

# **Determinants of bank capital: Case of Tunisia**

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## **Abstract**

The capital is essential for increasing the strength and efficiency of the banking system. Indeed, it is interesting to know the determinants of bank capital. In the context of this article, we studied a sample of 18 banks in Tunisia over the period (2000...2013). We found that return on assets, net interest margin, liquidity, rate of inflation, foreign ownership and private ownership affect significantly bank capital.

**JEL classification numbers:** C23, G21, C32

**Keywords:** Bank, capital, return on assets, net interest margin, rate of inflation, liquidity, foreign ownership, private ownership.

## **1 Introduction**

Capital is important in banking. One of the essential requirements for banks and financial institutions is adequate and sufficient capital and every banks and financial organizations must keep balance between capital and available risk in its assets in order to guarantee its stability.( Bateni et al (2014)).

The concept of capital adequacy appeared in the middle of the 1970 s because of the expansion of lending activities in banks without any parallel increase in its capital , since capital ratio was measured by total capital divided by total assets ( Al Sabbagh ( 2004). Indeed, Sharp (1977) defined capital as a difference between assets and deposits, so the larger the ratio of capital to assets / or the ratio of capital to deposits) to safer the deposits.

As capital was adequate, deposits were safe enough. His idea was that if the value of an institutions assets may decline in the future, its deposits will generally be safer, the larger the current value of assets in relation to the value of deposits.

Dowd (1999) found in this study that the minimum capital standard's financial institutions can be seen as a means for reinforcing the security of deposits and robustness of banking system.

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Also, Harold (1999) found the same result as Dowd, in that many regulations and deposits were concerned about the security of deposit insurance system. His study applied existing risk based capital requirements to current credit union data to evaluate credit union's risk based capital strength.

Besides, in 2010, the world's central bankers, represented collectively by the bank of international settlements ( BIS) handed down Basel III. A global regulatory framework that, among other things, raise minimum capital requirements at least 7% of a bank's risk weighted assets. ( Hanke ( 2013)).

So, bank capital has internal determinants and external determinant. As part of this article, we will study the determinants of bank capital in Tunisia on a sample of 18 banks over the period (2000...2013). As a result, we will use an approach that consists of 3 sections.

First, we will show the literature review, then we will analyze the empirical study. At the end, we will make the conclusion.

## 2 Literature Review

There are a lot of studies that analyses the determinants of bank capital . Romdhane ( 2012) studied 18 banks in Tunisia in period ( 2002...2008). He finds that interest margin and the risk affect strongly the capital ratio. He explain the excess of capital held by Tunisian banks, so the excess is not explain only by regulatory pressures.

The deposit variability and the intermediation rate have the same sign . But the equity cost and the deposit ratio both have negative impact. Masood and Ansari ( 2016) studied 14 Paskistani commercial banks which were included in the KSE ( Karachi stock exchange ) for the period ( 2004...2008) . The results revealed that the LAT ( loan to assets ratio ) , and ownership concentration of more 50% had a significant but a negative impact on the CAR ( capital adequacy ratio ) .

The EAR ( equity asset ratio ) , DAR ( deposit asset ratio ) , LLR ( loan loss reserves ) had a significant and positive impact the determination of CAR whereas the size of the bank , ROA ( return on assets ) , ROE ( return on equity ) , NPL ( non-performing loans ) had no impact on the CAR ( capital adequacy ratio ) .

Besides, Bokhari, Ali and Sultan (2012) gathering the data of 12 banks for the period (2005...2009) for the Pakistani banking sector. The variables deposit, ROE, portfolio risk, and GDP were tested to gauge their explanatory power on the capital adequacy ratio .

The results revealed that ROE and deposits are negatively associated with the capital ratio, portfolio risk and GDP failed to explain the CAR .

On the contrary, the regression results show that portfolio risk has a negative significance on the CAR.

On the other hand, Mohd Al Tamimi and Obidat ( 2013) gathered 9 years data for the Jordanian listed banks to explore the factors influencing the capital adequacy ratio . The study was motivated by the fact that the banks are instrumental in the economic welbung of a country.

The time period ranged from 2002 to 2008 which was just the start of the banking crisis . The study postulated that ROA has a positive and significant influence on the CAR where the ROE has a significant negative impact on the adequacy rati.

The results also showed that the interest rate and the liquidity risk have a positive and negative influence respectively. Moreover, Abba and al (2013) highlighted the banking parity of holding the capital on the basis of paid up instead of risk based in Nigerian financial regime.

He collected 5 years data from 12 Nigerian banks. The period selected was (2007...2011). The explanatory power of the risk weighted assets, the deposit base and the inflationary impact on the capital appropriateness was checked .

