



## BANK CAPITAL, RISK AND PROFITABILITY: A COMPARATIVE STUDY OF EUROPE AND MENA COUNTRIES

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**ABSTRACT:** The purpose of this paper is to investigate the role of capital regulations in relation to bank risk and profitability across two different regions i.e. Europe and the Middle East and North Africa (MENA). The sample for this study includes annual data of 502 banks from European and MENA banking sectors for the period 2010-2019. The study employs OLS regression to ascertain whether Basel and non-Basel based capital ratios affect bank risk and profitability across different economic regions. The study also used Generalized Method of Moments and Limited Information Maximum Likelihood to remove the issue of possible endogeneity problems. The results show bank capital ratios comprises of risk-weighted assets are more effective in minimizing credit default risk and increasing profitability of banks in the European and MENA regions. Moreover, findings imply that complying with Basel capital guidelines do not penalize bank activities in one region compared to another. Overall results imply that bank regulators in both regions should make policies in compliance with Basel (III) capital guidelines to achieve financial stability.

**KEYWORDS:** Basel capital ratios, Traditional capital ratios, Endogeneity, GMM, Bank Risk, Bank profitability.

**JEL Classification:** G28, G28, G32, P5



## INTRODUCTION

Capital regulations became a primary agenda for policymakers after the onset of the 2007-2008 financial crisis. In order to prevent the collapse, governments around the world have to step in for emergency support of their respective banking sectors. The flaws in capital regulations at that time were deemed to create panic in the financial sector. Therefore, various stakeholders agreed upon the formulation of new capital standards (Basel III). These standards are made with the aim of making capital needs more rigorous (Demirguc-Kunt, Detragiache & Merrouche, 2013). Moreover, these regulations aim to protect banks from four different types of risk i.e. credit risk, operational risk, liquidity risk and interest rate risk (Abbas, Iqbal & Aziz, 2020). The Basel Committee for Banking Supervision (BCBS) is fully committed to the timely implementation of the last phase of Basel III referred to as “Basel IV”. The initial implementation date of Basel IV was 1<sup>st</sup> January, 2022. However, due to the global pandemic of COVID-19, BCBS decided in April 2020 to postpone its implementation for at least one year i.e. 1<sup>st</sup> January, 2023 (Feridun & Özün, 2020).

However, regulators are divided on these capital guidelines despite the fact that (Basel III) contributes to financial stability of the banking sector in the aftermath of the crisis. For instance, Finance Ministers of Europe and China on July 22-23, 2016 at G20 meetings sought to protect their banks from increased capital requirements<sup>1</sup>. These capital guidelines come with certain costs and benefits. For instance, complying with higher capital requirements provides protection against unexpected losses but it also restricts the lending extent of a bank (Kanga et al., 2020). Likewise, adhering to higher capital standards in a post crisis period will likely enhance financial stability and increase lending capacity of banks around the world (Kim & Sohn, 2017; Altunbas et al., 2016). However, increased capital requirements may restrict bank’s lending extent due to high cost of equity funding (Aiyar et al., 2014).

Likewise, to the dichotomous association between bank capital and lending, three interrelated concepts (capital, risk and profitability) are also ambiguous in nature. Some posits that bank capital and risk appetite increase together (Bitar, Saad & Benlemlih, 2016; Altunbas et al., 2007). However, others are of the view that adhering to higher capital requirements results in decreasing bank’s risk exposure (Anginer & Demirgüç-Kunt, 2014; Agoraki et al., 2011). Similar dichotomous results are also observed in case of capital and profitability. For instance, Tan (2016) and Iannotta et al. (2007) suggest that banks may experience higher levels of profitability as a result of increase in capital. However, Goddard et al. (2013) find an inverse relationship between bank capital and profitability. Therefore, issues related to Basel (III) guidelines still remain unresolved which demands for additional investigation in this matter.

In order to fulfill the above demands, we investigate how bank risk and profitability is affected by different risk and non-risk based capital ratios in European and Middle East and North Africa (MENA) regions. The European region transformed itself from a global trade power to a vibrant policy actor in recent decades (Verschaeve & Orbie, 2016). To that end financial institutions in the region played a key role because Europe is more of a bank based economy unlike the United States (U.S) market based economy (Allen & Gale, 1995). Similarly,

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<sup>1</sup> From John Rega, MLEX, on 8<sup>th</sup> July 2016: “EU will press G-20 to go easy on bank capital standards.”



European banking sector might possess a higher importance for global financial sector as most of the global systemically important banks have headquarters situated in Europe<sup>2</sup>.

Likewise, different developed and emerging economies of Asia, Africa and Europe connect themselves through the MENA region. Therefore, this region is considered as a hub for bankers and investors from all over the world (Bitar, Saad & Benlimith, 2016). Furthermore, recent decades witnessed financial liberalization of banking sector in MENA region that includes making prudent laws according to international standards and increasing autonomy of central banks<sup>3</sup>. Therefore, likewise the European economy, the banking sector plays a vital role in the bank based economy of this region (Kar, Nazhoglu & Agir, 2011).

The empirical evidence on capital, risk and profitability mainly focuses on a single region: Lee and Hsieh (2013) in Asian context; Naceur and Omran (2011) and Bitar et al. (2016) in MENA region; and others, such as Altunbas et al. (2007) and Demirguc-Kunt et al. (2013) in American and European contexts. However, to the best of our knowledge, there is no empirical study that examines the impact of Basel and non-Basel based capital ratios on bank risk and profitability in a comparative perspective especially between two different economic regions i.e. Europe and MENA. Our study contributes to the literature of bank capital risk and profitability in several ways. First, we use both accounting and regulatory capital measures to ascertain whether the difference in measurement affects bank risk and profitability across different regions. Second, by conducting a comparative analysis, this study ascertains whether or not one size fits all capital regulatory frameworks that penalize bank activities in one region compared with other regions. Third, this study evaluates how the relationship between bank capital, risk and profitability is affected by different bank sizes and institutional environments. Finally, the study employs different econometric tests to remove the issue of possible endogeneity. The rest of the paper comprises literature review in section 2, methodology in section 3, results and discussions in section 4 and conclusion in section 5.

## LITERATURE REVIEW

### Capital and Risk

Theoretical banking models give contrasting views on the relationship of two interrelated concepts i.e. bank capital and risk. When banks tend to follow strict capital regulations, it may help them to curb significant unexpected losses. Furthermore, in this way banks are also better protected against unexpected earnings shock, thus suggesting an inverse relationship between capital and risk (Anginer & Demirguc-Kunt, 2014). In addition, holding higher capital helps bank owners to become more sensible in their investment decisions. Hence, increased owner's involvement improves the overall bank risk monitoring mechanism. This may reduce the chances of public bailouts on one hand and minimize bank liabilities on the other hand (Demirguc-Kunt et al., 2013).

