What are the determinants of bank interest margin and profitability in the Tunisian context?

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Abstract

The aim of this paper is to investigate the determinants of net interest margins and profitability of banks in the Tunisian banking context during the period 1999 to 2018, during Subprimes crisis and during the Jasmine revolution. Using double clusters regression, we find that the individual characteristics (size, lending activities and capitalization, non- interest activities) of the bank have a considerable impact on bank interest margins and net profitability, GDP growth has a positive effect on banks' net interest margins, concentration is less beneficial to Tunisian banks than competition and the development of the relative size has a positive effect on banks profitability. During the financial crisis, the internal and macroeconomic determinants of profitability have not changed. Only lending activities have a negative effect on profitability after the crisis. During the revolution, concerning the internal determinants of profitability, a higher profitability is associated with bank loans, size and efficiency. For macroeconomic determinants, only inflation has a negative impact on net interest margins. The effect of concentration of banking market and relative size of banks has turning on a positive and significant one on net interest margins during the post-revolution period. Whereas, the banking sector size has a negative effect on banks' profitability.

1. Introduction

In many developing countries, banks represent the main source of financing of the economy. This is especially true in countries whacking system where there are no debt security markets. Indeed, in Tunisia, the economy is largely financed though banks, as the bond market is underdeveloped; only few corporations' issue bonds and most investors use a buy and hold approach, which considerably reduces the liquidity of the market. Maintaining the viability of the banking system, and, hence, the profitability of financial institutions, is key to the economy. Understanding the determinants of profitability is a necessary step.

The financial and banking literature has previously developed the determinants and measures of profitability. Most studies have shown that the profitability of the bank is explained by internal determinants and external determinants (Bennaceur and Goaied, 2008; Demirguc-Kunt and Huizinga, 1999; Molyneux and Seth, 1998; Molyneux and Thornton, 1992; Guru et al, 2002; Olson and Zoubi, 2011). Internal determinants include bank-specific variables such as capital ratio or bank efficiency. However, external determinants cover environment variables in which financial institutions operate that are likely to affect their profitability such as economic growth or inflation.

Recent trends in financial deregulation, technological innovations, globalization, financial liberalization of markets and successive crises in banking systems creates certainly new challenges for market participants in the financial sector. Besides, the financial crisis that started after the collapse of subprime mortgage market has its considerable effects on banks and on international banking system. However, according to Beck et al. (2012), the crisis has limited impact on Africa because the transmission mechanisms between the African financial systems and the rest of the world were weak. African financial institutions were not exposed to the risks emanating from complex instruments in international financial markets because most of the banks in Africa rely on deposits to fund loan portfolios (which they keep on their books to maturity), most of the interbank markets are small, and the markets for securitized or derivative instruments were either small or non-existent. The speedy decline in global trade in late 2008 hit all African economies and leads to a lower growth in 2009. Meanwhile, the increasing role of China and India in the global economy has helped African economies to recover relatively quickly. Consequently and in this crisis, the low rate of access to banking services lead to a difficulty of realization of economies scale. Besides, the limited competition among banks is due to the small number of international banks and the predominance of

public banks lead to absorption of the 1/3 of private firms of Tunisian economy. In addition, the governance of Tunisian state owned banks is weak, the high credit risk due to poor asset quality and high overhead costs. All those factors erode net interest margins, and high overheads cost may lead to the deterioration in the bank's profitability in Tunisia, which may be shaped by the internal and external elements.

The purpose of this paper is to focus on the main determinants of banks' profitability in the Tunisian banking system during the period 1999-2018, during the periods before and after Subprime crisis and during the Jasmine revolution. This study covers all banks listed on the Tunisian stock exchange (11 banks).

The contributions to the banking and finance literature of this paper are threefold. First, we contribute to the existing literature by analysing the determinants of banks' profitability on an emerging country (Tunisia). In fact, the context of our study is Tunisia. In this context, firms that want to benefit from debt can only contract bank debts (private debt). Unlike other contexts, where debt can be public or private, the public debt still underdeveloped in Tunisia. Indeedthe bond market, public debt and Treasury bonds as well as some leasing companies are the main players in the bond market. In 2009, they represent respectively € 1 072 million, € 8 582 million and € 1 359 million. The underdevelopment of public debt markets in Tunisia is a consequence of the lack of development of money markets and a diversified institutional investor's base, opportunistic primary issuance practices, and captive demand by banks, which dominate bonds markets. These problems have led to highly concentrated buy-and-hold portfolios by banks and state-owned institutions, and lack of liquidity in secondary markets. Tunisian bonds' are now considered "speculative grade." They have a higher risk of default. The financing through bonds is marginal, and even decreasing to a level of 1.5% of bank loans in 2015. The corporate bonds issuance represented only 4.3% of the total private investment in 2011, confirming the domination of bank financing (low ratio of financing through bond market to bank loans of 1.5% in 2015). Consequently, the main source of debt in our study context is the bank. Second, this study identifies the different determinants of the financial performance of Tunisian banks during a critical period affected by the Jasmine revolution. Third, the paper complements the stream of literature documenting bank profitability and especially during the revolution crisis.

2. Tunisian context

The events of the "Arab Spring" led to a process of political change in several countries in the region of North Africa. In Tunisia, seven years after the Jasmine Revolution, the transition to

democracy is reaching fruition with the adoption of the new constitution and the organization of free elections (African Development Bank, 2017).Tunisia is a developing country that has followed since the 80's outgoing economic policy while betting on its banking sector. In fact, the Tunisian banking sector forms the heart of the financial system and thus the mainly financing source of Tunisian business. In fact, Tunisian banks carry out an essential function and they perform more than 90% of financial intermediation. Moreover, businesses fight back to obtain access to bank financing. Indeed, despite the provision of high volumes of credit to the private sector, access to finance for small firms needs remains weak comparing to developing countries. While still needing to improve, the share of firms reporting that they are connected to the financial sector is substantially high in Tunisia, according to the 2016 MENA Enterprise Survey report (EIB, EBRD and WBG, 2016). MSMEs, which constitute the majority of firms in Tunisia, are more dependent on bank financing than large firms, since their access to alternative forms of financing (e.g. stock market) is limited.

Tunisian banks operate within a complex context but continue to show strong resilience. The lending rate has increased since 2010, but it remains low in comparison to OECD countries (OECD, 2018).Between 2010 and 2016, the part of non-performing loans in total loans rose from 12% to 15.4%, which is high in comparison to OECD countries and reached 20% in 2018 in the public banks. The weaknesses of bankruptcy procedures have aggravated the problem of nonperforming loans. Since 2012, the central bank has several measures to reinforce the banking sector. The regulations governing provisioning have been tightened. The statutory solvency ratio has been increased. In addition, a plan to restructure the public banks has been launched with the recapitalization of three large public banks and the disposal of minority shareholdings in some mixed banks. A banking law was adopted in 2016 introducing a bank resolution mechanism a "lender of last resort" device and a deposit guarantee fund. Nevertheless, despite the important weight of the banking intermediation for the financing of the Tunisian economy and reforms adopted there is the existence of weak signals like low levels of profitability, liquidity and capitalization (OCDE, 2018).

