THE IMPACT OF BANKS' CONCENTRATION ON FINANCIAL STABILITY IN THE MENA REGION

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Contents

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List of Tables

Abstract

Purpose - The banking sector in many MENA countries has recognized noticeable bank consolidation, which has dropped the number of banks and raised market concentration. This might raise questions about the impact of such increase in concentration on the soundness of the banking sector and consequently on the financial stability. Therefore, this study examines the impact of concentration on the financial stability of MENA banking sectors.

Design/Methodology/Approach – the study adopts the FM-OLS panel method on 15 MENA banking sectors covering the period 1996-2016.

Findings – The empirical results show a negative relationship between banks' concentration and financial stability. Thus, banks' consolidation is harmful for financial stability in the MENA region.

Originality/Value – Little studies on the impact of banks' consolidation on financial stability in the MENA countries have been performed. Moreover, our findings suggest that banks' consolidation weakens financial stability.

Keywords Financial stability, MENA region, banking concentration, FM-OLS panel, concentration-stability approach, concentration-fragility approach

Chapter 1

Introduction

1.1. Background

Financial liberalization in both matured and emerging economies since the late 1970s and early 1980s has increased competition in the banking sector, which influenced large banks from matured countries operating at low-profit margins to penetrate emerging countries with a relatively high profit margin (Noman et al., 2017). Increased competition drives banking institutions to accelerate the consolidation process to protect their market power, which again raises concerns of increasing the number of large banks, and the level of concentration. In fact, the world has witnessed a significant wave of mergers and acquisitions (M&A) in the financial services sector. At the same time, the recent financial crises in both developed and developing countries resulting regulatory failures to bring the financial system in discipline have raised concerns among policy makers and academics regarding the subsequent effect of competition on financial stability in the banking system. This is essential because banks provide financial intermediation services that facilitate fund transfer between lenders and depositors and contributes to the stable economic system through the efficient allocation of financial resources.

The recent wave of M&A is affecting competition in the banking sector. The latter, competition is among the drivers that researchers and policymakers find it essential for a healthy banking system. Although M&A are two different operations, they are often used interchangeably. As per the definition of Georgios (2011), a merger occurs when two or more firms combine and transform into a single firm. An

acquisition, however, takes place whenever a large and financially healthy firm purchases a small one.

In the banking sector, as in all sectors, M&A lead to a drop in the number of banks and an increase in market concentration. The number of banks can drop due to several reasons such as bankruptcies during phases of crises, consolidation urged by the reduction of state branching and national interstate banking restrictions, and deliberate mergers between different banks (Kowalik et al., 2015). Furthermore, there are different business-related reasons that might urge banks to merge. M&A permit banks to attain economies of scale, boost revenues, drop costs through operational efficiencies and diversify by expanding business lines or geographic reach (Kowalik et al., 2015). M&A are vital forms of external growth. With largely globalized economies, international firms are using M&A as an approach for maintaining a larger asset base, opening new markets, attaining larger market shares, achieving complementary skills and capabilities and becoming more competitive (Derashri, 2016).

Bank consolidations in emerging economies are realised to cope with difficulties engendered by systemic banking crises or individual bank default. Throughout or succeeding banking crises, policy makers usually recommend, or even urge, banks to consolidate in order to minimize the risk of bank defaults and cut the financial and social cost of banking crises. When the banking sector is quite sound, authorities normally do not interfere. They are likely to do so and urge banks to merge when the banking sector is vulnerable to crises and is threatened by difficulties (Awdeh and Moussawi, 2011).

One main goal of banking authorities is to insure stability, more specifically financial stability. Financial stability is the position in which the financial system is resilient to economic shocks and is able to efficiently perform its elementary functions: the intermediation of financial funds, management of risks and the organization of payments. According to Schinasi (2005), "Financial stability is a condition in which an economy's mechanism for pricing, allocating and managing financial risks (credit, liquidity, market, counterparty etc.) are functioning well enough to contribute to the performance of the economy. A certain financial system is in a range of stability whenever it is capable of facilitating the performance of the economy, and of dissipating financial imbalances that arise endogenously or as a result of significant adverse and unanticipated events".

The topic of the effect of competition in the financial sector on its stability has been controversial. There are two opposing views on the effect of competition on financial stability. The first sees that regulations that allow banks to liberally compete might jeopardise the banking sector's stability. It triggers enormous panics and uncontainable bank runs that can spontaneously influence the whole economy. Advocates of this view agree that a competitive banking sector tends to be more vulnerable than uncompetitive one. The other view sees that monopolistic banks tend to take risky projects. These banks possess liquidity surplus that might take over their financial position and risk the projects that they normally aim to finance. (Caminal and Matutes, 2002). So, advocates of this view agree that a competitive banking sectors are less vulnerable than less competitive ones. Thus, the relationship between concentration and financial stability remains controversial in the banking industry.

1.2. Need for the study

The various financial difficulties that hit the financial system, especially the 2007-2008 Global Financial Crisis, have shown the complex relationship between market structure, regulation and stability of the banking industry. To be more specific, studying the impact of banks' competition on the probability of a crisis has grabbed a lot of attention recently. However, little is known about the impact of banks' concentrations on financial stability in the Middle East and North Africa area. So, this thesis sheds light on the MENA region, whose banking sector is still categorized by low levels of competition and high barriers to entry. Understanding the impact of banks' concentration on financial stability is crucial to financial analysts, banking sector representatives, policymakers and economic researchers. It helps them introduce and suggest suitable policies, regulations and recommendations that maintain financial stability.

1.3. Purpose of the study

The banking sector in many MENA countries has recognized noticeable bank consolidation, which has dropped the number of banks and raised market concentration. This might raise questions about the impact of such increase in concentration on the soundness of the banking sector and consequently on financial stability. Therefore, this study examines the impact of banks' concentration on the stability of financial sector in the MENA region. In order to test this relation, we adopt the FM-OLS panel method on 15 MENA banking sectors covering the period 1996-2016.

1.4. Brief overview of all chapters

The remainder of the thesis is organized as follows: Chapter two discusses the main theories related to the relationship between banks 'concentration and financial stability. Furthermore, this chapter discusses the recent empirical findings showing the gap in the literature. Chapter 3 presents the main hypothesis and its related variables. It further explains the sample under examination and proposes the suitable method to test the impact of banks' concentration on financial stability in the banking sector. Chapter 4 presents the results of our findings. First, it presents the descriptive statistics, followed by the preliminary tests, specifically, unit root and co-integration tests. Finally, results from regression analysis are analysed. Chapter 5 discusses the main findings and the managerial implications of this study. It presents a set of recommendations to policy makers and regulators and ends up with a concluding remarks.

Chapter 2

Literature Review

2.1. Introduction

Economic theory stresses that competition has desirable outcomes as it reduces prices, increases production and provides incentives for firms to innovate. In contrast to this, economists and policy makers are convinced that the banking sector is unique. The presence of market failures explains why the standard competition paradigm is not directly applicable to the banking sector (Doll, 2010). Relationships in financial markets are characterized by asymmetric information, the presence of network externalities and (implicit) switching costs (Carletti, 2008). These market frictions and entry barriers explain why the market mechanism in financial markets might not function as well as it does in other markets.

The past fifty years have seen systemic shifts in the structure, size and composition of financial systems globally. The concentration of banks reveals the relative sizes and number of banks functioning in the financial sector. Successively, the concentration level displays the conduct of banks in the market. In general, the higher it is, the more banks will rely on each other or on the leading bank (Stazhkova et.al, 2017). The monopolistic structure of the market is exemplified by the maximum level of concentration.

Theoretical models make contradicting predications about the effect bank competition has on financial stability. This chapter discusses the theoretical ambiguity of the relation between concentration and financial stability. The first part deals with theories predicting both positive and negative effects that competition has on financial

stability. This part starts by discussing the two competing theories, the so-called the "Collusion Hypothesis" and the "Efficient Structure Hypothesis". These theories address, in general, the relationship between concentration and banks' performance. Then a thorough discussion of the relationship between concentration and financial stability in the banking sector based on the "Concentration -Stability" approach and the "concentration-fragility" approach is presented. The second part of this chapter covers the recent empirical studies on this field. This chapter ends with summary and conclusion that identify the gap in the literature.

2.2. Theoretical foundation

The theoretical, as well as empirical, literature on the relationship between bank competition and stability produces controversial evidence. Two main competing theoretical views have been developed on this issue. The "concentration stability approach" suggests that competition in the banking sector leads to instability, while the "concentration-fragility approach" suggests that a positive relationship exists between competition and stability. However, two earlier theories, "collusion hypothesis" and "efficient structure hypothesis" addressed the relationship between market structure and the performance of the banking sector. The main focus of those two theories is on the relation between market structure and profitability of entities.

The basic premise of the collusion hypothesis, developed by Bain (1951), is that collusion among firms in markets with high concentration ratios is also high. Collusion among firms leads to an increase in the prices of services provided, and thereby it results in the acquisition of excess profits. As a result, this leads to the

weakening of the market's competitive structure and the appearance of imperfectly competitive market structure. In addition, higher market shares of companies lead to an increase in concentration ratio and causes the level of competition to decrease.

