Problem loans in the MENA countries: bank specific determinants and the role of the business and the institutional environment

Abdelkader BOUDRIGA[1]
DEFI, Tunis University and LEO, University of Orléans
Neila BOULILA TAKTAK[2]
DEFI, Tunis University
Sana JELLOULI[3]
DEFI, Tunis University

Forthcoming, Bankers, Markets and Investors

Abstract

The paper empirically analyses the determinants of problem loans and the potential impact of both business and institutional environment on credit risk exposure of banks in the MENA region. Looking at a sample of 46 banks in 12 countries over the period 2002-2006, we find that, among bank specific factors, high credit growth, loan loss provisions, and foreign participation coming from developed countries reduce the NPL level. However, highly capitalized banks experience high level of credit exposure. Credit quality of banks is also positively affected by the relevance of the information published by public and private bureaus. Finally, our findings highlight the importance of institutional environment in enhancing banks credit quality. Specifically, a more control of corruption, a sound regulatory quality, a better enforcement of rule of law, and a free voice and accountability play an important role in reducing nonperforming loans in the MENA countries.

Keywords: Banks, problems loans, business environment, institutional quality, MENA

[1] abdelkader.boudriga@fulbrightmail.org
[2] neila_boulila@yahoo.fr
[3] sanajellouli@yahoo.com

1. Introduction

The banking sector is the main source of financing in the Middle East and North Africa (MENA) countries. Indeed, stock markets are relatively new and are a minor method of raising funds for firms and economic agents. Despite several reforms and developments, financial systems still perform modestly. This may be due to the government interference in the banking sector, the lack of competitiveness as well as the weaknesses of the legal systems. However, financial soundness indicators as well as financial development exhibit severe disparities between MENA countries.

More specifically, Financial Sector Assessment Programs (FSAPs) conducted jointly by the World Bank with the IMF in several countries from the MENA region[4] report high levels of unproductive debts in these countries. Tunisia and Egypt exhibit the highest levels of Non Performing Loans (NPL), with 21% and 24% of gross loans over the period 2002-2006 respectively. Problem loans are also problematic in the United Arab Emirates (12% of gross loans) despite recent financial system reforms. At the opposite, other countries such as Kuwait and Saudi Arabia do not seem to suffer from problem loans (4% and 5% respectively).

Although the MENA countries share several features due to cultural and geographic proximities, they exhibit sharp differences in their economic policies and institutional environments. Hence, differences in banking outcomes in general might stem from these disparities in the economic environment. These banking outcomes are also related to the specific features of each bank as it is widely reported in the literature.

The aim of this research is twofold. First, it seeks to explain differences in NPL levels amongst MENA banks using a set of firm specific variables. Second, it addresses the possible impact of business and institutional environment on the rate of banks problem loans.

Based on existing literature, we model nonperforming loans disparities between banks and over time as a function of both bank specific and environmental factors. The former serves to capture differences between banks on ownership structure, credit and provisions policies and level of regulatory capital. The latter category allows us to control differences in business and institutional environment both between countries and over time to assess the link between their effectiveness and a well-functioning financial system (Barth et al., 2006, Kaufmann et al., 2008). The impact of business environment is captured through information on getting credit including measures of credit sharing, depth of credit information and legal rights variables. Finally, the institutional category considers the six governance indicators complied by Kaufmann, Kraay and Mastruzziet (2008).

Our empirical analysis is based on a sample composed of 46 commercial banks from 12 MENA countries over the period 2002-2006. We use a random-effects panel regression model that controls for cluster effects at the country level. Our results show that (i) foreign participation from developed countries reduces the NPL level, (ii) highly capitalized banks experience high levels of NPLs, (iii) high credit growth is associated with a reduced level of problem loans and finally (iv) loan loss provisions are regarded as a controlling mechanism over expected loan losses. Concerning business environment factors, it appears that only the relevance of information published by credit bureaus favourably impacts the credit exposure of banks. Finally, our results highlight the importance of institutional environment in enhancing banks credit quality. Specifically, a better control of corruption, an effective implementation of regulation and promotion of the private sector, an increased enforcement of the rule of law and a free and effective participation in political issues contribute to reduce problems loans in MENA countries.

Our research contributes to the related literature in several ways. First, it is the first paper that considers the issue of nonperforming loans in the MENA region. Besides, this research extends the relatively scarce literature on the determinants of NPL as only a limited number of studies have investigated the determinants of problem loans on a cross-country basis (Sinkey et Greenwalt, 1991; Kwan and Eisenbeis, 1997 and Salas and Saurina, 2002; Boudriga et al., 2009). Finally, it considers the impact of the business and the institutional environment on banking outcomes.

The remainder of the paper is organized as follows. The second section reviews the literature on the determinants of bank nonperforming loans. The third section describes data and the methodology used. The fourth section analysis the results. The last section concludes the paper.

[4] Tunisia, Algeria, Morocco, Egypt and United Arab Emirates.

2. Literature review and hypotheses development

2.1. Bank specific determinants of NPLs

Credit policy

The *credit policy* of the bank plays an essential role in determining the subsequent levels of NPLs. To maximize short run benefits, managers seek to rapidly expand credit activities and may hence take inadequate credit exposures. Keeton (1999) suggests that rapid growth of loans can be triggered by return maximization strategies. In fact, interest revenues are the main source of return creation in banks. Particularly, during periods of economic growth, financial institutions engage in market share conquest campaigns discarding the necessary assessment of credit quality of borrowers (Fernandez De Lis et al., 2000). This search for rapid growth of loans is achieved by either reducing interest rate charged to borrowers or by lending to lower credit quality borrowers. This will lead, due to adverse selection, to an increase of problem loans. Fries et al. (2002) support the same conclusion relating NPLs to credit growth rates. They suggest that managers engaging in "Gambling resurrection" policies prefer more speculative prospects to maximize short term gains. This schema is further aggravated by the conduct of income smoothing activities, which delays the discovering by shareholders of the dangers and impacts of such strategies.

Empirically, Kwan and Eisenbeis (1997) find a U-shaped relationship between bad loans and loans growth. At a low growth rate, loans growth has a negative effect on the number of bad loans. As loans growth rate exceeds a certain point, further loans growth adds increase bad loans. In the same vein, Boudriga and Jellouli (2008) examining a sample of 10 major Tunisian banks report a negative relationship between credit to total assets ratio and nonperforming loans. They argue that the more the bank is concentrated on credit activities the better it controls borrowers' solvency.

H1: An expansive credit policy leads to higher problem loans.

Capital adequacy ratio

Capital adequacy ratio is used, theoretically, as a tool to control excessive risk taking by banks and to prevent them from being insolvent through recapitalization (Basel accord, 1988). Before 1988, several authors, as Kahane (1977), Koehn and Santomero (1980) and Kim and Santomero, (1988), show a positive relationship between bank risk and capital ratio. They explain the behavior of excessive risk taking by financial institutions for their willingness to increase their capital to meet regulatory requirements. Indeed, these authors show that the portfolio risk increases with the increase in the minimum ratio of capital and regulatory capital constraints make the risk of the asset as a substitute in the capital. Thus, banks under pressure of a capital increase would reach the desired level by increasing the risk of assets in the hope of making significant gains and reduce their risky assets when regulatory pressure would allow reductions in capital. However, Keeley and Furlong (1990) show, theoretically again later, that more stringent capital regulation will reduce the risk exposure of the insurance system as long as the stringency of the regulation of asset portfolio risk remains unchanged. Indeed, higher levels of capital allow banks to better cope with unexpected losses and to improve their performance (Fries et al., 2002). Regulators are therefore akin to make financial institutions comply with the capital regulation. According to Dewatripont and Tirole (1994), this may be achieved either by increasing equities (through market financing) or by reducing their risk exposures (particularly by less loans offering).