Nonbanking financial institutions and capital market in the region are still at an early stage of development and only account for a small share of the financial sector's total assets. Tunisian banking sector is one of the most developed on African continent. This was evidenced by its resilience during the most recent international financial crisis. In fact, the Tunisian banking system maintained its support for the economy despite a delicate macroeconomic and political climate. Furthermore, Tunisian banking sector is fragmented with only four banks (BIAT, BNA, Attijari Bank and STB) sharing 47.5% of total deposits (African Development bank,

2018). Besides, the level of liquidity remains contrasting due to the growing use of government bonds for financing purposes and the widening of the current deficit which have reduced the level of liquidity in the banking sector.

2. Literature review

Banks plays the principal role in the economies' allocation resources. They participate in the growth of economies when they finance investment projects of firms. Besides, bank profitability attracted the interest of bankers and scientific research and has an interesting role in the financial system. This role was greatly exhibited by the drop of large banks during the Subprimes crisis, which generated the global financial crisis. Theoretical analysis of bank profitability determinants recognizes two main theories: the first theory if the market power theory. This theory relates bank profitability to external factors. Indeed, bank profitability is determined by the behavior of agents on the market and by its structure or by the market shares. The second theory is the efficiency structure theory. This theory explains profitability of banks using internal factors. In fact, the best profitable banks are those with lower costs while the scale efficiency hypothesis states that banks achieving high scale economies realize the best profitability.

Literature classifies determinants of profitability into internal factors and external factors. Internal factors depend on bank's specifications and under the control of bank management. Besides, those factors can be divided into financial-statement variables and non-financial-statement variables. The second type of determinants are external to the bank and depend on the environment in which bank operates and reflect the economic, financial structure and legal environment (Al-Harbi, 2019; Talbi and Bougatef, 2018; Kacem and Sakr, 2018; Athanasoglou et al., 2008; Garcia-Herrero et al., 2009; El-Ansary and Megahed, 2016; Abobakr, 2018).

2.1. Internal determinants

Capital adequacy is considered as an internal of profitability because it relies on the capital funds of banks and represents the strength of bank capital (Golin, 2001). Capital adequacy is evaluated by the capitalization ratio (capital to total assets) and it captures the general soundness of banks by representing how well the bank is capitalized (Menicucci et al., 2016). Well capitalized banks are protected from bankruptcy, have easily admission to funds, follow

business opportunities with better flexibility, absorb any unexpected losses and face financial crises and reinforce security for depositors during unstable macroeconomic conditions. Consequently, they realize higher levels of profitability (Menicucci et al., 2016; Al-Harbi, 2019; Talbi and Bougatef, 2018; Sufian, 2012; Demirguc-Kunt and Huizinga, 1999). However, banks realizing lower capital ratio are risky and they generate higher profits compared to well-capitalized financial institutions according to the conventional risk-return hypothesis (Saona, 2016; Ali et al., 2011).

Banks loans held is used to evaluate the efficiency of asset portfolio management. Banks loans are measured by total loans to total assets. This ratio indicates the level of liquidity detained by banks. Loans are the principal source of income and have a positive effect on bank performance (Menicucci et al., 2016; Bashir, 2003; Sufian and Habibullah, 2009). However, Bourke (1989) arguments that banks having high ratio of liquid assets realize lower profits and they are well covered against liquidity risk. In addition, the increase in loans could escalate the costs of funds and support lower level of profitability and loans. Kosmidou et al. (2005) and Heffeman and Fu (2008) document that banks' lending activities are sensitive to the change of economic conditions and during slow periods more loans are anticipated to default leading to a negative effect on profitability.

Non-interest bearing activities Banks engage in activities; like deposit and transaction fees, insufficient funds fees, annual fees, monthly account service charges, inactivity fees; that not bear interest to diversify in order to have higher level of revenue to cover the decrease of its earnings coming from traditional lending activities. Valverde and Fernández (2007), Nguyen (2011), Sufian (2012), Vithyea (2014) and Petria et al. (2015) provide evidence that banks engaged in non-interest bearing activities have higher level of profitability. However, banks that are deeply involved in nontraditional activities are more risky and thus engender a lower profitability (Chen and Liao, 2011; Wahidudin et al., 2012; Rahman et al. 2015; Saona, 2016).

Costs management (Inefficiency) Banks' inefficiency is measured by the ratio of operating costs to total assets. This rate represents the manner by which banks manage their costs. Indeed, bank managerial prudency leading to cost efficiency reduces bank operational costs and increase by the way profitability (Olsen and Zoubi, 2011). A negative association indicates that efficient banks are operating at lower costs (Mamatzakis et al., 2005; Pasiouras and Kosmidou, 2007; Park and Weber, 2006; Sufian, 2012). However, a positive relationship can be expected, as banks with high operating costs are more likely to have high-interest spread. However, this positive impact on profitability can be achieved by shifting part of their

cost to their customers in terms of lower deposit rates and/or higher lending rates (Dietrich et al. 2015; Ben Naceur and Goaied, 2008).

*Bank size i*s introduced to detect the existence of economies or diseconomies of scale in the market. Smirlock (1985) finds a positive and significant relationship between size and bank profitability. Short (1979) argues that size is strongly associated to the capital adequacy of a bank since relatively large banks tend to raise less expensive capital and, therefore, appear more profitable. The same argument of the link bank size to capital and by the way to profitability is used in studies of Bikker and Hu (2002) and Goddard et al. (2004).

2.2. External determinants

2.2.1. Macroeconomic determinants

Inflation's effect on banks profitability depends on the rate by which banks' operating costs increase (a faster or slower rate than inflation) (Revell, 1979). In the same vein, Perry (1992) states that the effect of inflation on bank profitability depends on whether inflation expectations are fully anticipated. An anticipated inflationary environment suggests that banks can judiciously regulate interest rates in order to raise their revenues faster than their costs and thus obtain higher profitability. Most studies have shown a positive relationship between inflation and banks profitability (Bourke, 1989; Molyneux and Thornton, 1992; Ben Naceur and Goaied, 2008; Ben Khedhiri and Ben Khedhiri, 2009; Talbi and Bougatef, 2018).

Economic development is measured by the GDP per capita growth. It represents business cycle fluctuations. During recessions, the quality of loans depreciates which raises defaults and consequently leads to lower profitability. The negative association between economic development and banks' profitability is reported by Demirgüç-Kunt and Huizinga (1999) and Ben Naceur and Omran (2011). However, the economy's expansion enhances the demand of loans inducing the improvement of bank profitability. Bogdan and Roman (2015) results are in line with this. I expect this variable will affect banks' profitability positively.

Corruption is defined as a fraudulent behavior of an officeholder looking for illicit private gain. The association between bank profitability and corruption is not evident. Definitely, corruption may exacerbate the problem of bad loans and consequently reduces bank's profitability (Bougatef, 2015; Park, 2012).

Using a sample of 69 Islamic banks operating in 16 countries during the period 2008-2010, Bougatef (2015) studies the effect of corruption on the soundness of Islamic banks. He measured the corruption by the Corruption Perception Index and he uses an index as

composed by Park (2012). His results suggest that corruption slows down Islamic banks to use optimally their resources. Indeed, it intensifies the problem of impaired financings and this effect is more notable for high corrupt countries. Corruption aggravates the problem with impaired financing through conducting funds to bad projects. In contrast, some forms of corruption such as "speed money" would enable individuals to avoid bureaucratic delay (Mauro, 1995). Therefore, the borrower can take advantage from a business opportunity before its disappearance and hence be able to pay his debt service. This result is predicted since the absence of competition between Islamic banks may guide to corruption in lending (Barth, Lin, Lin, and Song, 2009).

