The role of political patronage in the risk-taking behaviour of banks in the Middle East and North Africa

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Abstract

In light of growing interest in the role of political patronage in banking, several issues are highlighted with regards to the performance and behaviour of politically connected banks that may differ from their non-connected peers. In this article, the effect of political patronage on bank risk-taking is examined ina sample containing 67 banks in several Middle Eastern and North African MENA countries based on a hand collected dataset of political banking connections. Although the study found no evidence that politically connected banks take more risks than their non-politically connected counterparts, which is inconsistent with the moral hazard hypothesis, a nonlinear analysis revealed an indirect effect of political connection. Contrasting results may be related to differences in institutional settings, however, political connections remain an important factor to consider in prudential banking behaviours, either implicitly or explicitly. Overall, this article discusses whether moral hazard is relevant to MENA banks and fills an existing gap in the literature on the MENA region.

J.E.L classification: G21, G32, G34.

Keywords: political patronage, banks, risk-taking, moral hazard, MENA, neural network.

Acknowledgements
This work was financially supported by the "PHC Utique" program of the French Ministry of Foreign Affairs and Ministry of higher education and research and the Tunisian Ministry of higher education and scientific research in the CMCU project number 18G0411.

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1. Introduction

Do political connections affect banks' risk-taking behaviours in the Middle Eastern and North African MENA countries? In this article, a negative side of political connections is explored in support of the moral hazard perspective; the incentives they create for firms to take more risk and reduce their prudential behaviour.

The moral hazard theory was first studied by Arrow (1963) in the health insurance context when there is imperfect information of the actions, which the insured is to undertake. This implies that the latter do not fully bear the consequences of their actions (Stiglitz, 1983). In general, a moral hazard problem arises in a situation in which one person makes a decision about how much risk to take, while someone else bears the circumstances. The moral hazard theory has recently been used to qualify the behaviour of large firms in terms of risk as they believe they would be rescued by the government under the too-big-to-fail principle. In fact, large firms are more likely to be refloated by the government to impede contagion by saving firms whose failure could threaten the whole financial system. One of the most famous examples is Bear Stearns, the first too-big-to-fail bank, which was bailed out by the government instead of the Lehman Brothers in 2008. Moreover, as government decisions can be influenced by political factors, firms are more prone to be politically connected in order to capitalise on moral hazards, which motivates them to take more risks(Dam and Koetter, 2012; Mariathasan *et al.*, 2014;Kostovetsky, 2015).

Based on this prediction, the hypothesis that politically patronised banks take more risks by focusing on banks operating in the MENA region is tested. This region is relevant for several reasons. Firstly, the institutional environment is particularly important as the phenomenon of political patronage is common in countries with high levels of corruption lacking in legal protection and strict regulations (Faccio, 2010; Ebrahim *et al.,* 2014). Besides, its impact is greatly identified in the region illustrated by controlling families or regimes and the dominant role of the government (Omran *et al.,* 2008), so the political and business infrastructure in this region allows politicians and royal families to be involved in the ownership structure of banks. Finally, as emerging stock markets in the MENA region are still underdeveloped (Omran *et al.,* 2008), banks play a crucial role as a major source of financing, and further, on the entire economy by establishing the stability of the financial system as a whole.

The value of political connections for firms is well established in the literature (Fraser *et al*, 2006; Khwaja and Mian, 2005; Bliss and Gul, 2012; Lim *et al.*, 2012; Ebrahim *et al.*, 2014) across different countries. However, studies involving MENA countries are few and far

between (Braham *et al*., 2019). This article contributes to the literature by exploring the role of political connections in risk-taking banking behaviour, which, to our knowledge, has not been thoroughly addressed in this region. Prior studies provide evidence of the benefits given to politically connected banks over their non-connected counterparts (Faccio, 2010). We suggest that the impact of political connections on bank risk-taking behaviours could be related to other banks' characteristics such as leverage (Braham *et al.*, 2019). Hence, we go beyond evaluating the direct link between risk-taking behaviour and political connections by examining possible indirect effects.

In our analysis of a sample of 67 banks operating in MENA countries over the period of 2013-2017, panel regression analysis is used in two steps. First, to examine the direct effect of political connections on bank risk, political connections are regressed among other control variables on risk-taking behaviour, defined as loans loss provisions. Second, regression analyses are carried out by interacting political connections with other banks' characteristics to assess any possible indirect effects. Our findings are summarised as follows. First, there is no evidence that politically connected banks take more risks than their non-politically connected counterparts in contrast to studies in the non-MENA context (Dam and Koetter, 2012; Mariathasan, 2014; Qian *et al.,* 2015; Kostovestky, 2015. Second, when both direct and indirect effects are considered, the effect of political connections is pronounced and significant. Although the direct effect is negatively associated with risk, its indirect effect is pronounced through its interactions with size and capital. Consistent studies involving the MENA region, mainly Lassoued *et al.* (2016) and Srairi (2013), indicate that political connections, as a substitute for state-ownership, induce higher risk-taking in banks. Along with traditional linear and nonlinear panel regression, an ANN analysis is developed for a robustness check. The effect of political connections remains persistent, however. The results reveal a nonlinear relationship between risk and political connections.

The rest of the article is organised as follows: section 2 presents the related literature and hypotheses; the data and econometric method are described in section 3; section 4 reports and discusses the empirical results and robustness check. Finally, a discussion and the study's conclusion are presented in section 5.

2. Literature review and hypotheses development

2.1. Costs and benefits of political patronage

Politics remarkably influences business on a global scale, particularly in countries with high levels of corruption, weak legal systems, and poor governance (Faccio, 2006). Political

patronage refers to political leaders or governments using their power to extract economic favours such as support, encouragement, privilege, or financial aid to connected firms in order to achieve the nation's economic goals. Although the literature favours the view that close ties with governments and politicians are considered to be a helping hand, several existing studies have come to the opposite conclusion.

