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TACKLING CORRUPTION: A PILLAR OF MENA BANKING STRENGTH

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Abstract
Corruption in the banking sector is a major problem that can have negative consequences for the economy. This paper reviews the literature on the impact of corruption on the banking sector, with a focus on the following areas: (1) the lending decisions of banks, (2) the riskiness of banks' portfolios, (3) the stability of the banking system, and (4) economic growth. The paper concludes that corruption has a negative impact on all of these areas, and that it can lead to financial crises.

Keywords: corruption, banking sector, lending decisions, riskiness, stability, economic growth

1. Introduction

Recognized as « an abuse of public or private power for personal gain » (International Transparency, 1999), corruption is increasingly prevalent in the main sectors of national economies particularly in the banking sector. Numerous theoretical and empirical studies focus on the negative effects of corruption on the performance of the banking sector. The Results from various cross-sectional regressions show that corruption significantly worsens the problem of impaired loans in the banking sector (Detragiache et al (2008), Park (2012), Messai and Jouin (2013), and Breuer (2006)). Moreover, Park (2012) shows that corruption in this sector can cause not only bank failures, which are not only manifested by financial losses for economic agents, but also by the destabilization of the entire system through the contagion mechanism. Thus, the literature on the financial crisis of 1997-1998 in East Asia shows that corruption contributed to this crisis by its negative impact on the balance sheets of banks and, in particular, on the relative weight of non-performing loans. The case of Hanbo in South Korea is a typical example of the fact that close ties between companies and politicians have led to a serious deterioration in the quality of bank assets and, ultimately, to the financial crisis.

Our purpose in this paper is to study the effect of corruption on the soundness of the banking sector and on economic growth. Many studies have focused on the effect of corruption on economic growth through various channels, such as investment in physical capital, investment in human capital, technology transfer, and public spending (Mauro, 1995, 1998; Ehrlish and Lui, 1999; Murphy et al., 1993; Souissi, 2014a). However, very little academic effort and research have focused on the impact of corruption on economic growth through the performance of the banking sector. This study shows that the banking sector can be a transmission channel for the effects of corruption on economic growth in MENA countries. Indeed, despite the reforms introduced by the countries of the region, notably Algeria, Egypt, Morocco, and Tunisia, since 1998, the banking sector of these economies continues to record modest performance, given the importance of non-performing loans in total bank loans. In addition, numerous studies have shown that these economies are characterized by widespread corruption in all sectors. Transparency International's Corruption Perceptions Index consistently ranks MENA countries below the global median in terms of public sector corruption. The Arab Spring has revealed politicians' corruption as a major political influence in many countries in the region.

Thus, the diversion of tens of billions of US dollars in state resources by former leaders in Egypt, Libya, and Tunisia has been the subject of numerous studies (Baccar, 2012; Rijkers et al., 2014; Diwan and Schiffbauer, 2018). Furthermore, Alley (2010) and Haddad (2012) showed that political corruption proliferates also in Algeria, Libya, Syria, and Yemen, where political cronies control large parts of the private sector. In the same context, Diwan and Schiffbauer (2018) affirmed that the political elites in Middle Eastern countries deliver business opportunities and privileges to friendly capitalists and establish different barriers to entry to exclude opponents. Also, Souissi (2014b) demonstrates that the governance system in Arab countries is characterized by crony capitalism and strong collusion between the economic and political elites. The governance institutions are weak and are dominated by informal and interpersonal arrangements.

Therefore, we study to what extent institutional failure or the omnipresence of corruption in these economies affects the soundness of the banking sector and, consequently, impacts the economic growth of these economies. Thus, we propose the following hypotheses:

Hypothesis 1: The omnipresence of corruption in MENA countries augments the problem of nonperforming loans in the banking sectors of these economies.

Hypothesis 2: The banking sector in MENA economies constitutes a transmission channel for corruption's effects on economic growth.

To test these hypotheses, we have organized our work as follows. In the first section, we review the literature on the effects of corruption on credit behavior and economic growth. We study the transmission mechanisms of the effects of corruption on non-performing loans and economic growth. We show that the omnipresence of corruption in the banking sector reduces the volume of loans granted and leads to a bad allocation of financial resources, which limits the level and quality of private investment and thus slows economic growth. In the second section, we conduct an empirical study on a panel of six MENA countries from 2000 to 2018. We estimate two econometric models inspired by Park (2012). The results of the estimation of the first model show that corruption aggravates the problem of impaired loans in the banking sectors of these economies. The estimation of the second model shows that the banking sector constitutes a channel for the transmission of the effects of corruption on economic growth in the MENA countries.

