

# 1 Prudential Regulation and Banking Risk in MENA Countries

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4 *Received: 6 December 2017 Accepted: 3 January 2018 Published: 15 January 2018*

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## 5 **Abstract**

6 This paper analysis the impact of prudential regulation on banking risk using the  
7 measurement technique "z-score" by introducing the financial and economic determinants  
8 (real GDP growth rate, inflation, real GDP growth rate, inflation, the governance indicator,  
9 etc.). For this reason, we used a sample of 146 conventional banks in the MENA region during  
10 the 2003-2014 period, whose purpose was to determine the specificities of these countries  
11 about the determinants of banking risk.

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14 **Index terms**— banking regulation, banking risk, z-score, mena countries.

## 15 **1 Introduction**

16 Recent developments in banking systems are a challenge not only for banks, but also for regulators, and then they  
17 are forced to perform riskier activities so that they can compete with other institutions in the capital market.

18 There is the phenomenon of deregulation that has had the same effect as disintermediation at the level of  
19 credit institutions. This deregulation creates new opportunities and, consequently, the possibility of international  
20 expansion.

21 Also, the erosion of margins accompanied by economic deterioration leads to a sharp increase in banking risks.  
22 These risks have the effect of reinforcing the difficulty of generating profits.

23 Due to the presence of several types of banking risks, public authorities are forced to put in place policies to  
24 organize the banking sector with the example of banking prudential regulation which was interpreted as a set of  
25 constraints that are difficult to bear but necessary for the proper functioning of their activities.

26 In the context of a modern theory of financial intermediation, it is, therefore, necessary to put in place an  
27 appropriate regulatory process while establishing a system for analyzing, measuring and controlling risks. The  
28 requirement of adequate prudential supervision has become a concern at the national and international level. To  
29 carry out the prudential and monetary tasks assigned to them, the regulatory authorities have at their disposal  
30 a multitude of devices. In addition to these, international prudential rules are imposed on all credit institutions  
31 by the Basel Committee. Over time, the prudential regulation of banks has taken on an international dimension  
32 based, notably those of the Basel Committee, which forms the basis of international prudential regulation seeking  
33 to harmonize prudential standards and financial strength in the field of global banking scale.

34 With the various regulatory provisions, the financial markets have undergone significant developments posing  
35 a challenge for credit institutions. Also, the financial market has brought profound fundamental changes in  
36 the nature and structure of the financial services sector. Among the main elements that characterize this  
37 regulation, there is the banking disintermediation, the development of activities, the internationalization and  
38 the reinforcement of the own funds.

39 Hence, the primary objective of financial regulation is to push banks to improve the level of liquidity and  
40 solvency (Lee and Chih, 2013). To this end, banks are required to put in place strategies involving the optimal  
41 allocation of resources and effective monitoring of environmental changes.

42 Therefore, and with financial liberalization, developing countries can not stay safe from these risks. However,  
43 few studies have focused on the study of the relationship between banking regulation in the Middle East and  
44 North Africa countries, although they have many characteristics with regard to the fragility of the banking system  
45 and informational opacity of the financial markets as well as their need to integrate on the international market  
46 (Rojas, 2001).

47 Also, MENA countries have put in place different mechanisms to enforce prudential regulation to deal with  
48 the effects of financial crises with a banking system increasingly integrated with global financial markets.

49 However, the application of prudential regulation standards requires a lot of effort on the part of banks, which  
50 must have sophisticated means to measure bank risks, as well as the possession of the necessary capital to apply  
51 these standards.

52 This brings us to the following questions: What is the impact of prudential regulation on the management of  
53 banking risks?

54 The problem developed is that of assessing the impact of banking regulation in the MENA countries on the  
55 management of banking risks.

## 56 2 II.

### 57 3 Theoretical Foundations

58 The banking system faces various difficulties, even though this sector is one of the most regulated sectors of the  
59 economy. The most acute crisis in the R banking sector is the subprime crisis, which has led to bank failures and  
60 significant damage to the economy. This situation led to the implementation of protection strategies, particularly  
61 for depositors to protect them from bank failures. Like those created by the subprime crisis, bank failures lead  
62 to a systemic crisis that is often accompanied by high social costs. To avoid such a situation, banks are obliged  
63 to comply with certain types of rules, the most important of which is prudential regulation through the Basel  
64 agreements.

65 To enable banks to manage the risks, the regulator of financial institutions has put in place several risk  
66 management principles through the Basel agreements.