The results further proved the negative relationship for the CAR with risk weighted assets and deposit assets ratio. On the other hand, Klepazarek (2015) examines the factors affecting the common equity Tier 1 Ratio (CET1) which is a measure of the relationship between core capital and the risk weighted assets of banks.

This research is based on a randomly selected sample from the group of banks examined by the European central bank authorities. The findings confirm the hypothesis about the impact of bank size and risk indicators ( risk weighted assets to total assets ratio and the share of loans in total assets ) on bank's capital adequacy ratio .

They also confirm strong effect of competitive pressure and the negative correlation between the CETI ratio and the share of deposits in non equity liabilities.

Besides , Ahmad et al ( 2009) examines capital ratio in Malaysian banking firms . He finds that risk variables (non performing loans and the risk index ) have a positive relationship with bank capital , while there is non significant association between the bank manager's capital decisions and profitability .

This last statement however is not consistent with the prior studies carried out by Berger et Herring (1995) , Saunders et Wilson ( 2001) . Van Den Brink , Apring ( 2009) who analyze data from 11 countries ( the G10 and Switzerland ) , prove a negative correlation between size , asset structure ( risk weighted assets to total assets ) and capital structure ( total liabilities to total assets ) of a bank .

Moreover, Shingjerni , Hyseni ( 2015) analyzed the main banking determinants of the capital adequacy ratio in the Albanian banking system after the global financial crisis . They find that profitability indicators such as ROA and ROE do not have any influence on CAR ( capital adequacy ratio ) while NPL ( non performing loans ) , LTD( loan to deposit ratio) and EM ( equity multiplier ) have negative and significant impact on CAR in the Albanian banking system.

Bateni and al ( 2014) studied influencing factors on capital adequacy in Iran private banks for the period ( 2006....2012) . The results obtained indicate negative relationship between bank size and capital adequacy ratio of banks and positive relationship between loan to asset ratio ( LAR) , return on equity ( ROE ) , return on assets ( ROA), equity ratio ( EQR) , on capital adequacy ratio .

Irwa , Angono ( 2015) studied the Indonesian banks during ( 2005...2014). The results of this study are assets, non performing loans and ROA have positive effect on capital adequacy ratio, while , ROE , NIM , credit and deposit have negative impact on CAR .

Besides , Mekowen (2015) study the determinants of bank capital in Ethiopia over the period ( 2004.....2013) . He finds that ROA, deposits and size have a positive effect on capital adequacy and ROE and NIM have a negative on capital adequacy but liquidity , leverage have not significant effect on capital adequacy .

Moreover , Dhouibi ( 2016) used a panel data set that employs bank level data from the Tunisian banking sector covering the period ( 2000....2014) and estimated the model with generalized method of moments ( GMM) .

The findings of this study suggest that bank transparency, lagged capital and foreign ownership are positively correlated with capital adequacy ratio and managerial efficiency is negatively related with capital adequacy ratio.

However, Tunisian banks do not take into account the level of risk in the determination of capital adequacy ratio .

On the other hand, Alansary and Hafez ( 2015) studied 36 banks in Egypt during the period (2003...2013) .

They examined the relationship between bank capital as dependent variable and the following independent variables ( earning asset ratio , profitability , liquidity , loan loss provisions as measure of credit risk , net interest margin growth , size , loan to asset ratio and deposit ratio ) Furthermore , they investigate the determinants of bank capital before and after ( 2007...2008) international financial crisis , results vary according the period under study .

For the whole period (2003....2013), results show that liquidity, size, and management quality are the most significant variables. After the period 2009, results show that asset quality, size, liquidity, management quality and credit risk are the most significant variable that explain the variance of Egyptian bank capital.

### **3 Empirical study**

The determinants of bank capital has been the object of several studies prompting us to study this problem in the Tunisian context .

Under this section, we will identify the sample at the beginning, then , we specify the variables and models .

On the other hand, we carry out the necessary econometric tests. Finally, we show the estimation results of the model and their interpretations.

#### **3-1Sample**

We will use 18 banks that belong to professional association of banks in Tunisia over the period (2000...2013). Financial data are collected through the web sites of the professional association of banks in Tunisia over the period (2000...2013).

Macroeconomic data are collected from site of central bank of Tunisia and national statistic institution.