From a resource based view, political connections can serve as a valuable intangible resource used to obtain government rents and support. In fact, the resource dependency theory suggests that a firm's competitive eadvantage depends on its possession of key resources that competitors find difficult to obtain (Pfeffer and Salancik, 1978).Moreover, Hillman (2005) states thatthere are many benefits driven from political connections such as reducing the uncertainty and transaction costs inherent in the external environment, which subsequently improves survival and performance. From this point of view, notable studies provide evidence on the benefits of political connections, including easier access to financial resources such as bank loans and other funds with more convenient conditions (Fraser *et al.,* 2006; Khwaja and Mian, 2005); improved performance (Johnson and Mitton, 2003) and company innovation (Hernández-Lara *et al.,* 2014); and a higher probability of bail-out (Faccio, 2006) and lower cost equity capital (Boubakri *et al.,* 2012).Despite the many advantages of political connections documented in the literature, the institutional environment tends to influence firms' agency costs.Agency theory suggests that agency problems are more severe when managers hold the balance of power over owners, such as through entrenchment, firm complexity, or diffuse ownership (Jensen and Meckling 1976). Hence, from the agency costs perspective, managers may use political connections for their self-interest at the expense of minority shareholders, which leads to greater agency costs and expropriation risk for firms. According to Barry *et al.* (2011), agency costs can result in weak managerial incentives and the misallocation of resources for government-owned banks compared to their privately-owned counterparts. Moreover, from the political view of state ownership, government-owned banks are inefficient as they are used by politicians to transfer resources to support political parties or pursue political and personal goals (Shleifer andVishny, 1997). According to prior research, political presence on the board negatively impacts firms by decreasing their accounting information quality (Chaney *et al., 2*011); appointing managers and directors with fewer qualifications (Boubakri *et al.,* 2012; Leuz and Oberholzer-Gee, 2006); and decreasing long-term performance due to lower managerial incentives and inefficiency (Claessens *et al,* 2008 and Fan *et al.,* 2007).Furthermore, state-owned banks have poorer loan quality and a higher default risk than privately-owned banks (Berger *et al*., 2005; Iannotta *et al*., 2007).

2.2. Political patronage and risk-takingbehaviour

In the context of risk-taking behaviour, the empirical literature related to the banking sector has comprehensively investigated this issue from different perspectives. Some literature has examined the relationship between risk and efficiency (Tan and Anchor, 2017a; Sarmiento and Galan, 2017; Fiordelisi *et al.,* 2011);other studies have investigated the relationship between risk and profitability (Tan, 2016; Tan *et al.,* 2017; Bouzgarrou *et al.,* 2018; Fang *et al.,* 2019) and between risk and competition in the financial system (Tan and Floros, 2018; Tan and Anchor, 2017b; Berger *et al.,* 2009; Schaek and Cihak, 2014).Regarding the MENA region, few studies have focused on the association between bank risk-taking and ownership (Srairi, 2013; Lassoued *et al.,* 2016) or risk-taking and bank performance (Hakim and Neaime, 2005a; Hakim and Neaime, 2005b).

A recent and growing body of literature addresses the issue of political influence on banking sector. For example, La Porta *et al*. (2002) examine a sample of banks operating in 92 countries around the world in a regression analyses and document that politicians use state-owned banks to achieve their own political goals. Garcia-Meca and Sànchez-Ballesta (2014) use a sample of commercial and savings banks to empirically analyse whether the political presence of governments affects risk-taking behaviour in Spanish savings banks for the period 2004–2009 and during the financial crisis. The results failed to provide evidence that political presence is related to risk-taking behaviour; however, the past banking experience of chairmen is likely to reduce such a risk. Additionally, Sapriza *et al.* (2013) use a sample of international rated banks in cross-sectional estimations to examine the intensity of government support by providing explicit or implicit guarantees, which is associated with more risk-taking, and the results robustly measure risk using z-score, a measure of stock return volatility and a more traditional measure of loan losses. Moreover, Igan *et al*. (2011) examine how US financial institutions with lobbying performed in the 2000-2007 period, in addition to 2008, and identified that they engaged in riskier lending practices than their non-lobbying peers prior to the financial crisis. A recent study of Eichler (2016) examines the impact of many political factors such as electoral cycles and government power on bank default risk in the Eurozone and revealed that these factors affect the stability of banks. Regarding emerging markets, Dinc (2005) provides empirical evidence concerning the political influences on banks in the 1990s by comparing the different reactions of both types of bank to a political event; the regression analysis isolated political influences from many other differences between private banks and government-owned banks and discovered that

state-owned banks increased their lending in election years compared with private ones. Recently, Vo (2018) addressed the issue of the impact of government ownership on firms' risk-taking behaviour in Vietnam as a transitional economy to provide insights into whether firms with a higher level of state ownership need to take extra risks to maintain their competitive strength given the political and financial privileges over other firms. Also, Micco *et al.* (2007) argued that the difference in performance between state-owned banks and private-owned banks in developing and industrial countries is politically driven by using bank-level data for the period 1995-2002 to test whether political factors affect the relationship between ownership and performance.

The use of political connections is one of these factors. However, there is a very small literature on the impact of these connections on bank risk-taking across the non-MENA countries. For instance, Carretta *et al.* (2012) examined the impact of political presence on the board of Italian cooperative banks in 2006 using a series of regression models and argued that politicians holding influential positions negatively affect bank activity measured by net interest revenue, loan portfolio quality and capitalisation level. Furthermore, Qian *et al.* (2015) used a sample of Chinese commercial banks from2006-2010 in a regression model to analyse the relationship between political connections from the perspective of "officials-and-directors" and the prudential behaviour of banks using similar proxies to Jia (2009) of bank prudence measures, that is, bank excess reserves ratio, loan to asset ratio, and deposit to loan ratio. The results suggest less prudent behaviour for banks with such connections. Besides, Dam and Koetter (2012) found that risk-taking in German banks is a function of bailout expectations as benefits from political connections by developing a structural system with two equations relating the expected bailout probability and bank risk-taking, proxied by credit risk, which resides among the most important individual risk drivers of financial institutions. This evidence is also supported by Kostovetsky (2015), who examined how political connections affect risk-taking behaviour in publicly traded US financial firms from 1973 through 2009 by using a geography-based measure. He discovered higher leverage for politically connected firms and that their stocks have higher stock volatility, suggesting that a moral hazard-based theory implied that financial firms with better political connections should take on more risk. In this regard, political connections may be an issue of interest specifically for emerging markets. For Chinese banks, for example, Boateng *et al.* (2019) examined the impact of politically connected boards interacting with the nature of firm ownership on credit risk to find that the type of ownership moderates the link between politically connected boards and credit risk. Regarding MENA countries, recently, Braham *et*

al. (2019) investigated the impact of political patronage on a sample of commercial banks using panel estimation models and found that politically backed banks tended to have high leverage.