### 67 4 a) Risk management and prudential regulation

68 Prudential regulation is intended to ensure stability of the banking system by pushing the banks to a reflection  
69 in their risk-taking. Thus, this regulation was presented as a cushion of security compared to the risks run by  
70 the banks.

71 Indeed, the main principles of prudential supervision were based on the prevention of banks' behavior, which  
72 could lead to risks and to avoid the spread in the financial markets. As a result, banks are forced to operate  
73 under liquidity and solvency constraints. When faced with a financial crisis, banks may have losses more than  
74 their capital. In this case, the role of regulation is to limit wealth transfers by forcing banks to control their  
75 risks. Thus, the most appropriate solution lies in the pressure exerted by the prudential authorities on financial  
76 institutions so that they can implement systems adapted to risk control. The supervisory authority also has the  
77 role of provoking reorganizations, having the participation of shareholders and financial partners to reduce the  
78 social cost of bankruptcies.

79 Thus, the Regulatory Committee focuses on researching the quality and effectiveness of banking supervision  
80 according to four different principles (Basel Committee on Banking Control, 2003).:

81 ? Strengthen the security and reliability of the financial system, ? Establish minimum standards for prudential  
82 supervision, ? Disseminate and promote best banking practices and monitoring, ? Promote international  
83 cooperation in prudential supervision.

84 The prudential regulation applies to the control of financial risks and arises as a consequence of different crises  
85 and their impact on the solvency of financial institutions. Under the impetus of the work carried out by the  
86 supervisory authorities of several industrial countries, prudential regulation has evolved enormously over the last  
87 twenty years.

88 The control of bank risks was generally done in a conventional way in the form of legal conditions and  
89 management ratios. A part of the rules is designed to limit risks in a straightforward way. The purpose of this  
90 system is to measure and verify compliance with the internal procedures of the various rules in force and to check  
91 compliance with the risk limits while ensuring the quality of accounting and financial information. In this case,  
92 the regulations provide for the implementation of the system of measures, definition of monitoring and control of  
93 risks. As banks operate in a highly competitive environment, they face many factors that lead them to take risks  
94 that are often important. This situation puts financial institutions at risk while threatening the stability of the  
95 entire financial system, because of contagion effects. The advent of prudential regulation came about the aim of  
96 limiting the harmful effects of risk-taking and promoting the stability and security of the financial system.

97 To summarize the impacts of Basel regulations on risk control and balance sheet, Saidane (2011) has drawn  
98 up the following table: However, while regulators believe that higher capital requirements will have a positive  
99 impact on the banking sector, the empirical results are contradictory.

100 Some studies indicate that capital requirements lead to excessive risk-taking by banks, Besanko and Kanatas  
101 (1996), Blum (1999), Calem and Rob, (1999), while others argue that capital requirements influence risky behavior  
102 only in particular circumstances, Beatty and Gron (2001).

103 Indeed, Awdeh et al. (2011), using a dataset of 41 Lebanese commercial banks between 1996 and 2008, they  
104 analyzed the impact of capital requirements on bank risk-taking. They found that increased capital requirements  
105 were associated with increased risk. Nevertheless, Rochet (1999) found that the imposition of a minimum fixed  
106 capital ratio does not necessarily translate into a reduction in bankruptcy.

107 On their part, Fernandez and Gonzalez (2005) indicated that stringent capital requirements reduce bank risk.  
108 Similarly, Barth et al. (2004) found that stricter capital requirements are associated with fewer nonperforming  
109 loans.

110 According to Hellmann, et al. (2000) and Repullo (2004), capital requirements alone were not sufficient, and  
111 the imposition of additional regulations may be useful for reducing risk in a competitive environment.

112 For Ghosh (2016), the most capitalized banks have high levels of liquidity and quite diversified income. Also,  
113 size promotes better diversification that reduces risk and allows banks to support their operations with less capital  
114 and less stable financing.

115 The second argument relates to the ability of big banks to operate in a different market segment. These may  
116 have a comparative advantage in market activities that require significant fixed costs and benefit from economies  
117 of scale (Laeven et al., 2014).

118 Similarly, Cetorelli (1999) has argued that poor asset quality and a low level of liquidity are the two causes of  
119 bank failures. Banks may decide to diversify their portfolios during periods of crisis.

