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2019

Online at <https://mpra.ub.uni-muenchen.de/96428/>  
MPRA Paper No. 96428, posted 16 Oct 2019 05:37 UTC

# **The determinants of non-performing loans: Do institutions matter? A comparative analysis of the MENA and CEE countries**

**Semia RACHID**

## **Abstract**

This paper tries to study the determinants of non-performing loans (NPL) in the Middle East and North Africa (MENA) and Central and Eastern European (CEE) countries during the 1997/2016 period. Our analysis, which is based on different panel data estimation approaches, shows that institutions have different effects on the level of NPL in the MENA and the CEE countries. We found that institutions (rule of law) increase the level of NPL in the MENA countries but they decrease these loans in the CEE countries. This result is attributed to the existence of an institutional difference between both samples of countries. In fact, the rise of NPL in the CEE countries is attributed to financial development. On the other hand, the global financial crisis (GFC) has an important effect on the accumulation of NPL in the MENA countries. However, the relationship between the GFC and the NPL is not significant for the CEE countries.

**JEL classification:**E51, D02, C33, O57

**Keywords:** Non-performing loans. Institutional quality. GMM estimator. Comparative analysis

## **1. Introduction**

Non-performing loans curb economic activity, especially in countries where financial institutions are the backbone of these economies. In other words, wherever banks are the main source of finance for economic agents, the financial market is the institution the less chosen by investors in order to finance their projects. Besides, non-performing loans are considered as « financial pollution » (Zeng ,2012) due to their adverse impact on economic growth. They are also deemed as an important determinant of banking instability. In fact, an augmentation of NPL causes a deterioration of the loan quality and financial system instability (Atoi, 2018). The important effect of non-performing loans, especially on economic growth, has pushed many researchers to analyze them from different viewpoints. Many studies have investigated the determinants of non-performing loans in different

countries (Boudriga et al. (2010) ; Abid et al., 2014 Gan Sun, 2018 ; Kumar et al. ,2018 ; Memdani, 2017). This stream of literature has explored these drivers seperately. However, little attention has been paid to the effect of different factors on a disparate evolution of NPL in countries belonging to different regions. Therefore, in order to fill this void, this study explores the effect of institutions on non-performing loans (NPL) in the MENA and CEE countries.

Inspite of the strengthening of their prudential regulation, banks in the MENA countries still suffer from a high level of non-performing loans (NPL). For instance, during 2002-2006, the ratio of non-performing loans in perecentage of gross loans exceeded 20% in the Middle East and North African countries (Tunisia and Egypt). As a consequence, non-performing loans prevents banks from making profits since they immobilize their capital and increase funding costs. On the other hand, when we look at the level of non-performing loans in the Central and Eastern European countries, we ascertain that after the global financial crisis (2008), the level of NPL did not exceed 10% in these economies. In addition, and according to (Dhahri et al., 2012), the MENA and the CEE countries have different institutional endowements. The aim of this study is therefore to examine the effect of institutional quality on the evolution of NPL in these countries. The rest of the paper is organized as follows. Section 2 provides a brief literature survey on the determinants of non-performing loans. Section 3 describes the data and the empirical model. Section 4 presents the obtained results and the last section concludes the paper.

## **2. Literature review**

According to the economic lirture, banks' specific and institutional factors are the principal determinants of non-performing loans.

### ***2.1. Macroeconomic determinants***

(Tanaskovic and Jandric, 2015) found that macroeconomic and institutional determinants increased the ratio of doubtful debts in Central and Eastern European countries and in the South-East of Europe during the 2006/2013 period. There is a negative relationship between the growth of the GDP and the ratio of doubtful debts. On the other hand, (Abid et al., 2014) have studied the effect of macreconomic and bankig specific variables on the quality of household credits accorded by 16 tunisian banks over the 2003/2012 period. They have found

that the growth of GDP negatively affects the ratio of doubtful debts. In fact, a one percent increase of GDP causes a 0,040297 decrease of doubtful debts. For instance, Fofack (2005) has sought the causes of unproductive loans during the economic and banking crises that affected the sub-saharan African countries in the 1990s. He found that real GDP growth is negatively linked to non-performing loans. On the other hand, in order to identify the determinants of non-performing loans, Klein (2013) studied the Central Eastern and South Eastern European banking sector. He found that the increase of the unemployment rate cause a rise of doubtful debts. As for Baboucek and Jancar, (2005), they quantified the effects of macroeconomic shocks on the quality of Czech banking loans for the period 1993-2006 and reported a positive correlation between unproductive loans and the unemployment rate. On the other hand, Quagliariello (2007) studied the evolution of non-performing loans based on a set of explanatory variables and showed that the increase of the unemployment rate has a negative and significant effect on the quality of the loan portfolio in Italy.