2. Literature Review

In the economic literature, one of the pioneering contributions highlighting the negative impact of corruption on bank loans is La Porta (1997, 1998). The author highlights the adverse impact of corruption on bank lending through the relationship between finance and legal institutions. Thus, in a transparent legal and institutional system, contracts are guaranteed, and bank recovery procedures are ensured. In the event of a borrower's bankruptcy, the legal and legislative systems allow the bank to recover its funds through collateral or take possession of the business. In contrast, in a failing legal and institutional system, corruption increases the uncertainty of banks and the impossibility of recovering funds lent and damages; in the case of a judgment against defaulting debtors, banks should refrain from lending and take more risk. Credit risk is the primary risk faced by banks (Caprio et al., 1998; Campbell, 2007) and is the root cause of bank defaults (Thomson, 1991; Wallen, 1991; Cole and Gunther, 1995; Barnhill et al., 2002; Vazquez et al., 2012). Thus, corruption in an economy increases « credit risk »and *consequently limits the volume of loans granted*. This inhibits investment and economic growth, because the banking sector is the main source of finance for the productive sector in most economies (Beck et al., 2000); Beck and Levine, 2004). Galli et al. (2017) conduct an empirical study of a sample of European companies during the period 2009–2014 and show that corruption in these economies

limits access to bank loans for small businesses. Indeed, the payment of bribes constitutes a major obstacle to their entry into the market given their insufficient financial resources and weak negotiating power. Similarly, Weil (2009), for the case of Russia, argues that corruption has a negative effect on bank loans. This is a barrier to investment financing and acts as a tax that increases the cost of credit to the borrower. This hinders financial development and economic growth.

Another negative effect of corruption on bank loans is *the selection of projects and the allocation of credit*. This effect illustrates the complicity that can exist between the lender and the borrower, which means that the selection of projects is based on the amount of the « bribe » paid to the lender and not on the profitability of the project. Thus, it is not the most profitable project to be funded, but the most corrupt entrepreneur.

This leads to a deprivation of the economy of projects according to their importance and priorities. Park (2012) shows that the greater the degree of corruption in an economy, the lower the marginal efficiency of capital. This, in turn, reduces the incentive for individuals to invest because the expected rate of return is low and risky. Breuer (2006) conducted an empirical study of 52 countries worldwide and showed that corruption is an important determinant of the proliferation of non-performing loans in the banking sectors of these economies.

Another mechanism for transmitting the effects of corruption on banking soundness is *the state's participation in the banking sector*. In this context, numerous theoretical and empirical studies have shown that public banks may not serve the economic and social goals assigned to them if they are captured by political power and ensure their own private interests. In this case, bureaucrats in public banks protect only the individual interests of a certain group in power. Kane (1995) shows that entrepreneurs with proven relationships with influential politicians can benefit from bank credit with minimal collateral and a high risk of default. Micco et al. (2007) confirmed the influence of political lobbying on state-owned banks. In the same context, Taktak (2010) showed that the inefficiency of Tunisian banks is mainly due to the failure of big public banks. These banks are characterized by misguided state interventions and poor governance. Similarly, in other countries of the MENA region, the banking sector is characterized by a high degree of interventionism, which stimulates corruption and rent-seeking behavior. For example, in Egypt, public banks control 50% of economic activity, and in Algeria, public banks finance more than 85% of their economic activity. In addition, Kuwait's five largest national banks alone hold 90% of the country's assets, with the first two holding two-thirds.

Additionally, a contrasting view of the impact of corruption on bank loans can be mentioned in this context. Therefore, corruption does not necessarily lead to bad loans in the banking sector. Stiglitz and Weiss (1981) show that banks opt for a credit rationing policy to avoid adverse selection[1] resulting from information asymmetry between the lender and borrower. Nevertheless, credit rationing suggests that some borrowers are willing to pay an interest rate higher than the official rate. This creates a situation favorable to corruption in the sense that those who are most likely to obtain loans are the ones who will have bribed the bank's employees the most. In this case, corruption is the « grease » of the credit-granting mechanism because it enhances the flexibility of the bank lending process and, in part, corrects the consequences of the imperfection of the information. Moreover, Mauro (1995), for a similar « speed money » argument, shows that a borrower with a good project may bribe loan officers to save time by passing the usual loan review process. In this case, the probability of success may increase because of the timely implementation of the project.

[1] The adverse selection is manifested by the choice of the bad borrower, because of imperfect information.

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3. Empirical Study:

3.1 Methodology

This study empirically demonstrates the impact of corruption on the soundness of the banking sector and economic growth in the MENA region. We rely on Park's article (2012) and use macroeconomic data for these economies. Moreover, it is worth remembering that Park (2012) conducted a cross-sectional study on the impact of corruption on non-performing loans and economic growth in 76 countries with uneven levels of development. In addition, by breaking the sample into two groups of countries that are highly corrupt and weakly corrupt, Park (2012) showed that corruption makes the problem of impaired loans more acute in highly corrupt economies than in weakly corrupt economies. Furthermore, Park (2012) estimated a model with simultaneous equations and showed that corruption simultaneously affects bank soundness and economic growth.

In this study, we introduce the temporal dimension to Park's model (2012) and conduct a panel data study for a set of MENA countries. We adopt Park's (2012) methodology and estimate two econometric models. First, we estimate the first model using the static panel data method, and we show that corruption increases the non-performing loans in the banking sector of MENA countries. Second, we estimate a model of economic growth by using the instrumental variable method. We demonstrate that corruption in MENA countries has an indirect effect on economic growth and that the banking sector constitutes a channel for the transmission of these effects. We show that these results are robust to various corruption indicators.