120 For the ratio of costs to revenues, Lee and Chih (2013) have shown an inverse relationship between this ratio  
121 and the bank risk, for the big banks in particular. As a result, big banks need to pay more attention to control  
122 costs than small banks.

123 Concerning the variable ready, it is generally used to measure risk: the over-expansion of credit was often  
124 interpreted as a warning of a banking crisis (Kaminsky and Reinhart, 1999; Mendoza and Terrones, 2008; ??orio  
125 and Drehmann, 2010). At this level, according to Mirzaei et al., (2013), big banks benefit from economies of  
126 scale, which allows them to diversify the risks associated with loan portfolios.

127 For Lee and Chih (2013), there is a positive relationship between the age of the bank and the management of  
128 bank risks. Indeed, the larger the bank is in age, the more likely it is to take more risks.

129 K?”§hler (2015) also showed that a large number of countries of characteristics likely to have an impact on  
130 the risk and return of the banks, as the overall macroeconomic environment. For example Real GDP per capita  
131 affects the Z-score in the opposite direction.

132 Hence the question arises as to the relationship between prudential regulations and the management of banking  
133 risks in developing countries and in particular the MENA countries, which have many characteristics about the  
134 fragility of the banking system and the informational opacity of the financial markets.

## 135 **5 b) Risk measurement**

136 Banking activities are considered inherently risky, and these risks are the very essence of the bankers' business.

137 The risk is a complex notion of defining because it is related to several factors, including the occurrence of an  
138 unforeseeable event with many consequences on the balance sheet of financial institutions. In other words, the  
139 risk presents itself for a financial institution as an event chronically impacting the operations carried out.

140 From these definitions, we can say that the risk was then linked to a notion of uncertainty in which we must  
141 measure both the volatility criteria and the negative consequences of risks on banking operations. Also, there  
142 were classified as specific risk, which affects all banks, and systemic risk.

143 Systemic risk was defined as a disruption that directly impacts the functioning of the banking system, its  
144 operating mechanisms, and its regulatory mechanisms.

145 To precisely define the notion of risk, it is wise to begin by distinguishing the random and unpredictable nature  
146 of the risk issue from the operation and financing of banks.

147 As part of this study, this is a measure Z-Score, to assess the banking risk and to overcome the shortcomings  
148 of the ratio method. Indeed, the assessment of banking risk is traditionally carried out by analyzing various  
149 financial ratios (for example the ratio of non-performing loans to total loans, the ratio of nonperforming loan  
150 provisions to total assets, etc.). These variables have been criticized by the empirical literature since the ratio  
151 method has no theoretical basis, and even in its most elaborate form, the ratio method does not take into account  
152 the diversification impact on risk, Lee and Chih, (2013), p713.

153 Hence, we will base ourselves on the measure of Z-score. This overall measure takes into account both the  
154 risks associated with banking activities and the degree of coverage of these risks assured by capital, Goyeau and,  
155 Tarazi, (1992). According to Beck et al. (2010), "Assuming that profits follow a normal distribution, it could be  
156 shown that z-score is the inverse of the probability of insolvency." The Z-score indicator can be estimated using  
157 the probability of default extracted from Roy (1952) and developed by Goyeau and Tarazi (1992). This is that  
158 the losses exceed the equity (Roy, 1952, ??oyd and Graham, 1988) and it can be written as follows:

159 (2.1)

160 In this study, we will divide the two components of the equation by the total assets: At the level of our study,  
161 we will calculate this variable by integrating the natural logarithm (Lee and Chih, 2013).

## 162 **6 III.**

## 163 **7 Methodology**

164 To avoid difficulties due to the lack of homogeneity of banking practices, the selection is focused exclusively on  
165 conventional banks, Cihak and Hesse, (2010). We have a sample of 146 banks for which we hold all the financial  
166 information necessary to conduct the empirical analysis.

## 13 H4: THE VARIABLE «CAPITAL RATIO» HAS A POSITIVE INFLUENCE ON "Z-SCORE ".

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167 Our sample will include 146 conventional banks in 17 MENA countries (Algeria, Bahrain, Djibouti, Egypt, 168 Jordan, Kuwait, Lebanon, Malta, Morocco, Oman, Palestine, Qatar, 8 Saudi Arabia, Syria, and United Arab 169 Emirates). Tunisia, Yemen) over the period 2003-2014, which gives a panel of 1752 observations.

170 Few empirical studies have focused on this area although it has specific characteristics. First, these countries 171 have bank-based financial systems, with bank assets accounting for 60% to around 100% of GDP in countries. 172 This situation makes the banking system a key player in the financial intermediation process.

