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Board characteristics and MENA banks' credit risk: A fuzzy-set analysis

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Abstract

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1. Introduction

The recent financial crisis revealed the dramatic impact of excessive risk-taking behaviour by banks on global financial stability. Several pieces of research have ascertained that corporate governance in banks was ineffective in preventing detrimental lending practices, leading to an extremely vulnerable financial system (Kirkpatrick, 2009; Adams and Mehran, 2011; Erkens et al., 2012). The Basel Committee on Banking Supervision (2015) has advocated the need to understand and improve the corporate governance in banks, as the lack of governance was perceived to be a major contributor to the turmoil. The relationship between governance and risk is central from a financial stability perspective (Srivastav and Hagendorff, 2016). Among the elements of bank governance, the Basel Committee (2015) identifies the board of directors as an essential part of bank regulatory reforms.

The uniqueness of bank governance suggests that the effects of bank boards on banking risk may be dissimilar from the effects of boards on risk in non-financial firms and are, thus, worthy of special attention (Elyasiani and Zhang, 2015). The role of the board of directors is more complicated and challenging in the financial than in the non-financial sector (Arun and Turner, 2004). For example, agency conflicts in banks are more complex than those observable in non-financial firms (Andres and Vallelado, 2008). The conflicting influences of regulators, shareholders, and depositors may further complicate bank governance (Adams and Mehran, 2003, 2011; Macey and O'Hara, 2003). Bank boards are the apex of the internal governance system and, indeed, hold overall responsibility for providing oversight of the monitoring of bank management and evaluating whether current and future risk exposure is consistent with risk appetite.

This paper investigates the issue of bank governance and credit risk in Middle East and North Africa (MENA) countries. Credit risk is considered the most important type of risk a banking institution could face but, whereas much academic research has looked at bank governance in other emerging markets, the study of this in the MENA region has generally been neglected. The World Bank and the IMF argue that the MENA banking sector is still threatened by a significant credit risk. Financial markets are unique in MENA countries given the higher reliance on bank finance compared to other regions of the world (Haque and Brown, 2017). Bank assets account for 60% to over 100% of GDP across MENA countries (Ghosh, 2017).The ratio of private credit to GDP is averaging nearly 65% (Ghosh, 2018).

The banking sector in this region is concentrated, with unique ownership and regulatory structures (Turk-Ariss, 2009). State banks accounted for 33% of total assets in 2008 and foreign banks increased from 18% of total bank assets in 2001 to 20% in 2008 (Farazi et al. 2013).The share of foreign banks remains low, averaging 13% in 2012 (Claessens and van Horen, 2014). Indeed, MENA banking sector is preponderantly domestically owned, displaying barriers to entry and licensing restrictions on foreign banks (Al-Hassan, et al. 2010). Bank concentration stills high, with the three-bank (usually, domestic) concentration ratio ranging between 0.5 and 0.8, and even higher in some cases (Ghosh, 2018). Moreover, MENA countries are characterized by a low level of disclosure and transparency (Piesse et al., 2012) and poor credit reporting systems that impede the proper evaluation of risk for potential borrowers (Cherif and Dreger, 2016). MENA banks suffer from several problems such as insufficient liquidity, high level of non-performing loans, credit risk and losses. Indeed, banks in this region exhibit a high level of non-performing loans (NPLs) (IMF, 2012). It is well beyond the international standards.

This research presents an application of fuzzy-set qualitative comparative analysis (fsQCA) (Ragin, 2008) to a sample of 38 banks in the MENA region. This methodology has recently been used in the context of governance issues (García-Castro et al., 2013). The focus on fsQCA is motivated by the mixed and inconclusive evidence for how bank board structure is related to credit risk taking. The diversity of views on what good governance means for banks reflects the

lack of robust evidence on how the form of governance mechanisms affects the performance of individual banks (Martin-Oliver et al., 2017). The effectiveness of the various governance mechanisms depends on how they work together (Rediker and Seth, 1995). However, we still know little of how governance mechanisms operate together to enhance a bank's credit quality.

We contribute to the literature on credit risk by examining the role of optimal configurations of boards of directors in MENA banks. Unlike techniques previously used to investigate bank governance, such as multiple regression analysis, the fsQCA approach reveals which governance practices are relevant, and which are redundant, for achieving effective control of credit risk management. FsQCA provides an alternative and complementary research strategy appropriate to identifying combinations of independent variables that yield the dependent variable (Woodside, 2013). In addition, we fill the research gap with regard to the previously study of bank governance in developing countries. This is the first major empirical study that examines the combination of different board characteristics and credit risk taking in MENA banks. Imitating best practice in governance will not always lead to the desired outcome if this practice is not considered in the context of specific features of the MENA region.