3.2 The Effect of Corruption on Non-performing Loans in MENA Countries

3.2.1 Model Specification

Referring to Park (2012) and many other empirical studies on the determinants of non-performing loans(NPLs), we recognize that they are related to bank-specific, macroeconomic, and institutional factors. In this regard, Jouini and Messai (2013) use microeconomic data for 85 banks in three countries (Italy, Greece, and Spain) for the period 2004–2008 and show that the rate of non-performing loans varies negatively with the GDP growth rate and profitability of bank assets, while it varies positively with the unemployment rate, loan loss reserves, and real interest rate. Boudriga et al. (2010) conducted an empirical study of 46 banks in 12 MENA countries over five years (2002-2006) and showed that non-performing credits in this region can be explained by a set of bankspecific variables such as credit growth rate, loan loss provision, bank size, asset profitability, foreign equity from developed countries, and capital requirements (capital banking regulations). Similarly, Boudriga et al. (2010) show that banks' NPLs are also explained by macroeconomic variables, namely the GDP growth rate and unemployment rate, as well as variables describing the business climate. Moreover, Espinoza and Prasad (2010), for a panel of 80 banks in the Gulf Cooperation Council (GCC) region during the period 1995–2008, show that the size of these banks' NPLs is explained by macroeconomic factors and bank-specific factors.

We adopt Park's (2012) model, which focuses on macroeconomic data. The specification of the model to be estimated is given by the following equation:

$$NPL_{i,t} = \beta_0 + \beta_1 \_{i,t} + \beta_2 INFLATION + \beta_3 \_{i,t} + \beta_4 \_{i,t} + \beta_5 \_{i,t} + \beta_6 Corrup_{it} + \alpha \_{t} + \mu_i + \varepsilon_{i,t} \quad (1)$$

Where,

NPL: ratio of non-performing loans / total loans.

RGDP: growth rate of Gross Domestic Production.

INFLATION: rate of inflation.
CAP: ratio of capital/assets.
PROV: provisions on non-performing loans.
ROE: return on equity ratio.
Corrup: corruption indicator.
The subscripts i and t indicate the country and year, respectively. $\beta_0, \beta_1, \beta_2 \ldots, \beta_6$ are the coefficients to estimate, μ_i is country-fixed effects, α_t is year dummy or time fixed-effects to account for common shocks affecting all countries in all sample period and $\varepsilon_{i,t}$is a random term.
Overall economic conditions are controlled by the GDP growth rate (*RGDP*). Thus, during a period of economic expansion with an increase in the GDP growth rate, the likelihood that existing or newly contracted loans will be classified as bad credit decreases. In this case, companies face favorable economic conditions and can meet deadlines and repay their loans. The overall economic situation can also be controlled by the real GDP per capita (*GDPPC*)[2]. Thus, the increase in GDP per capita assumes a favorable economic situation that supports the solvency of companies and reduces the credit risk assumed by banks.
The inflation rate is another indicator cited in the literature that identifies the economic context of the economy. Thus, an increase in the inflation rate reduces the purchasing power of economic agents and, consequently, reduces their repayment capacity. Thus, the coefficient associated with the inflation rate has a positive sign. Regarding bank-specific variables, banks adopt many regulatory measures to strengthen their banking soundness. Thus, capital regulation helps mitigate credit risk. In this regard, the efforts of the Basel II Committee to launch a new agreement on capital make it possible to verify that this regulatory measure could contribute to reducing the incentives for banks to take risks. This study considers the capital–asset ratio (*CAP*). The higher this ratio, the lower the risks assumed by the banks and the lower the non-performing loans. Therefore, the expected coefficient associated with this variable is negative.
The provision of non-performing loans (*PROV*) is another regulatory measure cited in the literature and taken by banks to strengthen their banking solidity. The lower these provisions are, the higher the credit risk. Therefore, the sign of the coefficient associated with PROV is negative. The return on equity ratio (*ROE*) is a bank-specific variable and is also used in the literature as a determinant of non-performing loans. Improving the profitability of bank assets may help mitigate credit risk. Therefore, the expected sign associated with *ROE* is negative.
The Corruption Index measures the degree of corruption in an economy. We use the *ICRG* corruption index from the « International Country Risk Guide ». The scores of this index are based on a scale ranging from 0 (totally corrupt) to 6 (no corruption). The higher the index, the healthier the institutional environment and the lower the corruption. Therefore, the expected sign of the coefficient associated with the corruption index is negative.

3.2.2 Source and description of Data

Based on data availability, we used panel data for six MENA countries (Saudi Arabia, Egypt, Jordan, Kuwait, Morocco, and Tunisia) from 2000 to 2018. The data were collected from different sources. Bank-specific data (*PROV, ROE,* and *CAP*) are extracted from the World Bank's Global Financial

[2] We note that the GDP / capita is expressed in purchasing power parity and in constant international dollars, that of 2011.