173 Second, the considerable importance of banks in these economies makes bank credit the main channel of 174 monetary transmission, Bougrara and, Ghazouani, (2011) and the lack of well-developed financial markets and 175 the changing nature of money markets make the effectiveness of an interest rate channel much less attractive, 176 Neaime, (2011).

177 Third, even in financial terms, the banking sector's indicators of cost and performance conditions are similar: 178 funding levels are adequate, revenue cost ratios are modest and, interest margins are high (World Bank, 2014 179 and IMF, 2015). Hence the motivation to work in the MENA zone.

### 180 8 a) Presentation of the model and definition of the variables

181 Following the economic changes in the MENA countries and especially in the banking sector, we have chosen the 182 quality of the assets and the capital ratio to study "Z-Score ". We also took into account the liquidity ratio, the 183 size, the banking efficiency and the age of the bank as a control variable.

184 Thus , the models used for the study of banking risk, inspired by the research of Lee and Chih (2013) and 185 ??lomp and Hann (2012), take the following forms:

### 186 9 b) The hypotheses

187 The succession of financial crises has given a lot of importance to prudential regulation in order to reduce the 188 exposure to risks and limit the negative effects of risk-taking. Then, it is necessary to find indicators capable of 189 alerting a risk in the banking system before the outbreak of a crisis. This situation is at the origin of the creation 190 of a bank failure indicator "Z-Score", Mercieca et al (2007), Goyeau and Tarazi (1992).

191 The objective of this study is to analyze the impact of banking regulation on risk management in conventional 192 banks in MENA countries between 2003 and 2014, taking into account the effect of the size of banks on the bank 193 failure indicator. Hence the question underlying this study is whether there is a significant link between Z-Score 194 and the level of regulatory oversight.

195 ? The relationship between asset quality and bank risk management:

196 Ayadi and Pujals (2006): the higher the number of impaired loans, the higher the risks, despite the provisions 197 made by the bank.

### 198 10 H1: Improving asset quality has a positive influence on bank risk management.

200 ? The relationship between liquidity and the level of

### 201 11 Global Journal of Management and Business Research

202 Volume XVIII Issue VII Version I ( )C

203 higher the cost-to-revenue ratio, the higher the risk of bank failure.

### 204 12 H3: The variable ratio of costs to revenue "has a negative influence on" Z-score ".

206 ? The relationship between the ratio of capital and " Z-score "

207 Zhong (2007): The level of capital is a determining factor in the bank's ability to withstand operational losses. 208 Adequate bank capital can be used to reduce bank risk by acting as a buffer against losses, providing easier 209 access to financial markets and limiting risk-Taking. Indeed, most prudential regulation bodies consider that an 210 adequate level of capital strengthens the soundness and security of the banking sector.

### 211 13 H4: The variable «capital ratio» has a positive influence on "Z-score ".

213 ? The relationship between macroeconomic variables and " Z-score "

214 Inflation is one of the key macroeconomic factors for financial development in the MENA region. Some studies 215 suggest a negative relationship between inflation and the "Z-score" variable, Boyd, Levine and, Smith ??2001).

216 Real GDP growth rate has a positive effect on the Z-score variable, Köhler, (2015).

217 Real GDP per capita has a positive relation with the Z-score variable, Köhler, (2015) since it is an indicator 218 of the wealth of the countries.

219 The governance indicator has a positive impact on the likelihood of default risk according to Köhler 2015.  
220 Also, Gerschenkron (1962) argued that governance indicators are involved in reducing bankruptcy and promoting  
221 market access.

222 The real interest rate is inversely related to the risk of bank failure. Indeed, banks in countries with a high  
223 level of real interest rates have lower Z-score (Köhler, 2015).

## 224 **14 H5: The influence of macroeconomic variables affects significantly "Z-Score".**

225 IV.

## 227 **15 Empirical Results**

228 This study involves presenting the results of the analysis to examine the impact of asset quality, efficiency,  
229 liquidity, prudential regulation, size and time factor on bank risk management.

230 In what follows, we present the significant statistics of the models constructed concerning the regression of the  
231 variables defined previously on conventional banks of the MENA zone with the empirical results obtained and  
232 their interpretations.