2.3. Political patronage in the MENA Region

Patronage is particularly common and more pronounced in developing economies (Faccio, 2010; Ebrahim *et al.,* 2014). Arrangements established through contacts and personal relationships rather than through contracts are widely recognised in countries in which the legal system is unreliable and the law does not require the information disclosure on which competitive finance depends. The institutional environment of the MENA region is relevant and suitable for the study. On one hand, corporate governance in the MENA countries shares many of the features of the developing economies such as limited access to external financing and the dominance of family owned firms. It should be noted that, in these countries, access to public services and business opportunities depends on patronage, power, and money, which is inherent to corruption and a weak legal system. Consequently, access to external finance would be difficult for firms in the MENA region (Belkhir *et al.,* 2016). Besides, the socio-political setting of the MENA region and the absence of restrictions allows politicians and royal families to hold positions in management or be large shareholders in companies, which favours informal arrangements and self-interest acts (Omran *et al.,* 2008). On the other hand, although countries in the MENA region have engaged in some reforms to develop their financial system, financial and security markets are still underdeveloped. However, the banking sector is still characterised by the dominance of government-owned banks, which are inefficient in terms of their credit allocation and risk management (Ben Naceur and Omran, 2011).

Political patronage in the MENA region has been practiced in different ways. For example, in Tunisia, the former President Ben Ali and his family monopolised the business sector (Rijkers *et al.*, 2017). This was also the case in Yemen, in which power and wealth were produced and transmitted inside networks of patronage (Alley, 2010). In Algeria, the relationship between economics and politics has evolved from state control to a network of opaque arrangements between businessmen, political elites, and army officers (Boubekeur, 2013). A recent study by Diwan and Schiffbauer (2018) examined a dataset of politically connected firms under the Mubarak Regime and identified that firms were owned by businessmen who were either ministers or members of the ruling party, as well as businessmen closely related to Hosni Mubarak such as friends and family.

2.4. Hypotheses development

While numerous studies have been carried out to examine the political influence on banking activities, we propose to study the impact of political connections on risk-taking behaviour in the specific context of the MENA region, which, to our knowledge, has not yet been addressed. In respect to previous literature, risk-taking behaviour in financial institutions has been examined from different perspectives, and so we suggest that banks with political connections are expected to take higher risks than banks without. From a resource-based perspective, political connections as a corporate and valuable resource enable companies to gain competitive advantages over their non-politically connected rivals, which enhances the risk-taking incentives of politically backed companies arising from the moral hazard problem. Based on agency theory, political patronage may be associated with agency problems. Similarly, politically connected managers may be incentivised to pursue political goals and act in their own self-interest, which may lead to losses in a firm's value and a higher level of risk. Hence, the following hypothesis is proposed:

H1: Political connections in the MENA region's banks are associated with higher risk.

Moreover, a well-documented literature finds evidence that political connections affect firms' values and activities. Similarly, the financial characteristics of politically connected firms differ from unconnected ones. Although the literature is not inconclusive, the effect of political connections on banking risks may be implicitly related to other banks' financial characteristics such as their performance, efficiency, and size. Hence, the following hypothesis is proposed:

H2: Political connections have an indirect effect on banks' risk-taking behaviour.

3. Research method

3.1. Sources of data

The sample comprises67 banks operating in the following MENA countries: Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and United Arab Emirates. Annual financial data and key ratios are obtained from the Thomson Reuters database for the period of 2003-2017.Information on ownership structures and shareholdings are obtained from banks' websites and financial reports. Macro-economic and institutional indicators are provided by The World Bank database.

Political connections data are hand collected. The information is collected from various sources such as Wikipedia (https://fr.wikipedia.org) and business websites Bloomberg (https://www.bloomberg.com/middleeast), Zone bourse (https://www.zonebourse.com/), Market screener (https://www.marketscreener.com/), and Leaders (https://www.leaders.com.tn/).

3.2. The definition of political patronage

One of the pioneer studies on political patronage is Gomez and Jomo (1997), in which political patronage is defined as preferential treatment given to businessmen who are either politicians or politically connected to the government. Previous studies have used several proxies to measure political connection such as: Firms with board members being government bureaucrats as an officer of either the central government, a local government, or the military as board members (Fan *et al*., 2007; Nys *et al*., 2015); Firms' owners being close to the president or top politicians (Fisman, 2001; Leuz and Oberholzer-Gee, 2006); Firms' owners that are members of any political party (Khwaja and Mian, 2005; Carretta *et al*., 2012); Firms which provide contributions during general elections (Cleassens *et al*., 2008). Furthermore, both Fraser *et al*. (2006) and Bliss and Gul (2012) considered three different ways of political linkages: economical by the percentage of government equity ownership, social by the percentage of equity owned by institutions (Teti and Perrini, 2013), and personal by capturing informal ties with powerful politicians. Overall, the most common measure of corporate political connections (Faccio, 2006) define political connections as follows: "a company is connected with a politician if one of the company's large shareholders or top officers is a parliament member, a minister or the state head, or a closely related to a top officer". In addition, close relationships include cases of friendship, former political positions, foreign politicians, and well-known cases of relationships with political parties.

3.3. Political patronage and its variable construction

This study adopts Faccio (2006) as a primary reference to define politically connected banks. This definition is extended here by including royal family members or individuals described as influential in the country, and/or informal ties with politically connected individuals such as relatives of individuals belonging to the aforementioned categories. Cases of political patronage are identified following Braham *et al.* (2019): First, the names of shareholders and individuals serving on the board of directors of each bank are drawn from banks' official websites. Second, we refer back to their individual biographies and information about their profiles and relationships to identify which banks had political connections. Finally, to

measure political patronage, a dummy variable is constructed, indicating 1 if a bank is politically connected and 0 otherwise.