Table 1: specification of sample

Name of bank	Indice
AB	Amen bank
ABC	Arab banking corporation
ATB	Arab Tunisian banking
Attijari bank	Attijari bank of Tunisia
BH	Bank of Housing
BT	Bank of Tunisia
BTE	Tunisia and Emirate bank of Tunisia
BIAT	Arab International Bank of Tunisia
BNA	National agriculture of bank
BTS	Tunisian solidarity of bank
BTL	Tuniso Lybian bank
CB	CITI BANK
STB	Tunisian bank company
SB	STUSID Bank
TQB	Qatari Tunisian Bank
UBCI	Banking Union of Trade and Industry
UIB	International Banking Union
BTK	Tunisia Kuwati Bank

### 3.2 Estimation method

We will utilize panel statistic because it can control:

- The time and individual variation in the observable behavior or cross sectional times series aggregated.
- The observed or unobserved individual heterogeneity
- The hierarchical structure

### 3.3 Specification of variables

We will estimate the following model :

$$Capi_{i,t} = b_0 + b_1.ROAi_{i,t} + b_2.ROEi_{i,t} + b_3.NIMi_{i,t} + b_4.TLAI_{i,t} + b_5.Sizei_{i,t} + b_6.ALAI_{i,t} + b_7.CEAI_{i,t} + b_8.CFCi_{i,t} + b_9.Tdepositi_{i,t} + b_{10}.Foreigni_{i,t} + b_{11}.Privi_{i,t} + b_{12}.TPIBi_{i,t} + b_{13}.TINFi_{i,t} + Ei_{i,t}$$

i= bank, t= time

b<sub>0</sub>=Constant

b<sub>1</sub>,b<sub>2</sub>,b<sub>3</sub>,b<sub>4</sub>,b<sub>5</sub>,b<sub>6</sub>,b<sub>7</sub>,b<sub>8</sub>,b<sub>9</sub>,b<sub>10</sub>,b<sub>11</sub>,b<sub>12</sub>,b<sub>13</sub>= parameters to be estimated

#### **CAP= total equity / total assets**

An enhancement is capital may increase expected earnings by decreasing the expected costs of financial distress , including bankruptcy ( Berger ( 1995)).

Capital is measured as total capital and reserves as reported in the balance sheet ( Bateni and al (2014))

#### **ROA = return on assets = net income / total assets**

ROA show how to generate income from the assets of the bank (Chin (2011)).

This ratio is used in several studies to compare the financial performance of banks, it reflects the ability of the bank to use the financial data and real estate resource to generate profits ( Naceur ( 2003 ) , Khrawish ( 2011 ) , Ongore et Kusa ( 2013)).

Gropp and Heider (2007) found that the profitable banks tend to have relatively more equity. Their findings are consistent with the prediction of pecking order theory.

Therefore, we test the following hypothesis:

**H1: Return on assets has a positive effect on bank capital**

**ROE = return on equity = net profit / equity**

ROE reflect the ability of bank to use its own funds to generate profits ( Yilmaz ( 2013)).

Kleff and Weber ( 2008) demonstrated that the capital level is positively correlated with the profit . The accumulation of the profit breeds the capital growth .

Then , we test the following hypothesis

**H2: Return on equity has a negative effect on bank capital**

**NIM = interest receivables – interest incurred / total assets**

Interest receivables (by borrowers )

Interest incurred ( paid by the bank to the creditors and despositors )

NIM indicates the efficiency of financial intermediation ( Hamdi , Awedh ( 2012)).

Therefore, we test the following hypothesis :

**H3: Net interest margin has a significant effect on bank capital**

**Size = size of the bank =natural logarithm of total assets**

Size can show the economies of scale . The large banks benefit from economies of scale which reduces the cost of production and information gathering ( Boyd , Runkle ( 1993)).

Bateni and al ( 2014) found that size has a significant and negative relationship with capital of bank . Yu ( 2000) indicated that large banks in Taiwan have much lower capital ratios than the small banks which is consistent with the previous study where the large banks do not think about fail because they are big enough .

Then , we test the following hypothesis

H4: Size has a positive effect on bank capital

**ALA = total liquid assets / total assets**

ALA depicts the bank's ability to absorb the liquidity shocks . In theory , the higher liquidity ratio indicates that the bank is in a better position to meet its stochastic with drawals ( Chagwiza ( 2014)).

Therefore , we test the following hypothesis

**H5: ALA has significant effect on bank capital**

**TLA= total loans / total assets**

The higher ratio signifies the bank willingness to comprise on the award of loans which are other than on merit just to foster the earnings in the period of recession . ( Kherming and Rasha (2009)

Then , we test the following hypothesis

**H6: TLA has positive effect on bank capital**

**CEA = operating expenses / total assets**

Operating expenses including personal expenses and other expenses. CEA shows the weight of operating expenses compared to total assets.