Development (2020) database. Data on non-performing loans (*NPL*) and macroeconomic data (*RGDP, GDPPC*, and *INFLATION*) are taken from the World Development Indicators database (2020). The *ICRG* corruption index is extracted from the « International Country Risk Guide » (2020).

Furthermore, the stationarity of the data should first be confirmed to ensure the credibility of the regression outcomes. Thus, the unit root test (Dickey-Fuller) completed on our data shows that the null hypothesis can be rejected at the 1% confidence level, which implies that the series is stationary. Table 1 shows the descriptive statistics of the variables used in Model 1. So, it can be seen that the average of non-performing credits (compared to total credits) is 8.3%, ranging from a minimum of 1% to a maximum of 26.5%. The *ICRG* corruption index shows an average of 2.457, ranging from a minimum of 1.5 to a maximum of 3. Therefore, on a scale that varies from 0 to 6, these economies are classified as below average and are characterized by a high level of corruption. Moreover, the correlation matrix displayed in Table 2 shows a negative correlation between nonperforming loans and the *ICRG* corruption index, which is equal to -0.20 and significant at the 5% level. In addition, the results show the existence of negative correlations between *NPL* and bank-specific variables (*CAP, PROV*, and *ROE*), which are significant at the 5% level. Furthermore, the correlation between *GDP* per capita and *NPL* is negative and significant at the 5% level.

Table 1: Summary and descriptive statistics

Variables	Average	Std. Deviation	Minimum	Maximum
NPL	0.083	0.060	0.010	0.265
PROV	0.789	0.368	0.269	2.028
ROE	0.134	0.057	0.005	0.148
CAP	0.100	0.031	0.005	0.148
ICRG	2.457	0.474	1.5	3
Growth Rate of GDP (RGDP)	0.041	0.032	-0.070	0.173
INFLATION	0.039	0.035	-0.011	0.183
Ln of real GDP/capita (Ln GDPPC)	0.667	0.981	8.408	11.481

Table 2: Correlation Matrix

	NPL	ICRG	PROV	ROE	CAP	Ln GDPPC	RGDP	INFLATION
NPL	1.00							
ICRG	-0.20	1.00						
PROV	-0.39	-0.32	1.00					
ROE	-0.35	-0.32	0.56	1.00				
CAP	-0.63	0.30	0.00	-0.04	1.00			
Ln GDPPC	-0.42	-0.06	0.20	0.42	0.36	1.00		
RGDP	0.019	-0.01	0.09	0.23	-0.12	0.013	1.00	
INFLATION	0.05	-0.26	0.14	0.27	-0.14	0.05	0.40	1.00

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3.1.3 Estimation Method and Results

Recall that the estimation of a model using panel data requires verification of the homogeneous or heterogeneous specification of the sample studied. This is to check whether the theoretical model studied is perfectly identical for all countries or, on the contrary, there are individual specificities for each country.

The Fisher statistic, associated with the homogeneity test, shows the existence of individual-specific effects in each country. Therefore, the model is an individual-effect model. The Hausman specification test shows that these individual effects are random. The estimation results of Model 1 are presented in Column 1 of Table 3.

Table 3: Panel regression results using alternative corruption index

Dependent Variable: NPL	**(1)**	**(2)**	**(3)**
ICRG	-0.018** (-2.43)	-	-
Ln CPI	-	-0.052** (-1.98)	-
CC	-	-	-0.025** (-1.98)
PROV	-0.024** (-2.46)	-0.023** (-2.43)	-0.025** (-2.37)
CAP	-0.870*** (-8.62)	-0.590*** (-3.92)	-0.759*** (-5.46)
ROE	-0.443*** (-6.37)	-0.385*** (-5.37)	-0.402*** (-5.04)
Ln (GDPPC)	-	-0.000 (-0.08)	0.001 (0.43)
RGDP	-0.167 (-1.42)	-	-
INFLATION	0.000 (1.55)	0.004* (4.22)	0.000** (1.98)
Year Fixed Effects	Yes	Yes	Yes
Constant	0.356*** (13.82)	0.267*** (6.87)	0.267*** (6.87)
R2	0.82	0.81	0.81
Observations	102	102	102
Method	Random Effect	Random Effect	Random Effect

Hausman Test (P-Value) (1)	0.18	0.47	0.2

Notes: The asterisk represents the p-value significance levels (* p < 0.1; ** p < 0.05; *** p < 0.01). The values in parentheses are the t-student of estimated coefficients. The results relating to year dummies are not reported. *(1)* This is the p-value associated with the Hausman test: if the coefficient result of the Hausman test shows that the p-value is higher than 0.05 (the significance level), then the null hypothesis of the random effects model is the preferred model. If not, the fixed effects model will be used instead.