3.4. Variables definition

Different accounting risk measures have been used in the literature. In our study, loan loss provision ratio is considered as a credit risk measure, since we are interested in banks and this is the most commonly used measure (Foos *et al.,* 2010; Hung *et al.,* 2017; Agusman *et al.,* 2014). The ratio measures the fragility of a bank's assets. An increase in this ratio indicates an anticipated increase in the non-performing loans, which causes losses for banks and is associated with a higher credit risk (Dong *et al.*, 2014; Srairi, 2013).

To measure the influence of political connections on bank risk, our model includes a number of bank characteristics that are considered to affect the bank's risk-taking behaviour. Following prior studies on the MENA region (Srairi, 2013; Abedifar *et al.,* 2013), variables are included to control for bank profitability, financial and operating leverage, efficiency, size, liquidity, asset growth, and state ownership. Bank-level variables are presented along with their possible sign regarding bank risk in Table 1 in the Appendix.

To define the political connections variable (pol), Braham *et al.*'s (2019) measure is adopted using a binary variable equal to 1 if the bank is considered as politically connected and 0 otherwise. Political connection is expected to enhance the risk-taking behaviour of banks.

Profitability (roa) is measured by the ratio of net income on average to total assets. The impact of this variable on bank risk-taking is ambiguous (Delis and Kouretas, 2011). However, in our study, a positive association between risk and profitability is expected, because high profits are generally accompanied by higher risk levels.

Bank size (size) is measured as the natural logarithm of the bank's total assets. Large banks could be less risky due to their greater ability to diversify risk across product lines or could be more risky following the too-big-to-fail hypothesis (Abedifar *et al.,* 2013).

Capital (cap) is the ratio of equity to total assets and is also a financial leverage measure. Higher ratio indicates a lower dependency on debt and consequently lower bank risk. However, a lower ratio indicates a higher dependence on debts and higher risk (Srairi 2013; Zheng *et al.,* 2017).

The effect of operating leverage on bank risk is also controlled by using the fixed assets to total assets (oplev) ratio. This ratio is expected to be positively related to bank risk (Srairi 2013).

Efficiency (eff) refers to the ratio between a bank's costs and its income to determine how efficiently the bank is run. It is expected that politically connected banks are less efficient than non-connected banks; hence they are likely to take on greater risk to generate profits than non-connected banks (Srairi, 2013).

Liquidity (liq) is the ratio of total loans to total deposits and indicates the extent to which customer loans are financed by customer deposits. Higher values reflects higher liquidity risk (Dong *et al.,* 2014; Rahman *et al.,* 2015).

State-ownership (state) is the percentage of state-shareholding in the bank. State-owned banks may invest in risky projects as a result of their political influence and may also enjoy some rents from government (Abedifar *et al.,* 2013).

3.5. Econometric method

In order to test our hypothesis on the impact of political patronage on bank risk-taking, a panel data linear regression is considered:

$$risk_{it} = c + \beta_1 pol_{it} + \beta_2 roa_{it} + \beta_3 cap_{it} + \beta_4 eff_{it} + \beta_5 liq_{it} + \beta_6 size_{it} + \beta_7 oplev_{it} + \beta_8 state_{it} + \mu_i + \epsilon_{it},$$

where i denotes the bank(i=1,2, …, 67), t denotes year (t=2003, …, 2017), c is the constant term, β_1, …, $\beta_8$are the parameters to be estimated, μ_i is the unobserved time-invariant individual effect and ε_{it} is the error term.

As a first step, in panel data it appears to be necessary to verify the homogeneous or heterogeneous specification of the model to determine if the parameters are perfectly identical or vary across individuals. Using Stata software, the Fisher test with the null hypothesis of the absence of individual effect is directly performed when running the fixed effect model estimation. Thereafter, two panel estimation methods are performed using fixed effects and random effects models. Statistically, the Hausman (1978) test is conducted to select the appropriate estimation method, with the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator.

Furthermore, there may be indirect links between risk and political patronage through interactions with other regression variables. To examine these effects, the political patronage variable is combined with each of the control variables as in the following regression:

$$\begin{aligned} risk_{it} = c + \alpha_1 pol_{it} + \alpha_2 roa_{it} + \alpha_3 cap_{it} + \alpha_4 eff_{it} + \alpha_5 liq_{it} + \alpha_6 size_{it} + \alpha_7 oplev_{it} + \alpha_8 state_{it} \\ + \alpha_9 pol * roa_{it} + \alpha_{10} pol * cap_{it} + \alpha_{11} pol * eff_{it} + \alpha_{12} pol * liq_{it} + \alpha_{13} pol \\ * size_{it} + \alpha_{14} pol * oplev_{it} + \alpha_{14} pol * state_{it} + \mu_i + \epsilon_{it} \end{aligned}$$

where α_i is the regression coefficient of the interest variables.

The starting point is to estimate the initial specification, including all variables. Subsequently, based on the statistical significance of the interest variables, the least significant one is eliminated and the estimation procedure is repeated until only significant variables are remaining.

4. Empirical results

In this section, different estimation results are presented and analysed in detail. However, it is necessary to conduct a preliminary analysis for the study sample. Within the empirical framework, descriptive statistics are first presented: variable correlation analysis and multicollinearity test.

4.1. Descriptive statistics

Table 1 illustrates the summary statistics (average, standard deviation, maximal value, and minimal value) for the study sample period from 2003 to 2017, including all variables used.

Table1. Variables descriptive statistics

Variable	obs	Mean	Std. Dev.	Min	Max
risk	928	.0133823	.0399002	-.2198	1.1048
pol	1005	.5910448	.4918858	0	1
size	1003	8.903704	1.244756	4.384523	12.31372
roa	996	.0188594	.0147434	-.099	.132
cap	1003	.1230747	.0597228	-.125716	.9862843
liq	983	.7870702	.4715068	-.12	6.31
oplev	992	-.153751	6.497415	-200.616	36.91
eff	1000	.443731	.1743403	-.117	2.569
state	991	17.16834	21.13335	0	69.77

In Table 2, a comparison of several descriptive statistics for politically and non-politically connected banks is presented. On average, the financial characteristics of patronised banks are similar to those of non-patronised banks. Consequently, further investigation is needed within panel analysis.