## ***2.2. Microeconomic determiants***

Barros et al., (2007) concluded that small banks have more opportunities to achieve good performance, while large ones are more likely to have poor performance. According to Jonghe (2009), small banks can extremely withstand adverse economic conditions. For his part, Chaibi (2016) examined the determinants of the deterioration of the quality of Tunisian banking loans over the 2001/ 2010 period. As a result, it seems that large banks lend loans to poor borrowers because they are guaranteed to be saved by the government in the event of bankruptcy, which increases the ratio of bad debts.

As for Homrani, Ben Gamra and Abaoub(2013), they worked on a sample of 10 Tunisian banks during the 1999/2010 period and found that the provisions on bad debts are negatively related to changes in future earnings. The same finding was made by Beaver and Engel (1996) who showed that bank's performance is related negatively to normal loan losses and positively to abnormal loan loss provisions (unproductive). On the other hand, on examining the relationship between loan provisions and non-performing loan levels, Ahmed and al (1999) found that this is a positive relationship since an increase in loan loss provisions indicates a deterioration of the loan quality, thereby impairing the performance of the credit institutions.

### **2.3. Institutional determinants**

Applying different panel data estimation approaches on 195 developed and developing countries over the period 2000-2016, Gjeçi and Marinc (2018) found a positive and statistically significant relationship between corruption and non-performing loans (NPL). However, the impact of corruption on NPL remained dependent on the legal origin and on the type of the financial system (bank or market-based financial system).

Administrative corruption (corruption of civil servants), including corruption of banks' officials, has deteriorated the quality of loans. In fact, banks' officials violate the law and favor those who bribe them, which leads to the increase of the weight of non-performing loans. For their part, Morakinyo and Sibanda (2016) exploited static and dynamic panel data to analyze the main determinants of unproductive loans in the MINT economies (Mexico, Indonesia, Nigeria, Turkey) between 1998-2014 and showed that the relationship between corruption and dubious debt is positive.

As for Tanasković and Jandric (2015), they analyzed the macroeconomic and institutional empirical determinants of growth of the NPL ratios for the CEEC and SEE countries over the 2006-2013 period. The results showed that macroeconomic variables, such as the GDP, the foreign currency loan ratio and the exchange rates, are positively and significantly related to the ratio of NPL. However, the financial market development level is the only institutional variable statistically significant and negatively related to the NPL.

Boudriga et al. (2010) used a random effects panel model to study the determinants of unproductive loans and the impact of the commercial and institutional environment on non-performing lending rates of 46 commercial banks in 12 countries in the MENA region. To the bank specific and macroeconomic variables, they have added institutional ones and found that corruption has a positive and significant impact on the growth of bad loans.

Covering fifty two countries during 2000, the study of Breuer (2006) concluded that legal, political, sociological, economic, and banking institutions contributed differently to the problem of bank loans. Referring to the banking institutions, the author found that deposit insurance increases non-performing loans. However, economic institutions, such as fixed exchange rate regime, reduce the problem of bank loans.

**Table 1: A literature review on the effect of institutions on non-performing loans**

Authors	Countries	Periods	Institutional indicators	Methods	Results
<b>Gjeçi and Marinc (2018)</b>	195 developed and developing countries	2000-2016	Capital stringency Rule of law Democracy Index Regulatory quality Corruption indexes	Different panel data estimation approaches	Positive and statistically significant relationship between corruption and non-performing loans. The effect of corruption on NPL is more pronounced when the legal environment is weak and the economies are bank-based systems.
<b>Morakinyo and Sibanda (2016)</b>	MINT economies (Mexico, Indonesia, Nigeria, Turkey)	1998-2014	Corruption	Static and dynamic panel	Positive relationship between corruption and non-performing loans.
<b>Tanasković and Jandrić (2015)</b>	CEEC and SEE countries	2006-2013	Audit Financial market development	The static panel model approach	Negative relationship between financial market development and the level of non-performing loans.
<b>Boudriga et al (2010)</b>	12 countries in the MENA region	2002-2006	The six world Bank governance indicators : -Voice and accountability -Political instability and violence -Government Effectiveness -Regulatory quality -Rule of law -Control of corruption	A pooled regression approach	Negative and significant relationship between all the institutional variables, except political stability and government effectiveness.
<b>Breuer (2006)</b>	52 countries	2000	Banking institutions :(Deposit insurance, government ownership, asset diversification....)  Legal	OLS estimation	Deposit insurance increases non-performing loans Government ownership is significant and reduces problem of

			<p>institutions :(Legal origin, Law and order, lack of property rights)</p> <p>Political institutions : (Government stability, Voice)</p> <p>Sociological institutions: (Ethnic fraction, income inequality, Corruption)</p> <p>Economic institutions :( Exchange rate regime, Fiscal burden, wage and price control</p>		<p>bank loans. civil law countries are less prone to problem of bank loans than common law countries</p> <p>-corruption increases the share of bank assets that are non-performing loans</p> <p>- fixed exchange rate regime reduces problem bank loans.</p>
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**Source : Author**

### **3. Data and empirical model**

#### **3.1. Data**

Annual data about 10 MENA countries and 11 CEE countries for the 1997/2016 period were obtained from the World Bank database. This study includes data on : non-performing loans to total gross loans (NPL), Gross domestic product (GDP), inflation (INF), unemployment (UNE), financial crisis (CR), return on asset(ROA), domestic credit provided by the banking sector (DCB) and six indicators that measure the quality of institutions, such as the Rule of Law (RL), Control of Corruption (CC), Regulatory Quality (RQ), Voice and Accountability (VA), Political Stability and Absence of Violence/ Terrorism (PS) and Government Effectiveness (GE). These indicators were extracted from the Worldwide Governance Indicators (WGI).

