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Modelling Non-Interest Income at Tunisian Banks

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Abstract

The aim of this paper is to analyze the determinants of the non-interest income for the Tunisian context by the use of data of 10 Tunisian deposit banks. Our sample is observed during the period 1998-2009. Using panel data estimation; our findings reveal that the information and communication technologies adoption and the banking characteristics are the main influential factors shaping the tendency of non-interest income in Tunisia.

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Introduction

Broadly, a bank can be defined as a financial institution whose principal function consists in managing money. In this sense a bank collects deposits from the public and it allocates loans by making advances out of the funds received as deposits to needy households. A bank is also the manager of a payment system and settlement.

Banks have received a particular attention by scholars. For example, Bagehot in « Lombard Street: a Description of the Money Market », published in 1873, argued that banks have played a major role for the industrial revolution of the UK in the beginning of the 19th century. Schumpeter (1912/1934), in "The Theory of Economic Development" argued that banks play a major role in the economy via the allocation of capital and the creation of wealth. More recently, Merton (1993) states that, a well developed smoothly functioning financial system facilitates the efficient life-cycle allocation of household consumption and the efficient allocation of physical capital to its most productive use in the business sector.
Contemporary banking theory classifies banking functions into four main categories[1]: Offering liquidity and payment services, transforming assets, managing risks and processing information and monitoring borrowers

[1] This, of course, does not mean that every bank has to perform each of these functions. Universal banks do, but specialized banks need not. for ,ore detail; see Freixas and Rochet (2008)

Nowadays, banks became such as the dynamo of the economy and their role became more and more important. Banks are the most important channel of money circulation between households, firms and financial markets; they become the hub of the economic development.

The last few decades have been marked by a globalization of financial market and the creation of a global integrated economy. Financial markets have emerged spectacularly and financial innovations have developed at a stunning rate. Barriers to international investment and finance have declined dramatically and access to financial services is becoming ever easier than before. This new environment followed by the surge in Information and Communication Technology (ICT) of the mid-nineties have transformed the banking sector[2]. This sector has known some spectacular change characterized by: The entry of non-bank financial institutions into traditional banking markets;

- The emergence of a new set of non-financial companies (such as many supermarkets) in the markets for retail and wholesale financial services;
- Non-banks offering payments facilities (Carrefour; Géant; etc..);
- The development of in-house company banks.

Nowadays, banks exercise an extensive variety of business than before[3] (their traditional financial intermediation: collecting deposits and making loans). Banks have become financial services enterprises and in many advanced financial service economies off-balance sheet income of banks exceeds income earned from traditional financial intermediation business. Banks start to be subject to substantial structural and operational change. As a result, some of the traditional monopolies and inherent comparative advantages possessed by banks are being eroded (Llewellyn – 1999).

Due to the new banking environment, characterized by high competition and pressure, banks were moved toward the diversification of their activities and they launched new products and services. In France, banks become the '*one stop shop'*: they offer telecommunication services, all kind of insurance, mortgage and many other financial and non financial services. In Korea, a legislation on the integration of the capital market" of 2009 allowed banks to expand further into financial services activities unrelated to traditional bank intermediation (Kim and Kim 2010). As a result, the interest income, which is the chief indicator of the banking profit, has decreased drastically and non interest revenue increased surprisingly.

The importance of the non-interest revenue and factors that determine its level is the principal motivation of our study. To empirically analyze this issue, we use data of 10 Tunisian banks observed during the period 1998-2009 and we perform panel data regression.

The reminder of this paper is organized as follows. Firstly, we present the structure of the Tunisian banking system, the use of the electronic means of payment and the level of the Non-interest Income (NII, henceforth). Second, we present a literature review of the determinants of the NII and the hypothesis of the model. Third, an empirical study on the determinants of the non-interest income is analysed. In the last section, we conclude.

The Tunisian banking system: structure, use of the electronic means of payments and the level of NII

In this section, we give an overview on the structure of the Tunisian banking system; the degree of IT usage by banks and the level of NII drown from the diversifications of banking activities.

[2] The growth of the Internet and wireless communication technologies are dramatically changing the structure and nature of financial services. Internet and related technologies are more than just new distribution channels—they are a completely different way of providing financial services. See HAMDI 2008.

[3] One example is commercial real estate (CRE) in the United States, an area in which some banks have become increasingly concentrated. The same things for the insurance industry, banks are interested to practice the insurance activities, they are moving toward the Bank Insurance Model (BIM), sometimes known as the Bancassurance.

Structure of the Tunisian banking system
The Tunisian banking system is currently constituted of 20 deposit banks. In 2005, its organization has known three major events: first the creation of a new bank called "Banks of Financing of Small and medium-sized firms", second the privatization of the "Banque de Sud" which gives the birth of "Attijari Bank" and third the change of the statute of some development banks (STUSID, BTL, TQB and BTK) to universal banks. In January 2008 and within the framework of the program of restructuration of the banking system there was the privatization of the "Tuniso-Koweitienne Bank" by the transfer of 60% of its capital to the profit of financial company «OCEOR», a subsidiary of the French group "Caisse d'Epargne".