In line with these arguments, Davis, Karim and Noel (2020) found a negative relationship between capital and risk using macro bank level data for 112 countries for the period 1999-2015. The author relates this result to the "skin in the game" hypothesis. In addition, Jabra et

<sup>2</sup> Kindly see Bostandzic and Weiss (2018) for detailed discussions.

<sup>3</sup> Kindly see Naceur, Ghazouani, and Omran, (2008) for further details.



al. (2017) also experienced similar results in commercial and investment banks of BRICS countries. The findings implied that holding higher amounts of capital helps banks to reduce their risk exposure in BRICS nations. Anginer and Demirguc-Kunt (2014) conducted a similar study on a large sample of different countries. Authors used different proxies of bank capital. The results demonstrated that bank capital and risk are inversely related to each other. Moreover, Agoraki et al. (2011) found that credit risk level of banks in transitional economies decreased by adhering to strict capital requirements. Therefore, based on previous studies, it is understood that presence of prudent management may serve as a tool to eliminate agency problems between shareholders and depositors. All of these discussions lead us to make the following hypothesis:

**Hypothesis 1a: Holding a higher amount of capital is associated with lower bank risk.**

Despite holding a higher amount of capital results in decreasing risk appetite, an extant amount of literature explains otherwise. Previous literature pointed out moral hazard problems between bank owners and creditors whereby bank managers take on excessive risk under deposit insurance schemes. Therefore, moral hazard problems may be reduced when banks tend to keep an increased amount of capital in accordance with risk taking activities (Kim & Santomero, 1988). Moral hazard behavior is more likely to be present in systemically important banks because they are mostly protected by both government safety nets and deposit insurance schemes. Therefore, holding an increased amount of capital in accordance with risk taking activities becomes mandatory for banks under the regulatory hypothesis. This in turn may result in a positive relationship between bank capital and risk (Bitar et al., 2018).

The findings of Davis et al. (2020) supported the notions of regulatory hypothesis. Authors analyzed a large sample of commercial and investment banks from 112 emerging and developed countries. The results revealed that capital adequacy and non-performing loans are positively related to each other. Furthermore, the findings of Bitar et al. (2016) demonstrated that under regulatory hypothesis, banks in MENA countries have to hold a higher amount of capital when they engage in risky activities. Authors used multiple capital ratios and found that they are positively associated with loan loss reserves. Likewise, results were experienced by Iannotta et al. (2007) in case of European countries. Authors found that capital and loan loss provisions are positively related to each other for a sample of 181 large commercial banks. All these discussions lead us to make the following hypothesis:

**Hypothesis 1b: Holding a higher amount of capital is associated with higher bank risk.**

**Capital and Profitability**

Previous empirical evidence explains the positive relationship between two interrelated concepts i.e. capital and profitability. Higher capitalized banks are likely to experience greater financial stability and lower bankruptcy cost. This results in lower funding cost, thus generating higher profits (Berger, 1995). More recently, in the case of MENA countries, Bitar et al. (2016) used various measures of capital ratios and found that capital and profitability are positively related to each other. They argue that bank supervision and monitoring activities become more vigilant when banks adhere to higher capital requirements. This results in higher bank efficiency and profitability. Similarly, the results of Tan (2016) demonstrated that higher capitalized banks used to engage in sensible lending and borrow less. Therefore, they are better at reducing their costs that resultantly increase their profit margins. Bitar et al. (2018) found



identical results between capital, profitability and efficiency in case of 39 OECD countries. In addition, Iannotta et al. (2007) argued that more prudent management in highly capitalized banks is beneficial in cutting costs and increasing profitability. Therefore, banks that experience greater profits have higher capital ratios at their disposal. Demircuc-Kunt et al. (2013) found similar results in large banks during the period of financial crisis. This then leads us to make the following hypothetical claim:

**Hypothesis 1c: Holding a higher amount of capital is associated with higher bank profitability.**

## RESEARCH METHODOLOGY

### Sample

We collect annual data for 27 European countries and 16 MENA countries for the period 2010-2019. The Banker Database<sup>4</sup> is used as a primary source to collect data in this study. We only included a bank in the sample if it has at least three continuous observations. Thus we end up with a total of 502 banks that includes 331 banks from European countries and 171 banks from MENA countries.

### Variables Measurement

Allowance for loan losses to gross total loans (AFLLGTL) is used as a primary proxy for bank risk. It identifies the quality of loan ((Bitar et al., 2016; Abedifar, Molyneux & Tarazi, 2013; Lee & Hsieh, 2013). For robustness check, we use nonperforming loans to gross total loans (NPLGTL) as a proxy for bank risk. Furthermore, return on assets (ROA) is used as a primary proxy for bank profitability (Lee & Hsieh, 2013). Higher values indicate higher earnings and vice versa. We use return on equity (ROE) for robustness checks. We use multiple definitions of bank capital. We follow Bitar et al. (2016); Anginer and Demircuc-Kunt (2014); Demircuc-Kunt et al. (2013) and use Basel based capital under risk weighted assets and total assets. Tier1 divided by risk weighted assets (T1RWA), Tier2 divided by risk weighted assets (T2RWA) and total capital ratio i.e. Tier1 plus Tier2 divided by risk weighted assets (TCRWA) are used in the first phase and then these ratios are used against total assets afterwards. We further included various control variables related to the bank's financial characteristics in this study.

First by following Bitar et al. (2016), we used net loans to total assets (NLTA). Banks that used to invest in non-traditional activities are more vulnerable to risk as compared to those who do not prefer such types of investments. Second, by following Abedifar et al. (2013), we use asset growth (AG). It is noted that information asymmetry is likely to be reduced as banks increase their size. Therefore, such banks may experience higher profits and less vulnerability to risk (Bitar et al., 2018).

Third, we use income diversity (IND) as our control variable. Past studies demonstrate a mixed relationship between income diversity, risk and returns. According to Abedifar et al. (2013), when banks diversify their income activities, they may be in a better position to screen clients' risk profiles. Fourth, we control bank size. Large banks are better at decreasing their risk

<sup>4</sup> <https://www.thebankerdatabase.com/>



exposure because they may be better equipped to diversify their income and assets (Abedifar et al., 2013; Tan & Floros, 2013; Pasiouras 2008). In terms of country level characteristics, we control for several macroeconomic, institutional and financial development indicators. Macroeconomic and institutional level data are collected from databases provided by World Bank<sup>5</sup>. Finally, we use Heritage Foundation database to control country's economic freedom<sup>6</sup>. We screened all variables at 1 and 99 percent to weed out liars. Variable formulations are provided in Table 1 below.

