financial stability.
Concentration-stability hypothesis	Staikouras and Wood [8]	They compared Spanish and Greek banks and they found that Spanish banks are more competitive and more stable than Greek banks.
	Schaeck et al [5]	The authors show that there is financial stability in most competitive banking systems.
	Smith [40]	The author shows that increased competition between deposit banks contributes to banking vulnerability.
Competition-fragility hypothesis	Hellman, Murdoch and Stiglitz [43]	The authors propose that accelerated competition forces financial institutions to engage in risky investments.
	Beck et al [10]	The study indicates that countries with a less competitive banking system are the least affected by banking crises than countries a more competitive system.
	Vives [9]	The author found that an intense banking competition leads to a maximal increase of banking risk through a coordination problem between depositors and investors liability-wise or through an increase in risk-taking incentives and failure probability.

Source: The authors

moral hazard. From the perspective of limited liability, the bank takes on more risky assets that contribute to this lack of capital. Then, in such a high risk context the bank can't increase neither its market share nor profits. Therefore, intense competition may worsen the problem of excessive risk taking.

An alternative hypothesis highlights a positive relationship between competition and financial stability. This latter is known as the "competition-stability" hypothesis. Since in a less concentrated market (with higher numbers) enjoying a higher market power degree, the bank will be able to set higher interest rates leading borrowers to undertake risky projects because of high financing costs. While these banks benefit from their dominant position that could be a form of guarantee or insurance against bankruptcy, this increased interest rates intensify risk-taking behavior but increase profits and the generated returns from these loans (Boyd and De Nicolo [1]).

Moreover, several studies attempted to test this relationship. Schaeck and others [2] showed that stability is high in most competitive banking systems. Thus, Uhde and Heimeshoff [3] argued for the" competition-stability "hypothesis by showing the existence of a negative impact of

market concentration on financial stability. Matutes and Vives [42] showed that banks in the case of monopolist end to offer risky loans which may increase the probability of bank failure.

From an empirical point of view, the results are more ambiguous than theory predicts. The study of Keeley [6] supported the" competition - fragility" hypothesis, while the work of Staikouras and Wood [8] supported the alternative hypothesis.

As for Bordo, Rockoff and Redish [44], they compared Canadian and American banks and found that Canadian banks are more stable because of their oligopolistic structures, Hoggarth, Milne and Wood [45] found that British banks are less stable and more competitive. Moreover, Staikouras and Wood [8] compared Spanis hand Greek banks and found that Spanish banks are more competitive and more stable than Greek banks.

4. SPECIFICATIONS, FINDINGS AND INTERPRETATIONS

4.1 Methodology

We use an econometric model inspired by a large empirical and theoretical literature like those of Soedarmono, Machrouh and Tarazi ([27], [32]) and Sallami Chaffai [15], Ariss [14], Schaeck and Cihak [39] and Maudos and De Guevara [4].

$$STAB_{i,t} = \alpha_1 LERNER_{i,t} + \alpha_2 TCPIB_{i,t} + \alpha_3 INF_{i,t} + \alpha_4 LDR_{i,t} + \alpha_5 LLR_{i,t} + \alpha_6 TCP_{i,t} + \alpha_7 SIZE_{i,t} + \varepsilon_{i,t}$$

With i and t respectively denote banks and time.

The dependent variable STAB is region-based financial stability and measured by Z-score. At this level there are two main regressions; a main regression based on the ROA where there is Z-score ROA and a robustness regression based on ROE where there is Z-score ROE. The independent variable LERNER is a measure of the degree of market power of the banks in the sample, while the other independent variables are control variables.

Moreover, we will apply three methods to study the relationship between market power and financial stability. The first method is ordinary least squares (OLS) based on a simple linear model that presents our basic model inspired by

the work of Soedarmono and Tarazi ([27], [32]). A second method to be applied is the fixed-effects generalized least squares (G LS), based on a fixed effects model where observed individuals (in this case banks are considered) have well-defined and precise characteristics which do not vary in time and which are also independent and uncorrelated. The third method is random effects generalized least squares (GLS) where individual differences are random.

4.2 Sample and Period

Our database is built from multiple sources, i.e. bank-specific data are obtained from the Bank Scope database 2009, while macroeconomic data are obtained from the World Bank and the International Monetary Fund databases. Our sample consists of 18 countries in the MENA region consisting of 157 commercial banks distributed as follows: Algeria (10), Bahrain (9), Egypt (23), Iran (8), Iraq (1), Israel (6), Jordan (10), Kuwait (5), Lebanon (18) Libya (4), Morocco (9), Oman (5), Qatar (6), Saudi Arabia (9), Syria (1), Tunisia (14), the United Arab Emirates (15) and Yemen (4). Furthermore, the chosen period covers 9 years, from 2000 to 2008. The studied banks are only commercial banks as such banks are free in choosing and executing their operations. These banks face also the same restrictions and reforms affecting all the countries in the MENA region.