Table2. Descriptive statistics: means and standard deviation values of politically and non-politically banks

variable	Politically connected			Non-politically connected		
	obs	mean	Std. Dev.	obs	mean	Std. Dev.
risk	568	.0124864	.0185553	360	.0147958	.0596978

pol	594	1	0	411	0	0
size	592	8.981977	1.310537	411	8.790961	1.13548
roa	588	.0192143	.0149809	408	.018348	.0143972
cap	592	.1282467	.0703262	411	.1156249	.0386461
liq	577	.7722184	.2623702	406	.8081773	.6636191
oplev	585	-.3401692	8.312453	407	.1141966	1.879585
eff	591	.4333756	.1855411	409	.4586944	.1557568
state	584	17.89512	22.74982	407	16.12549	18.54745

2.6. Collinearity analysis

Correlation analysis is also conducted between each pair of variables used in the study to ensure that none are highly correlated. Table 3 presents Pearson correlation coefficients and the statistical significance level (p-value) based on its subsequent test with the null hypothesis that the correlation is not statistically significant. Credit risk is negatively correlated with all variables, except for efficiency and operating leverage. Furthermore, the results show that the correlation coefficients do not exceed 0.5, except for efficiency and profitability, for which the correlation coefficient is 0.57.

Table3. Variables correlation matrix

	risk	**pol**	**size**	**roa**	**cap**	**liq**	**oplev**	**eff**	**state**
risk	1.0000								
pol	-0.0282 0.3905	1.0000							
size	-0.0616 0.0609	0.0755 0.0168	1.0000						
roa	-0.2189 0.0000	0.0289 0.3621	0.0093 0.7695	1.0000					
cap	-0.1021 0.0019	0.1040 0.0010	-0.1570 0.0000	0.5166 0.0000	1.0000				
liq	-0.0348 0.2921	-0.0376 0.2393	-0.0741 0.0201	0.0190 0.5539	0.2229 0.0000	1.0000			
oplev	0.0010 0.9767	-0.0344 0.2789	0.0171 0.5899	0.0296 0.3514	0.0454 0.1534	0.1590 0.0000	1.0000		
eff	0.0792 0.0159	-0.0714 0.0239	-0.2589 0.0000	-0.5756 0.0000	-0.3382 0.0000	-0.0172 0.5896	-0.0141 0.6572	1.0000	
state	-0.0338 0.3080	0.0412 0.1948	0.3167 0.0000	-0.0150 0.6391	0.0229 0.4715	0.2168 0.0000	0.0255 0.4256	-0.1249 0.0001	1.0000

Along with the correlation matrix, a multicollinearity test is performed. The Variance Inflation Factor (VIF) test is presented in Table 2 of the appendix. The multicollinearity problem is detected if VIF has a value of 5 or 10 and/or the average of VIF is greater than or

equal to 2. In our case, the VIF values vary between (1.02) and (1.79) and the average is equal to 1.31. This implies the absence of the multi-collinearity problem.

4.3. Estimation results

Table 4 presents the estimation results of the fixed and random effects linear models using the loan loss provision ratio, a credit risk measure as the dependent variable (a higher value of loan loss provision indicates high risk-taking). The calculated Fischer statistic is listed in Table 4 below. The F-statistic p-value rejects the null hypothesis, so individual effects have to be included in the model. The Hausman statistic p-value, which is equal to 0.3089, demonstrates that the random effects method is more appropriate for our modelling.

The results from the random effects model illustrate that only profitability measured by roa and efficiency are significant and negatively related to risk. In this case, profitable banks face less risk. However, efficiency is expected to be positively related to risk according to the hypothesis that less efficient banks take on more risk (Srairi, 2013). The negative association may be related to an implicit effect of political connection. Capital and operating leverage are insignificant; however, it should be noted that capital is negatively related to risk, that is, a high level of equity implies more prudent bank behaviour and less risk-taking (Srairi 2013; Zheng *et al.,* 2017). Similarly, operating leverage has a positive effect on risk, which is similar to the findings of Lassoued *et al.* (2016) stating that operating leverage as financial leverage increases bank risk. Political connections and state ownership have a negative but insignificant relation with risk, which is not in line with the risk-taking behaviour hypothesis.

Overall, the statistical significance of the explanatory variables is weak and there is no evidence that the presence of political connections implies higher risk-taking for banks. Consequently, in order to improve the quality of the regression estimate, statistically insignificant variable coefficients are iteratively eliminated.

Table4. Fixed and Random effect model estimation

variable	Fixed effect model			Random effect model		
	Coef.	Std. Err.	t	Coef.	Std. Err.	z
pol	-.0017336	.0081816	-0.21	-.001518	.0027168	-0.56
size	-.004966*	.0026302	-1.89	-.0019513	.0012195	-1.60
roa	-.9131669***	.1507808	-6.06	-.7625625***	.126549	-6.03
cap	-.0384259	.0537228	-0.72	-.0020729	.0318268	-0.07
liq	-.0030347	.0048658	-0.62	-.0045445	.0035142	-1.29
oplev	.0009021	.0010379	0.87	.0011878	.0010148	1.17
eff	-.0272969**	.0124575	-2.19	-.021654**	.0098806	-2.19
state	-	-	-	-.0000315	.000066	-0.48

constant	.0948407***	.0275391	3.44	.0597317***	.0147273	4.06
F (7,828) **Prob>F**	7.10 0.000					
Within R^2 **Between R^2** **Overall R^2**	0.0566 0.1162 0.0524			0.0548 0.1166 0.0559		
Hausman chi2(7) **Prob>chi2**	8.28 0.3089					

The regression is re-estimated with one less insignificant variable until 3 significant variables remain, as shown in column (6) of Table 3 in the Appendix. Results with respect to the latest estimation are the same as in Table 4; only profitability and efficiency are significant and negative. The profitability effect is negative, indicating that more profitable banks are less likely to fail (Psillaki *et al.*, 2010). The size becomes significant and negatively related to risk in line with the hypothesis that large banks are less likely to face risk. However, the negative association between efficiency and risk contrasts with previous literature on the MENA region. Further analysis is thus needed to detect possible indirect effects related to political connections.