Using data from 38 banks in the MENA region for the years 2004-2015, this study reveals that different combinations of board structure lead to high credit risk taking in the MENA banking sector. Furthermore, it is found that the conditions included in almost every combination are the presence of institutional director and the non independent directors. We conclude that director independence is significant in the vigilant monitoring of credit risk in MENA banks. However, the results highlight the association between a high proportion of institutional directors on a board and high credit risk. Results show that the combination of CEO duality, large board size and low proportion of foreign directors led to high credit risk in MENA region. In addition, we find that CEO duality and the high proportion of foreign directors appear to be substitutes for one another.

The remainder of this paper is organized as follows. Section 2 presents a literature review. Section 3 is devoted to describing the research methodology and data set. Section 4 presents the empirical results. Section 5 discusses the findings. Section 6 concludes the study.

2. Theoretical background

There is still limited understanding of the relationship between bank governance characteristics and banks' incentive for becoming more exposed to credit risk.

2.1. Board size

The number of directors serving on a bank board is relevant to the outcome of the board's decisions. The effect of board size on credit risk taking can be explained from the perspective of agency theory (Jensen, 1993) and resource dependence theory (Pfeffer and Salancik, 1978). According to agency theory, smaller boards are considered to be more efficient and productive because there are fewer communication and coordination problems (Lipton and Lorsch, 1992; Jensen, 1993). However, from the perspective of resource dependence theory, large boards are more likely to have greater expertise and more resources available for monitoring managers than small boards. Extensive studies have examined how the size of boards affects their monitoring function in non-financial firms, but relatively few studies have been conducted on the banking sector (Pathan, 2009; Grove et al., 2011; Gulamhussen and Fonte Santa, 2015).The empirical evidence is, however, mixed.

2.2. CEO duality

The dual role of the CEO may impede the monitoring function of a board of directors (Lipton and Lorsch, 1992; Jensen, 1993). Excessive power is concentrated in the CEO when

that individual is also the chair of the board of directors, as this encourages self-interested managerial behavior and reduces board independence. Indeed, according to agency theory, duality promotes CEO entrenchment. However, the proponents of CEO duality argue that vesting the two positions in one individual can provide a unified command and reduce information costs (Anderson and Anthony, 1986; Brickley et al., 1997). This theoretical debate has given rise to few empirical studies of the impact of the dual role of CEOs on credit risk. Moreover, the findings diverge (Pathan, 2009; Grove et al., 2011; Boussaada and Labaronne, 2015; Faleye and Krishnan, 2017).

2.3. Board independence

Agency conflicts can be controlled and minimized by increasing the number of non-executive directors on boards (Jensen and Meckling, 1976). Non-executive directors are more effective than executive-directors at monitoring and screening, as they are independent and seek to protect their own reputation in the labor market (Fama, 1980). The number of outside board members signals the directors' reputation (Fama and Jensen, 1983). In addition, independent directors are expected to bring more valuable skills and knowledge to reduce the freerider and coordination costs of large boards. Independent directors tend to support investments in less risky projects in the banking sector and, in turn, lower the credit risk (Pathan, 2009). Nevertheless, if a more independent bank board makes managers act in the best interests of shareholders at the expense of depositors, the agency cost of debt will increase, resulting in higher credit risk (Switzer et al., 2016).

The existing literature on the relationship between board independence and credit risk is mixed – some finding no relationship (Choi and Hasan, 2005) and others either a positive or a negative relationship (Pathan, 2009; Ting and Liao, 2010).

2.4. Composition of the board

Several researchers have found that the composition of the board of directors affects the bank's credit risk-taking behavior and credit policies. According to social welfare theory (Atkinson and Stiglitz, 1980), state-owned banks may pursue social and economic development objectives that render them more credit risky compared to private banks. Further, according to political theory (Shleifer and Vishny, 1994), banks controlled by the State are inefficient and used for political ends. Political lobbies engaged by various interest groups may influence public banks more than private ones (Hu et al., 2004). Consequently, the presence of directors representing the State on a board may increase credit risk taking. According to activism theory, institutional investors are considered to bemore conscientious and competent than other shareholders (Pearce and Zahra, 1992). However, according to passivity theory, they seem to play a passive role in bank governance. This theory posits that regulation is regarded as a substitute for the monitoring that would otherwise be undertaken by institutional investors in the banking sector (Adams and Mehran, 2003; Elyasiani and Jia, 2008).