Rule of law (RL) and control of corruption (CC) represent the indicators of governance that take into account on the one hand, the degree of the agents' trust in both the rules of the society and, the quality of contract enforcements and, on the other hand, the extent to which the government exerts its power for private gains.

Moreover, the regulation quality (RQ) is another indicator of governance, which reveals the capacity of the government to formulate and execute efficient policies, and establish regulations that assure the development and the promotion of the private sector.

The Voice and Accountability (VA) indicator reflect the aptitude of the agents to effectively participate in the selection of the government (liberty of expression and association, media liberty). Political stability (PS) shows us how violent and terrorist acts disturb the government. Concerning the indicator of government effectiveness, it measures the effectiveness of the government by evaluating the quality of public services, its degree of independence from political pressure, and its implementation.

### 3.2. Empirical model

In order to show how bank-specific factors, macroeconomic and institutional factors affect the ratio of unproductive loans in two different regions, we apply a panel data model on a sample of 10 MENA and 11 CEE countries over the 1997-2016 period. The choice of these two regions is largely justified by the difference of institutional endowments. The object of this paper is to show that institutional quality matters for non-performing loans. The model is presented as follows:

$$NPL_{it} = \alpha_0 + \sum_{i=1}^K \beta_i X_{i,t} + \alpha_1 INST_{i,t} + \varepsilon_{i,t} \quad (1)$$

where the subscript  $i = 1, \dots, N$  denotes the country (in our work, we have 10 MENA countries and 11 CEE countries) and  $t = 1, \dots, T$  the time period (our time frame is 1997–2016).

$NPL_{i,t}$ : The ratio of non-performing loans to total gross loans of country  $i$  at time  $t$  is the dependent variable.

$X_{i,t}$  is the vector of the explanatory variables which include macroeconomic variables (GDP, INF, UNEMP), a dummy variable that takes value 1 when there is a financial crisis and 0 otherwise, and Bank specific variables (ROA (return on asset, Domestic credit provided by the banking sector (DCB)).

$INST_{i,t}$  is the indicator of institutional quality, which is measured alternatively with the five governance variables (CC, RL, RQ, PS, and VA).

$\varepsilon_{i,t}$  is the error-term assumed to be independently distributed in all time periods of country  $i$ .

The model can be rewritten as follows:

$$NPL_{it} = \alpha_0 + \alpha_1 INST_{it} + \beta_1 GDP_{i,t} + \beta_2 INF_{i,t} + \beta_3 UNE_{i,t} + \beta_4 ROA_{i,t} + \beta_5 DCB_{i,t} + \beta_6 CR_{i,t} + \varepsilon_{i,t}$$

where  $GDP_{i,t}$  indicates the rate of economic growth

$INF_{i,t}$ : The inflation rate of country  $i$  at time  $t$ .

$UNEMP_{i,t}$ : The unemployment rate of country  $i$  at time  $t$ .

$ROA_{i,t}$ : Return on Assets

$CR_{i,t}$ : A dummy variable that takes value 1 when there is a financial crisis and 0 otherwise.

$INST_{i,t}$ : Institutional variables were taken from the worldbank governance database (Control of Corruption (CC), Rule of Law (RL), Regulatory Quality (RQ), Political Stability and Absence of Violence/ Terrorism (PS) and Voice and Accountability (VA)).

We use the Generalised Method of moments (GMM) applied to panel data and more precisely the first step of the GMM system approach. This econometric method enables us to control individual and temporal specific effects and address the problem of endogeneity. Besides, this method meets the need of the panel data study by providing solutions to the problem of simultaneity (the existence of bidirectional causality problem between variables).

In this study, we estimate a dynamic model where the endogenous variables are introduced as explanatory variables with one or more lags). The dynamic version of equation (1) is formulated as follows:

$$NPL_{it} = \alpha_0 + \alpha_1 NPL_{it-1} + \alpha_2 INST_{it} + \sum_{i=1}^K \beta_i X_{i,t} + \varepsilon_{i,t} \quad (2)$$

The model can be rewritten as follows:

$$NPL_{it} = \alpha_0 + \alpha_1 NPL_{it-1} + \alpha_2 INST_{it} + \beta_1 GDP_{i,t} + \beta_2 INF_{i,t} + \beta_3 UNE_{i,t} + \beta_4 ROA_{i,t} + \beta_5 DCB_{i,t} + \beta_6 CR_{i,t} + \varepsilon_{i,t}$$

Where  $NPL_{it-1}$  is the ratio of non-performing loans to total gross loans of country  $i$  at time  $t-1$ .