4.3 Results and their Interpretations

4.3.1 The Lerner index

Several measures of market power like the collinearity variation model of Bresnahan [17], the H-statistic of Panzar and Rosse [5] are used in the literature. In the case of banking firms, the model most used as reference is the Monti-Klein imperfect competition model. Indeed, in our study we will choose the non-structural approach to the assessment of banking competition and develop a commonly used measure of banking market power namely the Lerner index. Lerner index represents the markup of price over marginal costs is given in the following expression:

Lerner index = (Price - Marginal costs) / Price

Several studies like those of De Guevara, Maudos and Pérez [33], Maudos and De Guevara [4], Ariss [14], Soedarmono, Machrouh and Tarazi ([27], [32]) have used this index. The choice of such an index relates to the simplicity of its empirical application where we need

marginal costs for each bank but as it cannot be directly observed we estimate them by using a Tran's log cost function its formula is as follows:

$$\ln TC_i = \alpha_0 + \alpha_1 \ln TA_i +$$
$$\frac{1}{2}\alpha_2 (\ln TA_i)^2 +$$
$$\sum_{j=1}^{3} \beta_j \ln w_{ji} + \frac{1}{2}\sum_{j=1}^{3}\sum_{k=1}^{3} \beta_{jk} \ln w_{ji} \ln w_{ki} +$$
$$\frac{1}{2}\sum_{j=1}^{3} \gamma_j \ln TA_i \ln w_{ji} + \mu_1 Trend +$$
$$\mu_2 \frac{1}{2} Trend^2 +$$
$$+\mu_3 Trend \ln TA_i + \sum_{j=1}^{3} \lambda_j Trend \ln w_{ji} + \ln u_i$$

With P the mean price or the output price of the bank as measured by the net expense / total assets ratio, Cm represents marginal cost calculated from estimating a Tran's logarithmic cost function (Maudos and De Guevara [4], Sallami and Chaffai [15]).

However, we find that Total Cost (TC) depends on the prices of the three inputs (labor, physical capital and deposits) and is approximated by total expenses; in addition to total assets (TA), which represent the volume of production of the bank (the amount of outputs), as it depends on the technical changes represented by the variable (Trend). In fact, total assets are presented by the quantity provided by each bank qit. Labor price (w1it) is measured by the staff / total assets ratio. Capital price (w2it) is the fixed assets / total assets ratio. Funds price (w3it) is the interest costs / total deposits ratio. To facilitate our estimates we used the ordinary least squares method where we estimated the Trans logarithmic function of total cost to have α1 and the γj for each factor prices. Therefore, totals cost function will change to:

Ln TCit = α0 + α1 LnTAit+ γ1Ln(w1it) + γ2 Ln (w2it) + γ3 Ln (w3it) + εit:

Marginal cost calculated from the equation above is as follows:

$$MC_i = \frac{TC}{TA}\left(\alpha_1 + \alpha_2 \ln TA_i \right.$$
$$\left. + \frac{1}{2}\sum_{j=1}^{3} \gamma_j \ln w_{ji} + \mu_3 Trend \right)$$

To facilitate our estimates we used the ordinary least squares method where we estimated the Trans logarithmic function of total cost to have α1and the γj for each factor prices. Therefore, marginal cost will change to:

$$MC_i = {}^{TC}\!/_{TA}\left[\alpha_1 Ln\ TA + \sum 1^3\ \gamma_j Ln(W_i) \right]$$

Table 3 shows the results of the OLS regression of the variables components of the Lerner index:

Table 3. The results of the OLS regression of the Lerner index

Variables	Lerner Index	
Total assets	0.983***	(141.51)
Labor price	0.176***	(10.22)
Capital price	0.0875***	(6.85)
Fundsprice	0.372***	(25.09)
R^2	0.9594	
Nb. Obs.	898	

Note: For the results we have the estimated coefficients of the variables components of the index and what is in parentheses is the t-statistic. Moreover the coefficients with (***) are significant at 1%

4.3.2 Measuring financial stability

Based on the work of Soedarmono, Machrouh and Tarazi ([27], [32]), Ariss [14] and others, we opted for an appropriate measure of financial instability. For this purpose the variable Z-score is chosen as the index that measures degree of stability of banks. In this single indicator, we have three elements namely bank capitalization, bank income volatility and insolvency risk.