Structure Conduct Performance (SCP) paradigm, an extension to the collusion hypothesis, proposes that concentration in a market endorses collusion between firms. To clarify further, more concentration increases a firm's market power. As a result, firms begin signing open or secret agreements and elevate the price of the products to raise their profits leading to a monopolistic market structure. Furthermore, and according to the collusion hypothesis, concentration positively affects profitability and negatively affects market performance. The presence of barriers to market entry creates continuous high profits. Banking concentration can embody a sort of financial barrier to entry in the market of financial services. Banking market power leads to lower number of firms, a larger average firm size, and a higher fraction of large firms in markets where banks have more market power (Gaynor and Town, 2004).

The collusion hypothesis was disapproved by the initiators of the "efficient structure" hypothesis, which was put forward by Demsetz (1973) and developed further by Peltzman (1977). Demsetz (1973) argued that the market shares of some firms, and therefore the concentration ratios, are high because these firms are efficient and produce at low-cost. In such cases, it is possible to observe high market shares-concentration ratios simultaneously with highly competitive market structure.

Demsetz (1973), in his "efficient structure hypothesis" states that concentration in a market is not an arbitrary incident; however, it is due to the high efficiency (i.e., lower costs) of the main firms in the market. In other words, firms that have lower costs than their competitors will cut their prices and enjoy greater market

share than inefficient firms. This leads to higher concentration ratio in the market. According to Demsetz (1973), even though there is high concentration in a market due to efficient firms, the competition degree could still be high. To elaborate, the "efficient structure" hypothesis argues that there is a specious relationship between profitability and concentration. The actual relationship can be clarified as follows: "High efficiency in a sector leads to high market share and it causes to high concentration in the sector." That's why market share can be regarded as a quota of efficiency (Smirlock, 1985. p. 70-71).

On the other hand, considering market structure as a proxy for efficiency in empirical studies has been intensely disagreed. It was suggested that efficiency should be assessed and applied straightforwardly in empirical analysis (Shepherd, 1986; Timme and Yang, 1991; Berger, 1995). The leading purpose for using efficiency measures directly in studying collusion and efficiency market theories is related to the interpretation problem that the traditional specification involves: Shepherd (1986), for example, argues that market share only represents market power. On the contrary, Smirlock (1985) comprehends that high market share indicates that the most efficient firms enjoy low costs and gain market share. According to this viewpoint, market share can be deemed as a representation of efficiency.

To sum up, collusion and efficiency theories are contradictory theories that stress on the relationship between market structure and performance of firms without paying attention on the impact on financial stability. Later theories filled the gap that wasn't present in previous literature and addressed the relationship between market structure on the stability of the financial market.

Before discussing these theories, it is important to identify the qualifications for financial stability. According to IMF (2004) a financially stable market should fulfill the following three conditions: (a) maintaining the efficiency of allocation of economic resources and the efficacy of other economic processes; (b) evaluating, measuring, allocating, and controlling financial risks; and (c) preserving its aptitude to achieve these basic functions even when confronted by external shocks or by several imbalances—generally through self-corrective methods." In other words, a financial system is considered to be stable if it is proficient in enabling the performance of an economy, without being affected by financial imbalances that are engendered from adverse and unexpected events or shocks (IMF, 2004).

The impact of competition on financial stability has been a controversial issue and received much discussion in economic literature. Two major approaches: competition – fragility approach and competition – stability approach (anti – competition views and pro – competition views). The supporters of the former approach agree that bank competition lowers interest income and reduces profits, thus leading to higher probability of default or bankruptcy, which disturbs the whole financial system (Gonzalez et al., 2017). On the other hand, advocates of the latter approach claim that monopolistic banks, which have a greater market power, incline to charge higher interest rates. This motivates borrowers to involve in risky activities. Under this approach, there is a positive relationship between competition and financial stability (Gonzalez et al., 2017).

Both hypotheses may be true depending on the type of markets. For example, increased competition in less – competitive markets may support the risk shifting effect and improve efficiency, which ameliorates financial stability. The competition – stability approach explains the positive relationship between competition and

financial stability. However, in highly competitive markets, increasing competition might impact the interest margin that does not offset the risk shifting effect.

Banking authorities usually support the concentration – stability approach, knowing that a concentrated market is a less competitive one. After the global financial crisis, many M&A were carried out in order to promote financial stability. Proponents of the concentration – stability view (competition – fragility view): argue that monopolistic banks earn high profits, thus deterring excessive risks (Allen and Gale, 2004; Keeley, 1990; Salas and Saurina, 2003). Allen and Gale (2004) stress that competitive banks are prone to higher risks than concentrated ones since any adverse shock can lead to a chain reaction (contagious). Under perfect competition, banks are price takers, thus, they are taken for granted in a large industry. As a result, no bank will dare provide liquidity to a distressed bank without avoiding serious and painful impact of contagion effect.

Tabak et al. (2012) argue that competition between banks is one of the main reasons of adverse selection problems. The wide variety of competing banks increases the probability of untrusted debtors, thus, increasing the probability of bankruptcies. Keeley (1990) asserts that increased competition in the 1980s drove banks to act less wisely, which resulted in greater risk taking.

On the other hand, Boyd et al. (2006) and Boyd and Nicolo (2005) conclude that the previous theory is weak since it addresses competition between deposits and ignores competition between loans. Their approach explores the effect of competition in both deposits and loans markets and assumes that banks solve an optimal contracting problem with their borrowers. Boyd and Nicolo (2005) disagree with the competition – fragility view and claim that less contestability in the loans market

motivates banks with greater market power to charge high interest rates for borrowers. Consequently, this drives borrowers to take more risk, which increases their default risk. This subjects banks to moral hazard and adverse selection problems and drains its solvency due to the trade of risk from the borrowers to the banks.

Acharya and Gromb (2012) claim that regulators pay subsidies to the large banks in concentrated markets through 'too-big-to-fail' schemes. This changes the banks' risk-taking incentives and increases their risk-taking tendency, thus unsettling their stability. As a result, the failure of a large bank might cause the failure of others through the contagion effect.

Martinez-Miera and Repullo (2015) find a U-shape relationship between competition and banks' risk of failure. Risk of default first decreases as loan rates decrease (risk shifting effect) and then increases when the market becomes very competitive. On the other hand, Liu et al. (2013) find an inverted U-shape between competition and risk of failure. Competition might push loan rates downward reducing banks' interest income from non-defaulting loans used as a buffer for loan losses.

Due to the complexity of the financial system, policy makers find it difficult to decide what market structure best sustains the stability of the banking sector. Blundell-Wignall et al. (2011) argue that although competition is healthier for the soundness of the financial system, regulating it is all what matters. An effective competition ameliorates efficiency and provides a broader range of better products to final consumers. In addition, it encourages innovation and cuts prices. However, banks mostly operate in structurally oligopolistic markets, which was argued that it was the reason behind the recent financial crisis This was because many banks were

considered as systemically important, which failed market discipline resulting in moral hazard, with excessive risk taking being underwritten by perceived guarantees. Therefore, prudential authorities should set regulations that make the system less oligopolistic.

Blundell-Wignall et al. (2011) claim that the systemic element in banking is large. Thus, in contrast to other economic sectors, where competition and market discipline are vital, regulation is a key element for sound financial systems. Financial authorities should be able to administer applicable policies that preserve the stability of the financial system, without forgoing competition and efficiency. But, excessive regulation tends to obstruct competition, restrict innovation, and reduce efficiency. However, keeping the system as is de-stabilizes it. This is because the banks are hugely affected by demand deposits withdrawals and holding longer term risky assets, which are instable by nature. That generated instability could lead to substantial adverse spill-over effects. However, preserving economic growth must be aligned with limited risk-taking. Policy – makers should set limited safety and soundness regulations and policies that ensure the freedom of operation of banks and protect them from major predicaments at the same time. This is mainly one of the main concerns of regulators who tend to control the financial activities without affecting the grounds of competition.

In addition, results revealed by Karkowska (2017); Schaeck, Čihák and Wolfe (2006) and Vives (2010) show that the theoretical literature on the link between the market structure and stability is indecisive about what prudent policies towards banks would be the best. Moreover, Schaeck, Čihák and Wolfe (2006); Schaeck and Čihák, (2008) and Vives, (2010) conclude that there is no scientific consensus on whether bank concentration leads to greater or lesser stability in the financial sector.

2.3. Empirical studies

Empirical literature on the role of bank competition on financial system stability is divided into three main categories. First, most initial studies adopted the 'concentration-stability' or the 'franchise-value' view. The scholars of such studies (Broecker, 1990; Keeley, 1990, Agoraki, Delis and Pasiouras, 2011) agree that competition destroys market power, reduces profit margins, and as a result, erodes franchise value that motivates banks to take more risk; as banks gain market power, their franchise value improves. Knowing that this franchise value replicates intangible capital that banks only realize if they do not bankrupt, the higher the value, the more the banks are hesitant to take risk (De Ramon, S.J.A. et al., 2018).

The second category, which follows the 'concentration-fragility' hypothesis (Boyd, De Nicolo and Jalal, 2006; Soerdarmono et al., 2013; Schaeck et al., 2009), suggests that as banks maintain market power, it is also possible that their portfolio risk increases. This hypothesis claims that more competitive banking system creates more stability. The key principle behind this hypothesis is that banks with market power gain rents by enforcing higher rates on loans. Yet, higher borrowing rates might elevate the riskiness of banks' asset portfolios due to adverse selection (Stiglitz and Weiss, 1981) and moral hazard (risk-shifting) problems (De Ramon, S.J.A. et al., 2018).