Therefore, we following hypothesis

**H7: CEA has significant effect on bank capital**

**CFC = Financial expenses / total credits**

Financial expenses include interest expense due to loan made in the money market and the capital market by banks. CFC shows the share of financial expenses in relation to total credits.

Then, we test the following hypothesis

**H8: CFC has positive effect on bank capital**

**T deposit = total deposits / total assets**

Deposits include demand deposits and term deposits . T deposits show the share of deposits compared to total assets . It basically implies that the well capitalized banks will attract the depositor and they may be willing to deposit the money at lower rates –the customer deposits are cheap sources as other than borrowing so their impact is also very important . ( Masood , Ansari (2016)).

Therefore , we test the following hypothesis

**H9: Tdeposit has a negative effect on bank capital**

**TPIB = growth rate of gross domestic product**

TPIB show the growth in the economic activity in the country ( Ayadi , Boujelbène ( 2012)).

Asarkaya and Ozcan ( 2007) pointed out that when economic growth is high , the banks make more profit . This profit may contribute to their capital increase .

Then , we test the following hypothesis

**H10: TPIB has a positive effect on bank capital**

**TINF = rate of inflation**

TINF shows the rate of increase in the price index . Inflation is generally the persistence increase of price level of goods and service is an economic over a period of time .

Therefore, we test the following hypothesis

**H 11: TINF has a significant effect on bank capital**

**Foreign = binary variable that takes 1 if the bank is foreign , 0 otherwise**

The bank is foreign if the foreign investors owned more than 50% of bank( Kobeissi (2010)).

Then, we test the following hypothesis

**H12: Foreign ownership has a positive effect on bank capital**

**Priv = binary variable that takes 1 if the bank is private , 0 otherwise**

The bank is private if more than 50% of their shares are owned by private investors ( Fazdalan (2010)).

**H13: Private ownership has positive effect on bank capital**

Eit = term of error

### 3.4 Analysis of descriptive statistics

Table 2: Descriptive statistics of variables

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
<b>CAP</b>	252	0.1812322	0.188	0.0013	0.97
<b>ROA</b>	252	0.0112114	0.015	0	0.1291
<b>ROE</b>	252	0.0796725	0.095	0	0.9752
<b>NIM</b>	252	0.0284219	0.063	0	0.2193
<b>Size</b>	252	13.85563	1.312	10.19	15.98
<b>TLA</b>	252	0.697	0.198	0.057	0.95
<b>ALA</b>	252	0.04311695	0.051	0.0039	0.44
<b>CEA</b>	252	0.027	0.029	0.0023	0.42
<b>CFC</b>	252	0.03377	0.030	0.0017	0.35
<b>T deposit</b>	252	0.63594	0.273	0.0066	0.956
<b>TPIB</b>	252	0.0376	0.067	-1.08	0.0611
<b>TINF</b>	252	0.043	0.011	0.03	0.065
<b>Foreign</b>	252	0.5	0.5	0	1
<b>Priv</b>	252	0.7778	0.41	0	1

252=14\*18= total number of observations

14= Number of years (2000....2013)

18=Number of banks

-ROA ( mean = 0.0112) . The net return represent on average 1.2% of total assets.

-ROE ( mean = 7.96%) . The return net represent on average 7.96% of total capital.

-NIM (mean = 0.0284). The interest margin represents on average 2.84% of total assets. The standard deviation is low.

-Size (average = 13.85) . Most banks have a small and medium size. There is no large variation in size between banks.

-CAP (average = 0.1812) . The equity represents on average 18.12% of total assets. But there is a large variation in CAP between the banks (standard deviation = 18.83%) .

-TLA (average = 0.6970) . The total credit represent on average 69.7% on total assets .This shows the importance of financial intermediation of banks but there is a great deviation between banks in TLA ( standard deviation = 19.86%).

-CEA (average = 0.0279) .Operating expenses represent on average 2.79% of total assets. Thus, there is a good efficiency of banks . There is a slight variation of CEA between banks.

-CFC (average = 0.033) . Financial expenses represent on average 3.33% of total credits. So, there is an effective management of financial expenses in banks. There is a small variation between banks in CFC .

-T deposit (average = 0.6350) . The deposits represent 63.54% on average of total assets. This shows an great ability to attract deposits, deposits are important in the banking system.

-TPIB (mean = 0.0376). The standard deviation is low between (2000---2013)

-TINF (mean = 0.043). The standard deviation of inflation is low between (2000...2013)

- Foreign (mean = 0.5). The foreign ownership represent 50% of ownership on banks in period of (2000...2013). (The standard deviation is high
- Priv (mean = 0.77) . The private ownership represent 77% of ownership in period of (2000...2013). The standard deviation is low.