2.2.2. Financial structure determinants

Stock market development is measured by the ratio stock market capitalization to GDP. Demerguc-kunt and Huizinga (2000) show that developed stock market improves the availability of information to banks. Consequently, it allows them to ameliorate their risk evaluation of the customers. Besides, the stock market development emboldens investors to contract loans from banks in order to speculate in the stock market, and this behavior consequently increases banks' profitability. In addition, banks benefit from the fees that come from managing portfolio of their customers, which are predominantly composed of securities. Nevertheless, the stock market could affect deteriorate banks profitability when the stock market and banks are substitutes as a supplier of funds. Borroni et al. (2016) found that after the Subprimes crisis, stock market was negatively associated to banks' profitability suggesting that stock market and banks are substitutes.

Size of banking sector is estimated by banks assets to GDP. Many studies in the banking literature investigate whether financial structure plays a role in determining banking profitability. The financial structure is defined as the relative importance of banks. Commonly, a large banking sector presupposes that financial development has an important role in the economy and reflects a more important demand for banking services and attracts more potential competitors. Thus, the market becomes more competitive and banks adopt different strategies in order to maintain their profitability. The results of Demirguc-Kunt and Huizinga (1999) suggest that banks in countries having more competitive banking sector generally show lower level of interests and are less profitable. In addition, they notice that countries with underdeveloped financial systems are less efficient and adopt less-than-competitive pricing behaviors. Indeed, for these countries, greater financial development can improve the efficiency of the banking sector.

8

Concentration has a positive effect on banks profitability confirming the market power and the efficient-structure hypotheses (Almeida and Divino, 2015; Saona, 2011). Bourke (1989) and Molyneux and Thornton (1992) affirm that this positive relationship is caused by the increase of market power that grants monopolistic and high profits due to deviations from competitive markets. The efficient-structure hypothesis also supports a positive relationship between bank concentration and profitability. Then, highly concentrated markets will lead to a lower cost of collusion and encourage collusion between firms. Nevertheless, if there are a large number of banks, the cost of collusion increases because it is more difficult to carry out (Goddard et al., 2004). However, if collusion is practicable, banks will be able to earn monopoly rents (Saona, 2016).

3. Methodology and data

3.1. Sample selection and data

This study examines the determinants of banks profitability and net interest margin in the Tunisian context. The data used in our empirical study are extracted from the database of the Central Bank, the APBT (Association of Banking Professionals in Tunisia) and the World Bank Data for macroeconomic variables.
The sample includes all banks listed on the Tunisian stock exchange (11 banks)[1] during the period 1999-2018.

3.2. Variable estimates
3.2.1. Dependant variables

Based on previous studies, we consider two measures of profitability: the net interest margin (NIM) and return on assets (ROA) (Demerguc-Kunt and Huizinga, 1999; Ben Naceur and Goaied, 2008; Al-Harbi, 2019). The NIM variable is the net interest income divided by total assets. It is based on the profit earned by interest activities. ROA is the net income of the bank to total assets. It measures the profit earned per monetary unit of assets and reflects the banks' management use of their real investments.

3.2.2. Independent variables
Based on previous studies, this study considers the characteristic variables of banks as well as those relating to the environment in which Tunisian banks operate as determinants of the net

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[1]BIAT, BNA, ATTIJARI BANK, BH, STB, AMEN BANK, UIB, BT, ATB, UBCI and BTE

interest margin (NIM) and the performance of banks (ROA). Table 1 presents the definitions, estimates and expected signs of these variables according to the existing literature. The panel A shows the different internal determinants of the bank, the panel B presents the economic variables likely to affect the profitability of the banks and finally the panel C presents the variables of interest which are the NIM and the ROA.

Table 1. Variables definitions

Panel A: Internal determinants

	Definition	Estimation	Expected sign	Literature
SIZE	Size of bank	The natural logarithm of total assets	+	Sufian and Chong (2008), Sufian (2009), Ali et al (2011), Athanasoglou et al (2008)
BLOAN	Bank loans	Bank loans divided by total assets	+	Bennaceur and Goaied (2008), Dermirguc-kunt and Huizinga (1999), Demirguc-Kunt et al (2001)
NIBA	Noninterest bearing assets	Assets generating noninterest profits divided by total assets	-	Bennaceur and Goaied (2008), Dermirguc-kunt and Huizinga (1999), Demirguc-Kunt et al (2001)
CAP	External financing requirement	Equity divided by total assets	-	Koehn and Santomero (1980), Berger(1995), Athanasoglou et al(2008), Goddard et al, (2004), Molyneux and Thornton(1992), Abreu and Mendes(2001)
OVERHEAD	Inefficiency	Operating expenses divided by total assets	-	Bourke(1989), Steinherr and Huveneers(1994), Abreu and Mendes(2001)

Panel B: External determinants

	Definition	Estimation	Expected sign	Literature
INF	Inflation	The inflation rate	?	Demirguc-Kunt and Detragiache(1998), Bennaceur and Goaied, (2008), Alexiou and Sofoklis(2009)
GROWTH	GDP growth	Growth in GDP per unit of capital	+	Bikker and Hu(2002), Dietrich and Wanzenried, (2011), Athanasoglou et al(2008)
RSIZE	Relative size of a bank	Market capitalization divided by the total assets of banks	+	Huizinga (2000), Bennaceur and Goaied(2008)), Demerguc-Kunt and Levine (2004)
MCAP	Development of financial market	Market capitalization divided by GDP	+	Bennaceur and Goaied(2008), Demerguc-Kunt and Levine (2004)
SBS	Banks sector size	Total bank assets divided by GDP	+	Bennaceur and Goaied(2008)), Demerguc-Kunt and Levine (2004)
CONC	Concentration of major banks	The portion of the bank assets held by the three large banks in the country	?	Bennaceur and Goaied(2008), Smirlock (1985), Keeley and Zimmerman (1985), Berger (1995)

Panel C: Measures of profitability and performance

	Definition	Estimation	Literature
NIM	Net interest margin	Net interest income divided by total assets	Dermirguc-Kunt and Huizinga (1999), Huizinga (2000), Demirguc-Kunt et al (2001), Bennaceur and Goaied (2008), Maudos and De Guevara (2004), Saunders and Schumacher (2000)
ROA	Return on assets	Net income divided by total assets	Dermirguc-Kunt and Huizinga (1999), Huizinga (2000), Demirguc-Kunt et al (2001), Bennaceur and Goaied (2008), Maudos and De Guevara (2004), Saunders and Schumacher (2000)