Following the recommendations of international regulators, several MENA countries have adopted minimum capital requirements for their banks as imposed by the first Basel Accord. The date of implementation of these regulations varied across countries: Jordan was the first country to impose the Cooke ratio (1992) and Tunisia (1999) was the last country to catch up. In addition to these differences in the years of adoption, the level of the minimum capital requirement varies from country to country. It ranges from 8% (Malta, Saudi Arabia, Tunisia, Yemen and Morocco), 10% (Qatar, United Arab Emirates and Egypt) and 12% (Kuwait, Jordan, Bahrain, Oman and Lebanon). Recently, some countries as Tunisia and Morocco have started implementing the new Basel accord .

A limited number of empirical studies have examined the impact of capital regulation on bank credit risk in the MENA region. Murinde and Yaseen (2004) examining a panel of 11 MENA region countries over the 1995-2003 period find that regulatory pressure positively impact risk taking behavior of banks. Ben Naceur and Kandil (2009) report that imposing higher capital adequacy ratio, following the implementation of the Basel accord by five MENA countries, led to expand credit activities among banks. These studies did not, however, examine the direct relationship between credit risk and capital adequacy regulation.

H2: Capital adequacy ratio is negatively related to problem loans.

Loan loss provisions

Loss provisions are used to prevent banks from expected credit losses that might be incurred in the future. Theoretically, higher levels of nonperforming loans should be associated with high rates of lagged provisioning (Hasan and Wall, 2004). Banks anticipating high levels of capital losses should create higher provisions to decrease earnings volatility and to reinforce medium term bank solvency. This indicates the overall bank attitude toward risk control. Managers can also use loan loss provisions to signal the financial strength of their banks. The willingness of a bank to provision for loan losses is regarded as a strong belief in the future performance of the bank (Ahmed et al. 1999). This may be done through the raise of general provisions which are set without regard to the occurrence of a default event. General provisions are made as a percentage of the total credit offered in a given year. Specifically, in countries with static provisioning (as in the MENA countries) the use of general provisioning is the only way to reduce future loan losses.

H3: The lagged level of loan loss provisions is positively related to problem loans

Bank performance

Bank performance is related to the risk taking behaviour of managers. Banks are usually exposed to revenue creation pressure and thus constrained to engage in risky credit offerings. As noted by Hu et al. (2004), profitable banks are less engaged in risky activities as they have less pressure to create revenues. At the opposite, inefficient institutions might engage in risky lending in particularly when managers have short-termist incentives. Indeed, inefficient management can imply weak monitoring for both operating costs and credit quality of customers. Under this bad management hypothesis advanced by Berger and DeYoung (1997), managers lack competencies to effectively assess and control risks incurred when lending to new customers. This will induce high levels of capital losses and poor performances. Godlewski (2004) using the return on assets (ROA) as a proxy for performance[5], shows that banks profitability negatively impacts the level of nonperforming loans ratio.

H4: Bank performance reduces the level of problem loans.

Diversification

Theoretically, *diversification* reduces risk taking as it makes possible the compensation for losses in some products by gains in others (Winton, 1999). The potential losses on the loan activity might be overcome by looking for non interest sources of revenues (financial revenues and capital gains). For well diversified banks, where non-interest revenues are important, NPLs should be lower than for less (poorly) diversified financial institutions. Hu et al. (2004), using the "entropy index"[6] do not find a significant relationship between NPLs and revenue diversification for a panel of 40 Taiwanese banks during 1996-1999. They argue that diversification could not be used as an efficient mean to reduce the proportion of problem loans, especially when the main source of revenue is from loans. Thus, only an effective revenue diversification will lead to a decrease in the rate of problem loans. Accordingly, Micco et al. (2004) using a panel of developing countries over the period 1995-2002 find that non operating revenues are positively correlated to problem loans. However, Lepetit et al. (2008) show, from a panel of European banks over the period 1996-2002, that banks engage in non-traditional activities (commissions, fees, etc.) have a higher risk of insolvency as banks focused on their traditional loans activities. DeYoung and Roland (2001) provide three arguments for the inefficiency of diversification into non-traditional activities namely the strong competition, fixed costs and lack of regulation in this type of activity.

H5: Revenue diversification is negatively related to problem loans.

Foreign ownership

Foreign participation uses to be commonly accepted as an important driver in improving firm performance and reducing risk taking. Levine (1996) argues that foreign shareholding leads to improved financial services and easier access to international financial markets. Accordingly, Lensink and Hermes (2004) report an advantageous impact of foreign ownership on human capital, skills and technologies. This is particularly true in developing countries. Indeed, this highly skilled international expertise offers quality training and knowledge transfer. The foreign presence could also improve country attractiveness to foreign direct investments (Brealey and Kaplanis, 1996). Empirically, various studies reported a beneficial impact of foreign ownership in banks outcomes: nonperforming loans (Barth et al, 2002); bank performance (Micco et al., 2004) and risk taking

[5] The ROA is the indicator widely used in the empirical studies as a proxy of profitability.

[6] Entropy index = where $-\sum_{j=1}^{n} S_j \ln S_j$ Sj is the share of j^{th} revenue and n the number of revenue sources.

(Boubakri et al., 2005).

While the merits of foreign ownership are widely highlighted, several other economists mirrored the adverse effects of such foreign participation (e.g. Goldberg et al., 2000). More recently, the financial crisis that originated in high-income economies and which has spread rapidly to developing economies through investment has put under question the desirability of foreign funds in particular from developed countries. Indeed, it is essential to highlight that the impact of foreign participation depends on its origin (from developing vs. developed countries). Particularly, foreign participation in the MENA region, which has only developed recently due to barriers to entry, originates from both Arab and Western countries. This foreign presence exhibits also some disparities between countries. These differences are related to the share of bank assets owned by foreign which varies between 0 for Yemen to 68 percent for Jordan (the more widely opened banking sector in the region).

H6.a: Foreign participation coming from developed countries is associated with less problem loans.
H6.b: Foreign participation coming from developing countries is associated with problem loans.

State ownership

State ownership may play a role in shaping the behavior of risk taking of bankers and consequently the level of NPLs. State controlled banks are expected to exhibit higher levels of problem loans. Two explanations could be advanced. First, due to their development mandate state-owned banks are inclined to allocate a proportion of credits to small and medium size firms regardless of their risk-return profile (Salas and Saurina, 2002). Second, usually banks controlled by official authorities have little assessment and recovery capacities to cope with bad borrowers (Micco et al., 2004). Alternatively, Hu et al. (2004) argue that bank risk-taking depends on three main factors: the political lobbies, corruption and join ownership effect. Empirically, Hu et al. (2004) using a panel of 40 banks in Taiwan over the period 1996-1999 find a positive correlation between capital share owned by the state and the level of NPLs. Barth et al. (2004), based on the results of the survey they established in 1999 with 107 countries, found that public ownership is positively related to non-performing loans, and a banking sector dominated by state ownership tends to be more corrupt. For developed countries, Garcia-Marco and Robles-Fernandez (2007) find that Spanish commercial banks (private) are more exposed to risk than deposit banks (mainly state owned).

H7: State owned banks exhibit higher levels of problem loans.

Size

Size is also hypothesized to be negatively linked to credit risk exposure. As noted by Hu et al. (2004), this could indicate that larger banks have more resources and are more experimented to better deal with bad borrowers. Small banks, on the contrary, may be exposed to the adverse selection problem because of the lack of sufficient competencies and experience to effectively assess the credit quality of borrowers. Income creation pressure is also higher for small banks leading them to lend to 'bad' customers.

H8: Large banks exhibit less problem loans.

2.2. Business environment and nonperforming loans

Business environment defines the conditions under which firms and individuals operate and impact the opportunities of growth in a country. In this study, we focus on aspects of the business environment related to getting credit provided by the Doing Business database[7]. The items provided by this database are supposed to have a direct impact on bank credit risk. It includes measures of credit information sharing and legal rights of borrowers and lenders. Specifically, these indicators reflect the coverage, the scope, the quality and the accessibility of credit information available through public and private credit registries. Second, they indicate the extant to which collaterals and bankruptcy laws facilitate lending. They are thus likely to have an important influence on bank risk taking.