The coefficient associated with the corruption index (*ICRG*) has the expected sign and is significant at the 5% level. So, improving the institutional environment and fighting corruption contribute to reducing NPLs in

MENA economies. On a scale that varies from 0 to 6, increasing the corruption index by one scale ($\Delta\, ICRG = 1$)generates a decrease in the ratio of non-performing loans, compared to total loans, by 1.8% ($\Delta NPL = -0.018$).

The coefficients associated with bank-specific variables (*PROV, CAP*, and *ROE*) have the expected signs and are statistically significant at the 1% level. The adoption of regulatory policies, such as loan loss provisions and capital regulation, helps mitigate credit risk and reduce non-performing loans. In addition, improving the profitability of bank assets helps reduce credit risk in MENA countries.

The coefficients associated, respectively; with the rate of gross domestic production (*RGDP)* and the inflation rate *(INFLATION)* are not significant. So, the global macroeconomic context was not a significant determinant of non-performing loans in MENA countries during the period 2000–2018; rather, it was bankspecific conditions and the institutional environment that affected the volume of non-performing loans in these economies.

3.1.4 Robustness Test

We consider two other corruption indices that are frequently used in the literature. The Corruption Perception Index (*CPI*) from « International Transparency»(2020) and the Control of Corruption Index (*CC*) from «World Governance Indicators» (2020). The *CPI* ranks countries worldwide based on their perceived levels of corruption. The scores of this index are given on a scale from 0 (highly corrupt) to 100 (very clean). The *CC* index varies from -2.5 (totally corrupt) to 2.5 (no corruption). The higher these indices, the lower the corruption. Therefore, the expected sign of the coefficient associated with each of the indices in Equation (1) is negative. The estimation of equation (1) using, respectively, the *CPI* and *CC* indices provides the results displayed, respectively, in columns (2) and (3) of Table[3]3. The coefficients associated with the *CPI* and *CC* corruption indices have the expected signs and are significant at the 5% level. This confirms the results presented above. Similarly, it can be seen that there is no significant change in the results associated with the other control variables.

[3] To homogenize the data, the CPI index and the GDP / capita are linearized, by applying the Nuperian Log function to the various values associated with the CPI index and the GDP / capita.

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3. 2 Corruption, Banking Soundness, and Economic Growth in MENA countries:

3.2.1 Model Specification

Our purpose in this section is to show that corruption exerts an indirect effect on economic growth through the banking sector. To do this, we estimate the growth model proposed by Park (2012) which is as follows:

Where,

HUMAN[4]: human capital in the economy, which is approximated by the average level of schooling in the economy

POPG: population growth rate

INVT: rate of investment in physical capital *GOV*: an indicator of public governance.

The *RGDP, CPI,* and *NPL* variables are already defined in the previous section.

Recall that the *NPL* variable in Model 2 is endogenous (Equation (1)). This constitutes a transmission channel for the indirect effects of corruption on economic growth. Similarly, the *GOV* is another endogenous variable in the model. Indeed, the presence of institutional variables among the explanatory variables in a development or economic growth model causes a problem of simultaneity. Therefore, to estimate Model 2, we use the instrumental variables method applied to panel data.

Moreover, knowing that non-performing credits denote the soundness of the banking sector in an economy, the lower the non-performing loans *(NPL)*, the better the banking sector performs, and the higher the economic growth. Therefore, the expected sign of the coefficient associated with *NPL* is negative.

Furthermore, based on the standard literature on the determinants of economic growth, we retain that the coefficients associated with the other control variables (*HUMAN, INVT*, and *POPG*) have the same sign, which is positive.

In addition, given that some countries in the MENA region are in a period of political and democratic transition, the governance indicator used was the political instability index. The scores of this index vary from -2.5 (strong political instability) to +2.5 (strong political stability). Therefore, the higher the political stability index, the more favorable the business climate, and the higher the economic growth. Therefore, the expected sign of the coefficient associated with *GOV* is positive.

3.2.2 Source and Description of Data

Data on the GDP growth rate (*RGDP*), investment rate (*INVT*), population growth rate (*POPG*), and nonperforming loan rate (*NPL*) are extracted from the «World Development Indicators» (2020). Data on human capital are obtained from the database of Barro and Lee (2020). The political stability index (GOV) is extracted from «World Governance Indicators» (2020). Tables 4 and 5 in the Appendices display the descriptive statistics and correlation matrix of the variables in Model 2, respectively.

3.2.3 Method and Results of Model 2 Estimates

To estimate Model 2, we used the instrumental variable method applied to the panel data. Our estimation method involves two steps.

In the first step, we are interested in instrumenting the endogenous explanatory variables using the panel data method:

[4] Note that the Nuperian Log function has been applied to the different values associated with the variable Human.

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$NPL_{it}=a+B\,X\,it+\alpha\,Z\,it+\mu it$ **(3)** $\widehat{GOV}_{it}= b+C\,X\,it+\beta\,Z\,it+\mathcal{E}\,it$ **(4)**

X is the vector of exogenous variables, which are defined in Model 2, and Z is the vector of instrumental variables. The instruments used were the *ICRG, CAP, PROV, ROE,* and *INFLATION*. To demonstrate that these are good instruments, we must show that these instruments are strongly correlated with the endogenous explanatory variables without being correlated with the error term.