Regarding the nonlinear analysis, the second model including the interactive terms is first estimated. Table 5 shows the results for the fixed and random effect estimations. Based on the Hausman test, the fixed effects model is retained.

Table5. Estimations with interactive terms

variables	Fixed effect model			Random effect model		
	Coef.	**Std. Err.**	**t**	**Coef.**	**Std. Err.**	**z**
pol	-.1598476***	.0502821	-3.18	-.0507985	.0334436	-1.52
size	-.0136998***	.0038377	-3.57	-.0032997	.0020552	-1.61
roa	-1.121898***	.2527549	-4.44	-1.142287***	.219377	-5.21
cap	-.2338979**	.0970739	-2.41	-.1013206	.0693948	-1.46
liq	.002805	.0055095	0.51	-.0036752	.0040434	-0.91
oplev	.0002625	.0010961	0.24	.0008648	.0010822	0.80
eff	-.037338	.0242329	-1.54	-.0430128**	.0202336	-2.13
state	-	-	-	-.0001177	.0001143	-1.03
pol×size	.0142955***	.0046943	3.05	.001381	.002592	0.53
pol×roa	.3428552	.3203066	1.07	.5862116**	.2719005	2.16
pol×cap	.2616398**	.1170123	2.24	.1139173	.0787543	1.45
pol×liq	-.0114248	.0131181	-0.87	-.0011229	.0087719	-0.13
pol×oplev	.0030246	.0035512	0.85	.0008844	.0033741	0.26
pol×eff	.0181645	.0285197	0.64	.0262422	.0232982	1.13
pol×state	-.0004331	.0007813	-0.55	.0001274	.0001429	0.89

const	.1999904***	.042313	4.73	.1002809***	.0278582	3.60
Within R²	0.0736			0.0601		
Between R²	0.0420			0.1823		
Overall R²	0.0402			0.0680		
Hausman chi2()	51.92					
Prob>chi2	0.000					

For the direct effects, political connections appear to be significant and negatively associated with risk. Profitability, size, and capital are significant and negative in line with previous estimations. However, when accounting for the nonlinear effect, the coefficients of the interactive terms between political connections and other variables are insignificant, except for capital and size.

Subsequently, to enhance the statistical significance of the variables, statistically insignificant variable coefficients are iteratively eliminated to end up with 7 significant variables. The detailed iterative estimations procedure is presented in Table 4in the Appendix. Table 6 presents only the final estimation, including 7significant variables, which confirms the results in Table 5.

Table6. Fixed effect model estimation
(Including only significant variables)

	Coef.	**Std. Err.**	**t**	**P>t**
pol	-.1368996	.0421499	-3.25	0.001
size	-.0126937	.0036645	-3.46	0.001
roa	-.9102498	.1461178	-6.23	0.000
cap	-.2409192	.0867907	-2.78	0.006
eff	-.0285352	.0119548	-2.39	0.017
state	-	-	-	-
pol×size	.0120337	.0042978	2.80	0.005
pol×cap	.2692681	.1003589	2.68	0.007
_cons	.1824411	.0373524	4.88	0.000
Within R²	0.0704			
Between R²	0.0438			
Overall R²	0.0469			

Political connection is significantly negative, as well as size, roa, capital, and efficiency. These results are also similar to the results provided by previous estimations. High equity implies lower risk-taking (Srairi 2013; Zheng *et al.,* 2017). Similarly, banks with increasing assets can diversify their risk because they have more opportunities and a wider variety of loans and related activities (Srairi, 2013; Abedifar *et al.,* 2013). According to Dohner (1991), growth opportunities increase profits and add value to firms. Despite the persistent and negative impact of efficiency, evidence of indirect effects related to political connections has

not been detected. Liquidity, state-ownership, and operating leverage do not have an impact on the risk-taking behaviour of banks, neither directly nor indirectly. Regarding the nonlinear results, only the interactive variables relative to capital and size are statistically significant and positive. Although their direct effect is negatively related to risk, it is inversed when associated with political connections, which implies that political connections have a dominant effect.

Overall, there are a number of differences in the results obtained in our estimations compared to those of the previous literature. First, the political connection coefficient is insignificant or negative in contrast to the hypothesis that politically connected banks take more risks than non-connected ones (Dam and Koetter, 2012; Mariathasan, 2014; Qian *et al.,* 2015; Kostovestky, 2015).Hence, there is no evidence that political connection in the MENA region is associated with a high level of risk-taking. Second, regarding the nonlinear analysis, an interesting result is the presence of the effect of indirect political connections on risk-taking behaviours. While the capital and size coefficients appear to be significant and negative in line with previous studies (Srairi, 2013; Abedifar *et al.,* 2013; Zheng *et al.,* 2017), their corresponding terms interacted with political connections and are significantly positive, indicating an implicit political patronage effect on risk through size and capital. Hence, there is evidence of the dominant impact of political connections on the risk-taking behaviour of banks, regardless the sign.