Information sharing

Information sharing quality between borrowers and lenders leads, through improved credit risk assessment and reduced information asymmetry, to a more efficient allocation of credit (Jappelli and Pagano, 2002). In

[7] www.doingbusiness.org

economies where information asymmetry is high lenders are not able to observe the true credit quality of borrowers, which induces adverse selection problems. Pagano and Jappelli (1993) suggest that enhanced information sharing contributes to reduce defaults among borrowers as adverse selection problems are mitigated. This depends on the production and dissemination of information on borrowers. The market response to information failures takes the form of institutional innovations, particularly the creation of either public or private credit bureaus. These credit registries imply higher transparency, better market discipline and therefore less default on loans. Godlewski (2004) argues that the existence of such registries induces higher transparency and better market discipline forces.

Besides, as noted by Padilla and Pagano (2000), credit bureaus may act as a borrower discipline device. If borrowers know that lenders will share their information on defaulting customers, they will be more cautious about their repayment records. This will create an incentive to borrowers to better perform. However, in countries where the information provided by credit bureaus are either incomplete, inadequate or are inappropriately used due to lack of competencies, credit registries do not play a disciplining role on credit risk taking. Indeed, while some agencies collect and distribute extensive information on total credit exposure by borrower (ratings, late payments and defaults, court records of the company and its owners), others disseminate only limited and consolidated information (Miller, 2003). Due to differences on nature and the depth of credit information, it is worthwhile to explore whether public credit registries and private bureaus have different impacts on bank risk taking.

H9: Increased information sharing is negatively associated with problem loans.

Legal rights

Legal rights, which measure the degree to which collateral and bankruptcy laws facilitate lending (Doing business 2010), are hypothesized to impact credit risk taking and to be correlated with financial and economic outcomes (La Porta et al., 1998). Jappelli and Pagano (2002) and Qian and Starhan (2007) show that poor rules of law predict higher credit risk. In the same vein Djankov et al. (2007) expanding their measure of legal formalism, report improved lending activities for juridical systems with better legal rights and efficient enforcement.

H10: Enhanced legal rights are associated with less problem loans.

2.3. Institutional environment and nonperforming loans

The institutional environment within which the banking system operates is a very important determinant of credit quality. In the last decade, most of the MENA countries undertook several institutional reforms intended primarily to improve the international openness and economic stability. Since, an important strand of research has been undertaken to examine the role of institutions in economic growth. These studies set out that higher growth rates are associated with an effective enforcement of civil property rights and sound regulatory systems. In contrast, the relationship between institutions and nonperforming loans has not been sufficiently examined in the literature (Godlweski, 2004; Breuer, 2006). The following analysis contributes to fill this gap.

The institutional environment includes the legal and judicial framework, the political stability, and the degree of corruption control. Although a well functioning government system is known to influence the performance of the financial system, there is few evidence linking well-functioning institutions and good governance to bank financial outcomes such as nonperforming loans (Kaufmann et al., 2008).

These factors appear hence to be important in determining cross-country differences in credits quality. For instance, in many developing countries, banks suffer from the importance of nonperforming loans. These countries are most characterized by inefficient judicial system, heavy bureaucracy or corrupt political institutions. These deficiencies hinder either the process of making credit or the process of control and recovery once the loan is granted (Creane et al., 2004).

More specifically, the existence of corruption negatively impacts the degree of market competitiveness and thus leads to inefficient loans offering. Johnson and Wilson (2000) suggest that in societies with little democratic traditions and civil discipline, decision makers are exposed to informal connections and other pressures from groups seeking for unjustified or illegal economic rents. In this context, loan decisions are affected by the intensity of pressures from political lobbying engaged by various interest groups. Loans will thus be gained by enterprises with good political connection, which could be of lower quality (even in severe distress). Furthermore, internal control tends to decrease in countries with corrupt civil society. This weakens banks capacities of screening and management loans and borrowers.

In much of the MENA region, the quality of institutions, including the judicial system, bureaucracy, law and order, and property rights, is poor albeit with some disparities between the different countries (Creane et al., 2004). It seems worthwhile to investigate whether the differences in banks credit exposure is linked to the

quality of institutions in each country.

H11: Enhanced quality of the institutional environment is associated with less problem loans

3. Data and Methodology

3.1. Data

In this study, we investigate how bank specific factors, country's institutions and business environment affect nonperforming loans in the MENA region. We consider a sample of 46 banks from 12 countries for the years 2002-2006. The choice of the period is mainly motivated by data availability for NPL levels. In fact, data on non performing loans in a comparable format exist only since the year 2002. The exclusion of period following the year 2007 was to avoid contaminated data due the global financial turmoil. The data used in this study are drawn from three main sources: (i) bank-level financial statements and ownership information are obtained from the Bankscope database. The original sample covered the 21 MENA countries as defined by the World Bank, and a total of 584 banks. The sample selection procedure is as follows. First, to ensure the homogeneity of the data used only commercial banks were selected. Other special financial institutions such as Islamic banks, Investment banks are excluded for international comparison purposes. This led to a sample of 351 banks. Second, we considered only unconsolidated financial statements to better capture the effect of individual nonperforming loans leading to a sample of 238 banks. Third, 182 banks, for which data on nonperforming loans and capital adequacy ratio are not available were excluded from the sample. Finally, 10 banks were eliminated due to lack of information on ownership structure. This reduced the sample to a balanced panel of 46 banks from 12 countries[8] consisting of a total of 230 observations over the period 2002-2006.

(ii) Country level data on information sharing measures and legal rights are taken from the Djankov, McLiesh, and Schleifer (DMS, 2007) and "Doing Business" data-base.

(iii) Country level data on institutional environment are provided by the World Governance Indicators compiled by Kaufmann, Kraay and Mastruzziet (2008). These data are based on 276 individual variables taken from 37 data sources produced by 31 different organizations. This database is particularly used in the literature to analyze the role of institutions in shaping economic outcomes.

Finally we use the Financial Structure Data set as developed by Beck, Demirguc-Kunt and Levine (2008) to control for financial structure, and the World Economic Outlook (WEO) database to obtain other macroeconomic factors. Tables (1) presents the data sources and provides a brief descriptions of the variables used in this study.

3.2. Variables used

Based on the subsequent analysis, we used three sets of factors to explain the NPLs level in a cross-country framework: namely bank industry factors, business environment and institutional variables. A set of control variables that captures macroeconomic differences between countries are also introduced.

3.2.1. Bank specific variables

The bank industry factors include the rate of credit growth *(Credgr)* which reflects banks credit policy. The one year lagged bank regulatory capital to risk-weighted assets minus the required minimum capital *(Difcar)* as a proxy for capital requirements. This measure is more appropriate than using the absolute level of the regulatory capital because it controls the differences in the regulatory minimum solvency ratio between countries. Bank specific factors include also the one year lagged loan loss provisions to total loans ratio *(Prov)*, the return on assets ratio *(ROA)*, the Herfindahl index *(Herfind)* as a measure of diversification and the natural logarithm of total assets *(Size)* as a proxy of bank size. We further include three dummy proxies of ownership structure. Particularly, *(State)* is a dummy variable that equals one if the government holds a majority stake in the bank, *(Forgnodev)* is a dummy variable that equals one in the case of foreign participation from developing countries and *(Forgdev)* is a dummy variable that equals one for foreign participation from developed countries.

3.2.2. Business environment variables

[8] These countries are: Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Saudi Arabia, Tunisia, Qatar, United Arab of Emirates and Yemen.