### 3.5 Econometrical tests

#### 3.5.1 Test of multi-collinearity

Table3: correlation between variables

	<b>ROA</b>	<b>ROE</b>	<b>NIM</b>	<b>Size</b>	<b>CAP</b>	<b>TLA</b>	<b>CEA</b>
<b>ROA</b>	1.000						
<b>ROE</b>	0.1642	1.000					
<b>NIM</b>	0.1087	-0.0251	1.000				
<b>Size</b>	-0.1133	0.3144	0.0372	1.000			
<b>CAP</b>	0.4591	-0.1512	0.1731	-0.5216	1.000		
<b>TLA</b>	-0.1774	-0.045	0.1388	0.2879	-0.05	1.000	
<b>CEA</b>	-0.08	0.019	-0.0096	0.0188	-0.017	-0.019	1.000
<b>CFC</b>	-0.071	0.559	0.0321	-0.0067	-0.085	-0.20	0.1723
<b>Tdeposit</b>	-0.2760	0.2133	-0.091	0.4811	-0.65	-0.09	0.1512
<b>ALA</b>	0.041	-0.0463	0.041	-0.1402	0.096	-0.13	-0.071
<b>TPIB</b>	0.2158	0.0583	0.1191	-0.1204	0.13	-0.18	0.045
<b>TINF</b>	-0.16	0.0088	-0.13	0.3167	-0.27	0.31	-0.14
<b>Foreign</b>	0.096	-0.1829	-0.09	-0.68	0.35	-0.26	0.033
<b>Priv</b>	0.21	0.032	-0.015	-0.36	0.1456	-0.21	0.122

Table 4: Suite of correlation between variables

	<b>CFC</b>	<b>Tdeposit</b>	<b>ALA</b>	<b>TPIB</b>	<b>TINF</b>	<b>Foreign</b>	<b>Priv</b>
<b>CFC</b>	1.000						
<b>T deposit</b>	0.2516	1.000					
<b>ALA</b>	-0.054	-0.24	1.000				
<b>TPIB</b>	0.0812	-0.094	0.0447	1.000			
<b>TINF</b>	-0.0115	0.2381	-0.2413	-0.48	1.000		
<b>Foreign</b>	0.14370	-0.1370	-0.074	0.0015	-0.005	1.000	
<b>Priv</b>	0.1293	0.2251	-0.435	0.00035	-0.0003	0.5762	1.000

There is no problem of multi-collinearity because all coefficients are inferior to 0.80.

Table 5: Test of VIF

	<b>VIF</b>
<b>Size</b>	3.57
<b>T deposit</b>	2.81
<b>Foreign</b>	2.65
<b>Priv</b>	1.91
<b>TINF</b>	1.68
<b>ROA</b>	1.47
<b>ROE</b>	1.25
<b>CFC</b>	1.11
<b>ALA</b>	1.12
<b>CEA</b>	1.09
<b>NIM</b>	1.15
<b>TLA</b>	2.94

There is no problem of multicollinearity because VIF inferior to 5.

### 3.5.2 Hausman test

It determines if the individual effects are fixed or random . It determines if the coefficient ( beta ) and fixed or random estimates are not statistically different . Under the null hypothesis of independence between errors and explanatory variables , both estimators are unbiased , so the estimated coefficients becomes somewhat different .

The fixed effect model assumes that the influence of explanatory variables on the dependent variable is the same for the all individuals , and that whatever the period ( Sevestre ( 2002)).

The random effect model assumes that the relationship between the dependent variable and the explanatory variable is not fixed but random , the individual effect is not fixed parameter but a random variable ( Bourbonnais (2009)).

The null hypothesis of the test is following :

H0: The presence of random effect

The hausman test blends in  $Pv = Chi^2$

If  $Pv$  inferior to 5%, we accept H 0 ( presence of random effect ) , If not we accepted

#### **H 1: Presence of fixed effect**

In our model  $Pv= 0.041$  inferior to 0.05

We accept a random effect

### 3.5.3 Breush Pagan test

The Breush Pagan test developed in 1979 by Trevor Breush and Adrian Pagan , It is used to test for heteroskedasticity in a linear regression model . It is a Chi squared test . The test statistic is  $nX^2$  with the degree of freedom . It tests the null hypothesis of homoskedasticity If the chi squared value is significant with p value below an appropriate threshold ( p inferior to 0.05) then the null hypothesis of homoskedasticity is rejected and heteroskedasticity assumed .