Finally, recent studies approve that there is a non-linear relationship between bank competition and financial stability (Berger et al., 2009; Tabak et al., 2012; Beck et al., 2013). In particular, banking systems that are more competitive or more concentrated tend to be more stable than those with average levels of competition.

Empirical evidence from studies in the period prior to the 2000s are mostly in support of the 'concentration-stability' hypothesis. Specifically, Brocker (1990), whose study is based on USA data, supports the 'concentration-stability' view by concluding a negative relationship between number of banks and average banks' credit quality. Keeley (1990) adds to Brocker's conclusions that more competition in the US banking sector succeeding deregulation ruined bank charter values, subsequently pushing banks to accept more risk. Agoraki et al. (2011) use bank-level panel data of Central and Eastern European countries applying the Lerner Index as a proxy for bank competition and non-performing loans (NPLs), in addition to z-score as measures of bank risk taking. Their results support the 'concentration-stability' view. Particularly, they deduce that NPLs and the Lerner Index have a significant negative relationship, indicating that an increase in market power decreases bank risk taking behavior. They also find that risk taking behavior of banks is reduced by bank capital buffers, rigorous regulations, bank size and required economic performance. The z-score shows a positive significant relationship with market power, which means that concentrated market systems are characterized by stability in the banking sector. Moreover, Noman et al (2017) study the impact of national bank concentration, bank regulations, and national institutions on the likelihood of a country suffering a systemic banking crisis. Using data on 69 countries from 1980 to 1997, they find that crises are less likely in economies with more concentrated banking systems, even after controlling for differences in commercial bank regulatory policies, national institutions affecting competition, macroeconomic conditions, and shocks to the economy. Furthermore, the data indicate that regulatory policies and institutions that thwart competition are associated with greater banking system fragility. In addition, a recent study by Rakshit and Bardhan (2020) examines the impact of competition in

the banking sector on financial stability in India. They use a dynamic panel model using data on commercial banks in India from 1996 to 2016. They find a positive impact of the Lerner index on Z-score which supports the competition-fragility hypothesis. Additionally, they find a positive relationship between bank competition and the prevalence of non-performing loans.

However, Boyd et al. (2006), who used US cross-sectional data and an international panel data of Banks, support the 'competition-stability' hypothesis. Their results show that higher bank competition is associated with better financial system stability. Moreover, they find that bank competition encourages banks to lend. However, one shortcoming of their study is that it applies Hirschman-Herfindarl Index (HHI) that disregards firm behavior in determining profitability. Furthermore, Schaeck et al. (2009), who applied duration and logit analysis and used bank-level cross-sectional data from 45 countries, also support the 'competition-stability' point of view. Precisely, they infer that competition (measured by H-statistic) reduces the probability of a crisis and increases time span between crises, therefore rejecting the impression that competitive banking systems are prone to systemic risk. The findings are significant with expected sign, even after incorporating a measure of concentration, indicating that concentration is not a correct measure of competition.

Financial crises may also affect the competition-stability interconnection. A study by Soedarmono et al. (2013) examines how financial crises alter bank competition, and accordingly bank risk taking behavior. In their study, they rely on bank-level panel data from 11 Asian countries using Lerner Index as a proxy for market power, while they rely on standard deviations of return on equity and assets as proxy of risk taking, while bank insolvency is measured by z-scores. The results indicate that market power positively impacts banks' volatility measures, which

means that market power has a positive relationship with bank risk taking behavior. Market power increases bank insolvency as well. Lastly, their results show that even though a higher Lerner index pulls bank ratios down, it has no drawbacks on financial stability during the 1997-1999 Asian financial crisis. Particularly, higher market power in banking affects risk taking adversely and bank solvency positively. Hence, they conclude that higher intensity of market power is accompanied by instable financial system, but this is not the case during a financial crisis. Another study by Minh et al. (2020) discovers the impact of market power on financial stability using bank-level data from 24 banks in Vietnam over the 2008-2017 period. They use the separated Lerner index by fixed effect model and random effect model as a proxy of market power, and Z-score as a proxy of financial stability. Their findings indicate that Vietnamese commercial banks realising little competition inclined to be less stable.

A study by Berger et al. (2009) undertakes a test of the opposing views of 'concentration stability' and 'concentration-fragility' using firm level data from 30 developed countries. The scholars agree with both theories. Specifically, they ascertain that banks with more market power tolerate more loan risk portfolio in favor of the 'concentration-fragility' hypothesis, besides their findings that banks with more market power appreciate less overall risk exposure that is in favor of the 'concentration-stability' hypothesis. Furthermore, they find that larger banks hold noticeably less non-performing loans, while foreign owned banks are more breakable. Furthermore, better economic performance is associated with less bank fragility.

Similar to Berger et al. (2009), Tabak et al. (2012) support both 'Competition-Stability' and 'Competition-Fragility' hypotheses. They also find that bank size and capitalization are major players in this relationship using bank-specific panel data

from 10 Latin American countries. They apply the Boone Index as a measure of competition. In their results, they realize that banks functioning under high and low competition level are healthier than those operating under average competition. Moreover, they find that higher loan loss provision positively impacts bank stability, while bank capitalization has the contrary impact. Further, their results show that bank liquidity and size ameliorate financial system stability. Thus, they accomplish that there is non-linear relationship between competition and risk-taking behavior.

The question whether banks 'concentration influences financial stability is examined by a large body of literature in emerging markets and, similar to those in developed markets, reveals mixed results also (Chen, Harford and Li, 2007; Greenaway, Guariglia, and Yu, 2014, Cuestas, Lucotte and Reigl, 2017; Lapteacru, 2017). Bank concentration is important because it can influence bank managers' ability to diversify bank risk. Ozili and Uadiale (2017) focus on bank concentration in the Nigerian banking sector and find that banks in highly concentrated sectors have a higher ROA ratio and net interest margin while banks with dispersed concentration have lower return on assets. Yeyati and Micco (2007) emphasise that from the 1990s on, Latin American banking sectors saw a growth in concentration and foreign penetration that prompted different implications for financial stability and the activity of domestic banks. They find that increased concentration did not weaken banking competition in the region, but foreign penetration did.

As for Middle East and North Africa (MENA) region related studies, few studies address the relationship between banks' concentration and financial stability. For instance, Almarzoqi *et al.* (2015) perceive various aspects of financial stability that are related to different sources of individual bank risk: solvency, liquidity and credit risk. Their results show various effects of competition on financial stability

depending on each type of banks' risk. Price competition positively affects bank liquidity since it promotes a self-discipline mechanism on the selection of bank financing sources and on the maintaining of liquid buffers. On the contrary, price competition might decrease bank solvency and credit quality of the loan portfolio. To be more specific, if banks have no sufficient capital base that compensates a decline in profitability, an increase in competition might reduce the solvency of the bank. Also, more competition could raise credit risk of a bank by presenting a higher rate of non – performing loans if the increase in lender's risk taking behaviour beats the decrease in the borrower's credit risk. Also, Gonzalez et al. (2017) study the impact of competition on bank stability for 356 MENA banks during the period 2005–2012. They find a U-shaped relationship between competition and banks' risk taking. The results show a negative linear relationship between z-score and H-statistics in Gulf countries, which indicates that an increase in competition renders the fragility of the financial system. The results of non-Gulf countries, however, show a positive relationship between competition in uncompetitive markets and stability.

2.4. Summary and conclusion

The literature on the relationship between competition in the banking sector and financial stability has been contradictory. There are two main opposing theories that explain this relationship. The competition – stability view states that there is a positive relationship between competition and financial stability. Supporters of this view argue that monopolistic banks, which enjoy a greater market power, earn higher interest profits. This encourages borrowers to involve in riskier activities. The

opposite view is competition fragility view, which argues that competition and stability are negatively related. Advocates of this view argue that competition in the banking sector reduces income generated from interest and lowers profits. This leads to higher probability of default or bankruptcy and destabilizes the whole financial system. Thus, the theoretical literature on the link between the market structure and stability is indecisive about what prudent policies towards banks would be the best. Therefore, the theoretical part concludes that there is no scientific consensus on whether bank concentration leads to greater or lesser stability in the financial sector.

Similar to the theoretical studies, the empirical literature shows disparities in the results. Some results support the competition – fragility view, while others agree with the competition – stability view. Moreover, some results agree with both of the renowned views and conclude a non-linear relationship with banks' competition and financial stability. Thus, the literature on the relationship between the market structure of banks and finical stability is indecisive about what prudent policies towards banks would be the best. It should be noted that there is no scientific consensus on whether bank concentration leads to greater or lesser stability in the financial.

Additionally, it is worth mentioning that very few papers address the relationship between concentration and financial stability in the MENA region. Just like studies on other regions, papers on the MENA region have reached contradictory results. In conclusion, literature on whether banks' competition is beneficial to financial stability has shown a wide gap between scholars' findings and conclusions. Therefore, this thesis will try to address this gap.