3.3. Econometric modeling

Our empirical study focuses on the identification of the main determinants of the profitability of Tunisian banks during the period from 1999 to 2018. For this, we implement 4 specified

models for each dependent variable by adding subsequently macroeconomics variables and financial structure variables:

$$PROF_{i,t} = \alpha_0 + \alpha_1 CAP_{i,t} + \alpha_2 BLOAN_{i,t} + \alpha_3 NIBA_{i,t} + \alpha_4 OVERHEAD_{i,t} + \alpha_5 SIZE_{i,t} + \varepsilon_{i,t} \tag{1}$$

$$PROF_{i,t} = \beta_0 + \beta_1 CAP_{i,t} + \beta_2 BLOAN_{i,t} + \beta_3 NIBA_{i,t} + \beta_4 OVERHEAD_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 INF_t + \beta_7 GROWTH_t + \mu_{i,t} \tag{2}$$

$$PROF_{i,t} = \gamma_0 + \gamma_1 CAP_{i,t} + \gamma_2 BLOAN_{i,t} + \gamma_3 NIBA_{i,t} + \gamma_4 OVERHEAD_{i,t} + \gamma_5 SIZE_{i,t} + \gamma_6 INF_{i,t} + \gamma_7 GROWTH_{i,t} + \gamma_8 CONC_{i,t} + \gamma_9 SBS_{i,t} + \gamma_{10} MCAP_{i,t} + \vartheta_{i,t} \tag{3}$$

$$PROF_{i,t} = \delta_0 + \delta_1 CAP_{i,t} + \delta_2 BLOAN_{i,t} + \delta_3 NIBA_{i,t} + \delta_4 OVERHEAD_{i,t} + \delta_5 SIZE_{i,t} + \delta_6 INF_{i,t} + \delta_7 GROWTH_{i,t} + \delta_8 CONC_{i,t} + \delta_9 RSIZE_{i,t} + \omega_{i,t} \tag{4}$$

$PROF_{i,t}$: the two alternative measures of profitability measures (NIM and ROA) for the bank i at the year t and NIM represents Net interest margins and ROA represents Return on assets; $CAP_{i,t}$: Bank capitalization for the bank i at the year t; $BLOAN_{i,t}$: Banks loans for the bank i at the year t; $OVERHEAD_{i,t}$: Inefficiency rate for the bank i at the year t; $NIBA_{i,t}$: assets bearing non financial profits for the bank i at the year t; $SIZE_{i,t}$: Bank's size for the bank i at the year t;INF_t: Rate of inflation for the bank i at the year t; $GROWTH_t$: Growth rate of GDP for the bank i at the year t;$CONC_t$: Concentration of the three major banks in Tunisia for at the year t; $RSIZE_{,t}$: Relative size of the bank at the year t; $MCAP_t$: Market capitalization ratio at the year t; $SBS_{i,t}$: Banking sector size at the year t; α, β, γ, δ: residual term of models (1), (2), (3) and (4) respectively.

4. Empirical results

4.1. Univariate tests

Table 2 shows the various descriptive statistics for the dependent and independent variables of our study. We note that the mean of net interest margin of our sample is 2.55% with a low volatility of 0.00929 for the period of our study. This finding states that the banks composing the sample of this study are profitable having a minimum profitability of 0.00055 and a maximum profitability of 0.07625. Most of the mean and median values of variables are in stable range, with low standard deviation. This implies that there is very low variation in the data set and the distribution of data is symmetric. Two exceptional cases of SIZE (bank size) and CONC (Ratio concentration) are because we have taken into consideration various sizes

of banks. The mean level of ROA is 0.911% is lower than minimum levels as required bank scope database (ROA = 1%), showing that on average, these banks had the acceptable profitability levels compared to international standards. The mean of the ratio of the traditional activity of banks of our sample and during the period of study is 80.55% with a volatility of 0.06003. This implies that our sample is homogeneous and does not present any aberrant values.

Based on the VIF matrix and the Pearson and Spearman correlation coefficients (Table 3), there is no problem of multicollinearity. Our model is estimated by the two-way clusters method using panel data, which solves the problems of serial correlation of errors as well as the problem of heteroscedasticity. With panel data structure, correlations are more likely to appear in two dimensions with both firm effects and time effects. This method of estimation provides rich information as compared to either cross-sectional of Fama MacBeth estimation because they do not deal with two dimensions (across firms and across time).

Table 2. Descriptive statistics

Variables	Mean	Std	Min	Median	Max
NIM	0.02559	0.00929	0.02485	0.00055	0.07625
ROA	0.00911	0.01273	0.00051	0.00986	0.06046
CAP	0.10853	0.09247	0.02649	0.08362	0.62367
BLOAN	0.80552	0.06003	0.63620	0.81342	0.94588
NIBA	0.16231	0.05716	0.03534	0.15676	0.32957
OVERHEAD	0.01521	0.00398	0.00810	0.01512	0.02503
SIZE	14.88438	0.88099	12.11311	15.01533	16.57748
INF	0.02027	0.07664	-0.30856	0.03435	0.07308
GROWTH	0.07412	0.02082	0.02280	0.07634	0.10853
CONC	0.42474	0.58960	0.02403	0.31398	5.84066
RSIZE	0.00829	0.00815	0.00009	0.00589	0.07145
SBS	0.92143	0.25648	0.05073	0.91354	1.25331
MCAP	0.16167	0.05785	0.0003	0.16887	0.24236

Table 3. Analysis of correlation between the different variables of the banking profitability model

Panel A: Correlation coefficients

	NIM	ROA	CAP	BLOAN	NIBA	OVERHEAD	SIZE	INF	GROWTH	CONC	RSIZE	SBS	MCAP
NIM	**1.000**	0.252	0.216	0.351	-0.401	-0.258	0.328	-0.105	-0.050	-0.021	-0.351	-0.057	-0.326
ROA	0.225	**1.000**	0.237	-0.012	-0.020	-0.475	-0.368	0.058	0.043	-0.145	0.230	-0.223	0.421
CAP	0.450	0.465	**1.000**	0.171	-0.251	-0.217	-0.414	-0.159	-0.113	0.107	-0.098	-0.079	-0.116
BLOAN	0.484	-0.083	0.075	**1.000**	-0.353	0.159	-0.351	0.015	-0.231	-0.248	-0.236	0.188	-0.076
NIBA	-0.522	0.154	0.137	-0.434	**1.000**	-0.125	0.236	-0.308	0.077	0.214	0.018	-0.349	-0.195
OVERHEAD	-0.192	-0.4011	-0.241	0.151	-0.120	**1.000**	-0.124	-0.162	-0.027	0.169	-0.153	-0.253	-0.181
SIZE	0.314	-0.284	-0.375	-0.246	0.148	-0.119	**1.000**	0.389	0.114	-0.235	0.428	0.294	0.452
INF	-0.090	0.031	-0.147	0.005	-0.249	-0.112	0.329	**1.000**	0.381	-0.493	0.326	0.422	0.345
GROWTH	- 0.018	0.035	-0.091	-0.126	0.055	-0.012	0.094	0.362	**1.000**	-0.107	-0.139	-0.203	-0.139
CONC	-0.017	-0.046	0.076	-0.188	0.153	-0.077	-0.135	-0.237	-0.090	**1.000**	-0.148	-0.510	-0.315
RSIZE	-0.048	0.197	-0.067	-0.149	0.046	-0.139	0.245	0.325	-0.121	-0.147	**1.000**	-0.013	0.643
SBS	-0.037	-0.028	-0.160	0.109	-0.125	-0.064	0.396	0.234	-0.140	-0.428	-0.011	**1.000**	0.147
MCAP	0.184	0.266	-0.171	-0.012	-0.073	-0.096	0.362	0.283	-0.094	-0.172	0.540	0.076	**1.000**

The coefficients below the diagonal represent the Pearson correlation coefficients and those above the diagonal are the Spearman coefficients

Panel B: Variance inflation factors (VIF)

	CAP	BLOAN	NIBA	OVERHEAD	SIZE	INF	GROWTH	CONC	RSIZE	SBS	MCAP
VIF	1.579	2.381	2.979	1.215	1.015	1.493	1.532	2.299	3.197	3.216	2.355