### 3.5.4 Results of estimation and interpretation

Table 6: Results of estimation

CAP	Coefficient	Standard error	Z	Z<P
ROA	1.40617	0.91	-2.82	0.114
ROE	-0.0079	0.12	-0.071	0.972
NIM	0.871	0.45	2.74	0.098
TLA	1.1225	0.03	0.019	0.654
Size	0.0127	0.09	0.62	0.713
CEA	-0.086	0.41	0.31	0.953
CFC	-0.072	0.052	0.074	0.0155
Tdeposit	-0.094	0.0670	-1.27	0.014
ALA	-0.68	0.32	-3.58	0.226
TPIB	-0.981	-0.51	-0.78	0.012
TINF	5.230	4.52	4.74	0.315
Foreign	0.072	-1.20	2.24**	0.259
Priv	0.031	-0.46	2.63***	0.281
Constant	0.814	0.61	2.81***	0.334

-There is a positive relationship between CAP and ROA ( if ROA increases by 1% , CAP will increase by 1.406%) . The increase of return on assets has a positive effect on bank capital. This relationship is statistical significant at 1%. This result is similar to result found by ( Gropp and Heider ( 2007 ) , Kleff and Weber ( 2009 ) , Mohd Al Tamimi and Obeidat ( 2013 ) , Yuanjua and Shishen (2012)) but contrary a result found by ( Ahmad and al ( 2009).

This is consistent with the pecking order theory suggesting that retained earnings and a better source of funding an debt, and debt is better than equity (Meyers (2005)). It implies that, for a present level of investments, capital adequacy (Which includes retained earnings) is higher for more profitable companies. It is also in the line with the dynamic trade off theory ( Hemesy and Whited ( 2005)).

Besides, there is a negative relationship between ROE and CAP ( if ROE increases by 1% , CAP decreases by 0.0079%) . The increase of return on equity has a negative effect on bank capital. This relationship is not statistical significant. This result is similar to found by Mohd Al Tamim and Obeidat (2013) , Shingjergi , Hyseni ( 2015 ) , Kishman and Sukar (2014) but contrary to result found by (Batani and al ( 2014)).

There is a positive relationship between NIM and CAP (if NIM increases by 1%, CAP will increase by 0.871%). The increase of net interest margin has a positive effect on bank capital. This relationship is not statistical significant. This result is similar to found by Romadhane (2012), Demirguc Kunt and Huizinga (2000), Kuo and Lee (2003) found the same strong relationship . Contrary to result found by Ahmed, Skully (2008), Irwan and Herlanto (2015)).

Moreover, there is a positive relationship between TLA and CAP (if TLA increases by 1%, CAP increases by 1.225%). The increase of total credit vs total assets, has positive effect on bank capital . This relationship is not statistical significant.

This result is similar to found by Batani et al (2014).

The share of loans in total assets generally indicates the level of asset risk, since the lending of funds is always connected with some level of uncertainty related to borrower . Therefore, a bank with more risky assets should balance out the higher risk with the better capital coverage ( Klepczarek ( 2015)).

On the other hand, there is a positive relationship between CAP and size ( if size increases by 1% , CAP will increase by 0.0127% ) . The increase of total size has a positive effect on bank capital . This relationship is not statistical significant . This result is contrary to found by Romdhane ( 2012), Bateni and al ( 2014), Gropp and Heider ( 2008 ), Ahmed Ariff, Skully

There is negative relationship between CEA and CAP (if CEA increases by 1% , CAP decreases by 0.086%) . The increase of operating costs has negative effect on bank capital. There is a negative relationship between CFC and CAP (if CFC increases by 1% , CAP will decrease by 0.072%) . The increase of financial expenses has a negative effect on bank capital.

Besides there is a negative relationship between T deposit and bank capital ( if Tdeposit increase by 1% , capital decreases by 0.094%) . The increase of deposits has a negative impact on bank capital.

This relationship is contrary to found by ( Romdhane (2012) , Masood , Ansari ( 2016)).

When the deposit ratios are high, the banks have costly deposits . But this cost remains lower than the cost of all other the funds. Therefore the capital may relatively decrease.

Similar to result found by (Abba and al ( 2013)), Bokhari and al ( 2012)).

Ben David , Palvia , Spatt ( 2013) found that bank's internal capital demand appears to be a dominant factor in determining deposits rates . They do not find a negative relationship between deposit rates and bank capital before or after the financial crisis, which suggests the absence of market discipline.

During the period after 2008; we find a positive association between deposit rates and equity capital suggesting that the better capitalized banks are those that pay higher deposit rates. These results remain qualitatively similar across deposits horizons and deposit sizes.

There is a negative relationship between ALA and bank capital ( if ALA increase by 1% , CAP decrease by 0.68%) . The increase of liquid assets has a negative impact on bank capital . This relationship is statistically significant at 1%.