**Table 1: Variable Formulations**

Variable	Measurement
AFLLGTL	Allowance for loan losses to gross total loans
NPLGTL	Nonperforming loans to gross total loans
ROA	Net income to total assets
ROE	Net income to total equity
T1RWA	tier 1 capital to risk weighted assets
T2RWA	tier 2 capital to risk weighted assets
TCRWA	tier 1 plus tier 2 capital to risk weighted assets
T1TA	tier 1 capital to total assets
T2TA	tier 2 capital to total assets
TCTA	tier 1 plus tier 2 capital to total assets
NLTA	Net loans to total assets
AG	Current year growth of total assets compared with previous year total assets
IND	$1 - \frac{(\text{net interest income} - \text{other operating income})}{(\text{operating income})}$
LNTA	Natural log of total assets
GDP	The annual percentage growth rate of a country's GDP
WGI	The World Governance Index includes six governance dimensions: (1) voice and accountability, (2) political stability and absence of violence, (3) government effectiveness, (4) regulatory quality, (5) rule of law and (6) control of corruption

<sup>5</sup> <https://databank.worldbank.org/source/world-development-indicators>.

<sup>6</sup> <https://www.heritage.org/index/explore>.



EF

Economic freedom is an index computed as the average of 10 quantitative and qualitative factors that capture 4 categories of economic freedom including: (1) the rule of law, (2) limited governance, (3) regulatory efficiency, and (4) open markets

## Econometric Approach

We follow Bitar et al. (2018), Anginer, Demirguc-Kunt and Zhu, (2014), Berger and Bowman (2013), and use the following baseline regression model:

$$f(\text{risk, profitability})_{ijt} = \alpha + \beta \times \text{Bank\_Capital}_{ijt} + \gamma \times \text{Bank\_control}_{ijt} + \sum_{j=1}^N \delta_j \times \text{Country}_j + \sum_{t=1}^T \mu_t \times \text{Time}_t + \varepsilon_{ijt}$$

Where the dependent variables are risk (AFLLGTL, NPLGTL) and Profitability (ROA, ROE) refers to bank i's risk and profitability indicators in country j in year t. Different definitions of capital are represented by Bank\_Capital whereas, Bank\_control refers to multiple control variables as defined in section 3.2. Time and country represent year and country fixed effects. Country and year dummies are included to mitigate any effect of potentially omitted variables (Anginer & Demirgüç-Kunt, 2014). This study also employed an instrumental variable approach to check possible endogeneity concerns in capital ratios.

## RESULTS

### Descriptive Statistics

**Table 2: Descriptive Statistics for Europe and MENA**

	Euro pe					MEN A				
	Mea n	Medi an	Min	Max	Cou nt	Mean	Media n	Min	Max	Cou nt
<b>T1RWA</b>	0.170	0.144	0.063	0.830	2217	0.182	0.147	0.074	1.019	1170
<b>T2RWA</b>	0.025	0.020	0.000	0.176	1745	0.021	0.013	0.000	0.086	1062
	19.04	16.10		89.20						
<b>TCRWA</b>	2	0	8.400	0	2319	20.137	16.800	9.600	94.000	1205
<b>TITA</b>	0.084	0.071	0.014	0.366	2600	0.131	0.106	0.038	0.731	1390
<b>T2TA</b>	0.012	0.009	0.000	0.056	1837	0.016	0.010	0.000	0.072	1079
<b>TCTA</b>	0.093	0.081	0.016	0.379	2600	0.143	0.121	0.046	0.734	1390
<b>NLTA</b>	0.624	0.648	0.150	0.932	1402	0.599	0.632	0.153	0.891	670
			-					-		
<b>AG</b>	0.018	-0.006	0.458	0.966	2278	0.072	0.061	0.405	0.930	1219
			-					-		
<b>IND</b>	0.472	0.426	0.732	1.910	2518	0.424	0.367	0.356	1.867	1335
				14.35						
<b>LNTA</b>	9.193	9.064	4.906	3	2606	8.695	8.646	4.312	11.676	1390



<b>AFLG</b>										
<b>TL</b>	0.060	0.042	0.000	0.275	1398	0.044	0.035	0.003	0.250	670
<b>NPLGT</b>										
<b>L</b>	0.005	0.001	0.000	0.076	1633	0.005	0.001	0.000	0.111	975
<b>ROA</b>	0.240	0.400	7.300	4.100	2481	1.423	1.300	3.500	8.000	1378
<b>ROE</b>	1.898	4.900	89.20	0	2453	10.689	10.200	0	38.000	1354
<b>GDP</b>	1.864	1.838	4.265	8.706	2597	3.542	3.184	2.371	11.113	1354
<b>WGI</b>	0.977	0.930	0.130	1.800	2597	-0.214	-0.180	1.600	0.710	1358
<b>EF</b>	9	0	0	0	2606	64.031	63.800	0	77.700	1362

Table 2 presents descriptive statistics for European and MENA countries. It includes bank level variables and country level variables as defined in section 3.2 and 3.3. See table 1 for variable formulations.

Table 2 presents the descriptive statistics for European and MENA banks. It provides summary statistics for various variables used in the study. From the above table, we can see that banks in European and MENA region clearly follow the minimum capital requirement i.e. 6 percent proposed by Basel committee on banking supervision (BCBS)<sup>7</sup>. We can see that T1RWA is almost 14 percent for banks in both regions with a total number of 2,217 observations in European banks and 1,170 observations in MENA banks respectively. However, the total number of observations varies for different capital measures in both European and MENA banks. For instance, the total number of observations for T1TA is 2,600 with a median value of 0.071 in European banks and 1,390 observations with a median value of 0.106 in MENA banks. This difference can be explained by the fact that some banks are reluctant to give information related to their capital adequacy ratios. Instead, these banks choose to disclose information related to their traditional capital ratios. This means that such banks might still be following Basel I accords. Apart from descriptive statistics, we ran correlation analysis for both European and MENA banks. All correlation coefficients are well below the threshold of 0.70. However, same is not true for different definitions of capital ratios<sup>8</sup>. Thus, to avoid the problem of multicollinearity, we run six regression models one for each of the six capital ratios.

<sup>7</sup> In the month of September, 2010, the Basel committee agreed to strict capital regulations. For instance, it is agreed that banks have to increase their common equity ratio to 4.5% from 2.5%. Furthermore, the Tier1 capital requirement must be raised by banks from 4% to 6%. On the contrary, risk weighted capital requirements will remain unchanged from 8%. Banks will use Tier2 capital to meet the difference between total capital requirement and Tier1 capital. Different definitions of capital have also become more rigorous. These transitional changes have to be completed by 2019.

<sup>8</sup> For brevity we have not presented the results of correlation. However, results can be obtained from authors upon request.