### 3.3. Tests :

**a- Hausman test:** The Hausman test (1978) is the most common test that specifies individual effects. It is essentially intended to differentiate between fixed and random effects models. In this sense, this test is based on the difference between the coefficients of the two estimates (fixed and random), in other words, the difference between the (MCG estimator) and the (Within estimator). Therefore, the Hausman test compares the variance-covariance matrix of both estimators. Hausman's statistics is:

$$H = (\hat{\beta}_{MCG} - \hat{\beta}_{Within})' [\text{var}(\hat{\beta}_{MCG} - \hat{\beta}_{Within})]^{-1} (\hat{\beta}_{MCG} - \hat{\beta}_{Within})$$

In the case of a rejection of the null hypothesis ( $H_0$ ), the model is specified with fixed individual effects and the within estimator is the best one. However, if the null hypothesis is accepted, then the model is specified with random individual effects and the MCG estimator is retained.

**b-Panel unit root test :** Im, Pesaran, and Shin (2003) and Levin, Lin, and James Chu (2002) are the most common among panel unit root tests developed in the literature. These two tests are based on the ADF principle. However, they assume a strongly balanced data. For this reason, we have resorted to the Fisher unit root test, which can be applied to unbalanced panel data. According to Fisher unit root test, all the series are stationary since the probability of this test is equal to zero for the whole variables and lower than 5%, which is in favor of rejecting the null hypothesis ( all panels contain unit roots) and the acceptance of the alternative hypothesis. This result concerns the MENA as well as the CEE countries.

**c-Endogeneity test :** The application of endogeneity test shows that the variables "Growth Domestic Product (GDP), Domestic Credit to the private sector by Banks (DCB) and Return on Assets (ROA) are endogenous. Nevertheless, the other variables, such as inflation (INF), unemployment (UNE), crisis (CR), and institutional (INST) variables are exogenous for the MENA countries. However, the result of this test is different for the CEE countries since their GDP, DCB, CR, INF, ROA are endogenous while the other variables, such as (unemployment (UNE) and INST are exogenous.

## 4. Results

### 4.1. Ordinary Least Squares (OLS) regression

According to the models institutional indicator (rule of law (rl)), the macroeconomic indicator (GDP) and the specific bank indicator (ROA) are negatively and significantly associated with the ratio of non-performing loans for the CEE countries. These results are important since they show that these countries benefit from institutional soundness that contributes to the diminution of the non-performing loan ratio. Nevertheless, the specific banking indicator (DCB) is positively and significantly associated with the dependent variable. Financial development is in favor of the accumulation of the important portfolios of non-performing loans, in other terms, it is on behalf of the banking instability. Unemployment (UNEMP) is also positively and significantly associated with non-performing loans, whereas inflation (inf) and the dummy variable (Cr) are not significantly linked to non-performing loans.

Concerning the MENA countries, inflation is negatively and significantly associated with non performing loans, which means that a rise in inflation leads to a decrease in the amount of non-performing loans. The bank's specific variables are also negatively and significantly linked to the dependent variable. In fact, an increase in the return on assets contributes to a decrease of non-performing loans. Unlike in the CEE countries, the financial development variable (DCB) in the MENA countries reduces doubtful loans besides, the institutional variables, such as the "rule of law"(rl) and "political stability" (PS) are positively and significantly associated with non-performing loans. This means that the vulnerability of institutions in these countries causes the rise of non-performing loans. Moreover, the variables, "GDP" and "UNEMP" are not significantly associated with doubtful loans. The dummy variable "financial crisis" (Cr) is not always significant.

However, these results may suffer from some econometric problems, such as (heteroscedasticity, endogeneity). For this reason, we resort to the Generalized method of moments (GMM) method.