This result is similar to that found by Diamond and Rajan (2000). They affirmed that a high capital reduces the creation of liquidity by the bank. But it enables them to be solid and to avoid the bankruptcy.

Fu ,Lin , Molyneux ( 2015) investigate the bicausal relationship between liquidity creation and regulatory capital and find that the trade off between the benefits of financial stability induced by enhanced capital requirements and those of higher liquidity creation is applicable to all of the sample banks , regardless of bank size and economic region . Distinguin , Roulet and Tarazi ( 2013) find that banks decrease their regulatory capital ratios when they face

higher illiquidity as defined in the Basel III accords or when they create more liquidity as measured by Berger and Bouwman (2009). As discussed by Berger and Bowman (2009) , bank capital tends to impeded liquidity creation through distinct effects “ the financial fragility structure and the crowding out of deposits .

The risk absorption hypothesis predicts that increased capital enhances the ability of banks to create liquidity. This hypothesis stems from two strands of the literature concerning the role of banks as risk transformers. Liquidity creation increases the bank's exposure to risk because banks that create more liquidity face greater losses when they are forced to sell illiquid assets to satisfy the liquidity demands of customers ( Allen et Santomero ( 1998) , Allen et Gale ( 2004)).

By contrast , more capital allows the bank to absorb greater risk ( Bhattacharaya et Thakor ( 1993), Repullo ( 2004)). But the financial fragility hypothesis predicts that increased capital hampers liquidity creation ( Diamond , Rajan ( 2001)).

There is a negative relationship between TPIB and bank capital ( if TPIB increases by 1% , Bank capital will decrease by 0.981%) . The increase of growth of PIB has a negative impact on bank capital. This relationship is not statistically significant.

Martynova (2015) indicated that banks facing higher capital requirements can reduce credit supply as well as decrease credit demand by raising lending rates which may slow down economic growth .

However, having better capitalized banks enhances financial stability by reducing bank risk taking incentives and increasing bank's buffers against losses. Tabak and al (2011) indicated that economic cycles negatively affect the surplus capital. These results have important implications for the discussion of capital regulations and the recent counter cyclical proposal under Basel III .

There is a positive relationship between TINF and bank capital ( if TINF increases by 1% , Capital will increase by 5.23%) . The increase of rate of inflation has a positive effect on bank capital. This relationship is statistically significant at 1%.

There is a positive relationship between Foreign ownership and bank capital (if foreign increases by 1% Capital will increase by 0.072%) . The increase of foreign ownership has a negative effect on bank capital. This relationship statistically significant at 5%.

There is a positive relationship between private ownership and bank capital ( if private ownership increases by 1% , capital will increase by 0.031%) . The increase of private ownership has a positive effect on bank capital . This relationship is statistically significant at 1%.

## 4 Conclusion

Bank capital plays a very important role in maintaining safety and solidarity of banks and the security of banking system in general as it represents the buffer gate that prevents any unexpected losses that banks might face, which might reach deposits funds, given that banks operate in a highly uncertain environment that might lead to their exposure to various risks and losses ( Mohd Al Tamimi , Obeidat 2013) .

Indeed, there are many determinants of bank capital (both internal and external)

In this article, we have analyzed the determinant of bank capital in Tunisian context over the period (2000--2013). We have found that return on assets, net interest margin, liquidity, rate of inflation, private ownership, foreign ownership have a significant effect on bank capital.