In addition, as stated by the home field advantage hypothesis (Berger et al., 2000), domestic institutions are generally more efficient than foreign entities. Differences in language, culture and regulatory structures may impede the control of banks by foreigners. Thus, banks that are domestically owned have some comparative advantage that foreign-owned banks lack. Nevertheless, according to the global advantage hypothesis (Berger et al., 2000), foreign institutions can overcome cultural and institutional differences and perform more efficiently than domestic ones. A board containing foreign directors is more effective at monitoring to the extent that these directors are more independent (Gulamhussen and Guerriero, 2009) and more experienced than the other directors (Choi and Hasan, 2005).

2.5. Board committees

Good governance practices call for increased use of various committees (e.g. risk, audit, compensation, and nomination committees), as these are likely to improve the effectiveness of the board. The main functions of the committees include holding meetings, deciding the number of meetings, discussing firm-related issues, and exchanging ideas on supervising and monitoring managers (Vafeas, 1999; Andres and Vallelado, 2008).

Bank boards have more committees than other firms (Adams and Mehran, 2003). Indeed, committees monitor the performance of a bank and assist the board in fulfilling those of its responsibilities that relate to risk management practices. Empirical studies on the role of the committee in bank credit risk are almost nonexistent. However, Boussaada and Labaronne (2015) find that the higher the number of committees, the better the quality of loans and the lower the credit risk.

3. Methodology

3.1. Overview of fsQCA

In this work, we apply fsQCA, which has become increasingly prominent in recent years in business and management research (Bell et al., 2014; Wagemann et al., 2016). This methodology is frequently considered to be a typical "mid-sized N" approach, in reference to those analyses that work with intermediate numbers of cases and are thus appropriate for neither small-N in-depth analysis nor for those statistical analyses for which large numbers are needed (Wagemann et al., 2016). FsQCA is built on the set theoretic methods introduced by Ragin (1987, 2000, 2008) and analyzes data by listing and counting all the combinations of variables in the data set, rather than correlations. In contrast to statistical methodology based on linear algebra, QCA depends on Boolean algebra and applies a rigid logic methodology to compare phenomena that vary both qualitatively and quantitatively, for instance in nature (e.g. present or absent) or degree (Rihoux, 2006).

A fundamental advantage of fuzzy set/QCA over the regression analysis that is traditionally used is that it helps overcome difficulties by using multiple interactions between regressors, since it ignores variation and distribution in individual variables and does not focus on the isolated net independent effect of a single variable (Aguilera and Desender, 2012). We consider credit risk-taking behaviour as an interaction of several internal corporate governance factors that currently affect the bank due to environmental uncertainty. Rather than focusing on the estimation of main effects, we examines how complex antecedent combinations of board structure can collectively affect bank credit risk, implying that not only one component—or condition—of board structure explains the outcome (credit risk), but rather combinations of several conditions jointly explain it. We evaluate how well different board characteristics ensure high credit risk in MENA banks. Traditional linear regressions methods follow an effects-of-causes approach in which the target is to estimate if an individual variable has a significant (positive or negative) effect, net of other variables' effects, on the dependent variable. However, fsQCA examines whether a condition or combination of conditions is necessary and/or sufficient for a certain outcome. Moreover, it seeks to uncover the minimal (combinations of) conditions for bringing about a specific outcome (Vis, 2012) and, accordingly, explores complex pathways. Therefore, we use fsQCA to explore combinations of necessary, sufficient and minimal conditions under which the board structure of MENA banks displays high credit risk.

To apply fsQCA, we defined the outcome as the credit risk of banks. This is estimated by the NPLs ratio. Then, we tested the combinations that lead to this outcome. Our research model had seven causal conditions related to the board structure and composition. These are: (1) board size, (2) duality, (3) proportion of independent directors, (4) proportion of institutional

directors, (5) proportion of directors representing the State (6) proportion of foreign directors and (7) number of committee established by the board. All logically possible combinations of conditions are examined (Ragin, 2008). For the purpose of this paper, the fuzzy program in the STATA software package was used.

3.2. Sample

Our initial sample consists of 584 banks from 21 MENA countries as defined by the World Bank. Our sample selection is primarly motivated by the availability and the continuity of the bank's information, though. First, we exclude non commercial banks and special financial institutions such as Islamic and Investment banks to ensure the homogeneity of the sample and better ascertain the effect of NPLs through consolidated financial statements. Second, we eliminate commercial banks for which data on NPLs were missing. Our sample was then reduced to 56 commercial banks. Finally, 18 commercial banks were excluded due to a lack of information on board structure. After data cleaning, we have a balanced panel of 38 banks from 10 MENA countries[1]consisting of 456 observations over the period 2004-2015. Data on board characteristics were gathered from the annual reports of our sample of banks. Financial data and the non-performing loans ratio were collected from the Bureau van Dijk Bankscope database.