**Table 2 : The effect of institutions on non-performing loans (fixed effects estimation)**

	Dependant variable : non performing loans											
	Panel A : CEE country region						Panel B : MENA country region					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
<b>GDP</b>	-0,199 (-1,93)**	-0,163 (-1,58)**	-0,15 (0,094)	-0,174 (-1,78)**	-0,141 (-1,37)	-0,157 (-1,52)	-0,018 (-0,22)	0,013 (0,16)	-0,007 (-0,09)	-0,034 (-0,42)	-0,0006 (-0,01)	-0,007 (-0,08)
<b>Inf</b>	0,004 (0,76)	0,004 (0,86)	-0,002 (-0,50)	0,002 (0,62)	0,004 (0,87)	0,004 (0,96)	-0,141 (-2,10)**	-0,136 (-2,03)**	-0,163 (-2,34)**		-0,142 (-2,04)**	
<b>DCB</b>	0,07 (2,89)**	0,04 (1,90)**	0,08 (3,94)**	0,04 (2,34)**	0,05 (2,24)**	0,04 (1,83)**	-0,17 (-7,86)**	-0,158 (-6,45)**	-0,198 (-8,58)**	-0,17 (-7,73)**	-0,196 (-8,61)**	-0,183 (-8,14)**
<b>ROA</b>	-0,988 (-3,37)**	-0,999 (-3,36)**	-0,958 (-3,57)**	-0,902 (-3,20)**	-1,086 (-3,72)**	-1,116 (-3,79)**	-2,60 (-5,35)**	-2,64 (-5,45)**	-2,85 (-5,67)**	-2,57 (-5,29)**	-2,97 (-5,94)**	-2,89 (-5,79)**
<b>UNE</b>	0,684 (5,94)**	0,655 (5,56)**	0,629 (5,90)**	0,718 (6,48)**	0,685 (5,90)**	0,700 (5,98)**	0,160 (0,86)	0,144 (0,77)	0,139 (0,69)	0,153 (0,82)	0,09 (0,47)	0,0164 (0,08)
<b>Cr</b>	0,550 (0,30)	0,93 (0,51)	-0,07 (-0,05)	-0,560 (-0,32)	0,656 (0,36)	1,19 (1,84)**	9,84 (1,78)**	9,06 (1,64)**	8,32 (1,44)	4,07 (0,84)	7,37 (1,29)	1,54 (0,31)
<b>RL</b>	-6,15 (-2,76)**						6,20 (3,81)**			6,53 (4,02)**		
<b>PS</b>		-3,73 (-2,13)**						3,32 (3,78)**				
<b>RQ</b>			-12,28 (-6,52)**						0,235 (0,14)			
<b>CC</b>					-4,36 (-2,19)**						2,12 (1,98)**	
<b>VA</b>				-12,67 (-4,87)**								2,49 (2,01)**
<b>Const</b>	1,87 (0,84)	2,46 (0,99)	8,64 (3,66)**	9,30 (3,30)	0,72 (0,34)	-0,414 (-0,20)	21,27 (7,78)	21,59 (7,94)	23,69 (8,45)	20,29	24,07 (8,77)	25,37 (8,64)
<b>R<sup>2</sup></b>	0,3600	0,3497	0,4565	0,4084	0,3507	0,3342	0,5047	0,5042	0,4605	0,4989	0,4732	0,4630
<b>Observations</b>	207	207	207	207	207	207	179	179	179	181	179	181
<b>Fisher test (p value)</b>	0,000	0,000	0,000	0,000	0,000	0,000	0,0000	0,0000	0,0000	0,0000	0,000	0,000

Hausman test (p value)	0,0003	0,0001	0,0000	0,000	0,0236	0,0000	0,0000	0,0000	0,0000	0,0000	0,0001	0,0012
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Notes: the p-values in parentheses \*\* indicate statistical significance at 5 percent level.

#### 4.2. The GMM System regression:

Before presenting the estimates of the above-mentioned models, it would be interesting to present the test results. In fact, the null hypothesis of the Arellano-Bond test AR (1) is the lack of autocorrelation of order 1, while the null hypothesis of the Arellano-Bond test AR (2) is the absence of autocorrelation of order 2. According to the first and the second order errors autocorrelation tests AR (1) and AR (2) of Arellano and Bond, there is no autocorrelation between errors at different degrees.

As for Hansen suridentification test, it confirms the validity of instruments since the probability of this test is higher than zero, which is in favor of the acceptance of the null hypothesis and the rejection of the alternative hypothesis according to which instruments are invalid.

The finding of the dynamic panel-data estimation, the one-step system GMM revealed that non-performing loans positively and significantly depend on their lagged value (doubtful debts of the previous period ( $NPL_{t-1}$ )) for the MENA and CEE countries. An increase of 1 % of the lagged value of non-performing loans increases doubtful debts by almost 1% and 10 %, respectively for the MENA and CEE countries (tables 2 and 3). The results of the estimation of tables 2 and 3 show that GDP has a negative and significant effect on the dependent variable for the two sample of countries. An increase of 1% of GDP reduces non-performing loans by around 0,2 % and 0,1% for the CEE and MENA countries. However, the UNEMP has a positive and significant effect on non-performing loans for the MENA and CEE countries, which confirms the results found by Klein (2013) and Khemraj and Pasha (2009) who also revealed a statistically positive relationship between unemployment and doubtful debts.

On the other hand, the variable (INF) has a positive and insignificant effect on non-performing-loans for the CEE countries but it has a negative and significant impact on the dependent variable for the MENA countries. These results are similar to those obtained by Messai and Jouini (2013) and Klein (2013) who found respectively a positive and negative relationship between inflation and non-performing loans.