The level of information sharing among creditors is also likely to have an important influence on bank risk taking. Based on the data available from DMS (2007) and the Doing Business data set, we include two dummy variables to measure information sharing among lenders: the first variable *(Pubregist)* equals one if public credit registries exist in the country by the end of 2003, and zero otherwise. Public registries are created by public authorities and aim at collecting information on the credit quality of borrowers and disseminate it to financial institutions (DMS, 2007). The second variable *(Pivbur)* equals one if a private bureau is operating in the country by the end of 2003, and zero otherwise. Private bureaus are private commercial firms which maintain database facilitating the exchange of information among banks and other financial institutions (DMS, 2007). We also use the depth of Credit Information *(Infor)* to measure rules affecting the scope, accessibility and quality of credit information available through either public registries or private credit bureaus. This variable captures the difference in information contents across countries and is composed of six indicators. The credit information index ranges from 0 to 6, with higher values indicating higher availability of credit information. Finally, we introduce the legal rights index *(Right)* which measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders. This index ranges from 0 to 10, with higher scores indicating that collateral and bankruptcy laws are better designed to expand access to credit. Appendix (A) provides further details on variables construction.

3.2.3. Institutional environment variables

World Governance Indicators compiled by Kaufmann, Kraay and Mastruzziet (2008) are commonly adopted in the related literature to analyze the institutional quality in a country. The six dimensions of governance provided by this database are included in this study to test the effect of each of them on problem loans. They include : 1) voice and accountability *(VA)* which measures the extant of political and civil rights; 2) political instability and violence *(PS)* which indicates the likelihood of violent threats or changes in government; 3) government effectiveness *(GE)* as an indicator of the competence and the quality of public service delivery; 4) regulatory burden *(RQ)* which encompasses the incidence of market unfriendly policies; 5) rules of law *(RL)* as a proxy for the quality of contract enforcement, the police and the courts, as well as the likelihood of crime and violence; and 6) control of corruption *(CC)* which indicates the exercise of public power for private gain, including both soft and grand corruption and state capture. The six governance indicators are measured on a scale ranging from -2.5 to 2.5, with higher values corresponding to better governance. Appendix (B) provides further details on variables calculations and sources of information.

3.2.4. Control variables

We use four proxies for the macroeconomic environment. To control economic expansion we introduce the lagged GDP growth *(GDPgr)*. We expect lagged growth rate of GDP to account for omitted variables related to the level of development. For example, Breuer (2006) shows that the one year lagged growth rate in real GDP negatively and significantly impacts the nonperforming loans rate.

The second variable introduced is unemployment rate *(Unemploy)*. We suppose a positive relation between unemployment rate and nonperforming loans. First, unemployment is related to the broad economic conditions. Second, as noted by Babihuga (2007), the unemployment rate deteriorate assets quality by affecting borrowers capacity to repay due loans.

We also include a dummy variable *(HighInx)* which equals to 1 for high income MENA countries and 0 otherwise, as a control variable which proxies for the wealth differences between countries. This variable also coincides with Gulf/non-Gulf classification. Finally, to account for the weight of bank financing relative to market financing, we use the ratio of private credit by deposit money bank to stock market capitalization *(Market)*.

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Table 1
Variables definition

Definition		Predicted sign	Data source
NPL	Nonperforming loans to total loans ratio		Bank data from Bankscope
Cred_gr	Credit growth rate on annual basis	+	Bank data from Bankscope
Difcar	Capital adequacy ratio minus the minimum required capital	-	Bank data from Bankscope and
ROA	Return on asset ratio	-	Bank data from Bankscope
Prov	Loan loss provisions to total loans ratio	+	Bank data from Bankscope
Herfind	Herfindahl index equals to the sum of the squares of each income category in total bank income	-	Authors' calculations using Bank data from Bankscope
Size	Natural logarithm of total assets	-	Bank data from Bankscope
Forgnodev	Dummy variable equals to 1 for banks with foreign participation from developing countries and 0 otherwise	- /+	Bank data from Bankscope
Forgdev	Dummy variable equals to 1 for banks with foreign participation from developed countries and 0 otherwise	-	Bank data from Bankscope
State	Dummy variable equals to 1 for State controlled banks and 0 otherwise	+	Bank data from Bankscope
GDP_gr	Growth rate of gross domestic product on annual basis	-	World Economic Outlook database (2008)
High_inc	Dummy variable equals to 1 for high income countries and 0 otherwise	-	Financial structure data set (2007)
Market	Ratio of private credit by deposit money bank to stock market capitalization	- /+	Financial structure data set (2007)
Unemploy	Unemployment rate	-	Central Intelligence Agency, World Factbook
Pubregist	Dummy variable equals 1 if a public credit registry exists in the country by the end of 2003, zero otherwise.	-	Djankov, McLiesh and Shleifer (2007)
Privbur	Dummy variable equals 1 if a private credit bureau operates in the country by the end of 2003, zero otherwise.	-	Djankov, McLiesh ,and Shleifer (2007)
Infor	Credit information index which measures rules affecting the scope, access, and , quality of credit information	-	Doing business (2008)
Right	Legal rights which measures the degree to which collateral and bankruptcy laws facilitate lending	-	Doing business (2008)
VA	Voice and accountability measuring political and civil rights	-	World Governance Indicators compiled by Kaufmann, Kraay and Mastruzziet (2008)
PS	Political Stability and Absence of Violence	-	World Governance Indicators compiled by Kaufmann, Kraay and Mastruzziet (2008)
GE	Government effectiveness measuring the competence of the bureaucracy and the quality of public service delivery	-	World Governance Indicators compiled by Kaufmann, Kraay and Mastruzziet (2008)
RQ	Regulatory quality measuring the ability of the government to implement policies and regulations that promote private sector development.	-	World Governance Indicators compiled by Kaufmann, Kraay and Mastruzziet (2008)
RL	Rule of law measuring the quality of contract enforcement, the police and the courts, as well as the likelihood of crime and violence	-	World Governance Indicators compiled by Kaufmann, Kraay and Mastruzziet (2008)
CC	Control of corruption measuring the exercise of public power for private gain, including both petty and grand corruption and state capture	-	World Governance Indicators compiled by Kaufmann, Kraay and Mastruzziet (2008)

3.3. Methodology

We use a pooled regression approach. Panel data combines both time series and cross-section data. First, it has the advantage to increase the number of observations, degrees of freedom and reduce collinearity among explanatory variables especially when the number of years is low. Second, pooling enables controlling for exogenous shocks common to all banks (time effects) and reduces the omitted variable bias (unit effects). However, simple pooled regression may not be well designed to capture relationships between dependant variable and explanatory variables[9]. It assumes homogenous behavior of endogenous variable for all individuals in the sample (same intercept and same slopes). This is not obviously the case for the variable *NPL*, as it varies considerably between countries and years. Several alternative estimation methods are more suitable for panel data (fixed and random effects). Using the Hausman test, the random effect specification is preferred. Besides, the use of fixed effects specification raises two concerns. First, as noted by Haas and Lelyveld (2006), unit dummies are known to reduce cross-sectional variance. Second, the inclusion of units' dummies eliminates de facto time invariant exogenous variables and does not properly capture the impact of quasi time invariant variables (Beck, 2005). Definitely, we use a random-effects regression model that controls for both observed and unobserved cross-country heterogeneity. Besides, we include country specific and years dummies variables to capture the fixed effects. In all specifications the standard errors of the estimated coefficients are adjusted for cluster effects at the country level as suggested by Peterson (2009)[10].

3.4. Descriptive Statistics

The summary of descriptive statistics for the variables used in the empirical analysis is presented in Table (2)[11]. We note particularly that NPL rate present a high disparity between banks with a minimum of 0.38% and a maximum of 72%. A similar pattern is observed for loan loss provisions ranging between 0.45% and 276.9%. Regarding bank profitability, we remark that some banks have a negative return on assets with minimum values of -11.88%. Table (2) shows also that the Herfindahl ratio is on average very high (75%). This indicates that banks in the sample seem to be concentrated on the credit activities. With respect to the ownership structure, foreign participation appears to be higher than state ownership with a highly proportion of participation coming from developed countries.