Table I. Sample of banks by countries

	Number of banks
Bahrain	2
Egypt	4
Jordan	4
Lebanon	4
Morocco	5
Oman	2
Qatar	3
Saudi Arabia	2
Tunisia	10
The United Arab Emirates	2
Total	38

3.3. Variables and measurement

We consider one outcome to capture credit risk, NPLs ratio, and seven causal conditions related to the board structure and composition. These are: (1) board size, (2) CEO duality, (3) proportion of independent directors, (4) proportion of institutional directors, (5) proportion of directors representing the State (6) proportion of foreign directors and (7) number of committees established by the board.

The CREDIT RISK is proxied by the NPLs ratio. The majority of empirical studies used this proxy as an indicator of credit quality. Indeed, The credit risk is reflected by the high level of NPLs. Regarding the structure of the board of directors, two variables are used: BOARD SIZE and BOARD INDEPENDENCE.

We measure board size as the number of directors on the board. A dummy variable (CEO DUALITY) is used to evaluate the independence of the board. CEO DUALITY is equal to 1 if the CEO also serves as the chair of the board, and 0 otherwise. A variable (BOARD INDEPENDENCE) corresponding to the percentage of the total number of directors who are independent is also measured. We select three other variables concerning the composition of the board. First, to capture the institutional directors, we calculate the variable INSTIT as the

[1]Bahrain, Egypt, Jordan, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and the United Arab Emirates.

percentage of the total number of directors who represent institutional investors. Second, the STATE variable is used to capture the percentage of the total number of directors who represent the State. Third, we take into account the percentage of foreign directors of the total number of directors on the board (FOREIGN). We also include the number of committees established by the board (BOARD COMMITTEES). Table II shows the data sources and a brief description of the key variables used in this study.

Table II. Summary of the variables

Variables	Definition	Data Source
CREDIT RISK	Non-performing loans/ total loans (*Barth et al. 2004; Breuer, 2006; Shehzad et a.l 2010; Boussaada and Labaronne, 2015; Anastastiou, 2017).*	Bankscope
BOARD SIZE	The number of directors in the bank's board (*Simpson and Gleason, 1999; Sumner and Webb, 2005; Pathan, 2009).*	Annual report of banks
CEO DUALITY	Dummy variable which equals one if the Chief Executive Officer also serves as chairperson of the board, zero otherwise (*Simpson and Gleason, 1999 ; Pathan, 2009 ; Palvia, 2011)*	Annual report of banks
BOARD INDEPENDENCE	The percentage of total directors who are independent (*Pathan et al. 2007, Andres and Vallelado, 2008; Pathan, 2009).*	Annual report of banks
INSTIT	The percentage of total directors who represent institutional investors.	Annual report of banks
FOREIGN	The percentage of foreign directors to total directors on the board (*Choi et Hasan, 2005; Gulamhussen and Guerreiro, 2009).*	Annual report of banks
STATE	The percentage of total directors who represent the state (*Konishi and Yasuda, 2004).*	Annual report of banks
BOARD COMMITTEES	The number of committee established by the board (*Wanget al., 2012*).	Annual report of banks

3.4. Descriptive Analysis

Table III informs about some key indicators of banking system in MENA region. Specially, performance, risks and concentration/competition are analyzed. Values used in this analysis are calculated from the Global financial Development of the World Bank Data Bank.

Table III. Key indicators of banking system in MENA countries

	Performance		Risk	Concentration	Competition
Years	ROA	ROE	NPLs	C5	Lerner
2004	1,555	14,052	15,113	82,176	0,373
2005	2,034	16,163	12,913	81,021	0,381
2006	1,874	15,404	8,557	79,872	0,350
2007	1,665	15,283	7,043	79,359	0,330
2008	1,364	12,711	4,633	78,96	0,306

2009	1,269	11,829	6,070	80,317	0,386
2010	1,335	12,217	6,227	79,977	0,394
2011	1,357	11,535	5,748	80,553	0,403
2012	1,388	11,931	5,880	80,244	0,406
2013	1,341	12,233	5,878	80,205	0,411
2014	1,693	15,144	5,379	85,246	0,175
2015	1,457	12,793	5,006	84,537	0,130
Mean	**1.528**	**13.441**	**2.974**	**81.039**	**0.337**

Where ROA is return on assets, ROE is return on equity, NPLs is Nonperforming loans to total loans ratio, C5 is 5-bank asset concentration, lerner index is the market power of a bank.