4.2. Multivariate tests

Table 4 shows the results of the estimates of our econometric model relating to the determinants of the profitability of Tunisian banks using four specifications. The first determinant of a bank's profitability is the capitalization variable (CAP). The CAP coefficients are positive and significant at the threshold of 1% and 5% respectively for the entire net interest margin and the return of the assets equations specifications. The results of our study are consistent with previous studies and therefore confirm the positive and significant relationship between the regression of the NIM and ROA equations. Indeed, Buser et al. (1981) argue theoretically that banks need to remain well capitalized when they have a high franchise value and a greater capitalization increase the confidence of the consumer on the banking sector which increases their demand of loans and as a consequence a greater net interest margins. CAP represents the aversion risk. Equity funds are riskier than deposits and they are more costly. A high proportion of equity capital indicates a better risk aversion, which contributes to higher profitability. Our results corroborate those of Berger and Bouwman (2013) and Zribi and Boujelbene (2011). This result suggests that well-capitalized Tunisian banks bear lower forecasted bankruptcy costs for themselves and for their clients; thereby reducing their capital costs which enhances the confidence of the consumer and increase their NIM. In all specification equations of net interest margin, bank loans (BLOAN) have a positive and significant coefficient at the 1% threshold in the net interest margin (NIM) equation, while the latter is positive and not significant using return on assets (ROA) as a dependent variable. This reflects the fact that the banks' traditional activity of lending generates interest, thus increasing profits and net interest income. While the variable of non-interest bearing assets (NIBA) has a negative and significant coefficient at the level of 10% in the net interest margin equation, this result asserts that banks' profitability always comes from assets bearing interest, and that at a high level lending activity, lending activities tend to be more profitable. Our results are on line with the findings of Bennaceur and Goaied (2008). In this study, the variable OVERHEAD has no effect on the net interest margin and on the return on asset. The size of the bank (SIZE) has a positive and significant coefficient in all the net interest margin and return on assets equations specifications. In fact, large banks enjoy greater profitability than small banks. This is because large banks have a higher level of credit and more diversified products than small and medium-sized banks. These findings corroborate with the findings of Dietrich and Wanzenried (2011), Kosmidou et al. (2006a, b) and Alper and Anbar (2011).For macroeconomic indicators, the inflation variable (INF) has no

significant effect on net interest margins and on return on assets. However, economic growth (GROWTH) has a positive and significant on net interest margins. This finding corroborates the results of Molyneux and Thornton (1992), Demirgüç-Kunt and Huizinga (1999), Kosmidou et al. (2006 a, b), Athanasoglou et al. (2008), Davydenko (2010), Bikker and Hu (2002) and Zeitun (2012) and this result suggests that the increase in the loan rates is associated with a low rate of default following to the economic growth.

The introduction of the variables of the financial structure and the ratio of market concentration aims to measure the importance of the bank and the financial market and to estimate the financial development. These variables may reflect complementarities or substitution between banks and the financial market. We note that the size of the banking sector (SBS) has a negative and significant coefficient in the regression of the net interest margin and in the return on assets. This result suggests that banks face stiffer competition and therefore acquire lower profitability. Regarding capital market size and financial market development (MCAP), we find that the relationship between this variable and the net interest margins is positive and significant but MCAP has no significant effect on net interest margins. This result suggests that a larger capital market gives banks the opportunity to increase their profits. This is due to the effect of complementarities between stock market and debt market. As stock markets grow and improve the availability of information, this increases the potential number of bank clients by facilitating the identification and monitoring of borrowers. Thus, stock market development leads to increased profits for banks especially at lower levels of financial development like the Tunisian context, which indicates complementarities between bank and stock market (Bennaceur and Goaied, 2008, Bertay et al, 2013). In addition, the banks' market concentration ratio (CONC) has a negative and significant effect only on the profitability proxy (NIM). This result shows that the concentration is less beneficial in terms of the profitability of Tunisian banks than competition. The ratio of the relative size (RSIZE) also represents a positive and significant effect on return on assets (ROA), so this reflects the complementarities between the banks and the growth of the capital market. These results confirm the findings of Bennaceur and Goaied, (2008), Bertay et al, (2013) and Lall (2016). These findings suggest that when the size of the stock market is greater than that of the banking sector, bank profits increase and this confirms the effect of complementarities. From these results, we hold that the development of the Tunisian stock market is more profitable for the banking industry.

Table 4. Determinants of the Tunisian banks profitability

	NIM				ROA			
	(1)	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
Cte	-0.484**	-0.892***	-0.922***	-0.924***	-0.030	-0.026	-0.029	-0.037
	(-2.02)	(-2.97)	(-3.32)	(-3.06)	(-0.59)	(-0.56)	(-0.61)	(-0.78)
CAP	0.619***	0.673***	0.829***	0.682***	0.058**	0.058**	0.059**	0.058**
	(9.49)	(9.77)	(10.08)	(9.72)	(2.55)	(2.55)	(2.60)	(2.59)
BLOAN	1.045***	1.253***	0.974***	1.264***	-0.019	-0.021	-0.020	-0.004
	(5.26)	(5.27)	(4.08)	(5.10)	(-0.58)	(-0.65)	(-0.59)	(-0.15)
NIBA	-0.160	-0.067	-0.433*	-0.062	-0.034	-0.036	-0.037	-0.016
	(-0.76)	(-0.28)	(-1.77)	(-0.24)	(-1.20)	(-1.29)	(-1.27)	(-0.60)
OVERHEAD	0.467	-0.274	0.474	-0.209	-0.628***	-0.627***	-0.621***	-0.542**
	(0.32)	(-0.19)	(0.36)	(-0.15)	(-3.15)	(-3.12)	(-3.05)	(-2.85)
SIZE	0.011**	0.024***	0.062***	0.025**	0.004**	0.004**	0.004**	0.003*
	(1.99)	(2.61)	(6.23)	(2.55)	(2.24)	(2.31)	(2.32)	(1.88)
INF		0.003	-0.013	0.010		-0.0004	0.004	0.004
		(0.04)	(-0.16)	(0.12)		(-0.10)	(0.73)	(0.92)
GROWTH		0.442*	-0.151	0.421*		-0.008	-0.016	-0.011
		(1.79)	(-0.58)	(1.69)		(-0.29)	(-0.52)	(-0.43)
CONC			-0.031***	0.012			0.0006	-0.0002
			(-3.05)	(0.97)			(0.48)	(-0.15)
SBS			-0.224***				-0.010*	
			(-3.91)				(-1.97)	
MCAP			-0.075				0.029**	
			(-0.42)				(1.75)	
RSIZE				0.947				0.613***
				(0.86)				(4.95)
Fisher	0.5413	0.5713	0.6501	0.5730	0.1590	0.1509	0.1551	0.2189
Adjusted R²	79.84***	55.20***	45.88***	41.86***	5.63***	4.98***	5.42***	8.01***

NIM: Net interest margins, **ROA:** Return on assets, **CAP:** Bank capitalization, **BLOAN:** Banks loans, **OVERHEAD:** Indirect charges, **NIBA:** assets bearing non financial profits, **SIZE:** Bank's size, **INF:** Rate of inflation, **GROWTH:** Growth rate of GDP, **CONC:** Concentration of the three major banks in Tunisia, **RSIZE:** Relative size of the bank, **MCAP:** Market capitalization ratio, **SBS:** Banking sector size. *, **, *** represent respectively the significance at the level of 10%, 5% or 1%.