Chapter 3

Methodology

3.1. Introduction

As can be seen from the previous chapter, the relationship between concentration in the banking sector and financial stability is unclear. In fact, the literature has revealed two main competing theories. The first one is *the competition – fragility view.* It states that competition in the banking sector reduces the income generated from interest and hence lowers profits. This leads to higher probability of default and a risk of bankruptcy that would destabilize the whole financial system. The second one is *the competition – stability view*. It argues that banks' competition and financial stability are positively related. Advocates of this view consider that the banking sector has a monopolistic structure with a significant market power and hence banks earn high interest-profits. This encourages borrowers to take higher risks. Moreover, empirical evidence shows disparities in the results. Some results support the *competition – fragility view*, while others agree with the *competition – stability view*. Thus, the literature has shown wide variations between scholars' findings and conclusions. Furthermore, the banking sector in many of the Middle East and North African (MENA) countries has recognized noticeable bank consolidation, which has dropped the number of banks and raised market concentration. This might raise questions about the impact of such increase in concentration on the soundness of the banking sector and consequently on the financial stability. Therefore, the objective of this thesis is to examine the impact of concentration on the financial stability of the MENA's banking sector. Alternatively, the research question that we try to answer in

this thesis is the following: what is the impact of banks concentration in the MENA on the financial stability of the banking sector?

3.2. Hypotheses

In this sub-section, we translate the research question stated above into statistical hypotheses. A hypothesis is one of the fundamental tools for research in any kind of examination. Sage (2008) defines a hypothesis as "a specific, clear, and testable proposition or predictive statement about the possible outcome of a scientific research study based on a particular property of a population". Typically, a hypothesis test involves two competing hypotheses: the null hypothesis (H_0), which is given the benefit of doubt and the alternative hypothesis (H_1), which is given the burden of proof. Hence, a hypothesis test observes the significance of the available data supporting H_1. Consequently, the null and the alternative hypotheses considered in this thesis are as follows:

H_0: There is no relationship between banking market concentration and financial stability in the MENA region.

H_1: Banking market concentration affects financial stability in the MENA region.

3.3. Data

The population targeted in this thesis is the MENA countries. Although the MENA region consists of 19 countries; yet the sample taken in this thesis consists of 15 countries: Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, and United Arab Emirates. These are the countries that have a complete set of data. The other MENA

countries are not included in this study because they either have no data at all, such as Gaza and Yemen, or have insufficient data, such as Iraq and Iran. Therefore, these countries were excluded from our study. The variables listed have an annual frequency and are extracted from the World Bank and the World Economic Forum, and cover the period of 1996-2016.

3.4. Variables specifications

According to Patel (2009), a variable is defined as a feature that varies from one element of analysis to another one. To be more precise, it is a characteristic that varies upward or downward over time, or a concept that changes in each situation. Variables are classified as dependent or independent variables. The dependent variable is defined as the variable that depends on the variation of another variable. It is the variable that the researcher wishes to elucidate its variation (Patel, 2009). As for the independent variable, it is defined as the presumed source in an experimental study. It is the concept that explains the variations in the dependent variable. Therefore, the independent variables, also known as the explanatory variables are the predecessors, while the dependent variable is the successor (Patel, 2009).

This thesis aims to investigate the impact of the concentration in the banking sector in the MENA region on the country's financial stability. To do so, the following dependent and independent variables are considered in our model.

Dependent variable:

The main dependent variable is the financial stability. It captures the probability of default of a country's banking system. Alongside other indicators, the most used proxy for financial stability is the bank's z-score. It is computed as $\equiv (k + \mu)/$, where k is the percentage of equity capital to assets, μ is the

percentage of returns to assets, and σ is the standard deviation of return on assets as a measure for return volatility. A higher z-score indicates a higher probability of solvency. Thus, the relationship between the z-score and a bank's insolvency is negative. Among all the used financial stability proxies, z-score is the most used indicator (World Bank, 2012). Papers that considered the z-score as a measure for bank's stability include Boyd and Runkle (1993); Beck, Demirgüç-Kunt, Levine (2007); Demirgüç-Kunt, Detragiache, and Tressel (2008); Laeven and Levine (2009); Čihák and Hesse (2010).

Nevertheless, the z-score has several limitations. The most obvious one is that it completely relies on accounting data (World Bank, 2012). If financial institutions adjust the reported data, the assessment of stability might seem overstatedly positive. Also, the z-score looks at an individual financial institution; possibly, overseeing the financial institution's default risk might impact the whole system (World Bank, 2012). However, the benefit of using z-score by institutions is that it can be easily substituted by more complex market based data that might be missing. Also, the z-score permits the comparison of the default risk among various types of institutions that face the risk of insolvency, rather than the fact that they might vary in their ownership or purposes (World Bank, 2012).

Another possible proxy for financial stability is the liquid assets to total assets.

This indicator is recommended by the IMF to measure banks liquidity. The Bank for

International Settlements (2008) describes liquidity "as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses." So, this indicator shows the liquidity available to meet anticipated and unanticipated demands for cash. Liquidity risk arises when liquidity is inadequate to meet obligations as they come due. In most cases, a trigger event, such as the crystallization of the market, credit or operational losses in the bank, damages of the bank's reputation or market-wide liquidity stress, meets an existing vulnerability in a bank's balance sheet and causes an unfavorable liquidity outcome (Matz and Neu, 2007). However, the most common source of bank's vulnerability lies in liquidity mismatch between assets and liabilities – banks transform short-term deposits into long-term loans. Thus, failures of deposit takers can have a significant impact on the activities of all other financial and nonfinancial entities and on the confidence in, and the functioning of, the financial system as a whole. This makes the analysis of the health and soundness of deposit takers central to any assessment of financial system stability. Liquidity risk can be measured by two main methods: liquidity gap and liquidity ratios. The liquidity gap is the difference between assets and liabilities at both present and future dates (Bessis, 2009). Liquidity ratios are various balance sheet ratios, which should identify main liquidity trends. These ratios reflect the fact that banks should be sure that appropriate, low-cost funding is available in a short time. This might involve holding a portfolio of assets that can be easily sold (cash reserves, minimum required reserves or government securities), holding significant volumes of stable liabilities (especially deposits from retail depositors), or maintaining credit lines with other financial institutions.

One of the mostly used liquidity ratios is the liquid assets ratio which is the share of total liquid assets on total assets. This ratio shows the general liquidity shock

absorption capacity of a bank. In broad-spectrum, the higher the ratio, the higher the ability to withstand liquidity shock, where market liquidity is the same for all banks in the sample. However, a high value of this ratio might show a sign of inefficiency. Moore (2010) states that liquid asset ratio has also its shortcoming: it disregards the flow of funds from repayments, increases in liabilities and the demand for bank funds.

Another proxy variable employed in the literature is the share of liquid assets on deposits and short term borrowing. This ratio is more focused on the bank's sensitivity to selected types of funding (deposits of households, enterprises, banks and other financial institutions, and funds from the debt securities issued by the bank). Therefore, it should measure the banks' exposure to these funding sources. A higher value of the ratio means a higher ability to absorb liquidity shock. This indicator is similar to the one before but it involves only deposits to households and enterprises. It measures the liquidity of a bank assuming that the bank cannot borrow from other banks in case of liquidity need. The bank is able to meet its obligations in terms of funding if the value of this ratio is greater than 100%. A value less than 100% means that a bank is sensitive to deposit withdrawals.

Last possible proxy for financial stability is the non - performing loans (NPL) to loans. It is intended to identify problems with asset quality in the loans portfolio. It may be interpreted in combination with the NPLs less specific provisions to capital ratio. An increasing ratio may signal deterioration in the quality of the credit portfolio, although this is typically a backward-looking indicator since NPLs are identified when problems emerge.

The above-mentioned variables are all considered as proxies for financial stability. However, in our thesis, we use banks' z-score as a dependent variable (5 bank assets concentration ratio) along with the independent variables (shown in sub-

section 3.4.3). Applying the ratio of liquid assets to total assets as a dependent variable couldn't be used in this thesis because it violates the assumption of stationarity and co-integration that are necessary to use the FM-OLS model[1]. On the other hand, non – performing loans to total loans ratio couldn't be used due to lack of data. Therefore, the proxy of financial stability in our model is the banks' z-score.

Independent variables

Here below, we discuss the independent variables that will be considered in this thesis:

3.4.1.1. Lerner index

The Lerner index is used to identify the degree of monopoly. Monopoly power also called "market power" (L) is measured by the difference between the output price (P) of a firm and the marginal cost (MC) at the profit maximizing rate of output:

$$L = \frac{P - MC}{P} \quad \text{(Equation 3.1)}$$

The Lerner index lies between zero (perfect competition) and one (strong market power). A perfectly competitive firm has a Lerner index equal to zero ($L = 0$) since price is equal to marginal cost ($P = MC$). A monopolist will have a Lerner index greater than 0, and the index will be determined by the market power the bank has. A larger Lerner index indicates a larger market power. To be more accurate, "Lerner index… measures market imperfection rather than monopoly or oligopoly power" (Skitovsky, 1955).

[1] Details of these results are in Appendix

3.4.1.2. Herfindahl-Hirschman Index (HHI)

Under the HHI model, each bank's market share is squared and then totaled to develop the index of a specific year. It is calculated as shown in equation 3.2 below:

$$HHI = \sum_{i=1}^{n} s_i^2 \quad \textit{(Equation 3. 2)}$$

Where, s is the market share of bank *i* and *n* represents the number of banks in a specific industry. This index sets a high weight to large banks that enjoy high market shares and a relatively lower weight to smaller banks.

3.4.1.3. K-bank concentration ratio

The ratio is derived by adding the market share of *k* largest bank or banks, and is calculated as per equation 3.3 below:

$$CR = \sum_{i=1}^{k} s \quad \textit{(Equation 3. 3)}$$

Where, s is the market share of a specific bank and *k* is the number of banks. The value of *k* depends on a random selection process. The value of concentration ratio extends between zero and one. If the industry entails equally sized banks, the ratio is zero such that the chosen *k* is relatively small compared to the actual number of banks. However, when all banks are chosen, the ratio approaches one (Bikker and Haaf, 2002b).