## 233 **16 a) Descriptive analysis of variables and econometric tests i.** 234 **Descriptive statistics**

235 This study will expose the descriptive analysis of the different variables. The table below gives the mean, the  
236 standard deviation, the maximum and the minimum of the variables studied during the study of the previously  
237 defined models (see appendix 1).

238 Indeed, we notice the disparity of the average values of the explanatory variables and their standard deviations.  
239 These two variables suggest that the sample structure is not homogeneous and that additional tests are required  
240 to select the appropriate estimator.

## 241 **17 b) Econometric Tests**

242 We would be based on econometric tests following: the multicollinearity test, stationarity and heteroscedasticity  
243 tests, the homogeneity test and the Hausman test.

## 244 **18 i. Multicollinearity test**

245 Examination of the correlation matrix (see Annex 2) highlights the absence of a multicollinearity problem.  
246 Therefore, we carried out the VIF test (see appendix 3) which allowed us to confirm the result since the average  
247 value of VIF is 1.94.

248 ii. Stationarity test It is a question of testing whether the variables are stationary in time or not. To do this,  
249 we will base ourselves on the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests.

## 250 **19 iii. Heteroscedasticity test**

251 We adopted the Breusch-Pagan test, the value of chi2 displays a value of 0.766 with a significance level of  
252 0.09 below the critical threshold of 5% (see Appendix 4). This result leads us to accept the hypothesis of  
253 homoscedasticity and confirm the absence of a problem of heteroscedasticity.

## 254 **20 iv. Specification test, homogeneity test**

255 The specification test displays a Fisher value of 3.50 with a significance level of 0.0000 below the critical threshold  
256 of 1%; this leads us to reject the null hypothesis of homogeneity and to validate the distinction between fixed  
257 and random effects models.

258 v

## 259 **21 . Hausman test**

260 The results of the Hausman test make it possible to reject the null hypothesis since the level of significance is  
261 0.0007 below the 1% threshold having a chi-square value of about 34. The model chosen is, therefore, the fixed  
262 effects model.

## 263 **22 c) The results of the estimates**

264 The results of the Ordinary Least Squares fixed effects model estimation were presented in the following table.

## 265 **23 Variables ADF PP**

266 In

267 **24 For the global model:**

268 The variable «SIZE» is negatively related to "Ln Z-SCORE ". This result confirms the idea "Too Big to Fail".  
269 Indeed, this result corroborates with the work of Diamond (1984) and Hakenes and Schnabel (2011) who argue  
270 that the big banks are "too big to fail". Indeed, on the one hand, a large size allows the bank to occupy a more  
271 prominent place in the banking industry and enjoy an implicit insurance on its commitments. And on the other  
272 hand, it can still diversify in terms of asset portfolios, and as a result, achieve greater economies of scale.

273 The ratio of capital, in turn, is positively related to "Ln Z-SCORE". Indeed, several theoretical and empirical  
274 studies have highlighted the impact of prudential regulations on the level of banking risk. In this context, we  
275 can cite the studies by Koehn and Santomero (1980), Kim and Santomero (1988) who specify that the holding  
276 of a specific level of capital constitutes a margin of safety for the banking system, in particular for banks in the  
277 MENA countries which generally suffers from a strong asymmetry of information (Bougatef and Mgadmi, 2016).

278 Over the past two decades, the introduction of financial liberalization and financial system openness reforms to  
279 foreign investors in most MENA countries has led to a growing exposure financial crisis given the increase in the  
280 contagion effect. These countries have put in place various mechanisms to ensure the application of prudential  
281 regulation and put early warning indicators to avoid any possible banking crisis.

282 For the LDR variable, it was positively related to the "Z-score". This result confirms the finding of Ayadi and  
283 Pujals (2005), the higher this ratio, the higher the level of risk.

284 Also, the CIR ratio was negatively related to the risk of bank failure. As a result, the higher this ratio, the  
285 higher the risk of bank failure, according to the findings of Lee and Chih (2013) and ??hosh (2014).

286 For the variable LIQ, it was negatively linked with the dependent variable. This result indicates that banks  
287 have a significant level of liquidity and, as a result, high levels of risk.

288 Concerning the variable RES\_LOAN (the ratio between Provision on bad debts and gross loans), it was  
289 negatively related to the risk of bank failure. Indeed, this ratio measures the funds spent by the bank to cover  
290 unexpected losses caused by impaired loans ??Aggarwal and Jacques, 2001). This result contradicts the finding  
291 of Ayadi and Pujals (2005) which assumes a positive relationship between the ratio RES\_LOAN and the risk of  
292 bank failure.