Concerning business environment variables, the average legal right index across countries and years is 3.457. The country scores range from 2 to 4. In our sample, the credit information index ranges from 2 to 5 with an average of 2.66. This shows furthermore the disparities between MENA countries with regard to institutional quality. In our sample, there is at least one private bureau in 13% of the countries and one public registry in 71% of the countries. This might be explained by the recent trends in the banking industry in the region with a widespread movement of privatization and upgrading of the "infrastructure" of the financial systems. Finally, it is worthwhile to note that the institutional quality indicators remain weak (in average) with values around the zero for almost all the dimensions.

[9] Hsiao test rejects the homogeneity of data structure.

[10] We performed the bootstrap estimation as robustness checks, the significance of the main results is confirmed.

[11] Descriptive statistics by country are presented in appendix (C).

Table 2

Descriptive statistics

Variables	Mean	Median	Min	Max	SD
Dependant variable					
NPL	13.13	7.92	0.38	72.03	14.45
Bank specific variables					
Cred gr	0.20	0.15	-0.39	2.57	0.30
Difcar	12.21	8.85	-2.13	74.00	11.68
Prov	2.06	1.11	-2.26	29.48	3.26
Roa	1.99	2.06	-11.88	13.15	1.77
Herfind	0.75	0.76	0.42	1.83	0.15
Size	14.35	14.34	10.27	17.54	1.53
Forgnodev	0.39	0.00	0.00	1.00	0.49
Forgdev	0.22	0.00	0.00	1.00	0.41
State	0.15	0.00	0.00	1.00	0.36
Business environment variables					
Pubregist	0.72	1.00	0.00	1.00	0.45
Privbur	0.13	0.00	0.00	1.00	0.34
Infor	2.66	2.00	0.00	5.00	1.42
Right	3.46	4.00	2.00	4.00	0.65
Institutional environment variables					
VA	-0.79	-0.73	-1.66	-0.28	0.35
PS	-0.25	-0.33	-1.89	1.00	0.80
GE	0.07	0.15	-1.01	0.84	0.50
RQ	0.13	0.09	-0.91	1.07	0.51
RL	0.22	0.28	-1.27	0.95	0.58
CC	0.24	0.30	-0.87	1.18	0.64
Control Variables					
GDP gr	5.67	5.27	0.13	17.72	3.65
High inc	0.52	1.00	0.00	1.00	0.50
Market	0.65	0.45	0.00	2.42	0.58
Unemploy	0.14	0.15	0.02	0.35	0.09

Where NPL is Nonperforming loans to total loans ratio, Credgr is Credit growth rate on annual basis Difcar is Capital adequacy ratio minus the minimum required capital, Prov is Loan loss provision to total loans ratio, ROA is Return on asset ratio, Herfind is Herfindahl index, Size is Natural logarithm of total assets, Forgnodev is a dummy variable equals to 1 for banks with foreign participation from developing countries and 0 otherwise, Forgdev is a dummy variable equals to 1 for banks with foreign participation from developed countries and 0 otherwise, State is Dummy variable equals to 1 for State controlled banks and 0 otherwise, Pubregist is dummy variable equals 1 if a public credit registry exists in the country, Privbur is a dummy variable equals 1 if a private credit bureau operates in the country, Infor is the credit indicator information index, Right is the legal right index, VA is Voice and accountability, PS is Political stability indicator, GE is Government effectiveness indicator, RQ is the regulatory quality indicator, RL is the rule of law indicator, CC is control of corruption indicator, GDPgr is Growth rate of gross domestic product on annual basis, Highinc is Dummy variable equals to 1 for high income countries and 0 otherwise, Market is the ratio of private credit by deposit money bank to stock market capitalization and Unemploy is country unemployment rate

4. Empirical results

We first run a basic model including only bank specific factors and variables that control for economic conditions. We then estimate other specifications including business and institutional environment variables. To examine the impact of business variables on NPL, we introduce in four different specifications the four proxies defined above. The last specification considers the four variables altogether. The final regressions consider the six indicators of institutional quality. Considering that institutional indicators are highly correlated with each other, we introduce them individually in the basic model. In all regressions, we include both years and countries dummies variables to control for differences between countries and over the years.

We present in Table (3) the results related to the baseline model which examines the effects of bank specific variables on NPLs. Tables (4) and (5) report results after controlling for business and institutional environment.

4.1. Bank specific determinants and nonperforming loans

To explore the impact of bank specific variables on NPL, we consider the following model:

$$NPL = f(\text{Bank specific variables, Macro variables}) \quad (1)$$

Where the vector of bank specific variables is composed of those defined in the previous section. Control variables consist on the four macroeconomic indicators introduced individually. Regression results are reported in Table (3).

The coefficients estimates indicate that credit growth rate is negatively related to problem loans. This result is contrary to previous findings, which report a negative impact of rapid growth of loans on credit quality (Keeton, 1999. Fries et al., 2002). It shows that credit exposure is not driven by aggressive commercial strategies. However, the diversification measured by the Herfindahl index and the natural logarithm of total assets do not seem to be linked to banks credit quality. Diversification has no significant effect and does not reduce credit risk. This result is consistent with Hu et al. (2004) who find no significant relationship between bad loans and income diversification for a panel of Taiwanese banks over the period 1996-1999. Hence, we argue that diversification cannot be used as an effective mean to reduce the proportion of NPLs, especially when banks are mainly concentrated on their credit activities as it is the case for MENA banks. It is also likely that in thin markets, bankers have access to private information about the true credit quality of borrowers and thus they know about the future difficulties associated with bad loans they might grant.

The coefficient of *(DifCar)* is positively significant at 5% across model specifications. This result is contrary to our prediction considering the capital adequacy ratio as a tool to reduce bank credit risk as suggested by the Basel accord. Our result, however, support the findings of Godlewski (2004) who suggests that official pressure may not be the most appropriate regulatory device to limit banks excessive risk taking in emerging market economies. We though give an alternative explanation. Generally, banks in the MENA region are highly capitalized (an average rate of 20%). They are not hence under regulatory pressures to reduce their credit risk to comply with regulatory capital requirements and therefore tend to take more risks. These findings add to the conflicting results on the relation between capital and risk in banks (e.g. Shrieves and Dahl, 1992; Fries et al., 2002; Boudriga et al. 2009).

Lagged loan loss provisions *($Prov_{t-1}$)* are positively linked to problem loans. Banks with high provisions are those engaged in riskier activities which lead to high level of NPLs. This indicates that banks use provisions as a tool to anticipate risks of potential loan default losses (Hasan and Wall, 2004). This result differs from that found by Boudriga et al. (2009) who observed a negative relationship between lagged provisions and aggregated NPLs for a panel of 59 countries over the period 2002-2006.

Also consistent with our hypothesized prediction, the coefficient of *(ROA)* is negative and statistically significant in all model specifications. This result provides support to our hypothesis that greater performance reduces nonperforming loans. This may be explained by reduced risk taking in banks exhibiting high levels of performance. The bad management hypothesis may be another plausible explanation to this negative relationship, as bad management leads both to riskier activities and weak performance. This analysis is consistent with the majority of previous studies

(Kwan and Eisenbeis, 1995; Berger and DeYoung, 1997; Barth et al., 2002) which show, in different contexts, that the deteriorated quality of assets is the main source of banks failures.