Moreover, bank's profitability measured by Return On Asset (ROA) has a negative and significant impact on non-performing loans at 5% for the MENA and CEE countries. This result is consistent with the findings of Messai and al (2013), Abid et al (2014) who found that an increase of 1 % of the ROA reduces non-performing loans by 1.9% and 0.9%, respectively for the MENA and CEE countries while bank's profitability increases the aptitude of banks to deal with credit risk and reduce non-performing loans. The dummy variable « financial crises »(CR) has a positive impact on non-performing loans (NPL) in the CEE and the MENA countries as it is shown in tables 2 and 3. However, while such effect is not significant for the former, it is significant for the latter. This result confirms the important exposition of the MENA countries to external shocks, such as the Global financial crisis (GFC) of 2007-2008. Nevertheless, the non significant relationship between financial crises (CR) and the dependent variable for the CEE countries is attributed to the credit squeeze due to the GFC.

Besides, in the CEE countries (table2), the results show that the coefficients of the institutional variables « rule of law » (RL) and « regulatory quality » (RQ) are statistically significant and negative at 5% level of confidence. These countries have reinforced the rules that strengthen the aptitude of the financial system to reduce the portfolio of non-performing loans, such as, rules that oblige borrowers to pay their debt. However, the other institutional variables are not significant (PS, CC). Even if these variables are not significant, they have a positive effect on non-performing loans, while the variable (VA) has a negative impact.

**Table 3 : Non-performing loans and the effect of institutions in the CEE countries**

	Dependant variable : non performing loans				
	Panel B : CEE countries				
	(1)	(2)	(3)	(4)	(5)
<b>PNP<sub>T-1</sub></b>	0,57 (9,53)**	0,452 (6,05)**	0,546 (8,22)**	0,542 (6,26)**	0,578 (8,02)**
<b>GDP</b>	-0,269 (-1,92)**	-0,22 (-1,69)**	-0,292 (-1,96)**	-0,269 (-1,81)**	-0,297 (-2,17)**
<b>Inf</b>	0,03 (0,79)	0,013 (0,36)	0,057 (0,97)	0,026 (0,65)	0,013 (0,32)
<b>DCB</b>	0,018 (0,86)	0,04 (1,85)**	0,021 (0,75)	0,021 (0,83)	0,01 (0,47)
<b>ROA</b>	-0,90 (-1,65)**	-0,909 (-1,68)**	-0,660 (-1,35)	-0,826 (-1,52)	-0,738 (-1,49)
<b>UNEMP</b>	0,21 (1,83)**	0,249 (2,39)**	0,351 (2,22)**	0,287 (1,93)**	0,257 (2,16)**
<b>Cr</b>	1,96 (0,78)	0,854 (0,44)	2,52 (0,93)	1,514 (0,71)	2,54 (0,95)
<b>RL</b>	-1,68 (-2,37)**				
<b>PS</b>			1,20 (0,77)		
<b>RQ</b>		-5,90 (-2,96)**			
<b>CC</b>					0,257 (0,19)
<b>VA</b>				-2,207 (-0,96)	
<b>Const</b>	2,42 (0,95)	6,036 (2,38)**	-1,07 (-0,28)	2,62 (0,73)	1,27 (0,40)
<b>Sargan test</b>		0,696	0,553	0,696	0,606
<b>Arellano-Bond test for AR (1)</b>	0,029	0,017	0,035	0,031	0,034

Arellano-Bond test for AR (2)	0,497	0,473	0,454	0,494	0,494
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Notes: The p-values in parentheses. \*\*, indicate a statistical significance at 5 percent level.

The estimation results presented in table 3 show important results regarding the effect of institutional variables (RL, PS, CC) on the portfolio of non-performing loans in the MENA countries. In fact, an increase of 1 % of these variables increases non-performing loans by 3.7%, 2.5% and 2 %, respectively. This result is quite logic since these countries are subject to institutional vulnerability. Financial institutions were governed by rules that did not give them the capacity to cope with different shocks (financial and political shocks..etc). A weak implementation of legal framework pushes these institutions to afford loans for politically connected firms, which causes an increase of the portfolios of non-performing loans.

These results show that the financial system in the MENA countries still suffers from corrupt practices. The laxism of financial regulaion has encouraged financial institutions to adopt cosmetic accounting, which refers to the act of publishing documents that do not show real results. For this reason, additional efforts must be made so that an improvement of institutional quality will contribute to the reduction of non-performing loans. The other variables (VA, RQ) are statistically insignificant but positively related to non-performing loans.