3.4.1.4. 5 bank asset concentration

This ratio represents the assets of the largest 5 banks as a percentage of the total assets of all the commercial banks in the country. As reflected in the MENA

region, the top 5 banks in each country represent the majority of the assets of the all the banking sector in the country. The increase of the concentration leads to monopoly of some banks in the market and in contrast, the decrease of concentration may increase the competition and can lead to more activities in the financial market. Moreover, if this ratio is too high, a default of a bank from the top 5 banks could have huge negative effects on the overall economy. According to Abuzayed and AL-Fayoumi (2016), bank concentration supports the economy, yet according to Deidda and Fattouh (2005), the relationship between banks' concertation and economic growth defers across countries.

Upon all the above mentioned proxies used to measure concentration, we consider in this thesis the 5-bank asset concentration due to data availability.

Control variables

When examining the impact of banking market concentration on financial stability, it is important to control for macroeconomic, bank-specific and regulatory factors that are expected to influence market structures and financial stability:

1- Financial Development (*FD*): we use the Financial Development Index published by the World Economic Forum.

2- Wealth and saving dispersions (*SAVING*): we use the national savings as a percent of nominal GDP.

3- The total deposits of the banking sector as percent of Nominal GDP (*DEPOSIT*): It is used to control for the impact of the relative size of the banking sector on financial stability.

4- The growth rate of Nominal GDP (*LGDP*): since the banks' investment opportunities may be correlated with business cycles (Laeven and Majnoni, 2003).

3.5. Data analysis

The data analysis is the process of bringing order, structure and meaning to the mass of collected data" (Marshall & Rossman, 1990, p.111). The data analysis techniques adopted in this research are the descriptive statistics and the regression analysis. Descriptive analysis is a method used to transform the available data into a form that will make it easy to interpret and understand (Bluman, 2014). A regression analysis is a statistical tool used to investigate the nature of the relationship between a single variable, known as the dependent variable and with one or more variables, known as the independent variables, to see if it is a positive or negative, linear or non-linear relationship. A regression can be categorized into three different categories; the simple regression, the multiple regression and the multivariate model. First, a simple regression analysis analyzes the variation of one dependent variable with one independent variable. Second, a multiple regression analyzes the relationship between one dependent variable and multiple independent variables. Finally, a multivariate model is a system of equations that considers multiple dependent variables function of multiple independent variables (Faraway, 2002). In our research, a multiple regression analysis will be considered and the Fully-Modified Ordinary Least Square (FM-OLS) estimator will be used for the reasons mentioned below[2].

The research has approached data from different dimensions. However, the most common tools of data analysis lie through three main statistical methods of data

[2] Section 3.6 page 36 explains the reasons of using FM-OLS model

structure: time series, cross-sectional and panel data. Nevertheless, each method has certain restrictions and respectively suitable for a different study and analysis.

Cross-sectional analysis

The cross-sectional method of data collection entails that the sample is selected at any given point in time (Wooldridge, 2010). In other word, Setia (2016) explains that cross-sectional study observes the population at a single point in time. Wooldridge (2010) highlights that mathematically, the cross-section data can be written as a vector in terms of *i* for each observation represented. Hulley et al. (2013) remarks that cross sectional approach is particularly beneficial for describing variables and patterns. This design is suited for observing associations and deducting a specific characteristic in the population (Visser et al., 2000). This method is also used to determine the relationship between subgroups in the population. Hulley et al. (2013) continues to note that one of the advantages of the cross-sectional design is that there is no follow-up and waiting time, since time is constant. Hence, this causes the study to be inexpensive. Moreover, Setia (2016) remarks that this approach has control and precision over the measurement. Nevertheless, Wooldridge (2010) remarks that the samples are often chosen using stratified sampling. Hence, the cross-sectional method of data collection is not based on random selection. Yet, as noted by Barreiro and Albandoz (2001), this type of sampling targets populations where the strata are easily formed due to the distinctiveness that each group has. Furthermore, Setia (2016) remarks that the sample size should be large enough, particularly if one is studying rare outcomes. He also notes that a potential for selection bias can also arise through this approach. Additionally, Setia (2016) and Hulley *et al.* (2013) consider that it is difficult to develop causality from the cross-sectional design.

Time series analysis

Time series method overcomes several limitations of the cross-sectional design including that of the causality analysis. The time series in general is based on collecting data over time in order to build a model, which inherits the characteristics of past observation (Adhikari and Agrawal, 2013). This system is then used to predict future events through understanding past events. It was originally applied to collecting data for engineering and environmental science studies (Shumway and Stoffer, 2017). Today, however, this method of collecting data is used in different areas including finance, economics, science etc. Mathematically, the time series design is defined as a vector of function of (t), where (t) represents time. Wessel (1995) continues to note that recoding data can either be a continuous function or discrete observation. The discrete time series measure the flow of data at an equally spaced time interval, whereas, the continuous time series observe data at every instance in time (Adhikari and Agrawal, 2013). Moreover, Adhikari and Agrawal (2013) note that in general, there are four components that affect the time series:

- Trend: the movement of the time series over a long period, such as the tendency to increase, decrease or stagnate over time.
- Cyclical variation: it monitors the cyclical repetition of the function, triggered by certain conditions over the medium-term.
- Seasonal variation: it is the general tendency of a time series to fluctuate during a given season; it is highly related to weather, climate, traditional habits etc.
- Random variation: the variation in a time series can be generated by unanticipated circumstances which are not only irregular but also do not have a precise pattern to follow.

Nevertheless, Kocenda and Černý (2015) note that there are several characteristics to be considered when studying a time series. For instance, the time series data are ordered through time built upon one variable or what is known as univariate time series. This case flourishes the lag effect or the dependence of the variable on its past behavior. Thus, the phenomenon auto regression arises as the variable regresses over time on its own past values. Another crucial aspect of the time series described by Kocenda and Černý (2015) is the stationarity. This specification entails that any shock that has occurred has a diminishing effect over time and disappears in $t + s$ as s tends to infinity. However, in the non-stationary time series, the impact of a shock does not disappear and the series are not mean- reverting. In addition to the above, standard statistical tests are misleading when the variables in the model are non-stationary. Hence, non-stationary variables should be converted to become stationary when included in the model. Variables can be either trend stationary or difference stationary. In the former case, the de-trended becomes stationary. In the latter case, the differenced variable becomes stationary. Kocenda and Černý (2015) note that the most common approach is to take the variable in first difference $= (\Delta y_t = y_t - y_{t-1})$ where Δy_t is the first difference of y_t . Through this

approach, part of the information contained in the data is lost with each differencing along with one observation. Therefore, according to Adhikari and Agrawal (2013), one of the underlying assumptions of time series is that the series is expected to be stationary to construct future forecasting.

Furthermore, Adhikari and Agrawal (2013) echo that the time series model is particularly valuable in strategic decision making and precautionary measures. The researchers add that this method is especially crucial when there is limited

information about the pattern or when the satisfactory explanatory variables are missing.

Panel data

The panel data captures the two characteristics discussed above. Variables will have a time dimension and a cross-section dimension. Hsiao (2007) outline that panel data or longitudinal data encompasses cross-sectional units, *i*, over time *t*. Greene (2010) note that this model allows the researcher to study causality while considering both heterogeneity across different variables which is missing in the time series model and the dynamic effect that is absent from the cross-sectional method. Although this approach is more complicated and is argued to be costlier, it has become widely adopted. Hsaio (2007, p.3) also note that the "*panel data is more accurate since it contains more degrees of freedom and more sample variability than cross-sectional data which may be viewed as a panel with t = 1, or time series data which is a panel with N = 1, hence improving the efficiency of econometric estimates*". Moreover, "the high degrees of freedom increase the power of statistical tests, by employing information on the dynamic behavior of a large number of entities at the same time" (Brooks, 2008, pp528).

In addition, the researcher argues that the panel data has the capacity to study the complexity of the human behavior better than the cross-section or time series data. This type of data collection contains more information and controls the impact of excluded variables. In other words, the panel data has information on the individuality of entities and the "intertemporal dynamics". Moreover, this approach can simplify the computation and the analysis in certain situations such as the analysis of non-stationary time series. In this case, Hsiao (2007) argues that with non-stationary data,

several techniques that were highly applied in the computation and analysis of the data, such as least-squares or maximum likelihood estimator which have an underlying assumption of normality of the data, cease to be affective. Hence, panel data can help to overcome this issue.

To address the research question and test the hypotheses previously outlined, the best approach would be to adopt the panel data design. The panel data, also known as longitudinal or cross-sectional time-series data, is a database in which the behavior of entities are perceived through time. The best use of this database is when the outcome variable might depend on the independent variables that are not observable but correlated with the observed independent variables. When those omitted variables are constant through time, panel data will estimate the effect of the observable independent variables (Schmidheiny, 2020). By combining time-series and cross-sectional database, the additional variation introduced can also help to moderate the presence of multi-collinearity issues that may arise if the database is modelled individually (Brooks, 2008). Thus, the general form of the panel data can be denoted as follows:

$$y_{it} = \propto + \beta x_{it} + \varepsilon_{it} \quad \text{(Equation 3. 4)}$$

Y represents the dependent variable for country *i* in year *t*, which is the bank risk or bank lending risk;

X is a column vector that contains the set of independent variables for country *i* in year *t*;

e represents the disturbance term;

$\propto$ is a constant term;

β is the column vector of coefficients;

i and *t* represents the cross-sectional and time-series dimensions respectively.