293 **25 Variables**

294 Global

295 **26 C**

296 In reality, this situation reflects a poor choice of projects or a reliance of banks on risky assets. Indeed, an increase  
297 in the level of capitalization will push banks to increase their risk to compensate for the losses generated.

298 For the control variable "Time", it was positively related to the dependent variable "Ln Z-SCORE." Indeed,  
299 the higher the age of the bank, the more likely it is to take on more risk.

300 Regarding the macroeconomic variables, and to control the institutional environment and the level of  
301 governance of the country, we will use the indicator of ??aufman et al. (2008). This indicator represents  
302 the average of the following six variables (Kaufman et al., 1999): Voice and Accountability, Political Stability,  
303 Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption. This indicator is positively  
304 related to "Ln Z-score" according to the findings of Köhler (2015). This result means that any improvement in  
305 the institutional environment results in a decrease in the probability of bank failure risk.

306 For the real interest rate, it is negatively related to the dependent variable, according to the findings of Köhler  
307 (2015). Indeed, every increase in this level will lower the level of Z-score.

308 **27 Comparison of big and small banks:**

309 At this level, it is interesting to test the evolution of Ln (Z-score) between large and small banks. Therefore, we  
310 will follow the division used by Bourgain et al. (2012) that a bank was considered big if its total assets are more  
311 than 10 thousand \$, otherwise, it is a small bank. As a result, 40 banks in the sample are considered big, and  
312 107 banks are considered small banks.

313 According to the estimates above, we note that only the LDR variable is not statistically significant and  
314 therefore does not affect "Ln Z-SCORE" of the major banks of MENA countries. However, and contrary to the  
315 results of Lee and Chih (2013), this variable is positively related to the "Ln Z-score" for small banks. This result  
316 confirms the finding of Ayadi and Pujals (2005), the higher this ratio, the higher the level of risk. This result is  
317 explained by the nature of the sources of deposits, in level of stability.

318 The LIQ variable is positively related to the "Ln Z-SCORE" in the big banks, but it is negatively related to  
319 the "Ln Z-SCORE" in small banks. This result indicates that big banks are more liquid and hold higher levels of  
320 risk. Indeed, according to the work of Adusei (2015), big banks can increase their profits by accumulating high  
321 "capital buffers," which allows them to be less sensitive to liquidity.

322 The CIR variable is positively related to the risk of bank failure in big banks. Indeed, the higher the ratio,  
323 the less risky big banks are, and as a result, banks pay less attention to control costs than small banks. However,  
324 this variable is negatively related to "Ln Z-SCORE" in small banks. This result means that the higher the

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325 cost-to-revenue ratio, the more risky banks are. This indicates that smaller banks need to pay more attention to  
326 control costs.

327 For the CAR variable, it was positively related to "Ln Z-SCORE" in small banks. This ratio can reduce the  
328 risk of bank failure. According to Dewatripont and Tirole (1993), this ratio presents a measure of security that  
329 can absorb the probability of bank failure.

330 Concerning the variable RES\_LOAN, it was negatively related to the risk of bank failure for small banks.  
331 This result reflects a poor choice of projects among the latter, who find many problems to access to successful  
332 projects. Nevertheless, this variable is positively related to Ln (Z-SCORE) in big banks. This result confirms  
333 the finding of Ayadi and Pujals (2005) which assumes a positive relationship between the RES-LOAN and the  
334 risk of bank failure. Indeed, the higher the ratio, the higher the number of bad debts expected and the higher  
335 the risks despite the provisioning.

336 The RES-NPL variable was negatively linked with "Ln Z-SCORE" for the big banks, hence the lower the ratio,  
337 the higher the banking risk. This result, contrary to the findings of Lee and Chih (2013), means that big banks  
338 do not have a capacity to resist.

339 For the control variable, it was positively related to the "Ln Z-SCORE" for large and small banks. Indeed,  
340 the more they are large in age, the more likely they are to take more risks.

341 Regarding the inflation rate, it was negatively related to the dependent variable in the big banks. This result  
342 shows the ability of the latter to cope with the high risk of inflation. Also, the "GDPPC" rate is positively  
343 related to the three dependent variables for large and small banks in MENA. This result confirms the findings  
344 of K?"Shler (2015) and means that banks in the most economically developed countries are more profitable and  
345 more capitalized.