4.3. Additional analysis

4.3.1. Determinants of banks' profitability during the Subprimes crisis

An additional analysis is carried out to detect the impact of the Subprimes crisis on the main determinants of the profitability of listed Tunisian banks. For this aim, we run our econometric model using four specifications and by periods: before and after crisis. Table 5 presents the results of our estimations.

Concerning the internal determinants of profitability, the capitalization ratio (CAP) maintains its positive and significant impact on profitability (NIM) and this during the periods before and after Subprimes crisis. Concerning the relationship between capitalization ratio and banks' performance, it stills positive and significant only in the period after the crisis. This result supposes that, even in the Subprimes crisis, Tunisian banks, which have greater capitalization bear lower forecasted bankruptcy costs and amplify the confidence of the consumer on the banking sector, which increases their profitability (Demirguc-Kunt et al, 2013). We also found the banking activities generating interest (BLOAN) has a positive and significant effect on the profitability of the bank (NIM) during pre and post Subprimes crisis. These activities remain an important determinant of the profitability of the banks as the lending activities represent the primary function of the Tunisian banking institutions. However, during the post-crisis period, this variable has lost its significance for the performance of the bank (ROA) but stills conserved for the net interest margins (NIM). Given the warning situation and the failure of the banking system in other countries affected by the subprime crisis, Tunisian banks are giving less and less credit as a precautionary measure during this critical period, which has allowed them to break out the effect of contagion of this crisis and leads to lower banks' performance. In this study, the indirect expenses (OVERHEAD) have a significant and negative effect on return on assets. In fact, during the period of crisis Tunisian banks maintain their efficiency, which maintains a certain level of performance. These findings corroborate with the results of Rachdi (2013) and Ding et al (2017).

For the post-crisis period, non-interest-bearing activities (NIBA) retain their negative and significant effects on profitability and performance, proving that even in the post-crisis period; the diversification of products (lending activities and collecting fees) does not improve the profitability of banks. During the crisis period, banks reduce costs to maintain

their level of profitability and efficiency. The size of bank to stock market (SIZE) has a positive and significant coefficient in the net interest margin and in the return on assets during the period post crisis. On the other hand, the latter is negative and significant for the return on assets in pre-crisis. Concerning the crisis period, large banks benefit from better profitability than small banks. During post crisis, inflation (INF) has a negative and significant effect on return on assets (ROA). Banks may not benefit in an unanticipated inflationary environment and they are hesitant in adjusting their interest rates. So, bank charges increase faster than revenues and subsequently and this increase in costs hampers the performance of banks Economic growth (GROWTH) maintains its positive and significant effect on NIM during post-crisis period (Albertazzi and Gambacorta, 2009; Beltratti and Stulz, 2012; Distinguin et al, 2013). We note that the size of the banking sector (SBS) maintains its negative and significant effect on net interest margins during the post-crisis confirming that the competition between banks affects their profitability. The relative size of the bank (RSIZE) maintains also its positive and significant effect on net interest margins confirming the complementarities between stock market and debt market even during the crisis. These results allow us to conclude that the Subprimes crisis has not affected the profitability of Tunisian banking system.

Table 5. Subprimes crisis and determinants of Tunisian banks profitability

	Pre-Subprimes crisis								Post-Subprimes crisis							
	(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)	
	NIM	ROA	NIM	ROA	NIM	ROA	NIM	ROA	NIM	ROA	NIM	ROA	NIM	ROA	NIM	ROA
Intercept	-0.08 (-0.26)	0.06*** (4.09)	-0.44 (-0.63)	0.02 (0.94)	-0.66 (-0.79)	0.03 (0.62)	-0.51 (-0.71)	0.04* (1.84)	-0.87*** (-2.74)	-0.01 (-0.49)	-1.15*** (-3.24)	-0.021 (-0.65)	-1.26*** (-3.87)	-0.015 (-0.44)	-1.21*** (-3.31)	-0.01 (-0.39)
CAP	0.50*** (4.30)	0.006 (0.48)	0.59*** (4.94)	0.007 (0.63)	0.58*** (4.50)	0.01 (1.00)	0.61*** (5.24)	0.01 (1.00)	0.66*** (4.00)	0.04*** (4.73)	0.67*** (4.16)	0.048*** (5.08)	0.90*** (5.59)	0.04*** (4.85)	0.71*** (4.53)	0.04*** (5.21)
BLOAN	1.03*** (3.52)	0.006 (0.34)	1.16 (1.50)	0.03 (1.40)	1.31* (1.69)	0.02 (0.91)	1.24 (1.59)	0.02 (0.85)	0.97*** (3.59)	-0.04** (-2.50)	1.14*** (4.02)	-0.046** (-2.33)	1.07*** (3.92)	-0.039* (-1.92)	1.09*** (3.38)	-0.04** (-2.25)
NIBA	-0.005 (-0.02)	0.034 (1.53)	-0.11 (-0.14)	0.057* (1.96)	-0.007 (-0.01)	0.04 (1.50)	0.01 (0.02)	0.04 (1.41)	-0.49* (-1.66)	-0.05*** (-2.63)	-0.31 (-1.05)	-0.05** (-2.42)	-0.392 (-1.35)	-0.050** (-2.09)	-0.37 (-1.07)	-0.05** (-2.30)
OVERHEAD	2.67 (1.06)	-0.36*** (-3.29)	1.75 (0.70)	-0.37*** (-3.15)	2.23 (0.99)	-0.30** (-2.28)	1.87 (0.77)	-0.31** (-2.32)	-1.69 (-0.92)	-0.13 (-1.11)	-1.59 (-0.88)	-0.042 (-0.36)	0.53 (0.28)	-0.088 (-0.77)	-1.90 (-1.04)	-0.02 (-0.24)
SIZE	-0.01 (-0.78)	-0.004*** (-2.98)	0.001 (0.06)	-0.003** (-2.26)	0.003 (0.16)	-0.003** (-2.43)	-0.0008 (-0.04)	-0.003** (-2.48)	0.04*** (4.04)	0.004*** (3.60)	0.049*** (4.31)	0.004*** (3.84)	0.08*** (6.72)	0.003*** (2.66)	0.05*** (4.40)	0.004*** (3.01)
INF			-0.27 (-0.19)	-0.0003 (-0.22)	0.26 (0.11)	-0.00002 (-0.02)	-0.46 (-0.32)	-0.00007 (-0.16)			-0.014 (-0.18)	-0.0005** (-2.11)	-0.03 (-0.31)	0.00001 (0.10)	-0.02 (-0.28)	-0.001*** (-3.63)
GROWTH			0.16 (0.40)	0.006** (2.01)	-0.07 (0.18)	0.005 (1.09)	0.09 (0.22)	0.004 (1.09)			0.591* (1.94)	0.006 (0.29)	-0.19 (-0.51)	-0.010 (-0.38)	0.54* (1.73)	0.02 (1.11)
CONC					-0.02 (-1.56)	-0.008 (-0.13)	-0.01** (-2.14)	-0.02 (-1.56)					-0.003 (-0.03)	-0.002 (-0.84)	0.12 (0.97)	-0.005* (-1.72)
SBS					-0.08 (-0.44)	4.21 (0.14)							-0.22** (-2.14)	-0.024 (-1.43)		
MCAP					1.28 (0.81)	1.24*** (4.93)							-0.20 (-0.48)	0.144 (1.41)		
RSIZE							3.10** (2.42)	0.0007*** (4.11)							-1.49 (-0.99)	0.0003*** (4.01)
Fisher	0.6021	0.3078	0.6414	0.342	0.683	0.390	0.659	0.3933	0.5521	0.2416	0.5567	0.2451	0.613	0.256	0.5576	0.2903
Adj R²	89.60***	6.71***	52.31***	4.79***	25.72***	8.61***	55.75***	8.44***	36.12***	14.45***	25.51***	10.00***	29.40***	8.12***	20.58***	14.12***

4.3.2. Determinants of banks' profitability during the Jasmine revolution

To shed light on the effect of the Tunisian revolution (14 January 2011) on the profitability and performance of banks, we divide our period of study on two sub-periods taking as reference the date of revolution, we run our econometric models and compare the determinants of banks profitability during the periods pre-revolution and post-revolution. Table 6 presents results of this additional study.

a. Pre-revolution period

The coefficient of the capitalization variable (CAP) is positive and significant for all the specifications of NIM's equation and ROA's equation. This result suggests that well capitalized banks have better profitability during the period preceding the social revolution. Indeed, well-capitalized banks support lower bankruptcy costs so they are not risky and they are more attractive for investors.