3.6. Empirical methodology

This part describes the use of panel data and the regression model that can be performed. In addition, it introduces the assumptions that must be tested and taken into consideration before running the regression.

Since we are using a panel data, many estimators can be performed, namely the pooled Ordinary Least Squares (OLS), the fixed effect, the random effect, the Fully Modified Ordinary Least Square (FM-OLS) and the Generalized Method of Moment (GMM). While pooled OLS assumes homogeneity across banks, the fixed and the random effect assume unobserved heterogeneity between banks. The fixed effect is a statistical model in which the model parameters are non-random quantities. It is used to "study the causes of changes within a person or entity since time invariant characteristics cannot cause such a change because they are constant for each person or entity" (Torres-Reyna, 2007, p.23). This contrasts with the random effect in which all or some of the model parameters are considered as random variables/quantities. If a researcher feels that he did not leave out any variable that may be uncorrelated with the independent variable in the model, then a random effect model is nominated to be used, because "it will produce unbiased estimates of the coefficients, use all the data available, and produce the smallest standard errors" (Williams, 2017, p.1). Conversely, if there are omitted variables, which are correlated with the variables in the model, "then fixed effects models may provide a means for controlling for omitted variable bias" (Williams, 2017, p.1).

The dataset under study is a heterogeneous panel dataset, which may also contain trended (i.e. non-stationary) or co-integrated variables. To provide optimal estimates of co-integrating regressions, FM-OLS regression may be used (Hamadi and Awdeh, 2020). This model adjusts the least squares to account for serial correlation effects and for the endogeneity between the explanatory variables coming from the presence of a co-integration relationships. Pedroni (2001) proposes a method based on the FM-OLS principles proposed by Phillips and Hansen (1990), which can also accommodate considerable heterogeneity across individual members of a panel. The author argues that an important advantage of working with co-integrated panel approach of the type he proposed is that it allows pooling the long-run information contained in the panel while permitting the short-run dynamics and fixed-effects to be heterogeneous among different members of the panel. Additionally, Pedroni (2001) states that an important convenience of the FM-OLS approach he proposed, is that in addition to producing asymptotically unbiased estimators, it produces nuisance parameter free standard normal distributions. In this way, inferences can be made regarding common long-run relationships, which are asymptotically invariant to the considerable degree of short-run heterogeneity that is prevalent in the dynamics typically associated with panels containing aggregate national data.

While the classical Fixed Effects/Random Effects models are capable of dealing with non-stationary, co-integrated panels, the heterogeneity of the exploited sample may weaken the inferences obtained from their estimations. Similarly, the FM-OLS does not suffer other weaknesses embedded in the alternative methods such as the Generalized Method of Moments (GMM) that may result in weak estimations if the variables are highly persistent (Blundell and Bond, 1998). Consequently, in this thesis we will use the FM-OLS proposed by Pedroni (2001). The test for non-

stationarity of the exploited panel and the existence of a co-integration equation linking the variables will be performed in the following sections.

Thus and based on the above discussion, this study adopts a FM-OLS model on a heterogeneous, non-stationary, co-integrated panel dataset. The exploited panel is formed of 15 MENA countries and covers the period 1996-2016.

The FM-OLS estimator can be used if the following assumptions are not violated:

1- Stationarity of the variables

As explained above, variables are expected to be stationary when considered in the model. Saying it differently, all variables must not have a unit root. A variable is strongly stationary if its distribution does not change in time and maintains its properties (i.e moments). A variable is weakly stationary if its mean, variance and covariance do not change with time. To test for the stationarity of the variables, we apply the Im, Pesaran and Shin (2003) panel unit root test. Our findings imply that our variables are non-stationary in level, but stationary in first difference. Consequently, they are all integrated of order 1 or I(1) variables.

2- Co-integration relation

The concept of co-integration came up to avoid spurious or noise regressions in time series. Researchers prefer that a spurious regression can be constrained to be homogeneous, thus, the coefficient estimator will be consistent. This will make the dependency of the estimated residuals on the estimated coefficients of the spurious regression substantial. In this case, the random variable nature of the estimated

coefficients induces the effect of switching a convergent panel unit root test statistic into a non-convergent test statistic when it is applied to estimated residuals. To test for co-integration, we apply the Kao residual co-integration test. Our results show the existence of a co-integration relation between the variables.

Henceforth, the model that will be estimated in this thesis is given by equation 4.1 below:

$$\square\square c\square\square\square\square_{i\square\square} = \square\square_0 + \square\square_1\square\square\square\square 5_{i\square\square} + \square\square_2\square\square_{i\square\square} + \square\square_3\square\square\square\square\square\square\square\square\square\square_{i\square\square} + \square\square_4 L\square\square\square\square_{i\square\square} + \square\square_4$$

$$\square e\square\square\square\square\square\square_{i\square\square} + \square\square_{i\square\square} \quad \text{Equation 4. 1}$$

Where *CONC5* is the bank assets concentration, *FD* is the financial development index, *Saving* is the percentage of national savings to nominal GDP, *LGDP* is log of nominal GDP, and *Deposit* is the percentage of total deposits to nominal GDP.

3.7. The statistical package

There are several statistical packages that are usually used to conduct similar empirical analysis. Some of those popular programs include Statistical Package for the Social Sciences or what is known as SPSS and Stata. SPSS contains several features and is user-friendly. It is used by market researchers, social scientists, government agencies, education researchers among other. This software is used for both quantitative and qualitative data analysis and contains multiple functionalities for managing, analyzing and measuring data. However, since SPSS contains a drawback for panel data analysis, it will not be used in our case.

An alternative program is E-views. This program is popular for managing

data, performing econometrics and statistical analysis. This package is employed by financial analysts, market researchers, economists and policy analysts. E-views can be

used to carry a wide range of tasks from building models, conducting regression analysis, generating model and estimating new policies and investment changes. This software overcomes the limitations of SPSS and offers tools for time series, cross sectional analysis and panel data analysis. In addition, E-views can support multiple linear and nonlinear least squares, ARMA, nonstationary regression, auto regression. Accordingly, E-views contains all the tools that are required to test the data gathered and help develop the model. Hence, this program will be used in this study.

Chapter 4

Results

4.1. Introduction

We focus in our empirical analysis on a set of 15 MENA countries for the period 1996 – 2016. We include in our analysis a set of control variables (financial and economic variables) alongside the main independent variable (5-bank assets concentration ratio). Our dependent variable is the "z-score" and the frequency of our data is yearly. In what follows, we present and discuss some descriptive statistics, the model's assumptions, and the findings.

4.2. Descriptive statistics

Table 4. 1 – Descriptive statistics

	ZSCORE	CONC5	FINDEV	SAVING	LGDP	DEPOSIT
Mean	22.82583	86.80638	0.313416	30.34067	3.969027	63.16011
Median	18.0475	92.471	0.32	27.3525	3.877181	54.2165
Maximum	60.437	100	0.591	67.983	6.628504	234.641
Minimum	5.212	48.18	0.032	-1.718	1.808617	4.981
Std. Dev.	11.60441	13.42874	0.135731	16.49753	1.07112	50.19966
Skewness	1.107682	-0.95242	-0.21019	0.313168	0.19764	1.878249
Kurtosis	3.800717	2.909907	2.367453	2.276743	2.573509	6.449854
Jarque-Bera	46.70393	30.60714	4.855068	7.704606	2.846011	218.9408
Probability	0	0	0.088254	0.021231	0.240989	0
Sum	4610.818	17534.89	63.31	6128.816	801.7435	12758.34
Sum Sq. Dev.	27067.11	36246.53	3.703021	54705.84	230.607	506521.2
Observations	202	202	202	202	202	202

- Based on table 4.1, 5-bank asset concentration ratio shows a maximum of 100% and a minimum of 48%. Libya has a concentration ratio equal to 100% Note that Libya's banking system is mostly owned by the state. The minimum concentration ratio is for Lebanon in 1996. It indicates that the Lebanese banking system is less concentrated than the one in the other MENA countries. The average of this ratio among our panel is around 87%, which indicates that there is a high concentration in the banking sector of the MENA countries.
- Table 4.1 shows that the United Arab Emirates (UAE) have the highest financial development index - FDI - (0.591 in 2009). This could be explained by the fact that the UAE have one of the most developed financial markets in the MENA region. However, Sudan scores the lowest FDI (0.032 in 2001).
- Based on table 4.1, the ratio of the national saving to GDP has a maximum of 67.983% in Libya in 2008. The oil industry accounts for over 90% of the government's budget. As a result, in recent years, Libya has benefited from the budget surplus that was accompanied with high oil revenues. This ratio has a minimum of -1.718% in Lebanon in 2014. This ratio was accompanied with Lebanon's budget deficit of 6.162% (trading economics).
- Table 4.1 shows that LGDP has a maximum of 6.628% in Saudi Arabia in 2014. This is due to its high oil revenues that surpass all other countries in the region. However, Mauritania has the lowest LGDP of 1.881% in 2000.
- Table 4.1 shows that deposit to GDP ratio has a maximum of 234.641% in Lebanon in 2014. The minimum deposit to GDP ratio is 4.981% in Sudan in 1999.
- Table 4.1 shows that z-score has a maximum of 60.437 in Jordan during 2006 and a minimum of 5.212 in Algeria during 1996. There is a wide gap between the maximum z-score and the average z-score of our chosen sample. This means that

in 2006, Jordan's banking sector had a much lower risk of default than other banking sectors.