## Regression Results

Table 3 presents the baseline results for capital and risk in Europe and MENA countries, using (AFLLGTL) as a proxy of bank risk. The results demonstrated that risk weighted capital i.e. tier1 capital and total capital maintained a negative and significant association with bank risk in Column (1, 3, 7, 9) for European and MENA regions. That is, higher levels of capital ratios result in decreasing bank risk. These results support “skin in the game” hypothesis and are similar to previous studies such as (Davis et al., 2020; Anginer & Demirgüç-Kunt, 2014; Lee & Hsieh, 2013; Agusman, Monroe, Gasbarro & Zumwalt, 2008; Demirgüç-Kunt & Kane, 2002). The findings imply that holding a higher amount of capital helps banks in European and MENA countries to curb significant unexpected losses, minimizing liabilities and expectations for public bailouts.

On the contrary, the results of non-risk weighted capital support the arguments of “regulatory” and “moral hazard” hypothesis. The findings in Column (4, 6, 10, 12) demonstrated that non-risk based tier1 capital and total capital maintained a positive and significant relationship with bank credit risk in both the European and MENA banking sectors. It means when banks choose to invest in risky assets they have to increase their capital structure. Moreover, it also implies that holding higher levels of capital compensate for risky investments. In a nutshell, overall results are validating the role of Basel accords.



**Table 3 Capital and Risk Model**

	<u>Europe</u>						<u>MENA</u>					
	1	2	3	4	5	6	7	8	9	10	11	12
<b>T1RW</b>	-						-					
<b>A</b>	0.052*						0.055***					
	*						(0.017)					
	(0.022)											
<b>T2RW</b>		-0.098						-0.017				
<b>A</b>		(0.106)						(0.090)				
<b>TCRW</b>			-						-			
<b>A</b>			0.000**						0.001***			
			*						(0.000)			
			(0.000)									
<b>T1TA</b>										0.063*		
										(0.036)		
				0.141**								
				*								
				(0.051)								
<b>T2TA</b>											0.097	
<b>A</b>											(0.125)	
<b>TCTA</b>												
<b>A</b>						0.127**						
						(0.051)						
												0.074*
												*
												(0.036)
<b>NLTA</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>A</b>	0.149*	0.135**	0.148**	0.162**	0.130***	0.162**	0.133***	0.121**	0.145***	0.123***	0.120*	0.122*
	**	*	*	*	(0.018)	*	(0.018)	*	(0.018)	(0.017)	**	**
	(0.015)	(0.019)	(0.015)	(0.014)		(0.014)		(0.016)			(0.016)	(0.017)



<b>AG</b>	-	-	-	-	-	-	-0.012**	-	-0.013**	-0.012**	-	-
	0.037*	0.038**	0.037**	0.033**	0.034***	0.033**	(0.006)	0.019**	(0.005)	(0.005)	0.019*	0.011*
	**	*	*	*	(0.008)	*		*			**	*
	(0.006)	(0.008)	(0.006)	(0.006)		(0.006)		(0.005)			(0.005)	(0.005)
<b>IND</b>		0.011**	0.009**	0.007*	0.010**	0.007*	0.001	-0.003	0.001	0.000	-0.003	0.000
	0.009*	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
	*											
	(0.003)											
<b>LNTA</b>	-	-	-	-	-	-	-	-0.010	-	-	-0.009	-
	0.022*	0.025**	0.024**	0.016**	0.031***	0.017**	0.031***	(0.006)	0.034***	0.024***	(0.006)	0.023*
	**	*	*	*	(0.006)	*	(0.006)		(0.006)	(0.006)		**
	(0.005)	(0.007)	(0.005)	(0.005)		(0.005)						(0.006)
<b>Consta nt</b>	0.356*	0.378**	0.376**	0.286**	0.432***	0.293**	0.424***	0.215**	0.468***	0.329***	0.208*	0.322*
	**	*	*	*	(0.068)	*	(0.060)	*	(0.059)	(0.057)	**	**
	(0.058)	(0.071)	(0.057)	(0.057)		(0.057)		(0.058)			(0.058)	(0.058)
<b>Year FE</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>R- Square</b>	0.22	0.23	0.22	0.23	0.24	0.23	0.18	0.16	0.21	0.17	0.16	0.17

Note: The dependent variable is AFLLGTL. The estimation is based on OLS regressions. Standard errors are presented in parenthesis below their coefficient estimates. \*, \*\*, \*\*\* represent significance level at 10%, 5% and 1% respectively.



Our findings are likewise to prior studies such as Bitar et al. (2018), Bitar et al. (2016), Altunbas et al. (2007) and Iannotta et al. (2007). However, the results of Column (2, 5, 8 and 11) for tier2 risk weighted capital as well as tier 2 non risk weighted capital remained insignificant in explaining bank risk. This insignificant impact is similar to results of Cathcart, El-Jahel and Jabbour (2015) and Haldane (2012). This is due to the fact that the nature of tier2 capital comprises complex debt type elements. These elements are not present in capital of good quality. Therefore, it may not be used to absorb bank losses (Bitar et al., 2018). Overall, our results related to how risk and non-risk based capital measures support proposed hypothesis 1a and hypothesis 1b.

Table 4 presents baseline profitability results using (ROA) proxy. The findings in Column (1, 3, 4 and 6) demonstrated that all capital ratios except tier2 maintained a positive and significant association with ROA in the European banking sector. However, in the MENA region, only risk based capital ratios in Column (7 and 9) i.e. tier1 and total capital exhibit a positive relationship with ROA. These results imply that increasing bank capital may result in lower cost of bankruptcy. Therefore, higher capitalized banks may incur lower funding cost that helps them to generate higher profits (Berger, 1995). Our results are similar to previous studies (Bitar et al., 2018; Tan, 2016; Iannotta et al., 2007). Thus on the basis of these results, we are going to accept our proposed hypothesis H2. However, the results reported in Column (2, 5, 8, 10, 11 and 12) remained insignificant in explaining bank profitability in both regions. This insignificant impact endorses the adoption of risk weighted capital structure in banks as proposed by BCBS especially in the MENA region.

### **Bank and Macroeconomic controls**

The results related to bank controls reveal different results. In terms of bank size, results pointed out that large banks are less risky, as they benefited from asset diversification strategies and vigilant risk management practices in both sets of countries (Abedifar et al., 2013; Pasiouras, 2008; Altunbas et al., 2007). However, the profitability model shows that large banks are more profitable in European countries as compared to MENA countries. As bank size and profitability posits a negative and significant relationship in the MENA banking sector. This may be because if large firms know they are too big to fail, they might pursue riskier strategies and large banks are also expected to benefit from a financial safety net in comparison to small banks (Anginer, Demirguc-Kunt, Huizinga & Ma, 2018). This investment in risky strategies may turn out to be ineffective investment decisions for large banks that may reduce their profitability in MENA countries.