**Table 4 : Non-performing loans and the effect of institutions in the MENA countries**

	Dependant variable : non performing loans				
	Panel B : MENA countries				
	(1)	(2)	(3)	(4)	(5)
<b>PNP</b> <sub>T-1</sub>	0,697 (17,20)**	0,742 (17,73)**	0,687 (13,93)**	0,725 (13,99)**	0,734 (19,07)**
<b>GDP</b>	-0,115 (-2,95)**	-0,108 (-2,49)**	-0,109 (-2,87)**	-0,124 (-2,99)**	-0,108 (-2,50)**
<b>Inf</b>	-0,186 (-3,86)**	-0,211 (-4,02)**	-0,143 (-3,13)**	-0,202 (-5,18)**	-0,223 (-4,01)**
<b>DCB</b>	-0,045 (-3,20)**	-0,031 (-1,70)**	-0,03 (-1,87)**	-0,054 (-3,57)**	-0,038 (-2,76)** <sup>15</sup>
<b>ROA</b>	-1,90 (-4,51)**	-1,59 (-4,73)**	-1,63 (-4,27)**	-1,84 (-5,67)**	-1,67 (-4,41)**

<b>UNEMP</b>	0,297 (1,99)**	0,327 (2,42)**	0,124 (0,72)	0,149 (1,05)	0,202 (2,18)**
<b>Cr</b>	16,35 (4,15)	19,5 (6,43)**	17,16 (5,29)**	17,10 (6,12)**	18,69 (5,23)**
<b>RL</b>	3,77 (2,49)**				
<b>PS</b>			2,53 (2,37)**		
<b>RQ</b>		0,663 (0,37)			
<b>CC</b>				2,01 (1,85)**	
<b>VA</b>					1,06 (1,33)
<b>Const</b>	5,79 (2,77)**	4,30 (2,39)**	7,11 (2,83)**	7,87 (3,74)**	7,05 (3,59)**
<b>Sargan test</b>	0,220	0,751	0,204	0,388	0,549
<b>Arellano-Bond test for AR (1)</b>	0,023	0,03	0,027	0,027	0,027
<b>Arellano-Bond test for AR (2)</b>	0,192	0,178	0,115	0,221	0,158

## Conclusion

On observing financial crisis episodes, we ascertain that many financial institutions have gone bankrupt due to the importance of non-performing loans which was attributed to a great exposition of banks to risks. However, a risk free taking by banks is due to the non compliance with the rules that ensure their stability because of institutional vulnerability.

In this paper, we present the effect of institutional factors on non-performing loans for the MENA and CEE countries. The choice of these two samples of countries is largely attributed to the existence of institutional difference between them. To our knowledge, little has been done about the link between the institutional difference and non-performing loans. Therefore, this study tries to fill this gap by testing the effect of institutional factors on non-performing loans for these countries that have different institutions over the period (1997-2016). To do so, we have applied a panel data model on a sample of 10 MENA and 11 CEE countries.

Moreover, the institutional indicator rule of law (rl) is negatively and significantly associated with the ratio of non-performing loans for the CEE countries, whereas it is positively and significantly associated to non-performing loans in the MENA countries. The “political stability” variable (PS) is also positively and significantly associated with non-performing loans in the MENA countries but it is not significant for the CEE countries. This means that the vulnerability of institutions in the MENA countries induces an increase of non-performing loans.

Concerning the macroeconomic variables, the results indicate that the “Unemployment” variable (UNEMP) is positively and significantly associated with non-performing loans in the CEE countries but it is not significantly associated with the dependent variable in the MENA countries. In addition, the macroeconomic indicator (GDP) is negatively and significantly associated with the ratio of non-performing loans for the CEE countries but it is not significant in the MENA countries. Therefore, these conflicting macroeconomic results can be attributed to econometric problems, such as endogeneity. To deal with potential endogeneity of the explanatory variables, we use the dynamic GMM estimator. The empirical results show that the macroeconomic variables reveal the predicted sign. The variables (GDP) and (UNEMP) have a statistically significant effect on non-performing loans in the case of the CEE and MENA countries. An increase of the Gross Domestic Product reduces doubtful debts. However, the latter cannot be reduced when the rate of unemployment is so high.

These results are then in line with those found in the littérature by Babouced I and Jancar M. (2005).

Our finding shows that institutional variables have different effects on non-performing loans for both samples of countries. On the one hand, we found that some institutional variables, such as political stability (PS) and control of corruption (CC)), are positively and significantly related to non-performing loans in the MENA countries. On the other hand, other institutional variables, such as regulatory quality (RQ) and rule of law (RL)) are negatively and significantly associated with doubtful debts in the CEE countries. These results are relevant since they show which institutional variables have a significant impact on non-performing loans for either sample of countries. The MENA countries are characterised by a limitation of political stability, which fosters the adoption of bad practices by financial institutions. In fact, political instability encourages banks not to respect the law and provide lending to politically connected people. In other terms, political instability (revolutions, electoral untrust..etc) increases non-performing loans, which amplifies corruption and inhibits financial stability as it also induces an increase of non-performing loans. This is in line with institutional vulnerability from which these countries still suffer.