In order to run our fully-modified OLS, we should test first for the stationarity of the variables and the presence of a co-integration relationship.

4.3. Preliminary results

Testing for the stationarity of the variables:

We apply the Im, Pesaran and Shin (2003) panel unit root test to check the stationarity of the variables. The null and the alternative hypotheses of this test are stated here below:

H_0: The panels contain unit roots

H_1: At least one of the series in the panels is stationary

The results of the IPS test applied on the variables in level are shown in Tables 4.2 (model with an individual intercept) and 4.3 (model with a trend and an intercept) [3]

Table 4. 2 - Unit root test for the variables in level and including an individual intercept

Series	Statistics	*p*-value
ZSCORE	-0.70266	0.2411
CONC5	0.06827	0.5272
FINDEV	-0.66819	0.2520
SAVING	-0.67913	0.2485
LGDP	2.61319	0.9955
DEPOSIT	1.50324	0.9336

The results in table 4.2 show that the *p*-values of the IPS test applied on all the variables are greater than 10% significance level. This means that we do not reject the null hypothesis of the presence of a unit root. Hence, all the variables are not

[3] Details of z-score results are in Appendix

stationary. For robustness check, we now apply the IPS test allowing for an individual intercept and a trend in the model. The results of the IPS test are shown in table 4.3.

Table 4. 3 - Unit root test on the variables in level and including individual intercept and trend

Series	Statistics	*p*-value
ZSCORE	-1.00378	0.1577
CONC5	0.09949	0.5396
FINDEV	0.7959	0.787
SAVING	1.62623	0.948
LGDP	2.89973	0.9981
DEPOSIT	1.95748	0.9749

Similar to table 4.2, the *p*-values of the tests are greater than 10% significance level. Hence, we do not reject the null hypothesis that the variables contain a unit root. Therefore, results in tables 4.2 and 4.3 confirm that all the variables are non-stationary in level. In order to check the order of integration of the variables, we apply the IPS test on the first difference of the above variables. The results of the test are shown in table 4.4.

Table 4. 4 - Unit root test of the variables in first difference and including individual intercept

Series	Statistic	*p*-value
D(ZSCORE)	-6.45889	0.0000
D(CONC5)	-5.18706	0.0000
D(FINDEV)	-5.49013	0.0000
D(SAVING)	-6.83323	0.0000
D(LGDP)	-3.54161	0.0002
D(DEPOSIT)	-3.13244	0.0009

Note: D denotes the first difference operator

Results in table 4.4 show that the *p*-values of the IPS test applied on all the variables is less than 1%. Thus, we reject the null hypothesis that the variables have a

unit root. Therefore, we conclude that they are stationary in first difference when including an individual intercept. We also apply the IPS test allowing for individual effects and trends. The results are shown in table 4.5.

Table 4. 5 - Unit root test for the variables in first difference and including individual intercept and trend

Series	Statistic	*p*-value
D(ZSCORE)	-4.22121	0.0000
D(CONC5)	-4.14439	0.0000
D(FINDEV)	-3.34525	0.0004
D(SAVING)	-6.61125	0.0000
D(LGDP)	-4.14439	0.0000
D(DEPOSIT)	-1.63537	0.0510

Note: D denotes the first difference operator

The results in table 4.5 show that there is no unit root in the variables in first difference when including individual intercepts and trends. In fact, we reject the null at 1% level for all the variables except for *deposit* which is stationary at 10% significance level. Results in table 4.5 confirm those in table 4.4. We conclude that all the variables are integrated of order 1.

Co-integration test

After insuring that all the variables are stationary in first difference, we perform the Kao residual co-integration test in order to check if equation 4.1 is a co-integration relation. The null hypothesis is the absence of a co-integration relation between the variables while the alternative hypothesis assumes the presence of a co-integration relation. The results of Kao test are shown in table 4.6[4].

[4] Details of z-score results are in Appendix

Table 4. 6 - Kao residual co-integration test

Series: ZSCORE CONC5 FINDEV SAVING LGDP DEPOSIT		
Trend assumption: No deterministic trend		
User-specified lag length: 1		
Newey-West automatic bandwidth selection and Bartlett kernel		
	t-Statistic	*p*-value
ADF	-1.917042	0.0276
Residual variance	7.687984	
HAC variance	6.928086	

The Kao test statistic (-1.917) and its *p*-value (2.76%) in table 4.6 reject the null hypothesis at 5% and 10% significance levels. Therefore, equation 4.1 is a co-integration relation.

FM-OLS model estimation:

Now that the two conditions of stationarity and co-integration are satisfied, we estimate equation 4.1 using the fully-modified least square (FM-OLS) estimator. The results of the estimation are shown in table 4.7.

Table 4. 7 - Estimation equation

Dependent Variable: ZSCORE				
Method: Panel Fully Modified Least Squares (FMOLS)				
Panel method: Pooled estimation				
Variables	Coefficient	Std. Error	*t*-Statistic	*p*-value
CONC5	-0.44918	0.138863	-3.2347	0.0015
FINDEV	25.6676	7.263269	3.533891	0.0005
SAVING	-0.223991	0.058135	-3.852973	0.0002
LGDP	4.011099	0.907409	4.420385	0.0000
DEPOSIT	-0.002629	0.033116	-0.079387	0.9368
R-squared	0.896339	Mean dependent var		23.13539
Adjusted R-squared	0.886696	S.D. dependent var		11.70236
S.E. of regression	3.93909	Sum squared resid		2668.826
Long-run variance	23.96529			

Results in table 4.7 show that the coefficients of all the variables are significant at1% significant level except the one for *deposit*. Therefore, there is a significant relationship between the explanatory variables (conc5, findev, saving, lgdp) and the dependent variable "financial stability" measured by the *z-score*.

The results show that concentration worsens financial stability in the MENA region. As concentration increases by 1 unit, financial stability decreases by 0.449. Theoretically, this negative relationship between concentration and financial stability satisfies the "concentration-fragility hypothesis". As we mentioned in the literature review, supporters of this hypothesis argue that monopolistic banks, which have a greater market power, tend to charge higher interest rates, which motivate borrowers to involve in risky activities. This might lead to the negative impact of concentration on financial stability. Our empirical findings are in accordance with Soedarmono et al. (2013) conclusion. The latter conclude that market power positively impacts banks' volatility measures, which means that market power has a positive relationship with bank risk taking behavior. Market power increases bank insolvency as well.

Financial development (measured by *findev*) and GDP taken in natural logarithm significantly increase financial stability in the MENA region. A 1 unit increase in financial development increases financial stability by 25.667 units, and a 1% increase in GDP increases financial stability by 0.044 units.

To explain the positive impact of financial development on financial stability, it is worth mentioning that financial liberalisation, which is an integral part of financial development, promotes financial stability. Financial liberalisation reduces credit control, lowers the interest rate which is the cost of borrowing, eliminates barriers to enter the market and opens the local market to foreign financial institutions, consolidates bank independence, and helps in attracting international

capital (Williamson and Mahar, 1998). Kono and Yokoi – Arai (2009) state that financial liberalisation would permit foreign financial institutions to engage in the market, enhancing competition and market efficiency. Accordingly, liberalisation boosts economic growth (Schumpeter, 1934). Kono and Yokoi – Arai (2009) add that if a country is hesitant to liberalise all financial services trade and capital flows, without hesitation, must liberalise those types of trade, which boost the financial system's stability and efficiency. This explains the positive relationship between financial development and financial stability in the MENA region.

The size of an economy (measured by *LGDP*) seems to be an important factor in stabilizing the financial system. This is shown in the positive and significant impact *LGDP* has on financial stability. It implies that larger MENA economies enjoy a more stable financial system. This may be because larger MENA economies possess robust financial systems against financial shocks.

However, according to our results, savings do not promote financial stability. *Saving* has a significant negative impact on financial stability. Knowing that savings play a positive role in maintaining the adequacy of banks, they might negatively impact the efficiency of banks. Efficiency is one of the main factors of maintaining financial stability. Banks that are not able to operate efficiently and cover their operational costs, are not able to overcome shocks.

Our results show that the model fits well the data. In fact, the coefficient of determination is 0.8963. This means that 89.63% of the variations in the dependent variable are explained by the model itself.

Chapter 5

Conclusions and recommendations

5.1. Introduction

Recently, the advantages and disadvantages of banks' consolidation and its impact of the stability of the financial sector became a hot debate among scholars. For instance, Boer and Portilla (2020) argue that consolidation of the European banking industry can lead to sounder and robust banks, and would also enhance their profitability due to higher economies of scale. On the other hand, emerging countries might move toward a higher degree of consolidation in the banking sector when they face systemic banking crises and a high risk of default. Banking consolidation might hence be a solution to overcome such difficulties (Awdeh and Moussawi, 2011).