To verify the relevance of the instruments, we rely on economic (intuitive) and statistical arguments. Thus, from an economic point of view, non-performing loans are correlated with all these instruments because they are the determinants of NPLs (according to Model 1). For the variable Political Stability (*GOV*), the reduction in the inflation rate (*INFLATION*) generates an improvement in the purchasing power and the standard of living of the population, which helps to ensure a certain social peace, a reduction in violence, and thus, a strengthening of political stability. In addition, an increase in bank-specific variables (*ROE, PROV*, and *CAP*) helps to support bank strength. This would create an environment conducive to economic and social progress, which, in turn, would contribute to reducing violence and strengthening political stability. Similarly, an increase in the corruption index (*ICRG*) ensures a healthy institutional environment and strengthens political stability.

Furthermore, from a statistical standpoint, these instruments are strongly correlated with endogenous explanatory variables of the model. Indeed, the correlation coefficients between these instruments and the variables to be instrumented (*NPL* and *GOV*) are significant at the 5% level (Columns 1 and 2 of Table 6 in the Appendices). Moreover, the results of the estimation of equations (3) and (4) show a globally significant Fisher statistic (Table 7 in the Appendices). These allowed us to conclude that the instruments are relevant.

In the second step, we estimate Model 2 using the panel data method. The estimation results are presented in Column 1 of Table 8. Thus, the coefficients associated with NPLs and political stability (*GOV*) are consistent with the predictions of the theoretical model and are significant for a degree of risk of 1% and 10 %, respectively.

Table 8: Results of the estimation of Model 2

Dependent variable: RGDP	**(1)**	**(2)**	**(3)**
			-1.581**

$\widehat{NPL}$	-1		**-0.701***	0.556***
		(-2.59)	**(-2.97)**	
		0.126*	0.096***	
		(1.67)	(2.42)	
	HUMAN	-0.0123	-0.006	Instrumental variables method
		(-1.55)	(-1.11)	
	POPG	-2.119***	-1.751***	
		(-3.43)	(-3.82)	
	INV	-0.470*	-0.280*	
		(-1.95)	(-1.85)	
0.4	Constant			
		(3.08)	(3.48)	
	R^2	0.07	0.011	
	Observations	102	102	
Estimation	0.285***			
Instrumental variables Method	Instrumental variables method			
ICRG	**Ln CPI**			**CC**
The instruments used (Z)	CAP PROV INFLATION	CAP PROV ROE INFLATION		CAP PROV INFLATION
Sargan's test (1)	0.10	0.43		0.08

Notes: The asterisk represents the p-value significance levels (* p < 0.1; ** p < 0.05; *** p < 0.01). The values in parentheses associated with the estimated coefficients are the t-students. (1) This is the p-value associated with the Sargan test (p-value > 0.05). This result shows that we must accept the H0 hypothesis: the instruments are not correlated with the error term. However, the coefficients associated with the *POPG* and *INVT* variables do not conform to the predictions of the model and are significant at the thresholds of 1% and 10% respectively.

Besides, human capital (*HUMAN*) shows no significant effect on the economic growth of the region. Finally, the application of Sargan's (1957) over-identification test shows that the instruments are valid. Economically, these results imply that the reduction of non-performing loans and improving the strength of the banking sector in the economies of the MENA region help to increase their economic growth. Moreover, according to Column 1 of Table 8, we can deduce that the establishment of a stable political environment makes it possible to improve the business climate and boost economic activity in the MENA region. However, an increase in the size of the population translates into a decrease in the economic growth of GDP. The increase in unemployment and the deterioration of purchasing power in most countries in the region mean that an increase in the size of the population cannot be converted into an increase in aggregate demand or an increase in the size of the market. On the contrary, the increase in population is converted into social problems (theft, illegal emigration, etc.), which creates uncertainty and reduces investment and economic growth.

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Furthermore, the negative effect of investment on economic growth is inconsistent with our expectations. This could be due to the decline and insufficient private investment in certain economies in the region (Tunisia, Libya, Algeria, and Egypt), especially after the 2011 revolution. It can also be due to the low productivity or inefficiency of public investment, which constitutes a significant fraction of the total investment in these economies. Moreover, human capital does not have a significant effect on economic growth in these economies. This result is not surprising; indeed, many studies show the existence of a weak, even insignificant, relationship between GDP growth and schooling. In this regard, Pritchett (2001) shows that the effect of schooling on economic growth varies according to the ability of the economy to use schooling productively. Thus, education does not affect economic growth in economies with a high level of corruption, a high black market premium, or an important level of brain drain. In this case, human capital is allocated to lucrative, but socially unproductive, private activities.