Concerning ownership structure, results show that state ownership does not affect credit risk in the MENA countries. This result is inconsistent with those reported by the majority of previous studies such as Salas and Saurina (2002) and Hu et al. (2004). We explain this result by the dominance of public ownership in most of the financial institutions in the MENA region. Our findings indicate also that foreign participation from developed countries improves credit quality in all model specifications. This confirms our theoretical prediction which supposes that foreign ownership contributes to improve human capital through foreign managers who bring better skills and technologies, in particular in developing countries (Lensink and Hermes, 2004). This result is also in line with other empirical studies which reported a beneficial impact of foreign ownership in banks outcomes: nonperforming loans (Barth et al, 2002); bank performance (Micco et al., 2004) and risk taking (Boubakri et al., 2005). In contrast, the coefficient of foreign participation from developing countries is not statistically significant. This is probably due to similarities in human skills and techniques between the country of origin and the host country. This result seems contradictory to the current events with the global banking crisis which stemmed from developed countries. We give the following explanation. Foreign presence in the MENA countries is mainly achieved through the acquisition of already existing banks. They hence "cherry pick" the most lucrative domestic borrowers compared to less competitive local banks left with riskier customers. This leads to increased credit risk exposure of domestic institutions (Goldberg et al., 2000).

Table 3
Bank specific variables regression on NPL

	Panel. 1	**Panel .2**	**Panel. 3**	**Panel .4**
Cred gr	-4.282**	-4.420**	-4 429**	-4.407**
	(-3.09)	(-3.18)	(-2.99)	(-3.24)
Difcar $_{t-1}$	0.168*	0.174*	0.174*	0.174*
	(2.06)	(2.1)	(2.09)	(2.1)
Prov$_{t-1}$	0.541***	0.551***	0.551***	0.551***
	(4.26)	(4.3)	(4.42)	(4.3)
ROA	-0.786*	-0.781*	-0.782*	-0.781*
	(-1.83)	(-1.77)	(-1.77)	(-1.78)
Herfind	0.172	0.593	0.606	0.637
	(0.05)	(0.17)	(0.17)	(0.18)
Size	-0.974	-1.075	-1.077	-1.061
	(-0.68)	(-0.79)	(-0.81)	(-0.78)
Forgnodev	-3.677	-3.772	-3.771	-3.762
	(-0.63)	(-0.65)	(-0.64)	(-0.64)
Forgdev	-12.01*	-12.12*	-12.12*	-12.11*
	(-1.79)	(-1.79)	(-1.78)	(-1.79)
State	-11.68	-11.73	-11.73	-11.74
	(-1.17)	(-1.17)	(-1.17)	(-1.17)
GDP_gr $_{t-1}$	-0.104			
	(-1.00)			
High inc		5.147		
		(0.71)		
Market			0.0502	
			(0.03)	
Unemploy				-2.284
				(-0.32)
Intercept	40.55*	41.41*	32 29*	41.54*
	(2.04)	(2.15)	(2.01)	(2.16)
Nbr groups (Obs)	46 (230)	46 (230)	46 (230)	46 (230)
R^2	0.5873	0.5873	0.5874	0.5874

Where NPL is Nonperforming loans to total loans ratio, Credgr is Credit growth rate on annual basis Difcar is Capital adequacy ratio minus the minimum required capital, Prov is Loan loss provision to total loans ratio, ROA is Return on asset ratio, Herfind is Herfindahl index, Size is Neperian logarithm of total assets, Forgnodev is a dummy variable equals to 1 for banks with foreign participation from developing countries and 0 otherwise, Forgdev is a dummy variable equals to 1 for banks with foreign participation from developed countries and 0 otherwise, State is Dummy variable equals to 1 for State controlled banks and 0 otherwise, GDPgr is Growth rate of gross domestic product on annual basis, Highinc is dummy variable equals to 1 for high income countries and 0 otherwise, Market is the ratio of private credit by deposit money bank to stock market capitalization and Unemploy is country Unemployment rate ***, **and * indicate significance at 1%, 5%, and 10% levels. Values in parentheses are t-Student. Method estimation is random-effects panel with cluster effects at the country level.

4.2. Business environment and nonperforming loans

We rerun the baseline model and include business environment variables related to information sharing (public registries, private bureaus, and depth of information) and to legal rights[12]. For all the regressions, we use the one year lagged GDP growth rate to control for macroeconomic conditions. The model is as follows:

$$NPL = f\left(Bank\ specific\ variables, Business\ environment, Macro\ variables\right) \quad (2)$$

The empirical results are presented in Table (4) with robust standard errors clustered by country. The coefficients estimates on the variables of the baseline model are similar in sign and magnitude to the results of the previous regressions. In the remaining of this section, we focus only on the interpretation of the estimated coefficients of the business environment factors.

The results show that the existence of public registries and private bureaus does not reduce nonperforming loans. This could be due to the quality and reliability of the information provided by these bureaus. Generally, credit data are above a certain threshold and disclosed in aggregated form. On the other hand, the presence of private credit bureaus in the MENA region is relatively recent (only 28% of countries included in the sample have private bureaus). Then, their potential positive effect on credit quality suggested by the literature (Pagano and Jappelli, 1993; Padilla and Pagano, 2000; Godlewski, 2004) is not likely to be observed over the examined period. It is also documented that the effective impact of such bureaus varies across countries and depends especially on their legal and regulatory framework (Miller, 2003).

To further investigate the impact of information sharing on credit exposure, we use the credit information index to capture the depth and quality of credit information across countries. This indicator measures the rules affecting the scope, the accessibility and the quality of credit information available through either public or private credit registries. We find a negative relationship between NPLs and the depth of credit information. This emphasizes the beneficial role of information quality in reducing moral hazard and adverse selection problems. It appears then that it is not only the existence of credit bureaus that improves the credit portfolios quality of banks but also and mainly the relevance of the information published by these offices. In fact, while some bureaus collect and disseminate extensive information on credit (total credit exposure by borrower, ratings, late payments and defaults, court records of the company and its owners), other agencies only gather limited or consolidated information (Miller, 2003).

Finally, as it can be seen from Table (4), the coefficient of legal rights is negative and statistically significant, suggesting the positive effect of legal rights on bank risk taking. This result is consistent with that of Jappelli and Pagano (2002) and Qian and Starhan (2007) who suggest that poor rules of law predict higher credit risk. Thus, greater the extant to which collateral and bankruptcy laws protect the rights of borrowers and lenders, better is the credit quality. Indeed, banks are more likely to seize collateral and to force repayment.

[12] We do not consider country dummy variables. We think that the business environment variables capture the specific effects related to the banking environment in the country. We also run the regressions with country dummies the main results are unchanged.

Table 4
Bank specific and business environment variables regression on NPL

	Panel. 1	**Panel .2**	**Panel.3**	**Panel .4**	**Panel. 5**
Cred_gr	-3.814**	-3.810**	-3.997***	-4.221***	-4.239***
	(-2.49)	(-2.51)	(-2.75)	(-2.73)	(-2.88)
Difcar $_{t-1}$	0.15	0.148	0.172	0.158	0.166**
	(1.52)	(1.55)	(1.9)	(1.68)	(1.97)
Prov $_{t-1}$	0.626***	0.631***	0.606***	0.576***	0.557***
	(4.89)	(4.79)	(4.86)	(5.04)	(4.59)
ROA	-0.967**	-0.974**	-1.000***	-0.838**	-0.841**
	(-2.56)	(-2.50)	(-2.58)	(-2.16)	(-2.03)
Herfind	-1.408	-1.499	-1.547	-0.432	-0.898
	(-0.56)	(-0.59)	(-0.60)	(-0.17)	(-0.36)
Size	-2.529***	-2.561***	-1.946***	-1.098	-1.017
	(-2.69)	(-2.61)	(-2.88)	(-1.39)	(-1.17)
Forgnodev	-3.121	-2.885	-3.075	-1.361	0.273
	(-0.45)	(-0.37)	(-0.51)	(-0.27)	(-0.04)
Forgdev	-5.796	-5.58	-6.169	-5.959	-3.759
	(-0.84)	(-0.85)	(-1.30)	(-1.45)	(-0.68)
State	-0.426	-0.349	-2.258	-1.015	-0.876
	(-0.05)	(-0.05)	(-0.30)	(-0.17)	(-0.13)
GDP_gr $_{t-1}$	-0.117	-0.12	-0.145	-0.108	-0.138
	(-1.16)	(-1.16)	(-1.17)	(-1.10)	(-1.17)
Pubregist	-0.345				-0.233
	(-0.08)				(-0.07)
Privbur		1.173			6.333
		(0.17)			-0.85
Infor			-1.791*		-1.075*
			(-1.67)		(-1.69)
Right				-7.309***	-7.671***
				(-2.66)	(-4.62)
Intercept	54.638***	52.82***	51.34***	58.00***	59.63***
	(3.56)	-2.82	(4.19)	(4.60)	(7.97)
Nbr groups (Obs)	46 (230)	46 (230)	46 (230)	46 (230)	46 (230)
R^2	0.3927	0.3949	0.4410	0.4518	0.4864