Bank capitalization is measured by the equity to total assets (EQTA) ratio. To measure bank income volatility which reflects risk-taking strategies, standard deviations of ROA and ROE noted respectively SDROA[1] and SDROE[2] are used.

In fact, this measure of bank income volatility represents a valuation of risk-taking degree in banks. Moreover, to assess insolvency risk we opted for two Z-score measures, one is based on ROA and the other is based on ROE and respectively denoted Z-scoreROA and Z-scoreROE as in the following formulas:

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[1]standard deviation of ROA
[2]standard deviation of ROE

$$Z_{ROA} = (ROAA^3 + EQTA) / SDROA$$

With ROA is the return on average assets, ROE is the return on average equity.

$$Z_{ROE} = (ROAE^4 +1) / SDRO$$

4.3.3 Regression results of Lerner index-Z scores

All the results of the Lerner index for all banks in the sample show that most banks have a low Lerner index indicating automatically a small degree of market power. Therefore, the banks operate in a competitive banking market with a low degree of market power. As for financial stability of the banks in the MENA region, we find low Z- score values for ROA and ROE. This suggests that banks in the MENA region are poorly stable and face banking risks. However, when the Z-score index decreases the risk for banks is higher and then financial and banking stability deteriorates. As a first conclusion, banks in our sample operate in a market with high competition and suffer from financial in stability.

The results of the main regression and the robustness regression are presented in Tables 4, 5 and 6. These tables present respectively the three OLS estimation methods MCO, random-effects MCG and fixed-effects MCG. Interpretations of the main regression are drawn from analyzing Table 4 while the interpretations of the robustness regression results are drawn from Table 5.

Table 4. The relationship market power-financial stability by the OLS method

Variables	Z_{ROA}		Z_{ROE}	
Lerner	-0.00026	(0.46)	-0.00015	(-0.9)
LDR	2.99***	(18.05)	0.024	(0.53)
LLR	0.033*	(1.88)	-0.006	(-1.29)
TCPIB	0.175***	(4.54)	0.015	(1.38)
INF	0.016	(0.52)	0.025***	(2.89)
TCP	0.776***	(3.67)	-0.04	(-0.73)
Size	4.04*	(7.05)	0.909***	(5.56)
R^2	0.413	0.413	0.101	0.101
Nb. Ob.	652	652	652	652

Note: Z_{ROA} and Z_{ROE} denote respectively the Z-score which measures financial stability based on "return on assets" and "return on equity". Lerner is the Lerner index which measures degree of competition in the market, TCPIB is the GDP growth rate, INF is inflation rate, LDR is total loans to total deposits ratio. LLR is the loan loss reserve to total loan. TCP is the growth rate measured as a % of loans, Size is the logarithmic mean of total assets. This table shows the results of the estimates by the Ordinary Least Squares method (OLS) of the two models (in the sense of Z_{ROA} and in the sense of Z_{ROE}), where the first column shows the coefficients of the variables and the between brackets present the t- Student of the variables. (***) (**) and (*) indicate statistical significance respectively at the 1%, 5% and 10% levels

Table 5. The relationship market power-financial stability by the fixed effects MCG method

Variables	Z_{ROA}		Z_{ROE}	
Lerner	-0.0003	(-0.69)	-0.00022	(-1.08)
LDR	0.805***	(5.83)	0.06	(0.94)
LLR	-0.07***	(-3.24)	0.02**	(1.98)
TCPIB	0.038	(1.44)	0.029**	(2.41)
INF	-0.06**	(-2.36)	0.018	(1.42)
TCP	0.76***	(4.56)	-0.017	(-0.22)
Size	1.49*	(1.8)	1.073**	(2.79)
R^2	0.136	0.136	0.057	0.057
Nb. Ob.	652	652	652	652

Note: Z_{ROA} and Z_{ROE} denote respectively the Z-score which measures financial stability of banks based on "return on assets" and "return on equity". Lerner is the Lerner index which measures degree of competition in the market, TCPIB is the GDP growth rate. INF is inflation rate, is total loans to total deposits ratio. LLR is the loan loss reserve to total loan. TCP is the growth rate measured as a % of loans, Size is the logarithmic mean of total assets, T.Hausman is the probability of the Hausman test. This table shows the results of the estimates by the fixed effects Generalized Least Squares (GLS) method of the two models (in the sense of Z_{ROA} and in the sense of Z_{ROE}), where the first column shows the coefficients of the variables and what is in brackets shows the t-Student of the variables., (*) (**) and (***) indicate respectively significance at the 1%, 5% and 10% levels