The indirect effect of corruption on economic growth:

Statistically, the indirect effect of corruption on economic growth can be captured by the derivative of the GDP growth rate, which is given by equation (2), with respect to the corruption index, that is

$$\frac{\partial RGDP}{\partial ICRG} = \frac{\partial RGDP}{\partial \widehat{NPL}} * \frac{\partial NPL}{\partial ICRG} \quad \textbf{(5)}$$

$$= \underset{<0}{\gamma_1} * \underset{<0}{\frac{\partial \widehat{NPL}}{\partial ICRG}} \quad \textbf{(6)}$$

The Column 1 of Table 8 displays a negative and significant relationship between *RGDP* and *NPL*, so $\gamma_1 = \frac{\partial RGDP}{\partial \widehat{NPL}}$ is negative. and $\frac{\partial \widehat{NPL}}{\partial ICRG}$ is negative. Furthermore, the previous section shows the existence of a negative significant relationship between *NPL* and *ICRG*. So, $\frac{\partial \widehat{NPL}}{\partial ICRG}$ is negative. Therefore, the derivative of the GDP growth rate with respect to the corruption index is positive ($\frac{\partial RGDP}{\partial ICRG} > 0$). This result indicates that corruption exerts a negative and indirect effect on economic growth through the banking sector. Therefore, the banking sector is a transmission channel for corruption's effects on economic growth.

3.2.4Robustness Test

To test the robustness of this result, we estimate equation (2) by instrumenting the endogenous variables of the model with the same instruments used previously but using other corruption indices, the *CPI* and *CC* indices. We used the same estimation method as described in the previous section. The estimation results are given in Columns 2 and 3 of Table 8. The coefficient associated with the *NPL* variable is negative and significant at the 1% and 5% thresholds, respectively. Moreover, as previously developed, the indirect effect of corruption on economic growth can be attributed to the derivative of the GDP growth rate with respect to the corruption indices *Ln CPI* and *CC*. This allows us to determine Equations (5) and (6) for each corruption index considered. This outcome allows us to capture the indirect effect of corruption on economic growth in each case. We follow the same procedure as above and show that the indirect effect of corruption on economic growth is negative.

It should be noted that the instruments used in both cases were relevant. Indeed, the correlation coefficients between these instruments and the variables to be instrumented (*NPL* and *GOV*) are significant at the 5% level (Columns 1 and 2 of Table 9 in the Appendices). Furthermore, the results of the estimation of equations (3) and (4) using the panel data method show a globally significant Fisher statistic (Tables 10 and 11 in the Appendices). This allows us to conclude that the instruments seem to be relevant. Moreover, Sargan's (1957) test shows that these instruments are valid (Columns 2 and 3 of

Table 8). Furthermore, the findings presented in Columns (2) and (3) of Table 8 provide the same conclusions regarding the effect of the other control variables on economic growth.

4. Conclusion

This study provides significant results based on empirical analyses. The omnipresence of corruption in MENA economies amplifies the volume of non-performing credits, which leads to the misallocation of financial resources and consequently reduces economic growth. Therefore, the banking sector constitutes a transmission channel for corruption's effects on economic growth. Such considerations normally lead to the adoption of new institutional policies that counter any form of rent seeking and ensure an efficient allocation of capital based on market criteria and not on opportunism or favoritism. Consequently, given that political corruption and state capture are the main challenges in the MENA region, reducing state intervention in the banking sector is necessary to reduce corruption in this sector. In fact, in MENA countries, the banking sector is characterized by a high degree of interventionism. Additionally, it is necessary to establish new banking supervision policies in the MENA countries. The traditional approach to banking supervision by official authorities that characterizes the banking sector in these economies does not improve the integrity of bank loans. Supervisory and regulatory bodies cannot serve the collective interests assigned to them because they are captured by political power and ensure their own private interests. The establishment of new banking supervision policies centered on the empowerment of private control is necessary to mitigate banking corruption and its effects on business financing.

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APPENDICES

Table 4: Summary and descriptive statistics.

Variables	Mean	Std. Deviation	Minimum	Maximum
RGDP	0.041	0.032	-0.070	0.173
NPL	0.083	0.060	0.010	0.265
INVT	0.236	0.062	0.106	0.390
POPG	0.024	0.015	0.007	0.062

HUMAN	6.784	1.658	3.82	10.5
GOV	-0.318	0.475	-1.648	0.65

Table 5: The correlation matrix.

	RGDP	NPL	INVT	POPG	HUMAN	GOV
RGDP	1.00					
NPL	0.019	1.00				
INVT	0.025	-0.261	1.00			
POPG	-0.117	-0.200	-0.289	1.00		
HUMAN	0.006	-0.254	-0.091	0.453	1.00	
GOV	0.103	-0.022	-0.065	0.237	-0.173	1.00