Where NPL is Nonperforming loans to total loans ratio, Credgr is Credit growth rate on annual basis Difcar is Capital adequacy ratio minus the minimum required capital, Prov is Loan loss provision to total loans ratio, ROA is Return on asset ratio, Herfind is Herfindahl index, Size is Neperian logarithm of total assets, Forgnodev is a dummy variable equals to 1 for banks with foreign participation from developing countries and 0 otherwise, Forgdev is a dummy variable equals to 1 for banks with foreign participation from developed countries and 0 otherwise, State is Dummy variable equals to 1 for State controlled banks and 0 otherwise, GDP gr is Growth rate of gross domestic product on annual basis, Pubregist is dummy variable equals 1 if a public credit registry exists in the country, Privbur is a dummy variable equals 1 if a private credit bureau operates in the country, Infor is the credit information index, Right is the legal right index, ***, **and * indicate significance at 1%, 5%, and 10% levels. Values in parentheses are t-Student. Method estimation is random-effects panel with cluster effects at the country level.

4.3. Institutional environment determinants and nonperforming loans

Finally, to test the impact of institutional variables on nonperforming loans, we adopt the same methodology as for the business environment variables. Therefore, we add to the baseline model the vector of institutional variables composed of the six indicators derived from World Governance Indicators compiled by Kaufmann, Kraay and Mastruzziet (2008). These are namely voice and accountability *(VA)*, political instability and violence *(PS)*, government effectiveness *(GE)*, regulatory burden *(RQ)*, rule of law *(RL)* and control of corruption *(CC)*. Considering that the institutional indicators are highly correlated with each other we introduce them separately in the following specification:

$$NPL = f\left(Bank\ specific\ variables, Institutional\ environment, Macro\ variables\right) \quad (3)$$

The empirical results are reported in Table (5)[13]. Examining the coefficients on the various institutional variables leads to a number of additional interesting results. The signs of all institutional variables are negative, but only two variables, government effectiveness and political stability, are reported to not affect problem loans. Our results highlight the importance of institutional environment in enhancing governance mechanisms and therefore in reducing excessive risk taking incentives as suggested by Godlewski (2004). Indeed, operating in sound environment where rules are well implemented and enforced and where corruption is controlled for may improve credit process and hence banking outcomes. In other words, it facilitates effectively both granting and recovery of credits. Overall, our analysis shows that institutions quality plays an important role in reducing nonperforming loans in MENA countries.

[13] Table (5) doesn't include the year dummies variables.

Table 5
Bank specific and institutional environment variables regression on NPL

	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5
Cred_gr	-3.790***	-3.989***	-4.006***	-3.991***	-4.027***
	(-2.59)	(-2.66)	(-2.62)	(-2.94)	(-3.22)
Difcar $_{t-1}$	0.134	0.143	0.148	0.149	0.143
	(1.31)	(1.52)	(1.52)	(1.57)	(1.47)
Prov $_{t-1}$	0.637***	0.628***	0.589***	0.564***	0.578***
	(4.84)	(4.95)	(4.82)	(5.25)	(5.11)
ROA	-0.995***	-0.848**	-0.919**	-0.964***	-0.862**
	(-2.68)	(-2.18)	(-2.35)	(-2.84)	(-2.27)
Herfind	-1.348	-0.138	-0.64	0.327	-0.256
	(-0.51)	(-0.05)	(-0.25)	(-0.11)	(-0.10)
Size	-2.741***	-2.121**	-2.389***	-2.188***	-1.512**
	(-2.69)	(-2.29)	(-2.71)	(-2.85)	(-2.06)
Forgnodev	-3.666	-2.327	-2.325	-2.16	-1.645
	(-0.59)	(-0.39)	(-0.41)	(-0.41)	(-0.31)
Forgdev	-7.854	-5.93	-5.622	-6.843	-6.158
	(-1.45)	(-1.21)	(-1.23)	(-1.54)	(-1.42)
State	-1.614	-0.338	0.153	-0.199	-0.283
	(-0.22)	(-0.05)	(-0.02)	(-0.03)	(-0.04)
GDP_gr$_{t-1}$	-0.124	-0.062	-0.0611	-0.0952	-0.103
	(-1.15)	(-0.69)	(-0.63)	(-0.90)	(-1.17)
VA	-5.373*				
	(-1.88)				
PS		-2.811			
		(-1.51)			
GE			-5.068		
			(-1.56)		
RQ				-7.746***	
				(-3.31)	
RL					-6.702**
					(-2.45)
CC					
Intercept	53.00***	46.60***	51.66***	49.14***	40.15***
	(2.96)	(3.03)	(3.47)	(3.82)	(3.64)
Nbr groups (Obs)	46 (230)	46 (230)	46 (230)	46 (230)	46 (230)
R^2	0.4233	0.4072	0.4118	0.4250	0.4210

Where NPL is Nonperforming loans to total loans ratio, Cred_gr is Credit growth rate on annual basis, Difcar is Capital adequacy ratio minus the minimum required capital, Prov is Loan loss provision to total loans ratio, ROA is Return on asset ratio, Herfind is Herfindahl index, Size is Neperian logarithm of total assets, Forgnodev is a dummy variable equals to 1 for banks with foreign participation from developing countries and 0 otherwise, Forgdev is a dummy variable equals to 1 for banks with foreign participation from developed countries and 0 otherwise, State is Dummy variable equals to 1 for State controlled banks and 0 otherwise, GDP_gr is Growth rate of gross domestic product on annual basis, Pubregist is dummy variable equals 1 if a public credit registry exists in the country, VA is Voice and accountability, PS is Political stability indicator, GE is Government effectiveness indicator, RQ is the regulatory quality indicator, RL is the rule of law indicator, CC is control of corruption indicator, ***, **and * indicate significance at 1%, 5%, and 10% levels. Values in parentheses are t-Student. Method estimation is random-effects panel with cluster effects at the country level.

5. Conclusion

The purpose of this paper is to examine the relationship between bank specific, business and institutional environment and nonperforming loans in banks operating in the MENA region over 2002-2006. Nonperforming loans in banks can be affected not only by specific factors but also by business and institutional environment. Using a random-effects panel regression model that controls for cluster effects at the country level, our results report that among bank specific factors, foreign participation coming from developed countries reduces nonperforming loans. However, there is no evidence that state owned banks experience more nonperforming loans. In contrast with the disciplining role assigned to regulatory capital, our results show that highly capitalized banks have high level of nonperforming loans. Results show also that high credit growth is associated with a reduced level of problem loans. Banks that are concentrated on their credit activity are more likely to evaluate effectively the true credit quality of borrowers. Finally, loan loss provisions are regarded as a controlling mechanism over expected loan losses.

With respect to the impact of environmental variables on nonperforming loans, we do not report evidence for the beneficial effect of the presence of private and public bureaus in MENA countries. Credit quality of banks is affected rather by the relevance of the information published by public and private bureaus especially rules affecting the scope, accessibility and quality of credit information. The authorities' bodies have hence to strengthen the culture of information dissemination, which helps credit bureaus to provide appropriate information and operate effectively.