Table III indicates that bank performance in MENA region measured by ROA records lower and almost more stable levels than the other key indicators. These levels do not exceed 2% during the period 2004-2015. For this period the average bank profitability in this region was 1.528%. Qatar and UAE have registered the high level of profitability with respectively 2.657% and 2.103%. However, the lower level has been recorded by Tunisia with a rate of 0.542% and 0.918% for Egypt.

Contrary to the stable evolution of ROA, the ROE has registered a decline during the period 2004-2015. It crossed from 14.052% in 2004 to reach 12.793% in 2015. Similarly to ROA, the highest ROE was realized by Qatar and UAE with an annual average ROE of 18.2% and 15.924% respectively. Once again banks in Tunisia and Egypt are qualified as the less profitable with a level of 8.153% and 9.648%. Based on statistics related to ROA and ROE, it appears that Qatar and UAE are the most profitable banks. However, Tunisian and Egyptian banks recorded the weakest level of profitability.

Regarding risk indicators, Tunisia and Egypt are the most exposed to the credit risk. The level of non-performing loans (NPLs) is 15.289% for Tunisia and 14.592% for Egypt. Unlike these countries, the low level of NPLs was registered by Qatar and Saudi Arabia respectively with 1.688% and 1.999%.

In several MENA countries, the banking sector is highly concentrated and the entry of foreign banks is difficult. On average, the five largest banks in term of total assets record more than 80% total bank assets. For example, banking system in Qatar remains highly concentrated with a level of 97.575%. In other words, five banks monopolize more that 97% of the total assets. In contrary, the Tunisian banking system appears as the less concentrated with a level of 63.562%. In relation with the indicator of banking concentration, bank competition measured by Lerner index differs from one country to another. Banking system in Saudi Arabia and Tunisia are qualified as the most competitive with a level of 0.550 and 0.498 respectively. The low level of competition is recognized for Egypt with a level of 0.050.

The summary of descriptive statistics for the variables used in the empirical analysis is presented in Table IV.

Table IV. Descriptive Statistics

Continuous variables				
Variables	**Mean**	**Min**	**Max**	**SD**
CREDIT RISK	9.06	2.1	47.89	8.62
BOARD SIZE	10.41	5	15	1.57
BOARD INDEPENDENCE	0.23	0	0.7	0.22
INSTIT	0.29	0	0.8	0.22
FOREIGN	0.21	0	0.7	0.22
STATE	0.09	0	0.58	0.15
BOARD COMMITTEES	3.62	2	10	1.66
Dummy variables				
	Modality			**Frequency**
CEO DUALITY	1			36.42%
	0			63.58 %

The NPLs ratio of MENA banks over the period 2004-2015 is about 9.06% with a high disparity between banks (Min : 2.1% and Max : 47%). On average, the MENA banks have 10 members on their board. Regarding the board composition, we notice that the presence of institutionnel directors (29%) on board appears to be higher than foreign (21%) and state directors (9%). Furthermore, 23% of directors are referred as independent. We note that in the majority of MENA banks there is a separation of the function of decision and control. In 36.42% of banks in the sample, the Chief Executive Officer presided over the board.

4. Results

We first conduct a Wilcoxon z-score test for the difference in the median values of board structure for several pairs of years, 2004 vs. 2008 and 2008 vs. 2015, and present the results in Table V. Except for the INSTIT, all governance structure seems to be stable over time. The evidence suggests that, on average, banks governance structure has not changed significantly over time.

Table V. Average Changes in Governance Structure Over Time

Variable	Time	Wilcoxon Z-Score	P-value
BOARD SIZE	2004-2008	0.839	0.4014
	2008-2015	-1.175	0.2401
CEO DUALITY	2004-2008	1.732	0.0833
	2008-2015	1.414	0.1573
BOARD INDEPENDENCE	2004-2008	0.019	0.9850
	2008-2015	-3.151	0.0016
STATE	2004-2008	0.608	0.5429
	2008-2015	-0.352	0.7249
FOREIGN	2004-2008	-0.399	0.6900
	2008-2015	1.312	0.1896
INSTIT	2004-2008	-2.188	0.0286
	2008-2015	2.107	0.0352
BOARD COMMITTEES	2004-2008	-0.29	0.769
	2008-2015	-0.293	0.7694

Table VI shows a summary of the outcomes and antecedent conditions in fuzzy terms. Each variable has been coded to facilitate the readability of the tables presented in the subsections below (CREDIT RISK : K ; BOARD SIZE : C ; CEO DUALITY : D ; BOARD INDEPENDENCE : I ; STATE : E ; FOREIGN : R ; INSTIT : S ; BOARD COMMITTEES :

M). Following Longest and Vaisey (2008), all the variables have been transformed into sets using standardized rank transformation. As shown in Table VI, the distribution of cases has not changed, but the scale has been "fuzzified" to range between 0 and 1. The values now represent the level of membership in a set. Different combinations of attributes lead to high risk taking. Based on the seven governance attributes of board structure, the maximum number of combinations is 128.