346 For the real interest rate, it was negatively related to the dependent variable in large and small banks according  
347 to the findings of Köhler (2015). Indeed, banks in the MENA countries with high real interest rates have lower  
348 Z-score levels.

349 However, the governance indicator is positively related to the dependent variable for small banks. This result  
350 confirms the results of Köhler (2015) who argues that any increase in this indicator reflects an improvement at  
351 the institutional level.

352 V.

## 353 28 Conclusion

354 The 1980s saw a significant increase in bank risks, including credit risks and increased competition, which had the  
355 effect of threatening the stability of the small banks, which are generally characterized by a low Otherwise, the  
356 financial crisis, in recent years, has shown significant shortcomings in the prudential regulation of banks as well  
357 as some dead ends in selfregulation. To provide immediate responses to the crisis, the regulatory authorities have  
358 put in place reforms on the regulatory system for financial institutions. There were related to the implementation  
359 of solvency ratio requirements designed to take into account the level of risk faced by banks, their size and the  
360 business cycle in which they were located. However, the supervisory role of capital regulators is insufficient and  
361 requires additional new approaches focusing on macro-financial supervision.

362 The latter is particularly necessary because of the increasing development of systemic risk faced by banks and  
363 the ever closer interconnection between markets and financial institutions. As a result, banks are required to  
364 hold more capital so that they are more secure from different banking risks.

365 In this context, we have sought to highlight the impact of bank regulation on the probability of failure bench  
366 area in the countries of the MENA area over a period from 2003 to 2014. The results showed that raising the level  
367 of capital through a strengthening of risk hedging standards should lead to an overall decrease in probabilities of  
368 default within banks (Bichsel and Blum, 2004).

369 The result indicates that big banks are more liquid and hold higher levels of risk and are more stable with a  
370 high coverage ratio provisions. Indeed, the latter reduces the risk of bank failure.

371 However, smaller banks are riskier with higher cost ratios on revenues. These banks need to pay more attention  
372 to control costs.

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373 ————— 1 2

## 28 CONCLUSION

Figure 1: ?

1

	Basel I	Basel II	Basel III
The scope of the measure	Basel I comes after a transition from a debt economy to a market economy and deregulation of credit. It aims primarily to frame a growing market activity.	The regulator has followed a micro-prudential approach (control of risk specific to an institution) to securing deposits	It begins a transition new macro-prudential aimed at stabilizing financial system as a
Impact in terms of mastery risks	<ul style="list-style-type: none"> <li>-Risk of market ++</li> <li>-Risk credit +</li> <li>-Requirements of own funds +</li> </ul>	<ul style="list-style-type: none"> <li>-Risk of market ++</li> <li>-Risk of credit +++</li> <li>-Funding requirements own +</li> <li>-Operational risk ++</li> </ul>	<ul style="list-style-type: none"> <li>-Risk of market ++</li> <li>-Risk of credit +++</li> <li>-Requirements of own funds +++++</li> <li>-Operational risk ++</li> <li>-Risk in liquidity +</li> <li>-Pillar 2 and 3</li> </ul>
Impact on the balance sheet	Low impact: assets, equity, off Balance-sheet	Strong impact on assets	Strong impact on assets and liabilities and strong on equity Balance -sheet

+ Low, ++ Medium, +++ High, and +++++ Very high. (Source: Saidane, 2011, P33)

Figure 2: Table 1 :

2

Year 2018

Figure 3: Table 2 :

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## 4

	level	Indifference	Indifference
Ln (Z-SCORE)	0.0295 **	0.0295 **	
RES_NPL	0.0064 ***	0.0072 ***	
RES_Loan	0.0002 ***	0.0002 ***	
CIR	0.0271 **		0.02 **
	(with variation)		(The trend)
LIQ		0.02011 0.02507 ** **	
		(The trend)	
LDR	0.011 **	0.011 **	
CAR	0.0244 **	0.0220 **	
SIZE		0.0763	0.08 0.099 *
GDPGR	0.0127 ** (The trend)	0.0127 ** (The trend)	
GDPPC	0.02163 **	0.02163 **	
INTEREST RATE	0.0009 ***	0.0002 ***	
GDP DEFFLATOR	0.0021 ***	0.0011 **	
GOVERNANCE	0.0000 *** (The trend)	0.0535 * (The trend)	

Figure 4: Table 4 :



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374 ?? +

375 F test that all  $u_i = 0$ :  $F(93, 574) = 3.54$  Prob >

376 F = 0.0000

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