**Table 4: Capital and Profitability Model**

	Europe						MENA					
	1	2	3	4	5	6	7	8	9	10	11	12
<b>T1RW</b>												
<b>A</b>	3.916*						2.083*					
	**						**					
	(0.967)						(0.683)					
<b>T2RW</b>		-6.468						-0.213				
<b>A</b>		(4.561)						(3.798)				
<b>TCR</b>												
<b>WA</b>			0.027*						0.056***			
			**						(0.011)			
			(0.009)									
<b>T1TA</b>										-1.150		
										(1.368)		
<b>T2TA</b>											-2.162	
											(5.300)	
<b>TCTA</b>												-1.128
												(1.361)
<b>NLTA</b>		0.422			1.102	1.195*	0.074	-0.489	0.516	0.178	-0.502	0.175
		(0.816)			(0.824)	(0.620)	(0.680)	(0.682)	(0.676)	(0.639)	(0.679)	(0.639)
<b>AG</b>												
<b>IND</b>												
<b>LNTA</b>												
<b>Consta</b>												
<b>nt</b>												
<b>Year</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>FE</b>												
<b>R-Square</b>	0.12	0.09	0.11	0.14	0.08	0.13	0.06	0.07	0.08	0.04	0.07	0.04

Note: The dependent variable is ROA. The estimation is based on OLS regressions. Standard errors are presented in parenthesis below their coefficient estimates. \*, \*\*, \*\*\* represent significance level at 10%, 5% and 1% respectively.

**Table 5: Capital, Risk and Macroeconomic Model**

	Euro pe						ME NA					
	1	2	3	4	5	6	7	8	9	10	11	12
<b>GDP</b>	0.003 *** (0.00 0)	0.003 *** (0.00 0)	0.003 *** (0.00 0)	0.003 *** (0.00 0)	0.00 3** * (0.0 00)	0.00 3*** (0.00 0)	- 0.00 (0.0 00)	0.00 0 (0.0 00)	- 0.00 (0.0 00)	- 0.00 (0.0 00)	0.00 0 (0.0 00)	0.00 0 (0.0 00)
<b>WGI</b>	- 0.018 (0.01 6)	- 0.042 ** (0.01 9)	- 0.019 (0.01 5)	- 0.020 (0.01 4)	- 0.03 1* (0.0 17)	- 0.02 0 (0.01 4)	- 0.03 2** (0.0 15)	- 0.02 8** (0.0 14)	- 0.03 7** (0.0 15)	- 0.04 0** (0.0 15)	- 0.02 8** (0.0 14)	- 0.04 1** (0.0 15)
<b>EF</b>	- 0.002 *** (0.00 0)	- 0.001 (0.00 0)	- 0.002 *** (0.00 0)	- 0.002 *** (0.00 0)	- 0.00 1* (0.0 00)	- 0.00 2*** (0.00 0)	- 0.00 0* (0.0 00)	- 0.00 0** (0.0 00)	- 0.00 0** (0.0 00)	- 0.00 0 (0.0 00)	- 0.00 0 (0.0 00)	- 0.00 0 (0.0 00)
<b>Cons tant</b>	0.478 *** (0.07 1)	0.458 *** (0.08 5)	0.494 *** (0.07 0)	0.409 *** (0.06 9)	0.52 1** * (0.0 81)	0.41 3*** (0.06 9)	0.45 2** * (0.0 68)	0.24 1** * (0.0 66)	0.51 3** * (0.0 68)	0.34 3** * (0.0 69)	0.23 3** * (0.0 66)	0.33 3** * (0.0 69)
<b>Year FE</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>R- Squa re</b>	0.24	0.26	0.24	0.26	0.26	0.26	0.20	0.17	0.23	0.19	0.17	0.19

**Note:** The dependent variable is AFLL/GTL. The estimation is based on OLS regressions. Standard errors are presented in parenthesis below their coefficient estimates. \*, \*\*, \*\*\* represent significance level at 10%, 5% and 1% respectively.

**Table 6 Capital, Profitability and Macroeconomic Model**

	Europe						MENA					
	1	2	3	4	5	6	7	8	9	10	11	12
<b>GDP</b>						0.092*						
	0.112** *	0.125** *	0.114** *	0.088* *	0.129** *	*(0.034)	0.076** *	0.066** (0.024)	0.081** *	0.070** *	0.066** (0.024)	0.070** *
	(0.036)	(0.040)	(0.036)	(0.034)	(0.041)		(0.024)		(0.024)	(0.023)		(0.024)
<b>WGI</b>	0.162 (0.704)	0.148 (0.867)	0.206 (0.709)	0.025 (0.626)	-0.451 (0.777)	0.025 (0.629)	-0.902 (0.586)	-0.838 (0.584)	-0.788 (0.572)	-0.516 (0.581)	-0.829 (0.581)	-0.502 (0.583)
<b>EF</b>	- 0.060** (0.029)	- 0.095** *(0.033)	- 0.069** (0.029)	- 0.060* *(0.027)	- 0.099** (0.032)	- 0.062* (0.027)	-0.000 (0.016)	0.005 (0.016)	0.006 (0.015)	-0.006 (0.016)	0.005 (0.016)	-0.006 (0.016)
<b>Constant</b>	-2.537 (3.018)	6.374* (3.647)	-0.674 (3.014)	-4.378 (2.913)	7.130** (3.600)	-3.428 (2.928)	2.238 (2.543)		-0.302 (2.553)	4.026 (2.579)		4.134 (2.613)
								9.297** *(2.719)				9.458** *(2.726)
<b>Year FE</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>R-Square</b>	0.14	0.11	0.13	0.15	0.11	0.14	0.08	0.09	0.11	0.05	0.09	0.05

**Note:** The dependent variable is ROA. The estimation is based on OLS regressions. Standard errors are presented in parenthesis below their coefficient estimates. \*, \*\*, \*\*\* represent significance level at 10%, 5% and 1% respectively. Moreover, results pointed out that asset growth is negatively linked to bank risk. However, it is positively linked to bank profitability. This result holds for both European and MENA banks. It implies that European and MENA banks are heavily investing in their respective risk management departments to reap benefits of lower credit risk and increased profit margins (Bitar et al., 2018). This investment in the risk management department allows banks to hire more qualified personnel that result in increased overlook and better screening of potential projects.