## References

- [1] Abba .G.O , Zachariah .P , Inyan .F.F ( 2013) “ Capital adequacy ratio and banking risks in the Nigeria deposit banks “ *Research Journal of Finance and Accounting* , issue17, vol 4, p 17-25.
- [2] Ahmad .R , Ariff .M , Skully.M ( 2008)” The determinants of bank capital ratios in a developing economy “ *CARE working paper* , March , Asia Pacific Financial Markets ,vol 15 ,issue 3-4 , p255-272.
- [3] Alsabbagh .N.M ( 2004) “ Determinants of capital adequacy ratio in Jordanian banks” *MSC Thesis* , Yarmouk University , Jordan , [www.Kantakji.com](http://www.Kantakji.com)
- [4] Asarkaya .Y , Ozcan .S ( 2007) “ Determinants of capital structure in financial institutions: the case of Turkey “ *Journal of BRSA banking and Financial Markets*, vol 1, issue 1, p91-109.
- [5] Ayadi .N , Boujelbène .Y ( 2012) “ The determinants of the profitability of the Tunisian deposits banks “ *IBIMA Business Review* , p1-20.
- [6] Bateni .L, H.Vakilifard , F.Asghari ( 2014) “ The influential factors on capital adequacy ratio in Iranian banks “ *International Journal of Economics and Finance* , vol 6, n°11,p108-116.
- [7] Ben David .I , A .Palvia , Spatt .C ( 2013) “ Bank’s internal capital markets and deposit rates “ *fisher .osu .edu* , p 1-42.
- [8] Berger .A ( 1995) “ The relationship between capital and earnings in banking “ *Journal of Money , Credit and banking* , 27 , p432-456.
- [9] Berger, Allen .N , Richard .J , Herring , Giorgio .P ..Szego (1995) “The role of capital in financial institutions “*Journal of Banking and Finance*, 19 , June , p393-430.
- [10] Bokhari .I.H , Ali .M.S ( 2012) “ Determinants of capital adequacy ratio in banking sector : An empirical analysis from Pakistan “ *Academy of Contemporary Research Journal*, p5-17.
- [11] Bourbonnais .R ( 2009) “ *Econométrie : manuel et exercices corrigés* »
- [12] Chagwiza .W ( 2014) “ Zimbabwean commercial bank liquidity and its determinants “ *International Journal of Empirical Finance* , 2 , (2) , p52-64
- [13] Dhouibi .R (2016) “Bank transparency and capital adequacy ratio: Empirical evidence from Tunisia “*International Journal of Economics, Finance and Management*, vol 5, n°1, February, p9-20.
- [14] Diamond .D.W , Rajan .R.G (2000) “ A theory of bank capital “ *Journal of Finance* , 35, p2431-2465.
- [15] Dowd .K (1999) “Does asymmetric information justify bank capital adequacy regulation? “19, (1), p39-47.
- [16] Fu .X, Y.Lin , P.Molyneux ( 2015) “ Bank competition , efficiency and liquidity creation in Asia pacific “.
- [17] Gropp .R , F .Heider ( 2009) “ The determinants of bank capital structure “ [www.ecb.europa.eu](http://www.ecb.europa.eu) , working paper.
- [18] Hamadi .H , Awedh ( 2012) “ The determinants of bank net interest margins : Evidence from the Lebanese banking sector “ *Journal of Money , Investment and Banking* , issue 23,p85-98.

- [19] Hanke .S.H (2013) “Basel’s capital curse: Financial Nigerai” *Development and Finance Journal*, 5, (54), p34-37.
- [20] Harold .S (1999) “Capital adequacy: wile risk based measurement help? “ *Credit Union executive Journal*, 39,( 6).
- [21] Irwan .K A . H Anggono(2015) “ A study of capital adequacy ratio and its determinants in Indonesian banks : A panel data analysis “ *Proceeding of 31st the IIER , International Conference , Bangok , Thailand.*
- [22] Khrawish .H.A ( 2011) “ Determinants of commercial bank performance : evidence from Jordan “ *International Research journal of Finance and Economics , Zarqa University , 5 (5).*]
- [23] Klepczarek .E ( 2015)” Determinants of European bank’s capital adequacy “ *Comparative Economic Research , vol 18 ; n°4,p81-98.*
- [24] Kobeissi .N , X.Sun ( 2010) “ Ownership structure and bank performance : Evidence from the middle East and North Africa Region “ *Comparative Economics Studies , vol 52 , n°3, p287-323.*
- [25] Masood .U ( 2016) “ Determinants of capital adequacy ratio : A perspective from Pakistan banking sector “ *International Journal of Economics , Commerce and Management , vol IV , issue 7 , July ,p247-273.*
- [26] Mckowen .Y ( 2015) “ Determinants of capital adequacy of Ethiopia commercial banks “ *European Scientific Journal , vol 11, n°25.*
- [27] Naceur .B ( 2003) “ The determinants of the Tunisian banking profitability : panel evidence “ *www.mafhoum .com.*
- [28] Romdhane .M (2012) “ The determinants of bank’s capital ratio in developing countries : Empirical evidence from Tunisia “ *Research Journal of Finance and Accounting , vol 3 , n°1,p35-46.*
- [29] Saunders .A , B.Wilson ( 2001) “ An analysis of bank charter value and its risk constraining incentives “ *Journal of Financial Services Research , vol 19 , issue 2 , p185-195.*
- [30] Sharp W F (1978) “Bank capital adequacy, deposit insurance and security values “ *Journal of Financial and Quantitative analysis , 13, p701-718.*
- [31] Shingjergi .A , Hyseni .M ( 2015)” The determinants of the capital adequacy ratio in the Commerce and Management , vol III , issue 1.
- [32] Yilmaz .A..A (2013) “Profitability of banking system: Evidence from emerging markets” WEI International Academic conference paper, January, Antalya, Turkey.