Nevertheless, an institutional improvement marks the CEE countries and, as a consequence, non-performing loans are reduced. The improvement of the quality of the legal framework and its implementation in these countries have a negative effect on non-performing loans therefore, these countries must undertake some institutional reforms, such as a tight control of corruption through the payment of heavy penalties by those who are engaged in corrupted practices, which reduces corruption and non-performing loans.

In addition, by referring to the bank's specific variable, which is at the same time a financial development one, we found that the level of financial development is an important determinant of non-performing loans for both samples of countries. Therefore, the less developed the financial system in the MENA countries, the lower the portfolio of non-performing loans is, whereas the more developed the financial system in the CEE countries, the more important non-performing loans are.

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## Appendix

**Table A.1 : Correlation Matrix for MENA countries**

	NPL	GDP	INF	UNEMP	CR	DCB	ROA	RL	RQ	CC	VA	PS
NPL	1.000											
GDP	-0.0854	1.000										
INF	0.0480	-0.0174	1.000									
UNEMP	0.2071	-0.0010	-0.0619	1.000								
CR	0.1673	-0.1086	0.4333	-0.0435	1.000							
DCB	-0.1294	-0.0684	-0.3608	-0.0781	-0.1944	1.000						
ROA	-0.5429	0.3100	-0.2469	-0.2430	-0.4952	-0.2491	1.000					
RL	-0.1150	0.0485	-0.1098	-0.0791	-0.0373	-0.2248	0.3290	1.000				
RQ	-0.3221	0.1325	0.1055	-0.0742	0.0566	-0.1351	0.3947	0.6777	1.000			
CC	-0.1625	0.0410	-0.1332	-0.0806	-0.0574	-0.0773	0.3622	0.8296	0.7018	1.000		
VA	0.1274	0.0402	0.1645	0.0229	0.1129	0.2414	-0.1505	-0.0965	0.0030	0.0158	1.000	
PS	0.0514	-0.0185	-0.2588	0.0510	-0.0846	-0.2324	0.2555	0.7800	0.5493	0.7382	-0.2347	1.000

**Table A.2 : Correlation Matrix for PECO countries**

	NPL	GDP	INF	UNEMP	CR	DCB	ROA	RL	RQ	CC	VA	PS
NPL	1.000											
GDP	-0.3613	1.000										
INF	0.0102	-0.0859	1.000									
UNEMP	0.3387	-0.0774	0.005	1.000								
CR	0.0076	-0.0109	0.0094	0.0568	1.0000							
DCB	-0.0130	-0.3291	-0.1702	0.1101	0.0986	1.000						
ROA	-0.3689	0.4621	0.3134	-0.1048	0.0026	-0.2440	1.000					
RL	-0.2458	-0.0055	-0.1710	-0.0884	-0.0284	0.3933	-0.1493	1.000				
RQ	-0.4026	0.0747	-0.2249	-0.0067	-0.0468	0.3521	-0.0645	0.8136	1.000			
CC	0.2941	0.0636	-0.1457	-0.1556	-0.0514	0.3450	-0.0788	0.8847	0.7209	1.0000		
VA	-0.3119	0.0760	-0.1315	0.0031	-0.0989	0.1853	-0.0490	0.8798	0.8035	0.8557	1.0000	
PS	-0.2339	0.0486	-0.1133	-0.0454	0.0087	0.1765	0.0139	0.6889	0.5366	0.6393	0.7148	1.000

**Table A.3 : Countries included in this study**

<b>MENA countries</b>	Egypt Arab Republic, Jordan, Kuwait, Lebanon, Morocco, Oman, Saudi Arabia, Tunisia, Turkey, United Arab Emirates
<b>PECO countries</b>	Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia.

**Table A.4 The list of variables and data sources**

	<b>Variables</b>	<b>Data sources</b>
<b>NPL</b>	The ratio of non-performing loans to total gross loans of the country	The World development Indicators Database, World Bank
<b>GDP</b>	The Gross Domestic product in %	The World development Indicators Database, World Bank
<b>INF</b>	The inflation rate in %	The World development Indicators Database, World Bank
<b>UNEMP</b>	The Unemployment rate in %	The World development Indicators Database, World Bank
<b>CR</b>	The financial crisis dummy variable that takes the value 1 when it occurs and 0 otherwise.	The IMF Banking crisis database (2012)
<b>DCB</b>	Domestic credit provided by banking sector in % of GDP	The World development Indicators Database, World Bank
<b>ROA</b>	<i>Return on Asset</i>	The Global Financial Development database, World Bank
<b>RL</b>	Rule of Law	The Worldwilde Governance indicators Database, World Bank
<b>RQ</b>	Regulatory Quality	The Worldwilde Governance indicators Database, World Bank
<b>CC</b>	Control of Corruption	The Worldwilde Governance

		indicators Database, World Bank
<b>VA</b>	Voice and Accountability	The Worldwilde Govenance indicators Database, World Bank
<b>PS</b>	Political Stability and Absence of Violence/ Terrorism	The Worldwilde Govenance indicators Database, World Bank