In addition, an increase in the portion of NLTA reduces risk and increases profitability of both the European and MENA banking sectors. This suggests that a bank is pursuing traditional banking activities that demand low levels of reserves in relation to credit default as compared to nontraditional banking activities (Bitar et al., 2016). It appears that European and MENA banks are using traditional banking activities that may help them reduce their cost and credit risk profile that may be converted into higher profits. However, the impact of NLTA remains insignificant in explaining bank profitability in MENA countries. One of the main reasons behind this result is that Arab countries in the MENA region faced political revolutions by the end of 2010. These Arab revolutions deteriorated overall economic and political instability in those countries (Ghosh, 2016). Finally, income diversification posits a positive link with risk and profitability in European and MENA banking sectors. An increased income diversification ratio implies that a bank diversifies its income by pursuing banking activities that are not traditional in nature. This may explain the positive relationship between income diversification and bank credit risk. Thus banks in both sets of countries anticipate higher default risk as they pursue banking activities that are not traditional in nature. However, likewise to NLTA, increased diversification results in higher bank profit margins (Bitar et al., 2016).



Table 5 and 6 reports result related to country level variables used in the study<sup>9</sup>. We find that GDP is positively linked to risk and profitability in European and MENA banks except Column (7, 9, 10, 12) of risk models in MENA countries. This result implies that banks used to increase their lending during more favorable macroeconomic conditions in search for higher returns that may result in higher default risk (Delis & Kouretas, 2011). Furthermore, Pasiouras (2008) argued that banks during favorable economic time periods tend to minimize their cost. This may result in increased profitability of banks. Moreover, results in Table 5 revealed that both WGI and EF are negatively linked to risk in European and MENA banking sectors. This suggests that a better institutional environment, existence of an external monitoring mechanism and increased economic freedom minimizes the risk of bankruptcy (Bitar et al., 2018). On the other hand, findings in Table 6 demonstrated that WGI is positively related to profitability except Column (5) in European banks but the same is not true for the MENA region, as WGI has a destabilizing effect on profitability of MENA banks. Finally, increased economic freedom decreases bank profitability in both European and MENA banks except Column (8, 9, 11) in MENA countries. This is due to the fact that higher economic freedom allows goods to move freely that result in increased competition. This competition may result in decreasing profitability of banks.

### **Capital, Bank Size, Risk and Profitability**

Following Bitar et al. (2018), we have divided our sample into three sub-samples (small, medium and large banks) based on total assets for both Europe and the MENA region. Table 7 reports the results of different Basel and non-Basel based capital, size, risk and profitability in European and MENA banks. In the case of Europe, we find that most of the risk based capital measures are inversely linked with risk in small, medium and large banks. However, most of the capital ratios that are traditional in nature either remain insignificant or maintain a positive relationship with bank credit default risk among various sizes of bank. In terms of the profitability model, findings related to European banks revealed that all capital ratios escalate bank profits in small, medium and large banks except tier2 risk and non-risk weighted capital. Likewise, results are found in the MENA banking sector. As most of the risk based capital measures maintained an inverse relationship with bank credit default risk. However, most of the non-risk based capital measures either positively linked to bank credit risk except in large banks or remained insignificant in absorbing bank credit risk. Contrary to the findings of European banks, we find different results for bank profitability models in small, medium and large banks. In the case of small banks, all capital measures are positively associated with bank profitability except non-risk based tier1 and total capital ratio. Identical results are found in medium scale banks except non risk based tier2 capital ratio. Finally, all capital measures are either negatively associated or remain insignificant in explaining profitability of large banks. Overall, findings of European and MENA banks demonstrated that small banks are better at absorbing credit default risk using different measures of bank capital as compared to medium and large banks. This suggests that small banks by using an internal rating based approach or standardized approach are less capable of manipulating their risk weighted assets (Bitar et al., 2018).

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<sup>9</sup> Results related to different capital measures remains identical to our baseline risk and profitability models reported in table 3 and 4. However, for the reason of space, we only report variables of interest in table 5 and 6. Full results can be obtained from authors upon request.



**Table 7: Capital, Bank size, Risk and Profitability**

	(RM)				(PM)							
	EUROPE		MENA		EUROPE		MENA					
<b>Small Banks</b>												
	Coefficient	N	R <sup>2</sup>	Coefficient	N	R <sup>2</sup>	Coefficient	N	R <sup>2</sup>			
<b>T1RWA</b>	-0.081** (0.038)	327	0.25	-0.299** (0.103)	93	0.43	0.693 (1.392)	323	0.18	16.181*** (4.055)	91	0.38
<b>T2RWA</b>	-			-			-			-		
<b>T2RWA</b>	0.428*** (0.139)	173	0.35	-1.247 (1.031)	67	0.37	12.028** (5.094)	169	0.22	9.972 (51.340)	65	0.31
<b>TCRWA</b>	0.000*** (0.000)	335	0.27	0.003*** (0.000)	100	0.45	0.007 (0.010)	331	0.17	0.187*** (0.037)	97	0.44
<b>T1TA</b>	0.134 (0.082)	357	0.26	0.282** (0.122)	122	0.31	1.586 (3.266)	353	0.13	-		
<b>T2TA</b>	-			-			-			-		
<b>T2TA</b>	1.344** (0.493)	177	0.36	0.301 (1.277)	67	0.35	28.850 (18.365)	173	0.20	8.682 (61.852)	65	0.31
<b>TCTA</b>	0.072 (0.081)	357	0.26	0.289** (0.122)	122	0.32	1.910 (3.219)	353	0.13	-9.915* (5.006)	119	0.18
<b>Medium Banks</b>												
<b>T1RWA</b>	-0.065* (0.037)	574	0.25	-0.035 (0.025)	326	0.14	7.846*** (1.625)	545	0.18	3.324** (1.147)	324	0.20
<b>T2RWA</b>	-			-			-			-		
<b>T2RWA</b>	0.131 (0.136)	441	0.30	0.036 (0.057)	315	0.14	12.290** (5.994)	425	0.09	0.986 (2.575)	313	0.17
<b>TCRWA</b>	-0.000** (0.000)	578	0.25	0.000 (0.000)	331	0.14	0.057*** (0.015)	549	0.16	0.055*** (0.016)	329	0.21
<b>T1TA</b>	0.071 (0.085)	608	0.25	-0.069 (0.052)	342	0.14	22.241*** (3.437)	577	0.21	11.052*** (2.217)	340	0.23
<b>T2TA</b>	0.406* (0.230)	449	0.31	0.226* (0.121)	315	0.15	-14.976 (10.063)	432	0.08	-0.570 (5.352)	313	0.17
<b>TCTA</b>	0.107 (0.081)	608	0.25	-0.011 (0.049)	342	0.14	19.534*** (3.352)	577	0.20	9.279*** (2.096)	340	0.22
<b>Large Banks</b>												
<b>T1RWA</b>	-0.012 (0.050)	333	0.25	-0.039 (0.046)	180	0.50	5.397** (2.035)	320	0.36	-1.445 (2.285)	180	0.05
<b>T2RWA</b>	0.121 (0.188)	305	0.25	-0.022 (0.077)	177	0.50	-13.221* (7.851)	293	0.36	-6.300* (3.761)	177	0.07
<b>TCRWA</b>	0.000 (0.000)	334	0.24	-0.000 (0.000)	179	0.50	0.073*** (0.025)	321	0.40	-0.026 (0.020)	179	0.06
<b>T1TA</b>	0.774*** (0.158)	336	0.30	-0.058 (0.058)	180	0.50	51.924*** (6.480)	323	0.51	1.972 (2.924)	180	0.05
<b>T2TA</b>	0.517 (0.447)	308	0.24	-0.036 (0.105)	177	0.50	-33.870* (19.458)	296	0.41	-3.927 (5.173)	177	0.05