The relationship between banking activities generating interests (NIM) is positive and significant only for the NIM's equation and for all the specifications. However, the coefficient of non-interest bearing activities is a negative and not significant for NIM's equation and ROA's equation. This result confirms that the principal activity of lending is the primordial determinant of profitability.

The inefficiency rate (OVERHEAD) has a positive and significant impact on NIM for the first specification of the model and has a negative and significant effect on ROA for all its model specifications. This result suggests that the lower rate of inefficiency raises the ROA and in order to improve their profitability banks shift the increase of operating fees to their customers in terms of lower deposit rates and/or higher lending rates.

The bank's size (SIZE) has a positive and significant effect on profitability. This result confirms that large banks have better profitability. Indeed, large banks have greater level of credits and various products, which increase their profitability.

The concentration of banking market (CONC) is negative and significant only for NIM. Thus, concentration decreases the level of banks' profitability. This result corroborate to the findings of Behname (2012) suggesting that a negative coefficient of concentration variable indicates that smaller banks are being more profitable than larger ones.

The size of the banking sector (SBS) has a negative and significant coefficient on banks' profitability and this result is true for the two proxies NIM and ROA. Thus, a large banking sector is interpreted by a lower level of profitability for banks, suggesting that banks are in a rough competition and come by lower profitability. The relative size of the bank (RSIZE) has a positive and significant effect on net interest margins. The development of stock market improves banks profitability and this result confirms the possibility of existence of complementarities between stock market and debt market (Demirguc-Kunt and Huizinga, 2000).

b. Post-revolution period

The relationship between capitalization ratio (CAP) and profitability keeps its positivity but it is significant only for the third specified NIM's equation. During this critical period, well-capitalized banks are averse to risk and support lower costs of bankruptcy and still the principal mean of financing, which improve the profitability of banking institutions.

The relationship between banking activities generating interest (BLOAN) and profitability is positive and significant for NIM's model and for all specifications. This result suggests that profitability of banks depends upon loans for revenue and represents the principal source of revenue for Tunisian banks even after the revolution.

The inefficiency ratio (OVERHEAD) has a positive and significant for all the specifications of ROA model suggesting that Tunisian banks tend to operate after the jasmine's revolution with high profitability to rise above their bad costs' management quality.

The coefficient of banks' size (SIZE) is positive and significant during post-revolution for the NIM and ROA equations and for all specifications. This positive correlation can be explained by the fact that the large banks benefit from the rule «too big to fail» and thus they are less risky. Those banks may engage in risky activities, claiming to insured beings saved by supervisory authorities who are obliged to act as lender of last resort.

Inflation (INF) presents a negative and significant coefficient in the NIM models. The increase of the inflation rate leads to a lower net interest margins. During the post revolution period, Tunisian banks do not anticipate inflationary environment and so bank costs increase faster than revenue and ultimately it deteriorates banks' profitability.

The banking market's concentration (CONC) turns on a positive and significant impact on net interest margins during the post-revolution period. The concentration is profitable for large banks due to the lower levels of loan portfolio. Indeed, market power emerges from a concentrated banking market, which encourages banks to not engage in highly risky operations and better customer selection especially during the revolution period. This behavior leads to a better level of profitability. Moreover, banks with market power will limit their risk taking in order to protect the revenue ensuing from that position. This result corroborate to the findings of Matutes and Vives (2000).The banking sector size (SBS) has a negative and significant coefficient on banks' profitability and this result is true for the proxy NIM. During the post-revolution period, a large banking market generates a lower level of profitability for banks. During this period, banks are in great competition and rivalry to survive and so they reach a lower profitability. Thus, in those circumstances of post-revolution, competition seems to be more distrustful of profitability than concentration.

During the post-revolution period, the coefficient of the relative size of banks to stock market (RSIZE) is positive and significant when we enter return on assets as a measure of profitability. In those circumstances, the development of the Tunisian stock market ameliorates the profits of banks. This result suggests that there are complementarities between banking market and stock market, which could lead to an increase in bank profits. Exclusively, stock market development and the availability of equity financing to firms may enlarge their borrowing capacity. Besides, the availability of information through stock markets facilitates to banks the evaluation of credit risk. This can lead to an increase in bank profits.