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[3]return on average assets
[4]return on average equity

Table 6. The relationship market power-financial stability by the random effects MCG method

Variables	Z_{ROA}		Z_{ROE}	
Lerner	-0.00028	(-0.064)	-0.00015	(-0.96)
LDR	1.20***	(8.69)	0.033	(0.66)
LLR	-0.03	(-1.64)	-0.0033	(-0.56)
TCPIB	0.06**	(2.25)	0.019*	(1.76)
INF	-0.059*	(-1.85)	0.022**	(2.43)
TCP	0.79**	(4.81)	-0.037	(-0.62)
Size	2.46***	(3.73)	0.879***	(4.8)
R^2	0.41	0.41	0.19	0.19
Nb. Ob.	652	652	652	652
T. Hausman	-	-	0.1317	0.1317

Note: Z_{ROA} and Z_{ROE} denote respectively the Z-score which measures financial stability of banks based on "return on assets" and "return on equity". Lerner is the Lerner index which measures degree of competition in the market, TCPIB is the GDP growth rate. INF is inflation rate, is total loans to total deposits ratio. LLR is the loan loss reserve to total loan. TCP is the growth rate measured as a % of loans, Size is the logarithmic mean of total assets, T.Hausman is the probability of the Hausman test. This table shows the results of the estimates by the random effects Generalized Least Squares (GLS) method of the two models (in the sense of Z_{ROA} and in the sense of Z_{ROE}), where the first column presents the coefficients of the variables and what is in brackets shows the t-Student of the variables. (*) (**) and (***) denote respectively significance at the 1%, 5% and 10% levels

The results show a negative and a non-significant relationship between degree of market power and degree of financial stability. This implies that the low degree of market power is not the result of a low degree of financial stability. In other words, high competition in the banking market is not responsible for the poor performance of the banks in the studied countries.

Our results are inconsistent with those of Ariss [14] who found a positive and a significant relationship between market power and financial stability, suggesting that a high degree of market power results in a high degree of financial stability by reducing potential risks. The results of Ariss [14] are also inconsistent with Soedarmono and others [27], De Nicolo and others [38] and Uhde and Heimeshoff [3] supporting the concentration-fragility hypothesis where a high degree of market power leads to a high degree of financial instability.

Moreover, in the three tables we note that among the control variables the LDR ratio is significantly positive for all regressions implying that banks in the region with high bank liquidity helps stabilize banks. As for the macroeconomic variable of the GDP growth rate, it is significantly positive implying that robust growth helps maintain financial stability. Furthermore, inflation has a negative sign and its significance indicates it negatively affects financial stability. The last significant variable in the regressions is the variable "Size", indicating that size positively affects financial stability through increased risk-taking behavior by banks.

5. CONCLUSION

Through the literature review, we concluded that the relationship between market power and financial stability remains ambiguous. From a theoretical point of view, this relationship bears on two basic hypotheses, the "competition-stability" hypothesis and the "competition-fragility" hypothesis.

Our purpose is to study the validity of these hypotheses on a sample of 157 commercial banks in the MENA region distributed as follows: Algeria (10) Bahrain (9) Egypt (23) Iran(8) Iraq (1), Israel (6), Jordan (10), Kuwait (5), Lebanon (18) Libya (4), Morocco (9), Oman (5), Qatar (6), Saudi Arabia (9), Syria (1), Tunisia (14), the United Arab Emirates (15) and Yemen (4) over a period of 9 years between 2000 and 2008.

In order to examine the impact of market power on financial stability we used two models, a main regression within the sense of ROA and a robustness regression in the sense of ROE. We used the Z-score index as a measure of financial stability where a high value of the latter indicates a better banking performance. We also used the Lerner index as a measure of degree of market power where a high value of the Lerner index implies a monopoly power and a low value of the Lerner index implies a low market competition.

In fact, the results of measuring these two variables indicate that the banking market in the MENA region is a competitive market because of the low degree of market power. Moreover, banks in this region suffer from financial

instability as indicated by the low value of the Z-score index.

Tables 4, 5 and 6 respectively include the results of the OLS estimation, the random-effects MCG and the fixed-effects MCG where the Lerner variable is negatively non-significant implying that in our sample, competition in the MENA banking market does not lead to financial instability. Therefore, our initial hypothesis has been validated according to which weak market power does not determine financial instability.

COMPETING INTERESTS

Authors have declared that no competing interests exist

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