<b>TCTA</b>	0.784*** (0.150)	336	0.31	-0.061 (0.055)	180	0.50	40.790*** (6.450)	323	0.47	0.961 (2.780)	180	0.05
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**Note:** The dependent variables are AFLGLTL and ROA. (RM) stands for risk model and (PM) stands for profitability model. For brevity, we only show variables of interest. The estimation is based on OLS regressions. In case of European banks based on lower (Q25) and upper quantile (Q75), banks are classified as small banks when  $LNTA < 7.666$ , medium banks when  $7.666 < LNTA < 10.674$  and large banks when  $LNTA > 10.674$ . A similar criterion is applied in case of MENA banks. Banks are classified as small banks when  $LNTA < 7.780$ , medium banks when  $7.780 < LNTA < 9.850$  and large banks when  $LNTA > 9.850$ . Standard errors are presented in parenthesis below their coefficient estimates. \*, \*\*, \*\*\* represent significance level at 10%, 5% and 1% respectively.

However, large banks are more profitable as compared to small and medium scale banks in the European banking sector. This is due to the fact that large banks are benefiting from economies of scale (Bitar et al., 2018). Therefore, they are able to better diversify their assets (Anginer et al., 2018). This may result in increased profitability of such banks. Contrary to the findings of European banks, small and medium scale banks are more profitable in MENA countries as compared to large scale banks. This may be because if large firms know they are too big to fail, they may pursue riskier strategies, as large banks are expected to benefit from financial safety net compared to small banks (Anginer et al., 2018). This excessive risk taking approach may result in decreased profitability of large banks in MENA countries.

### Robustness Check: Capital, Risk And Profitability (Alternative measures)

**Table 8: Alternative Risk and Profitability Measures**

	Europe			MENA		
<b>Risk Model</b>	<b>Coefficient</b>	<b>N</b>	<b>R-square</b>	<b>Coefficient</b>	<b>N</b>	<b>R-Square</b>
<b>T1RWA</b>	0.002 (0.005)	1002	0.18	0.012* (0.006)	553	0.23
<b>T2RWA</b>	0.002 (0.016)	760	0.11	-0.040 (0.036)	519	0.19
<b>TCRWA</b>	0.000 (0.000)	1010	0.18	0.000** (0.000)	563	0.23
<b>T1TA</b>	0.055*** (0.012)	1041	0.20	0.198*** (0.013)	580	0.48
<b>T2TA</b>	-0.002 (0.029)	765	0.11	-0.036 (0.051)	519	0.19
<b>TCTA</b>	0.056*** (0.012)	1041	0.20	-0.186*** (0.013)	580	0.46



<b>Profitability Model</b>						
<b>T1RWA</b>	72.799*** (11.188)	1232	0.13	6.015 (4.009)	597	0.05
<b>T2RWA</b>	-49.290 (57.294)	916	0.07	12.295 (24.032)	557	0.07
<b>TCRWA</b>	0.509*** (0.108)	1246	0.12	0.126* (0.071)	608	0.05
<b>T1TA</b>	210.768*** (24,655)	1297	0.15	- 33.346*** (8.400)	642	0.06
<b>T2TA</b>	-65.134 (105.158)	928	0.08	7.307 (33.395)	557	0.07
<b>TCTA</b>	185.777*** (25.060)	1297	0.14	- 30.766*** (8.399)	642	0.05

**Note:** The dependent variables are NPLGTL and ROE. For brevity we only report variables of interest. The estimation is based on OLS regressions. Standard errors are presented in parenthesis below their coefficient estimates. \*, \*\*, \*\*\* represent significance levels at 10%, 5% and 1% respectively.

We replace our main risk and profitability measures with NPLGTL for risk model and ROE for profitability model in table 8. The findings demonstrated that NPLGTL is positively related to all capital ratios except non risk based tier2 capital ratios in European banks. In terms of MENA countries, we find that Basel based capital ratios maintained a positive relationship with bank credit default risk, except risk weighted tier2 capital ratio. However, traditional capital ratios except tier1 capital ratio remains inversely associated with bank credit default risk. For profitability, model results revealed that only tier2 Basel and non-Basel capital measures resulted in decreasing profitability in European banks. However, all other capital ratios result in escalation of profitability in European banks suggesting a positive relationship between different measures of capital and ROE. As far as MENA countries are concerned, we find that Basel based capital measures maintained a positive relationship with bank profitability. However, nontraditional capital ratios except tier2 have a destabilizing effect on profitability of MENA banks.

### **Robustness Check: Generalized Method of Moments (GMM) and other Estimation Techniques**

According to “bad management” hypothesis, it is noted that to overcome any managerial incompetence and to compensate owners’ and debt holders, inefficient banks tend to engage more in riskier activities. Likewise, this behavior is also explained by the “cost skimming hypothesis”, whereby banks increase their profit margins by investing more in riskier assets (Williams, 2004; Fiordelisi et al., 2011). Therefore, bank risk, capital and profitability may be



interlinked that may create the possible problem of endogeneity (Tan & Floros, 2013; Bitar et al., 2018). Moreover, the presence of institutional variables such as WGI and EF may create the problem of reverse causality. Hence, to remove the issue of possible endogeneity and reverse causality, we use two models: (i) Two step system GMM by following Roodman (2006) and (ii) Limited information maximum Likelihood (LIML) by following Bitaar et al. (2016).