Table VI. Distribution of each variable and its corresponding set

Variable	Coding	Original range	Original mean	Set mean
CREDIT RISK	K	0.0021-15.15	0.2287937	0.5
BOARD SIZE	C	5-15	10.41978	0.4994487
CEO DUALITY	D	0-1	0.3642384	0.3642384
BOARD INDEPENDENCE	I	0-70 (%)	23.11064	0.3841886
STATE	E	0-58.333 (%)	9.891134	0.3373134
FOREIGN	R	0-70 (%)	21.9156	0.3854595
INSTIT	S	0-80 (%)	29.38218	0.4529915
BOARD COMMITTEES	M	2-10	3.627193	0.4634731

The results of sufficient conditions and their consistency and coverage indexes are shown in Table VII. We follow the notation applied by Fiss (2011) and subsequent research, where '●' represents the presence of an attribute, '⊗' represents its absence, and a blank space indicates that a given attribute is not causally related to the outcome. Consistency scores are equivalent to a Pearson's r coefficient in statistical analysis; coverage is equivalent to the coefficient of determination, R^2, in statistical analysis. Therefore, if sufficiency consistency is high enough, the evidence is consistent with the hypothesis that the conditions are sufficient for the outcome (Duşa and Alrik, 2013).

Table VII. Configurations leading to high credit risk

Antecedents	Solutions							
	1	2	3	4	5	6	7	8
BOARD SIZE (C)		⊗	●	●		●	●	●
CEO DUALITY (D)	⊗	●	⊗	●	●	●	●	●
BOARD INDEPENDENCE (I)	⊗	⊗	⊗		⊗	⊗	⊗	⊗
BOARD COMMITTEES (M)	⊗	●		●		⊗		
STATE (E)	⊗	●	⊗	●	●			●
FOREIGN (R)	●		●	⊗	⊗	⊗	⊗	⊗
INSTIT (S)	●	●	●	●	●		●	
Consistency	0.850	0.987	0.871	0.985	0.916	0.973	0.950	0.981
Raw coverage	0.196	0.041	0.246	0.048	0.070	0.185	0.122	0.153

Unique coverage	0.022	0.002	0.072	0.003	0.003	0.004	0.010	0.011
Overall solution coverage	0.502							
Overall solution consistency	0.896							

Notes: ❶ Presence of the conditions in the model predicting the outcome ⓪ Absence or negation of the conditions.

Table VII reports different combinations of board structure that led to high credit risk taking. Based on the seven board characteristics we find that eight configurations are sufficiently linked to credit risk in MENA banks. These eight causal paths display a consistency higher than the 0.75 threshold. The first solution shows that the combination between high proportion of institutional and foreign directors (core conditions) and the lack of CEO duality, board independence, state control and a small number of committees led to high credit risk. The second solution displays that a small board size; consisting of high proportion of state directors and institutional investors, and the presence of non-independent members, managed by the CEO and having a large number of committees; is less effective in monitoring credit risk-taking. The third solution shows that the combination of high proportion of institutional and foreign directors on a large board combined with a non-dual CEO, weak board independence and a low proportion of State directors conduct to high credit risk.

The forth solution excludes board independence but includes all the rest of the attributes to a high degree, apart from State control.This combination is associated with high bank credit risk taking. In addition, the fifth solution shows that only the presence of five conditions increase risk taking: CEO duality, high proportion of institutional and State directors, weak board independence and a low proportion of directors representing foreign investors. The sixth solution indicates that the presence of CEO duality and a large board size and a low level of board independence, number of committees within the board and proportion of foreign administrators; increase the credit risk. The seventh solution is similar to solution 6 but the high proportion of institutional directors is required to lead to high credit risk.

Finally, the eighth solution shows that the combination of CEO duality, large board size, weak board independence, a low proportion of foreign directors and a high proportion of directors representing the State led to the deterioration of banks' credit quality.

The conditions included in almost every combination are the high proportion of institutional directors (which are not present in a low proportion for any of the solutions) and weak board independence (independent directors are not present in a high proportion for any of the solutions). There seems to be some type of combinatorial relationship between the high proportion of institutional directors and the independence of the board, as the one situation in which the board independence is weak is also the one in which the presence of institutional directors appears as a central condition. Regarding the independence of the board our result is consistent with Felícioet al. (2016) who used fsQCA to analyse a sample of 32 commercial banks listed in the UK. They observe that for high loan quality, the bank must have a small board without affiliated members.