Many of the MENA countries adopted this strategy in the mid of the nineties in order to enhance their banking sector and install financial stability. Moreover, banks consolidation is now seriously considered by Banque du Liban as a potential solution for the financial and banking crisis Lebanon is currently facing. Hence, the topic we address in this thesis is timely and is of interest to policymakers in the MENA countries. The main question raised in this thesis is whether banking consolidation impacts financial stability. Consequently, we hypothesize the following:

H_0: There is no relationship between banking market concentration and financial stability in the MENA region

H_1: Banking Market concentration affects financial stability in the MENA region

Financial stability is "a condition in which an economy's mechanism for pricing, allocating and managing financial risks (credit, liquidity, market, counterparty etc.) are functioning well enough to contribute to the performance of the economy" (IMF, 2005). As shown in the literature review chapter, there are two hypotheses that explain the impact of banking consolidation on financial stability. The two are based on the relationship between competition and financial stability. The first one is the competition-stability hypothesis and the second one is the competition-fragility hypothesis. Scholars who support the competition-stability hypothesis find a positive relationship between competition among banks and financial stability (Broecker, 1990; Keeley, 1990; Beck, et al., 2006; Evrensel, 2008; Agoraki, Delis and Pasiouras, 2011; De Haan and Poghosyan, 2012a, De Haan and Poghosyan 2012b). On the other hand, scholars who support the competition-fragility hypothesis conclude that competition between banks disturbs the financial system (Boyd, and De Nicoló, 2005; Boyd, et al., 2006; Uhde and Heimeshoff, 2009; Fu, et al., 2014; Pawlowska 2016; Gonzalez *et al.*, 2017). Both hypotheses may be true depending on the type of the market. Thus, there is no clear answer in the literature on whether banking consolidation would promote or hinder financial stability.

5.2. Findings and analysis of the results

In this thesis, we apply the Fully Modified OLS estimator on a heterogeneous, non-stationary, co-integrated panel dataset. Our sample consists of 15 MENA countries observed over the period 1996-2016. Our results show a negative relationship between banking consolidation and financial stability in the MENA region. This supports the concentration-fragility hypothesis discussed in details in the

literature review chapter. Briefly, the advocates of this view claim that monopolistic banks have a market power and are inclined to charge high interest rates. The latter encourage borrowers to involve in risky activities (Gonzalez *et al.*, 2017). Banks with market power will engage in a rent-seeking behaviour by imposing high interest rates on loans. Yet, higher borrowing rates might increase the riskiness of banks' asset portfolios due to adverse selection (Stiglitz and Weiss, 1981) and moral hazard (risk-shifting) problems (De Ramon, S.J.A. et al., 2018). Thus, as banks gain market power, their portfolio risk will increase. Therefore, the monopolistic structure of the banking sector in the MENA countries may make the countries subject to systemic bank fragility. On the other hand, our results do not support the concentration–stability hypothesis. This hypothesis argues that bank competition lowers interest rates, reduces profits, and leads to higher probability of default. All this would disturb the whole financial system (Gonzalez et al., 2017). The main idea behind this hypothesis is that competition destroys market power, erodes franchise value, encourages banks to take more risk in order to gain more profits.

Our results reject the null hypothesis that states that there is no relationship between banks consolidation and financial stability. As explained above, we conclude that there is a negative and significant relationship between banks consolidation and financial stability. This implies that more banks with market power in the MENA region will encourage them to take more risk leading to banks' systemic fragility.

As to the other explanatory variables; firstly, GDP appears to have a significant impact on financial stability. Thus, a larger economy enhances the financial stability. Secondly, savings to GDP ratio destabilizes the financial sector. Since a larger saving to GDP ratio might indicate that banks are not able to operate efficiently and efficiency is one of the main factors to maintain financial stability.

This means that banks may not be able to absorb sudden shocks. Thirdly, financial development index has a significant and positive impact on financial stability. A well-liberalised financial sector ameliorates the efficiency and management of the overall banking sector. Fourth, deposits to GDP has no significant impact on the financial stability.

5.3. Managerial implications

Our results, as briefly explained above, support the concentration-fragility hypothesis. This might be related to the fact that the banking sector in the MENA countries has high concentration ratios and banks possess an unbeatable market power. The results call for a proposal to the central banks to increase the number of banks by inducing changes to market entry restrictions, thus, enhancing competition in the banking sector, because high market power in the banking sector will expose it to higher risk. We can thus say that reduction in banks' competition increases banks' risk, as well as solvency and credit risks. So, if the market's activity is greatly regulated, banks may accept additional risk by misusing their position in non-competing markets. This should induce policymakers to: i) foster price competition amid banks; ii) alter and diminish those unnecessary regulations that hinder the contestability of banking markets. More importantly, other policy reforms should aim to reach a higher level of quality and independence of prudential regulation. Policies should limit the governments' control on the banking sector which limits its contestability. Actually, contestability with a solid supervisory power may incentivize banks to take risk and improve their lending risk management. This protects banks from unnecessary and risky credit growth just for profitability concerns. Also,

limiting the government involvement in the banking sector may restrict the moral hazard incentives of banks that enjoy large market power. Or else, banks might implement imprudent management of their liquidity due to their dependence on government's supervision. Moreover, it is recommended that policymakers in the MENA countries adopt new policies that enhance the financing of small and medium banks to enter the market and compete with larger banks.

Moreover, the banking sector's size has no impact on financial stability. This means that it does not promote financial stability. We also find that wealth and saving have a negative impact on financial stability. Although savings are related to capital formation that is considered a cushion for banks against shocks, they might stand as an obstacle in front of banks to cover short-term costs such as operational costs.

5.4. Limitation of the research

The main limitation in this thesis is data availability. The literature suggests several proxies for financial stability: i) banks' z-score, ii) liquidity ratio, and ii) Non-Performing Loans (NPL) to gross loans. The ratio of liquid assets to total assets - as a dependent variable - shows no co-integration relation with the explanatory variables. Therefore, we could not use it as a dependent variable in our FM-OLS estimation. Unfortunately, NPL to gross loans is not available for most of the MENA countries. On the other hand, concerning the main independent variable; the literature shows that "banks' concentration" is measured by: i) Lerner index, ii) HHI, iii) K-bank concentration ratio, and iv) 5-bank asset concentration ratio. Due to data availability, we choose the 5-banks asset concentration ratio as a proxy for banks' concentration. Because of data availability, we were not able to check the robustness of our results. However, there is no agreement in the literature on the optimal proxy to measure

banks' concentration. Moreover, the obtained R^2 (0.89) shows that our model fits well the data.

5.5. Further research

Future research should include more variables that might impact financial stability such as: capital adequacy ratio, asset quality, management efficiency, profitability of banks, liquidity measures, and sensitivity to market risk (CAMELS). Due to time constraint and lack of data in the MENA countries, there was a difficulty in collecting these data. Moreover, future research might explore the impact of banks' concentration on financial stability in a wider range of countries. Since the MENA region is still classified as a developing region, future research could address the topic on developing countries.

Future research should address indicators or an index that measures the degree of competitiveness rather than concentration. While we find evidence that supports the concentration-fragility view, we do not explore the channels through which competitiveness impacts banking sector's stability as concentration is insufficient measure of bank competitiveness.

On the other side, one can extend the estimations done in this thesis by testing and modelling the presence of cross-section dependence across the variables. It is expected that banks in the MENA region would be subject to common shocks and hence the variables (i.e GDP) may be cross-sectionally dependent. In this case, the second generation of panel unit root tests (i.e CIPS) and cointegration tests (i.e Westerlund) must be considered. One can also estimate an Autoregressive Distributed Lag Model (ARDL) in order to capture the short-run and long-run relationship between the variables in general and between banks' concentration and financial

stability in particular. We can also allow possible heterogeneity in the coefficients. In this case, the marginal impact of banks' concentration on the stability of the financial sector would differ between the MENA countries. This is interesting to be investigated especially that countries in the MENA region have different levels of financial stability and banks' concentration as the descriptive statistics discussed in chapter 4 suggest.

Appendix

Table A. 1 - Unit root test for z-score in first difference and including individual intercept

Null Hypothesis: Unit root (individual unit root process)		
Series: D(ZSCORE)		
Date: 09/06/20 Time: 14:24		
Sample: 1996 2016		
Exogenous variables: Individual effects		
User-specified lags: 1		
Total (balanced) observations: 216		
Cross-sections included: 12 (3 dropped)		
Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-6.45889	0.0000

Table A. 2 - Unit root test of z-score in first difference including individual intercept and trend

Null Hypothesis: Unit root (individual unit root process)		
Series: D(ZSCORE)		
Date: 09/06/20 Time: 14:25		
Sample: 1996 2016		
Exogenous variables: Individual effects, individual linear trends		
User-specified lags: 1		
Total (balanced) observations: 216		
Cross-sections included: 12 (3 dropped)		
Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-4.22121	0.0000

Table A. 3 – Co-integration test using z-score as dependent variable

Kao Residual Cointegration Test		
Series: ZSCORE CONC5 FINDEV SAVING LGDP DEPOSIT		
Null Hypothesis: No cointegration		
	t-Statistic	Prob.
ADF	-1.917042	0.0276
Residual variance	7.687984	
HAC variance	6.928086	

Table A. 4 – Co-integration test using liquidity ratio as dependent variable

Kao Residual Cointegration Test		
Series: LIQUID CONC5 FINDEV SAVING LGDP DEPOSIT		
Null Hypothesis: No cointegration		
	t-Statistic	Prob.
ADF	0.264608	0.3957
Residual variance	213.2371	
HAC variance	80.78881	

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