**Table 9: GMM, Capital, Risk and Profitability**

Risk Model	Europe				MENA			
	Coefficient	N	AR2	Sargan	Coefficient	N	AR2	Sargan
<b>T1RWA</b>	-0.022* (0.012)	1033	0.891	0.134	-0.014 (0.015)	304	0.984	0.941
<b>T2RWA</b>	-0.126* (0.064)	561	0.148	0.297	0.143* (0.074)	165	0.340	0.744
<b>TCRWA</b>	-0.001 (0.001)	1044	0.870	0.101	-0.000** (0.001)	178	0.527	0.593
<b>T1TA</b>	0.039 (0.059)	810	0.660	0.572	-0.193** (0.083)	188	0.226	0.565
<b>T2TA</b>	-0.082 (0.162)	772	0.158	0.101	0.072 (0.136)	282	0.389	0.984
<b>TCTA</b>	0.066 (0.057)	810	0.660	0.517	-0.094* (0.048)	324	0.879	0.832
<b>Profitability Model</b>								
<b>T1RWA</b>	4.444*** (1.103)	1128	0.978	0.187	<b>-0.359</b> <b>(0.860)</b>	397	0.343	0.406
<b>T2RWA</b>	11.902*** (4.067)	836	0.434	0.239	-1.406 (2.255)	380	0.564	0.273
<b>TCRWA</b>	0.035*** (0.012)	1142	0.761	0.153	0.037*** (0.008)	415	0.719	0.452
<b>T1TA</b>	9.563*** (2.291)	1192	0.941	0.352	<b>2.461*</b> <b>(1.434)</b>	406	0.482	0.319
<b>T2TA</b>	17.915** (7.859)	850	0.352	0.259	-0.288 (3.757)	380	0.546	0.264
<b>TCTA</b>	9.851*** (2.626)	1192	0.990	0.364	<b>1.468*</b> <b>(0.810)</b>	436	0.437	0.488

**Note:** The dependent variables are AFLLGTL and ROA. For brevity we only report variables of interest. Standard errors are presented in parenthesis below their coefficient estimates. \*, \*\*, \*\*\* represent significance levels at 10%, 5% and 1% respectively. The p-value of second-order (AR-2) correlation clearly shows that there is no issue of serial correlation. Sargan test of overidentification is under the null that all instruments are valid.

**Table 10: LIML, Capital, Risk and Profitability**

	Europe				MENA			
Risk Model	Coefficient	N	Chi2	F	Coefficient	N	Chi2	F
<b>T1RW A</b>	-0.124*** (0.024)	905	210.33**	50.02**	-0.013 (0.014)	527	137.04**	7.28**
<b>T2RW A</b>	0.398*** (0.079)	905	204.01**	49.16**	-0.156* (0.083)	527	141.21**	5.79**
<b>TCRW A</b>	0.001*** (0.000)	905	215.80**	48.79**	0.000 (0.001)	527	136.36**	6.28**
<b>T1TA</b>	0.181*** (0.045)	905	196.52**	53.76**	0.052** (0.020)	527	144.77**	6.26**
<b>T2TA</b>	0.192 (0.166)	905	179.01**	55.72**	-0.146 (0.112)	527	138.28**	6.95**
<b>TCTA</b>	0.162*** (0.043)	905	194.81**	53.81**	0.051** (0.020)	527	143.83**	6.41**
<b>Profitability Model</b>								
<b>T1RW A</b>	-0.275 (0.701)	873	192.93**	10.31**	3.858*** (0.470)	523	101.90**	8.07**
<b>T2RW A</b>	11.583** (2.177)	873	230.32**	2.71**	9.801*** (2.805)	523	44.21**	17.66**
<b>TCRW A</b>	-0.010* (0.006)	873	196.62**	9.90**	0.040*** (0.005)	523	91.38**	7.67**
<b>T1TA</b>	0.430 (1.328)	873	192.93**	10.44**	0.402*** (0.644)	523	72.52**	12.41**
<b>T2TA</b>	26.675** (4.697)	873	231.50**	4.96**	15.291** (3.754)	523	48.71**	16.50**
<b>TCTA</b>	-1.411 (1.249)	873	194.35**	10.25**	3.790*** (0.667)	523	65.40**	13.52**

**Note:** The dependent variables are AFLLGTL and ROA. For brevity we only report variables of interest. Standard errors are presented in parenthesis below their coefficient estimates. \*, \*\*, \*\*\* represent significance levels at 10%, 5% and 1% respectively.



The results presented in Table 9 are largely in line with our baseline findings presented in Tables 3 and 4, whereby risk based capital ratios are more effective towards achieving financial stability and increasing profit margins of the banking industry in both regions. However, the results presented in Table 10 are somewhat contrasting to our baseline findings presented in Tables 3 and 4. The findings suggest the following: (i) risk based capital ratios posits a negative impact on profit margins in the case of the European region, however, such effect is slightly significant; (ii) risk and profitability are important determinants of capital ratios in both regions. In a nutshell, after controlling for endogeneity, the results in Table 9 and 10<sup>10</sup> are largely identical to main results presented in table 3 and 4.

## CONCLUSION, RECOMMENDATIONS AND IMPLICATIONS

This paper examines the impact of different capital components on risk and profitability of 502 banks from the European and MENA regions for the period 2010-2019. Overall, we confirm two main findings in European and MENA banks. One, among different capital components, risk based capital ratios are more useful in reducing risk and increasing bank profits and complying with Basel capital regulations does not penalize bank activities in one region compared to another. Instead, our results confirm the effectiveness of Basel (III) as prescribed by BCBS in different economic regions. Our results largely imply that holding higher levels of capital results in better protection against unexpected losses and higher bank profitability in both European and MENA regions. Finally, we note that the impact of different capital requirements on risk and profitability is more pronounced for banks in countries with good governance and appropriate institutional environment.

The results largely imply that capital requirements that consist of risk weighted assets are more effective in curtailing excessive risk taking activities and enhancing profitability in both regions. Therefore, banking authorities in both regions need to promote the application of risk weighted capital ratios in banks as described by BCBS which ameliorates profitability and financial stability. Second, on the basis of results we call on regulators to be more cautious with banks that are composed of higher tier2 elements as it may hurt the financial stability and performance of banks in both regions. Finally, in order to achieve better performance, regulators in both regions may make policies that support and exaggerate good governance and better institutional environment for banks in both European and MENA countries.

The study comes up with several limitations. First, the sample size is small because there are many missing observations for the study time period 2010-2019. Second, in comparison to other accounting measures, most of the capital components are less readily available. In addition, despite using different proxies and econometric tests to overcome this limitation, not all of our robustness checks confirm our main findings of the study. Third, since most of the banks are unlisted especially in the MENA region, we are unable to include market based financial indicators. Finally, since we are unable to find comparative studies on bank capital, risk and profitability across different regions. Therefore, findings of the study are mostly inspired by individual country and regional studies. In terms of future studies, research may be done on a large dataset related to the implementation of other Basel III guidelines such as

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<sup>10</sup> In order to save space, we only presented variables of interest in table 9 and 10. However, full results may be obtained from authors upon request.



liquidity, leverage and corporate governance requirements across different countries and regions around the world.

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