Solutions 4, 6, 7 and 8 (which represent 50% of all the solutions) are similar in that they include the presence of CEO duality, large board size and a low proportion of foreign directors. Our result confirms the findings of Felício et al. (2016) who conclude that banks achieve high loan quality when large boards and committees are absent.

We notice that CEO duality and the high proportion of foreign directors appear as substitutes for one another, as the presence of one is generally accompanied by the absence of the other (configurations 1, 3, 4, 5, 6, 7, 8).

5. Robustness Checks

For robustness checks, we use Z-score as an alternative proxy of credit risk[2]. The Z-score[3] measure the bank's distance to insolvency. This variable is inversely related to the probability of default (Blair and Heggestad, 1978; Boyd and Graham, 1988). We apply fsQCA and similarly to the NPLs ratio, eight configurations of board structure led to high Z-score. The results generally highlight that the low level of independent directors and high proportion of institutional directors on the board led to high credit risk. The majority of solutions show that a combination of large board with dual CEO led to high risk and therefore deteriorate the loan quality.

Table VIII. Configurations leading to high Z-score

Antecedents	Solutions							
	1	2	3	4	5	6	7	8
BOARD SIZE (C)	⊗	⊗	⊗	●	●	●	⊗	⊗
CEO DUALITY (D)	⊗	⊗		⊗	⊗	●	●	●
BOARD INDEPENDENCE (I)	⊗	⊗	●		●	⊗	⊗	⊗
BOARD'S COMMITTEES (M)	●	●	⊗	●				
STATE (E)	●	●	⊗	●	●		⊗	⊗
FOREIGN (R)		●	●	⊗	●	⊗	⊗	
INSTIT (S)	●		●	⊗	⊗	●		⊗
Consistency	0.914	0.946	0.904	0.921	0.898	0.897	0.908	0.952
Raw coverage	0.083	0.073	0.129	0.114	0.059	0.116	0.102	0.101
Unique coverage	0.0001	0.001	0.067	0.019	0.006	0.043	0.004	0.022
Overall solution coverage	0.382							
Overall solution consistency	0.902							

Notes: ● Presence of the conditions in the model predicting the outcome ⊗ Absence or negation of the conditions.

In addition, nonparametric Wilcoxon tests are performed to test for differences in bank credit risk in MENA region before and after the financial crisis of 2008 and to address the potential impact of the latter in our result. CRI is a dummy variable that takes 1 after 2008 and 0 otherwise. The results suggest that there is no statistically significant difference between bank risk before the crisis and bank risk after the crisis ($z = 1.217$, $p = 0.2237$ and $z = -0.675$, $p =$

[2]This indicator was used by Cihák and Hesse (2010) ; Beck et al. (2013) and Lassoued (2018).

[3]Is equal to the mean of return on assets plus the capital asset ratio (equity capital/total assets) divided by the standard deviation of asset returns.

0.4994). We also run fixed effect regression and did not find any significance for the dummy CRI (p-value= 0.371 and p-value= 0.145). Thus, there is no evidence that, in our sample, banking credit risk was more intensive in the period between 2004 and 2008 than between 2009 and 2015. MENA banking system show resilience and banks withstood the effect of crisis relatively well (Rochat et al., 2011).

We also perform a robustness analysis excluding Tunisian banks to check if the results are mainly driven or not by these banks. Regarding table I, 10 banks over the 38 of our sample are Tunisian. The findings are shown in table IX and yielded no proof that results only are driven by Tunisian banks. Indeed, empirical evidence of the total sample (table X) appears to confirm that the results are mainly driven by different combinations of board attributes which can lead to high credit risk in MENA banks no matter the country.

Table IX. Final Reduction Set for the sample excluding Tunisian banks

Set	**Raw coverage**	**Unique coverage**	**Solution consistency**
C*D*I*E*S*M	0.0073	0.004	0.988
C*D*E*R*S*M	0.079	0.005	0.984
D*I*E*R*S	0.094	0.005	0.900
C*D*I*E*R	0.079	0.003	0.970
Total Coverage	0.106		
Solution Consistency	0.910		

All the variables are reported in table VI, VII and VIII

Table X. Final Reduction Set for the total sample

Set	**Raw coverage**	**Unique coverage**	**Solution consistency**
D*I*E*R*S*M	0.196	0.022	0.850
C*D*I*E*S*M	0.041	0.002	0.987
C*D*I*E*R*S	0.246	0.072	0.871
C*D*E*R*S*M	0.048	0.003	0.985
D*I*E*R*S	0.070	0.003	0.916
C*D*I*R*M	0.185	0.004	0.973
C*D*I*R*S	0.122	0.010	0.950
C*D*I*E*R	0.153	0.011	0.981
Total Coverage	0.502		
Solution Consistency	0.896		