In Tunisia, the banking system is mostly made-up of private banks with mixed capital (70%); nevertheless the public banks play a major role in financing the Tunisian economy. Among the 20 despot banks, 11 of them are listed in Tunis Stock Exchange[4].

The use of the electronic means of payments
Since a few years, new forms of electronic payments have emerged. Their aim is to enhance and improve the efficiency of traditional payment systems notably cash and checks (Hamdi and Bougi 2010). These new devices have information stored in a microprocessor or on a computer database which allow data- including account balances, personal information, PIN codes, the history of the shopping information and loyalty rewards- to be stored on the card (Hamdi 2011). In Tunisia, the use of new means of payments has emerged significantly the recent years as the two graphs below illustrate.

According to the available data on the Tunisian e-payments services, presented in the chart 2 the number of cards (with payment and withdrawal functions) passed from 341.000 in 2000 to 1.087.015 in 2006; with 52% of them are payment cards,16% withdrawal cards and 32% are CIBT card (interbank electronic card). In 2009, the number of card reached 2082905 against 1870125 in 2008 and 1259533 in 2007.

As the chart 1 above illustrates; the number of ATM evolved at a high rhythm, their number was 206 in 1998; it becomes 1409 ATM in 2009. In the same way, the number of EFTPOS (Electronic Funds Transfer at Point of Sale) knew an outstanding evolution passing from 2158 in 1998 to 4842 in 2002. This number was 7391 in 2006 to reach 10450 in 2009.
As for the level of withdrawals, it passed from 242 million dinar in 2000 to 1626 million dinars in 2006, whereas the volume of the e-payments passed from 246 million dinars to 413 million dinars for the same period.
Regarding the others means of payments, there is also the e-dinar card which is an electronic money card loadable at ATM which enables cardholders to pay for retail transaction without the use of EFTPOS. Actually, the mobile payment is at its earlier stage of development in Tunisia, its widespread use needs undoubtedly some time as this innovation is the latest one in the banking sector.

Evolution of NII per bank and per period
The graph below illustrates a comparison of the level of NII for some Tunisian banks. Its shows that BIAT bank earns the highest NII with a level of 1174333 MDT followed by BNA. This means that the two banks diversified better their activities than their competitors.

BT and UBCI banks have the lower level of NII; this could be the result of the degree of modernization of their financial services or their strategy toward the traditional banking activities. In order to have an idea about the evolution of the NII over the time, the graph 4 below examines the level of the NII for the period 1998-2009. This study allows determining the period in which we have an increase in the NII.

The graph shows an evolution of the level of NII since 1999. The level of the NII starts to take higher values since 2005 with a value of 487426 MDT. This increase can be explained by the orientation of banks toward the use of new technologies of information and

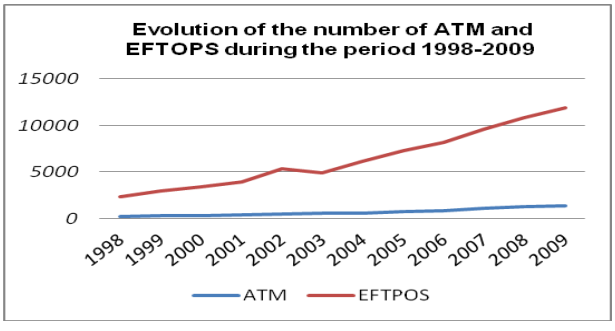
[4] Full name of banks are presented in appendix n°2

communication. In the same way, it result an increase in the use of electronic means of payment such as ATM, EFT and credit cards. We quote for example the evolution of the number of the ATM from 206 in 1998 to 1409 in 2009, 2158 EFTPOS in 1998 to 10450 in 2009 and from 185000 credit cards in 1998 to 2082905 in 2009. In the same way, banks introduced other services online for their customer's with is also a new source of revenue.

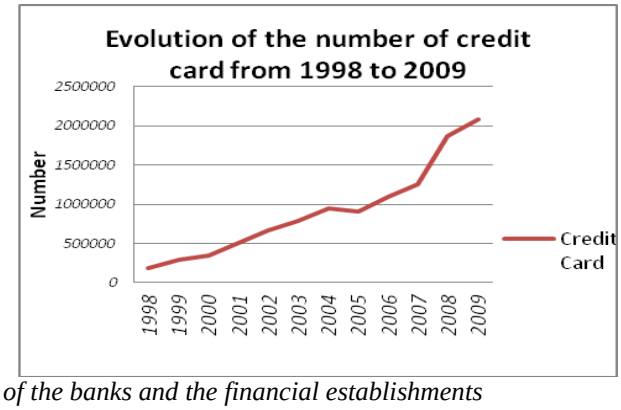
The determinants of non-Interest Income: literature review and hypothesis

Several theoretical and empirical studies on non-interest income showed the level of information and communication technology usage, the banking characteristics and the macroeconomic factors are the principal contributors that influence the new banking revenue.