Table 6. Jasmine revolution and determinants of Tunisian banks profitability

	Pre-revolution								Post-revolution							
	(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)	
	NIM	ROA	NIM	ROA	NIM	ROA	NIM	ROA	NIM	ROA	NIM	ROA	NIM	ROA	NIM	ROA
Intercept	-0.70**	-0.01	-1.11***	-0.01	-0.80**	0.005	·1.13***	-0.01	-0.77	-0.14***	-0.66	-0.13**	-0.19	-0.14**	-1.06**	-0.09*
	(-2.57)	(-0.22)	(-3.14)	(-0.14)	(-2.04)	(1.01)	(-3.13)	(-0.24)	(-1.55)	(-2.72)	(-1.25)	(-2.58)	(-0.45)	(-2.41)	(-2.16)	(-1.95)
CAP	0.73***	0.03	0.83***	0.03	0.84***	0.04	0.84***	0.04	0.09	0.15***	0.16	0.15***	0.56*	0.14***	0.25	0.10***
	(9.13)	(1.41)	(10.16)	(1.39)	(8.31)	(1.40)	(10.07)	(1.44)	(0.34)	(4.08)	(0.53)	(4.02)	(1.78)	(4.26)	(0.85)	(2.64)
BLOAN	1.00***	0.002	1.13***	-0.003	0.94***	-0.01	1.14***	0.01	1.07***	-0.008	0.92**	-0.01	0.78***	-0.01	1.04**	0.004
	(4.51)	(0.04)	(4.04)	(-0.07)	(2.98)	(-0.20)	(3.87)	(0.24)	(2.99)	(-0.28)	(2.20)	(-0.55)	(2.71)	(-0.35)	(2.30)	(0.16)
NIBA	-0.22	0.004	-0.28	-0.001	-0.55	-0.01	-0.28	0.02	-0.24	-0.03	-0.38	-0.04	-0.35	-0.04	-0.20	-0.01
	(-0.88)	(0.08)	(-0.94)	(-0.02)	(-1.56)	(-0.31)	(-0.86)	(0.41)	(-0.67)	(-1.20)	(-0.87)	(-1.39)	(-1.21)	(-1.16)	(-0.43)	(-0.5)
OVERHEAD	3.28*	-1.20***	2.06	-1.2***	1.51	-1.2***	2.09	-1.1***	-2.73	0.30*	-2.30	0.32*	0.76	0.25	-2.72	0.29
	(1.77)	(-3.27)	(1.15)	(-3.22)	(0.90)	(-3.10)	(1.18)	(-3.23)	(-1.15)	(1.69)	(-0.96)	(1.73)	(0.31)	(1.45)	(-1.08)	(1.5)
SIZE	0.02**	0.002	0.048***	0.002	0.05***	0.003	0.048***	0.001	0.03**	0.009***	0.038**	0.009***	0.06***	0.009***	0.049**	0.005***
	(2.03)	(0.80)	(3.53)	(0.80)	(3.92)	(0.83)	(3.32)	(0.51)	(2.27)	(5.22)	(2.56)	(5.16)	(4.18)	(5.05)	(2.62)	(2.97)
INF			0.12	0.001	0.005	-0.001	0.126	0.002			-1.98*	-0.07	-1.94*	-0.08	-2.30**	-0.01
			(1.52)	(0.21)	(0.05)	(-0.15)	(1.53)	(0.47)			(-1.82)	(-0.96)	(-1.93)	(-0.78)	(-2.16)	(-0.25)
GROWTH			0.004	-0.03	-0.26	-0.05	-0.007	-0.03			0.73	0.01	0.81	0.02	0.84	0.02
			(0.02)	(-0.60)	(-0.81)	(-0.99)	(-0.02)	(-0.66)			(1.12)	(0.35)	(1.22)	(0.37)	(1.26)	(0.73)
CONC					-0.03**	-0.001	0.007	-0.0001					0.27***	-0.006	0.45***	-0.01
					(-2.41)	(-1.10)	(0.77)	(-0.11)					(3.22)	(-1.01)	(3.94)	(-1.22)
SBS					-0.22***	-0.01***							-0.60***	0.009		
					(-2.74)	(-2.81)							(-4.18)	(0.60)		
MCAP					0.01	0.02							-1.08	0.04		
					(0.07)	(0.35)							(-1.60)	(0.53)		
RSIZE							0.83	0.59***							-1.24	0.69***
							(0.68)	(3.41)							(-0.49)	(4.69)
Fisher	0.607	0.1726	0.6597	0.1595	0.6869	0.1643	0.6581	0.2069	0.4899	0.3363	0.5003	0.3257	0.6295	0.3144	0.5355	0.4264
Adj R²	94.78***	10.98***	68.38***	9.04***	29.57***	11.71***	48.94***	9.07***	25.19**	10.62***	18.40***	7.51***	25.83***	6.05***	18.46***	14.88***

5. Conclusion

The results obtained show that the individual characteristics of the bank have a considerable part in the variation in bank interest margins and net profitability. A high net interest margin and profitability tend to be associated with banks with relatively high capital. Bank loans are also an important determinant of net interest margins and profitability and have a positive and significant effect whereas non-interest-bearing assets have a significant and negative coefficient, which asserts that the profitability of banks generally results from the activities of the loans. Second, among the macroeconomic indicators used in our study we find that only GDP growth has a positive effect on net interest margins and subsequently on profitability. This result is due to an increase in the rates of loans with a low rate of default following economic growth and subsequently an increase in the banks' net interest margin. Finally, depending on the financial structure and its impact on net interest margins and profitability, we find that concentration is less beneficial to Tunisian banks than competition. The development of the relative size of banks to capital market has a positive effect on bank profitability; this approves the complementarities between the banking sector and the growth of the stock market. During the financial crisis, the internal and macroeconomic determinants of profitability have not changed and they remained almost the same effect on the net interest margins and the profitability. Only the positive effect of activities generating interests turns on a negative effect on profitability after the crisis because of the increase of restricted loan. Thus, the financial crisis does not have a significant effect on the determinants of profitability, since this crisis did not spread to Tunisia.

During the revolution, which has a serious impact on the Tunisian economy and concerning the internal determinants of profitability, a higher profitability is associated with bank loans, size and efficiency. These findings approve that the traditional lending business still the principal determinant on net interest margin even in worst circumstances. Besides, the return to efficiency and good quality of costs management generate to better profitability because of the change of the political environment and the absence of corruption during this critical period. Moreover, large banks are less risky and realize better profitability. For macroeconomic determinants, only inflation has a negative impact on net interest margins. This result proves that the banks do not anticipate the occurrence of inflation and consequently do not benefit during periods of inflation and cannot adjust interest rates and consequently interest income declines faster than costs. The effect of concentration of banking

market has turning on a positive and significant one on net interest margins during the post-revolution period. Indeed, market power emerges during post-revolution period from a concentrated banking market, which do not encourage banks to undertake highly risky operations and better customer selection. This behavior improves the level of banks profitability. In addition, the banking sector size has a negative and significant coefficient on banks' profitability. During this period, banks are in massive competition and rivalry to survive and so they reach a lower profitability. Hence, in those circumstances of post-revolution, competition seems to be less beneficial for profitability than concentration. On the other hand, the relative size of banks to stock market has a positive effect on profitability. This result suggests that even during the post-revolution period there are complementarities between banking market and stock market, which could lead to an increase in bank profits.

Improving the profitability of Tunisian banks needs to be driven by strengthening banks' capitalization through national regulatory programs and by reducing the proportion of non-interest-bearing assets to bank lending. This improvement also requires a reduction in concentration and an impulse of competition, a stimulation of the development of the capital market since the existence of complementarities between banks and the securities market are complementary. The study provides some interesting policy implications for bank management in Tunisia. In order to improve academic understanding, this research can be enlarged by testing if there are other determinants of bank performance like interest rates, ownership structure, board of directors and deposit insurance. In fact, lower interest rates could affect adversely the net interest margins because the lending activities of banks are based on those rates. The direct effects of low rates could be small relative to the economic benefits, including through better support for asset quality. Fluctuations in net interest margins could be a significant source of uncertainty in bank profitability and could have negative effects for particular institutions. However, variations of interest rates seem unlikely to damage stridently the banking sector' health through their effects on net interest margins. Concerning ownership structure and board of directors, it can also be of assistance to mitigate agency costs. Where managers own shares in the bank, they are likely to take decisions that will ensure an increase of shareholder wealth by rising of net interest margins since their interests are more aligned with shareholders' interests (Demsetz and Lehn, 1985; Jensen and Meckling, 1976; Saunders et al., 1990). Consequently, a higher percentage of insider ownership is expected to reduce anticipated agency costs due to better alignment of shareholder and managerial control. However, higher insider ownership may advocate that

managers will have sufficient voting power to ensure the security of their position in the firm. In this situation, it becomes difficult to eliminate weak and useless management resulting in managerial entrenchment. As consequence, the association between interest margins and insider ownership and can be ambiguous while insider ownership can decrease agency conflict and increase agency conflict. Regarding deposit insurance, it has an uncertain effect on net interest margins. On the one hand, deposit insurance is helpful to border moral hazard problems and considerably reduces risk taking of banks, could bring a valuable impact on bank profitability and stability by decreasing the deposit rate for insured deposits given the insurance protection. On the other hand, deposit insurance could aggravate moral hazard in bank lending and could enhance bank risk taking by mispricing deposit insurance in order to increase the contingent pay-out from the deposit insurance agency. Correspondingly, deposit insurance could have an adverse effect on bank stability and profitability, growing the likelihood of banking crises.