4.4. Robustness check

Although previous studies have used binary variables to measure political connections, the lack of vital information for these measures may be inherent in checking the robustness of our results. Hence, we propose to use artificial neural network (ANN) modeling in order to improve estimations and variables explanatory power. The ANN has attracted much attention as a new technique for estimation and forecasting in economics and finance (Kaastra and Boyd, 1996; Kuan and White, 1994; Shazly and Shazly, 1999; Feng and Zhang, 2014). The main advantage of this new approach is the flexibility to detect and duplicate any complex pattern. Also, they are free from statistical assumptions such as linearity and more robust to missing and inaccurate data. Overall, ANN analysis offers superior predictability and outperforms traditional econometric methods (Swanson and White, 1997; Hammad *et al.* 2009; Nuroglu, 2014). Inspired from some studies proposing an adaptation of neural network to panel data of (de Peretti *et al.,* 2009), we present our model as follows:

$$risk = \beta_0 + \sum_{j=1}^{q} \beta_j g(\omega_{it}\gamma_j) + \vartheta_i + \varepsilon_{it} = \beta_0 + \sum_{j=1}^{q} \frac{\beta_j}{1 + exp[-(\gamma_{j,0} + \gamma_{j,1} pol_{it} + \cdots + \gamma_{j,k} oplev_{it})]} + \vartheta_i + \varepsilon_{it}$$

Where:

- ω= (1, pol, size, roa, cap, liq, eff, state, oplev) is a vector of explanatory variables at time *t* for individual *i*,
- $\gamma_j = (\gamma_{j,0}, \gamma_{j,1}, \ldots, \gamma_{j,k})$' is a vector of unknown parameters for hidden node *j*, j=1…q
- ν_i is unobserved heterogeneity modeled by fixed effects

The structure of ANN can be explained by the following figure:

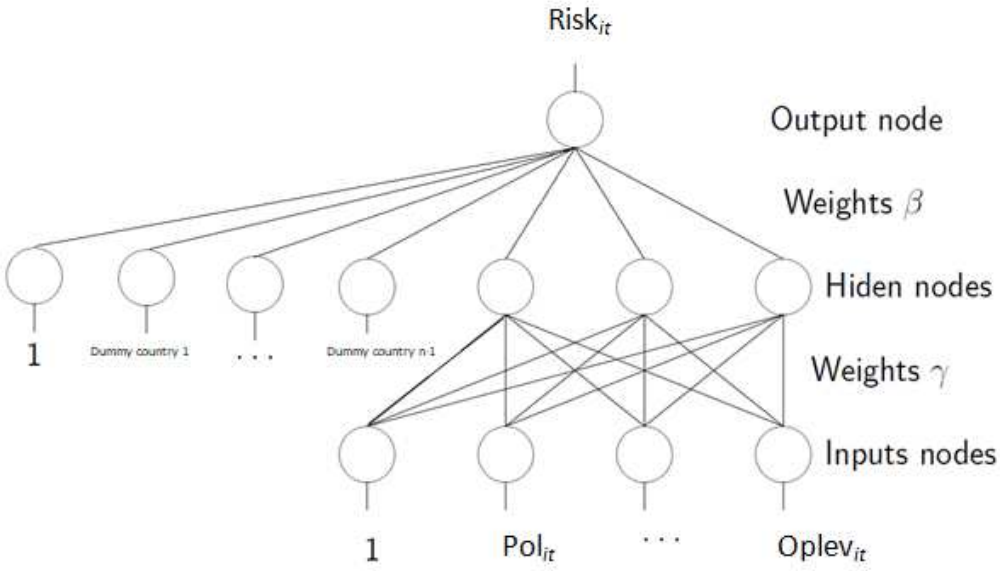

Figure1. Panel Neural network

To take into account individual heterogeneity, an ANN model with fixed effects is used by including dummies by countries in combination with the hidden layer neurons. For ANN calibration, 10,000 Monte Carlo simulations are used in combination witha classical optimisation algorithm. Similarly to classical linear regression models, the insignificant variables are successively deleted. Their suppression does not increase the prediction error, and it allows us to retain only the variables contributing to the model.

Although the ANNs are reliable in terms of predictions, they are considered a black box and difficult to interpret. Thus, the marginal effects are provided for each explanatory variable at the other variables' average value. It should be noted that the interpretation of these marginal effects is similar to the interpretation of the linear regression coefficients, which are also the

marginal effects of the explanatory variables of the linear model. Neural panel model estimation results are provided in Table 7.

Table7. Fixed effects ANN estimations

variable	Step 1	Step 2	Step 3	Step 4	Step 5
	square root of the average squared residual loss				Marginal effects
pol	0.0001	0	0.0002	0.0003	0.2568
Roa	-0.0003	-0.0002	0.0002	0.0012	
Cap	-0.0001	-0.0002	0.0001	-0.0006	-0.2246
Eff	0.0001	0.0001	0.0005		
liq	-0.0006	-0.0007	-0.0008	-0.0011	-0.0043
size	0.0003				
oplev	0.0003	0.0004			

It should be noted that in the ANN estimation, a variable marginal effect includes the variable direct effect, but also a combination of the indirect effects with the other variables in the hidden neurons. Thus, these effects could be linear and nonlinear. Regarding our results, the political connection marginal effect is positive. The capital effect is negative, and so is consistent with previous results. The liquidity variable is not relevant for the two models. Overall, regardless of its effect nature, political connection is also identified within the ANN analysis, consistently with previous results.

5. Conclusion and discussion

This article discusses whether moral hazard is relevant to MENA banks and how the current research question fills an existing gap in the literature on the MENA region by testing the impact of political connections on banks' risk-taking behaviours. For this purpose, linear and nonlinear panel data analysis is employed on a sample containing 67 MENA banks for the period 2003-2017, in which the impact of political connections, along with other banks' characteristics on bank risk, is examined.

Political patronage is found to have a dominant impact on MENA banks' risk-taking behaviours. Although evidence that politically connected banks take on more risk than their non-politically connected counterparts was not found, in contrast to studies dealing with the non-MENA context (Dam and Koetter, 2012; Mariathasan, 2014; Qian *et al.,* 2015; Kostovestky, 2015), the indirect effect of political connections is more pronounced. A possible explanation is the differences in the context of the study in terms of corporate governance and the institutional environment. Regarding nonlinear effects, an interesting

result is the presence of the indirect effect of political connections on risk-taking behaviours revealed through interactions with capital and size in line with previous studies (Srairi, 2013; Abedifar *et al.,* 2013; Zheng *et al.,* 2017). This implicit effect provides evidence of the dominant role of political connections in the banks' risk-taking behaviours regardless of the sign. Compared to studies involving the MENA region, mainly Lassoued *et al.* (2016) and Srairi (2013), we suggest that political connections as a substitute for state-ownership have a similar impact on bank risk-taking behaviour through capital and size. This is consistent with the hypothesis that the political connection effect for state owned-banks is associated with agency problems when a government intervenes by appointing politically connected managers to pursue political and social goals rather than maximising firm value (Wu *et al.,* 2012; Ding *et al.,* 2014). Hence, this study suggests that political connections are a relevant factor driving bank risk-taking behaviour. Along with traditional linear and nonlinear panel regression, we develop an ANN analysis to check robustness, in which the political connection effect persists. The results reveal that the relationship between risk and political connections is nonlinear.