All the variables are reported in table VI, VII and VIII

The combinations/configurations of the total sample are with high consistency scores (0.987; 0.985; 0.916, 0.981) compared to the same combinations/configurations of the sample excluding Tunisian banks, although total coverage has been increased from 0.106 to 0.502. If the consistency of a configuration is low, it's not supported by empirical evidence. Therefore, it should be considered less relevant than other configurations with higher consistency. Coverage refers to the number of cases for which a configuration is valid. Low coverage can nevertheless be useful to explain a set which causes a particular outcome (Ragin, 1987, 2000; Woodside and Zhang, 2012).

6. Discussion and findings

Several mechanisms are thought to affect the monitoring effectiveness of a board of directors. Our findings highlight the importance of bank board attributes with respect to high credit risk. There is no single path for enhancing credit risk in MENA banks. Different combinations of board structure lead to high credit risk. The analyses show that the presence of institutional directors and weak board independence are constant across all the configurations in which high credit risk is obtained.

Independent directors can provide more effective monitoring and better advice in identifying quality borrowers, resulting in higher-quality loans in MENA banks. Banks must have a board with independent directors, in view of the arguments highlighting that dependent and affiliated directors are expected to be aligned with managers. Hence, the credit policy in banks should benefit from the presence of independent members of the board. However, MENA regulators would first need to refine the definitions and the expected proportion of "independent" directors on bank boards. MENA countries have a weak governance framework (Moser, 2014) and the exact definition of what would constitute an "independent director" in a number of MENA jurisdictions is lacking (OECD, 2009).

This is of particular importance in this region, which is characterized by a high concentration of political connections in banks (Abdelsalam et al., 2017). In practice, controlling shareholders often appoint the entire board and in many cases banks lend to their owners or to companies in the same business group, all of which might be controlled by the same controlling shareholder (OECD, 2009; Piesse et al., 2012).

However, the results demonstrate the association between a high proportion of institutional directors on the board and high credit risk. Indeed, when combined with the presence of non-independent directors, the high proportion of institutional directors was associated with high NPLs ratio. Institutional investors in the MENA region are not as active as they should be. They are seen as opportunistic and self-serving and as aiming to maximize their own private benefits (Al Najjar and Clark, 2017). They exert significant power within banks through their right to vote and can, therefore, influence the decisions of managers in terms of risk taking (Barry et al., 2011). Institutional directors do not seem to be able to provide effective monitoring with respect to the risks taken by MENA banks.

Combining the role of CEO and chair on boards may also affect credit risk taking in MENA banks. However, we notice that the presence of foreign directors on boards is associated with the separation of the two positions of CEO and chair, thus sustaining the independence of the CEO's position.

Foreign investors in MENA banks are averse to risk because they may face distance problems, which limit accessibility to information and lead to unfamiliarity with the MENA markets (Lassoued et al., 2016). In addition, foreign shareholders often bring superior management and financial expertise. More rigorous and better governance practices are often sought by the foreign partners of a bank.

In addition, we find that banks with a larger board size experience higher NPLs ratio than other banks. Large boards make it more difficult to monitor the management of the bank effectively. Indeed, large shareholders have a great deal of influence over the directors of

MENA bank boards and may encourage managers to adopt a reckless credit policy (Boussaada and Labaronne, 2015).

7. Conclusion

In this paper, we analyzed different combinations of board attributes and how they lead to high credit risk in MENA banks. For this analysis, we relied on the fsQCA method and our study challenges traditional approaches to the investigation of bank governance. Our findings show that different combinations of bank boards can lead to high credit risk. The role of independent directors in risk management also seems to be important. Independent directors are more effective at limiting opportunistic behavior, thereby reducing potential agency conflicts in banks and lowering credit risk. In addition, a higher proportion of foreign directors on the board is a source of better management and tighter credit risk control. However, institutional directors seem to take more risk. In addition, we find that smaller boards with a greater proportion of independent directors are more effective in monitoring the management of a MENA bank.

This study contributes to a better understanding of the relationships between banking governance mechanisms and risk taking. There is no ideal formula for the structure and composition of a board of directors in the MENA region. However, improved board structure could result in better-governed MENA banks. According to our results, in order for a board to function effectively, it should be composed of more independent and foreign directors and fewer institutional directors.

Finally, our study has limitations that are essentially linked to the omission of certain board characteristics, such as the composition of its committees. Furthermore, future research may deepenour understanding of MENA banks'credit risk taking by investigating different combinations of bank ownership structures.

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