Finally, our findings highlight the importance of institutional environment in enhancing banks credit quality. Specifically, a better control of corruption, a sound regulatory quality, a better enforcement of the rule of law, and a free voice and accountability play an important role in reducing nonperforming loans in the MENA countries. Therefore, MENA countries need to take effective measures to strengthen their legal framework, improve the functioning of governmental bodies and reduce corruption to contribute to reducing banks credit risk and to insure the stability of the financial system.

Further investigations are needed to better understand the interactions and relationships between the different business and institutional factors and their respective impact on nonperforming loans. For instance, it is worthy to focus on the roles of banks' governance mechanisms and the potential impact of culture factors on banking outcomes. Finally, following the global financial crisis of 2008, a comparative analysis of pre-crisis versus crisis period analyzing problem loans of banks in the MENA region would be an interesting perspective for future research to determine the potential effects of the crisis on banks in this region.

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Appendix A. Getting credit Doing business and Djankov, McLiesh and Shleifer database (2007)

Public credit registry coverage DMS

The public credit registry coverage indicator reports the number of individuals and firms listed in a public credit registry with information on repayment history, unpaid debts or credit outstanding from the past 5 years. The number is expressed as a percent-age of the adult population (the population aged 15 and above according to the World Bank's World Development Indicators 2008). A public credit registry is defined as a database managed by the public sector, usually by the central bank or the superintendent of banks that collects information on the creditworthiness of borrowers (persons or businesses) in the financial system and makes it available to financial institutions. If no public registry operates, the coverage value is 0.

Private credit bureau coverage DMS

The private credit bureau coverage indicator reports the number of individuals and firms listed by a private credit bureau with information on repayment history, unpaid debts or credit outstanding from the past 5 years. The number is expressed as a percentage of the adult population (the population aged 15 and above according to the World Bank's World Development Indicators 2008). A private credit bureau is defined as a private firm or nonprofits organization that maintains a database on the creditworthiness of borrowers (persons or businesses) in the financial system and facilitates the exchange of credit information among banks and financial institutions. Credit investigative bureaus and credit reporting firms that do not directly facilitate information exchange among banks and other financial institutions are not considered. If no private bureau operates, the coverage value is 0.

Credit information index

The six characteristics measured by the index include: (1) both positive credit information (for example, loan amounts and pattern of on time repayments) and negative information (for example, late payments, number and amount of defaults and bankruptcies) are distributed; (2) data on both firms and individual borrowers are distributed; (3) data from retailers, trade creditors, or utilities, as well as from financial institutions, are distributed; (4) more than 2 years of historical data are distributed; (5) data are collected on all loans of value above 1% of income per capita; and (6) laws provided for borrowers' rights to inspect their own data. A value of one is added to the index when a country's information agencies have each of these characteristics.

The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions.

Legal rights

The strength of legal rights index includes eight aspects related to legal rights in collateral law and two aspects in bankruptcy law. A score of 1 is assigned for each of the following features of the laws:

1. Any business may use movable assets as collateral while keeping possession of the assets, and any financial institution may accept such assets as collateral.
2. The law allows a business to grant a non possessory security right in a single category of revolving movable assets (such as accounts receivable or inventory), without requiring a specific description of the secured assets.
3. The law allows a business to grant a non possessory security right in substantially all of its assets, without requiring a specific description of the secured assets.
4. A security right may extend to future or after-acquired assets and may extend automatically to the products, proceeds or replacements of the original assets.
5. General description of debts and obligations is permitted in collateral agreements and in registration documents, so that all types of obligations and debts can be secured by stating a maximum rather than a specific amount between the parties.
6. A collateral registry is in operation that is unified geographically and by asset type and that is indexed by the name of the grantor of a security right.
7. Secured creditors are paid first (for example, before general tax claims and employee claims) when a debtor defaults outside an insolvency procedure.
8. Secured creditors are paid first (for example, before general tax claims and employee claims) when a business is liquidated.

9. Secured creditors are not subject to an automatic stay or moratorium on enforcement procedures when a debtor enters a court supervised reorganization procedure.

10. The law allows parties to agree in a collateral agreement that the lender may enforce its security right out of court. The index ranges from 0 to 10, with higher scores indicating that collateral and bankruptcy laws are better designed to expand access to credit.

Appendix B. Worldwide Governance Indicators (WGI) developed by Kaufmann, Kraay and Mastruzziet (2008)

The six dimensions of governance that we measure are:

1. Voice and Accountability (VA) - capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

2. Political Stability and Absence of Violence (PS) - capturing perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism.

3. Government Effectiveness (GE) - capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

4. Regulatory Quality (RQ) - capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

5. Rule of Law (RL) - capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contact enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

6. Control of Corruption (CC) - capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

Appendix C. Descriptive statistics by country

Country	NPL	Credgr	Difcar	Prov	ROA	Herfind	Size	Infor	Right	VA	PS	GE	RQ	RL	CE	GDPgr	Market	Unemploy
BAHRAIN	28.56	0.02	26.54	3.20	0.42	0.92	14.03	4.00	4.00	-0.70	-0.06	0.50	0.83	0.73	0.66	8.21	0.93	0.15
EGYPT	19.34	0.01	3.30	2.95	0.96	0.70	15.83	2.00	3.00	-1.05	-0.88	-0.39	-0.48	-0.03	-0.44	3.69	0.50	0.11
JORDAN	7.94	0.26	9.49	0.76	1.71	0.69	14.05	2.00	4.00	-0.63	-0.38	0.17	0.26	0.37	0.24	6.43	1.51	0.15
KUWAIT	6.12	0.18	5.26	0.97	2.44	0.86	15.77	3.00	4.00	-0.35	0.07	0.28	0.47	0.71	0.89	8.53	1.05	0.03
LEBANON	13.89	0.11	21.85	2.19	1.28	0.79	13.11	4.20	3.00	-0.52	-1.07	-0.34	-0.21	-0.35	-0.53	4.67	0.14	0.18
MOROCCO	11.74	0.17	3.52	1.73	1.28	0.72	14.98	1.00	3.00	-0.57	-0.38	-0.11	-0.20	-0.05	-0.13	4.92	0.36	0.17
OMAN	12.44	0.07	6.88	2.28	1.96	0.79	14.28	2.00	4.00	-0.78	0.79	0.51	0.70	0.76	0.75	4.69	0.28	0.15
QATAR	11.82	0.47	13.46	0.97	3.03	0.78	14.14	2.00	3.00	-0.56	0.83	0.57	0.32	0.76	0.78	8.56	1.42	0.03
SAUDIARABIA	3.12	0.22	10.87	0.74	2.80	0.62	16.47	5.00	4.00	-1.53	-0.67	-0.30	-0.06	0.23	0.18	3.93	0.95	0.23
TUNISIA	12.10	0.10	6.35	1.45	1.35	0.66	14.42	3.00	3.00	-0.99	0.15	0.53	0.04	0.19	0.23	4.46	0.10	0.15
UAE	6.04	0.24	14.82	0.79	3.75	0.79	14.14	2.00	4.00	-0.78	0.71	0.74	0.77	0.79	1.08	6.82	0.71	0.02
YEMEN	37.62	0.39	13.88	7.62	0.85	0.72	12.00	0.00	2.00	-1.04	-1.49	-0.87	-0.83	-1.11	-0.73	4.21	0.00	0.33

Where NPL is Nonperforming loans to total loans ratio, Credgr is annual Credit growth rate Difcar is Capital adequacy ratio minus the minimum required capital, Prov is Loan loss provision to total loans ratio, ROA is Return on asset ratio, Herfind is Herfindahl index, Size is Natural logarithm of total assets, Infor is the credit information index, Right is the legal right index, VA is Voice and accountability, PS is Political stability indicator, GE is Government effectiveness indicator, RQ is the regulatory quality indicator, RL is the rule of law indicator, CC is control of corruption indicator, GDPgr is Growth rate of gross domestic product on annual basis, Market is the ratio of private credit by deposit money bank to stock market capitalization and Unemploy is country unemployment rate