Table 6: Correlation Matrix

	(1)	**(2)**	(3)	(4) Ln	(5)	(6)	(7)	(8)	(9)
	NPL	**GOV**	ICRG	CPI	CC	CAP	ROE	PROV	INFLA-TION
NPL	1.00								
GOV	-0.02	1.00							
ICRG	**-0.19***	**0.17**	1.00						
Ln CPI	**-0.28***	**0.52***	0.36*	1.00					
CC	**-0.19***	**0.59***	0.27*	0.73*	1.00				
CAP	**-0.63***	**0.35***	0.30*	0.65*	0.65*	1.00			
ROE	**-0.35***	**0.04**	-0.32*	-0.05	-0.05	-0.04	1.00		
PROV	**-0.39***	**-0.29***	-0.32*	-0.15	-0.15	0.00	0.56*	1.00	
INFLATION	**0.07**	**-0.43***	-0.23*	-0.38*	-0.38*	-0.16	-0.04	0.04	1.00

(*) significant at the 5% level

Table 7: Relevance of instruments

	Dependent Variable : NPL **(1)**	Dependent Variable : GOV **(2)**
INV	-0.360*** (-3.20)	1.369 (1.35)
POPG	-0.997** (-2.18)	0.189 (0.05)
HUMAN	-0.009 (-1.71)	-0.050 (-1.00)
ICRG	-0.060* (-1.95)	-0.196* (-1.83)

CAP	-0.380* (-1.72)	-2.657 (-1.34)
PROV	-0.105*** (-4.87)	-0.527*** (-2.71)
INFLATION	-0.0003 (-0.62)	0.001 (0.40)
Constant	0.398*** (8.9)	0.850** (2.11)
R^2	0.39	0.05
Fisher	**12.45*** **	**2.82*** **
Observations	**102**	**102**
Estimation Method	Static panel data method (Fixed Effect)	Static panel data method (Fixed Effect)

Notes: (***) The coefficients are significant for a degree of risk of 1%. (**) The coefficients are significant for a degree of risk of 5%. (*) The coefficients are significant for a degree of risk of 10%. The values in brackets associated with the estimated coefficients are the t-students.

Table 9: Correlation Matrix

	(1)	**(2)**	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	NPL	**GOV**	ICRG	Ln CPI	CC	CAP	ROE	PROV	INFLA-TION
NPL	1.00								
GOV	-0.02	1.00							
ICRG	**-0.19***	**0.17**	1.00						
Ln CPI	**-0.28***	**0.52***	0.36*	1.00					
CC	**-0.19***	**0.59***	0.27*	0.73*	1.00				
CAP	**-0.63***	**0.35***	0.30*	0.65*	0.65*	1.00			
ROE	**-0.35***	**0.04**	-0.32*	-0.05	-0.05	-0.04	1.00		
PROV	**-0.39***	**-0.29***	-0.32*	-0.15	-0.15	0.00	0.56*	1.00	
INFLATION	**0.07**	**-0.43***	-0.23*	-0.38*	-0.38*	-0.16	-0.04	0.04	1.00

(*) significant at the 5% level

Table 10: Relevance of instruments

	Dependent Variable NPL (1)	Dependent Variable GOV (2)
INV	-0.406*** (-3.97)	1.264 (1.31)
POPG	-0.910** (-2.04)	-0.997** (-2.18)
HUMAN	-0.012*** (-2.40)	-0.009 (-0.048)

Ln CPI	-0.092*** (-2.54)	1.177*** (3.44)
CAP	-0.668*** (-3.06)	-5.479 (-2.66)
PROV	-0.105*** (-4.87)	-0.418* (-1.90)
ROE	-0.300 (-3.42)	0.0315 (0.04)
INFLATION	-0.000 (-0.62)	0.001 (1.03)
Constant	0.398 (8.90)	-3.906 (0.40)
R^2	0.390	0.187
Fisher	**12.45*** **	**3.69*** **
Observations	**102**	**102**
Estimation Method	Panel data method (Fixed Effect)	Panel data method (Fixed Effect)

Notes: (***) The coefficients are significant for a degree of risk of 1%. (**) The coefficients are significant for a degree of risk of 5%. (*) The coefficients are significant for a degree of risk of 10%. The values in brackets associated with the estimated coefficients are the t-students

Table 11: Relevance of instruments

	Dependent Variable NPL (1)	Dependent Variable GOV (2)
INV	-0.414*** (-4.35)	1.088 (1.14)
POPG	-0.384 (-0.87)	6.432 (1.46)
HUMAN	-0.008* (-1.79)	-0.015 (-0.32)
CC	-0.068*** (-4.51)	0.573*** (3.79)
CAP	-0.737*** (-3.70)	-5.165** (-2.60)
PROV	-0.086*** (-3.90)	-0.704*** (-3.19)
ROE	-0.265*** (-3.22)	0.316 (0.38)
INFLATION	-0.000 (-0.84)	-0.001 (-0.24)
Constant	0.433*** (12.15)	0.438 (1.23)
R^2	0.370	0.222
Fisher	**19.03*** **	**4.08*** **
Observations	**102**	**102**
Estimation Method	Panel data method (Fixed Effect)	Panel data method (Fixed Effect)

Notes: (***) The coefficients are significant for a degree of risk of 1%. (**) The coefficients are significant for a degree of risk of 5%. (*) The coefficients are significant for a degree of risk of 10%. The values in brackets associated with the estimated coefficients are the t-students