Overall, this study has several implications, especially for the MENA region as an emerging economy. The region is characterised by the dominance of royal families and ruling regimes, weak law rule, widespread corruption, and poor investor protection, and so provides evidence of the political patronage relevance when considering risk-taking behaviour. For the banking industry, politically connected banks tend to exploit their connection to maximise their profits and value by engaging in riskier activities consistent with the moral hazard theory. Hence, the politician-bank network should be carefully considered by regulators and market participants. Investors should react more negatively to politically connected firms than non-politically connected ones during financial distress. The result of this study also suggests that regulators should monitor these banks and ensure their competitiveness and efficiency.

Furthermore, the contrasting results regarding the impact of political patronage on bank risk highlights issues on the sample and context of the study. Indeed, ignoring the institutional environment and corporate governance leads to incomplete conclusions about which should be considered in further research. Another important challenge is the political connection measure as binary variables, which lacks information and fails to reflect different political ties. Hence, we suggest considering new measures to capture the presence and strength of different political connections.

Appendix

Table1. Variables measurement and expected sign

variable	measure	Expected sign	references
pol	binary equals to 1 if the bank is politically connected; 0 otherwise	+/-	Hung et al. (2017), Kostovetsky (2015), Qian *et al.* (2015), Braham *et al.* (2019)
roa	net income/ total assets average	+/-	Delis and Kouretas (2011), Zheng *et al.* (2017), Ianotta *et al.* (2013)
cap	equity/total assets	-	Srairi (2013), Zheng *et al.* (2017)
eff	operating costs / operating income	+	Srairi (2013), Hung *et al.* (2017), Lassoued *et al*. (2016), Dong *et al.* (2017)
liq	loans/deposits ratio	+	Dong et *al.* (2014) Rahman *et al.* (2015) Lassoued *et al.* (2016)
size	Ln (total assets)	+/-	Abedifar *et al.* 2(013)
op_lev	fixed assets/total assets	+	Srairi (2013), Lassoued *et al.* (2016)
state	State-ownership percentage	+	Abedifar *et al*. (2013), Shaban and James (2017), Sapriza *et al.* (2013), Jia (2009)

Table2. Test VIF

Variable	VIF	SQRT VIF	Tolerance	R-Squared	Eigenvalue	Condition Index
risk	1.06	1.03	0.9441	0.0559	6.4468	1.0000
pol	1.02	1.01	0.9799	0.0201	1.0226	2.5109
size	1.27	1.13	0.7885	0.2115	0.9289	2.6345
roa	1.86	1.36	0.5374	0.4626	0.5559	3.4054
cap	1.42	1.19	0.7050	0.2950	0.3976	4.0266
liq	1.17	1.08	0.8579	0.1421	0.3471	4.3094
oplev	1.06	1.03	0.9460	0.0540	0.1573	6.4015
eff	1.79	1.34	0.5598	0.4402	0.0893	8.4952
state	1.19	1.09	0.8434	0.1566	0.0492	11.4493
Mean VIF	**1.31**				**Condition Number**	**35.2044**

Table3. Random effect model iterative estimations

Variable	(1)	(2)	(3)	(4)	(5)	(6)
pol	-.00151799	-.0015371	-.00160228			
size	-.00195132	-.00193697	-.00219636*	-.00221881*	-.00235851**	-.00228742**
roa	-.76256254***	-.76519772***	-.77188173***	-.77126031***	-.78228199***	-.78977151***
cap	-.00207289					
liq	-.00454447	-.00459456	-.00486983	-.0048773	-.00402999	
oplev	.00118784	.00119053	.00117588	.001203		
eff	-.02165404**	-.02155974**	-.02157147**	-.02137595**	-.02240546**	-.02257144**
state	-.00003147	-.00003161				
_cons	.05973167***	.05941345***	.06152391***	.06065784***	.06194889***	.05832749**

(1) *Model estimation including all variables, (2) to (6) estimations with one less insignificant variable*
, **, * Significant at 10%, 5% and 1%*

Table4. Fixed effect model iterative estimations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
pol	-.15984764***	-.1606214***	-.15988624***	-.15601639***	-.13865908***	-.14402431***	-.14314796***	-.13689961***
size	-.01369983***	-.01375271***	-.01358657***	-.01320026***	-.01305905***	-.01327907***	-.01317685***	-.01269365***
roa	-1.1218984***	-1.126173***	-1.1327117***	-1.1474242***	-1.0449643***	-1.0698799***	-1.0685485***	-.91024981***
cap	-.23389789**	-.23527523**	-.21781469**	-.21543063**	-.2105834**	-.21329371**	-.21329457**	-.24091916***
liq	.00280503	.00298586						
oplev	.00026253							
eff	-.03733803	-.03761689	-.03907792	-.04026962*	-.02529824**	-.02930126**	-.02944709**	-.02853515**
state	-	-	-	-	-	-	-	-
pol×size	.01429553***	.01434864***	.01419659***	.01343226***	.012998***	.01289689***	.0128002***	.01203372***
pol×roa	.34285516	.34729157	.35426648	.37153393	.23792682	.28188517	.28016582	
pol×cap	.26163979**	.26289325**	.24544199**	.2374547**	.22871385**	.22114031**	.22098181**	.26926811***
pol×liq	-.01142479	-.01159926	-.00884148	-.00980538	-.00981805			
pol×oplev	.00302457	.00328775	.00328174	.00325745	.00284542	.00001682		
pol×eff	.01816446	.01844477	.01985765	.0209261				
pol×state	-.00043306	-.00043032	-.00043111					
_cons	.19999038***	.20071401***	.20019591***	.19473116***	.18392082***	.18768162***	.18681818***	.18244107***

(1) to (8) estimations with one less insignificant variable

, **, * Significant at 10%, 5% and 1%*

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