Graph 1: Evolution of the number of ATM and EFTPOS

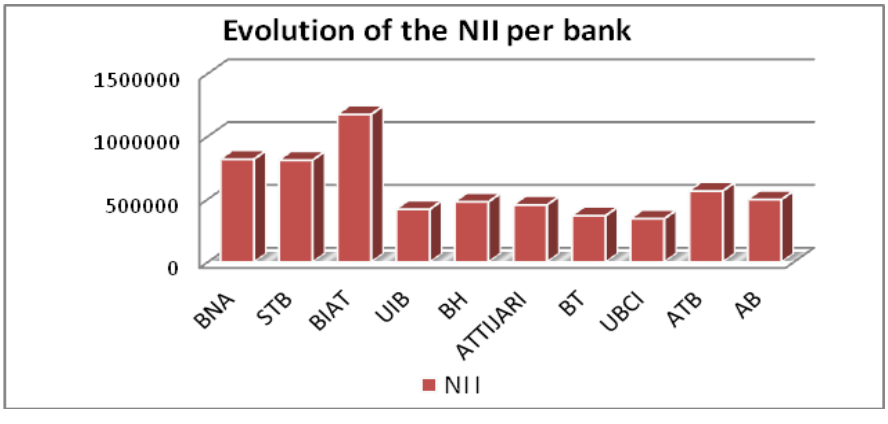


Graph 2: Evolution of the number of credit cards



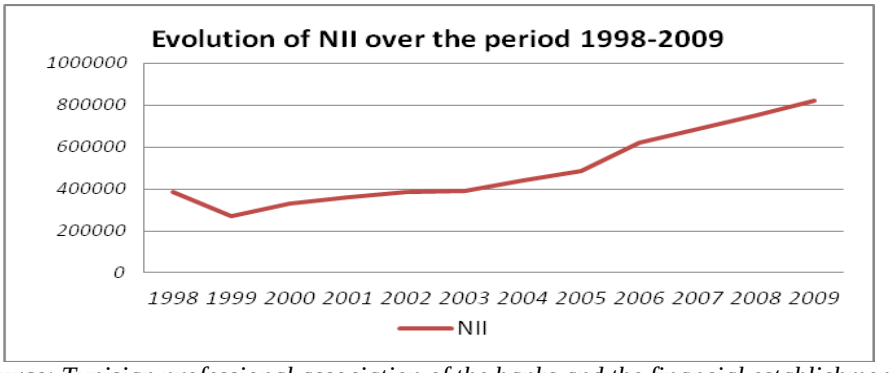
Source: *Tunisian professional association of the banks and the financial establishments*

Graph 3: *Evolution of the NII per bank in Tunisian in Dinar.*



Source: *Tunisian professional association of the banks and the financial establishments*

Graph 4: **Evolution of the NII**



Source: *Tunisian professional association of the banks and the financial establishments*

2.1 ICT and the deregulation policy

Since the nineties, the banking sector has witnessed a structural change thanks to sweeping financial deregulation and a rapid surge in information flows and communications technology in the financial markets. Deregulation enhanced competition between banks, nonbanks, and financial markets. In response to these competitive pressure and opportunities, many banks embraced the new ICT tools as new commercial and financial strategies. As a result, this policy has transformed their production and distribution channel and resulted in large increases in noninterest income. The empirical evidence of the study of Craigwell. R and Maxwell. C (2005) supports bank characteristics and the ATM technology as the most influential factors shaping the trend of non-interest income in the banking industry in Barbados and suggests that non-interest income is positively related to both bank profitability and earnings volatility.
H1 the advance in information and communication technology exert an effect on the level of the non-interest income

2.2 Banking caracteristics

The size of bank is one of the important characteristics which can affect the non-interest income. Joon-Ho Hahm (2008), by using a dataset of 662 relatively large commercial banks in 29 OECD countries from 1992 to 2006, find that banks with relatively large asset sizes, low net interest margins, high impaired loan ratios, and high cost-income ratios tend to exhibit higher non-interest income shares. De Young and Hunter (2003) and De Young *et al*. (2004) also argued that bank size is positively correlated with the degree of non-interest income expansion.

Rogers and Sinkey (1999) find that core deposits and net-interest margins are both negatively correlated with non-interest income, while bank size is positively correlated with non-interest income. *H2 The size of the bank can affect the level of the non-interest income.*

Another factor related to the banks which can increase or reduce the level of the non-interest income is the deregulation policy. Well-managed banks responded to these competitive pressures by becoming more cost-efficient and more revenue-efficient. This included offering customers an expanded array of new and/or non-traditional fee-based products, selling increased amounts of existing fee-based products, pricing fee-based products more efficiently (e.g., by unbundling retail deposit products), and improving the quality of fee-based products and services so that they commanded higher prices. De Young and Rice (2004) find that well-managed banks expand more slowly into non-interest activity and that greater levels of non-interest income are associated with poorer risk-return tradeoffs. De Young and Roland (2001), using the data of 472 US commercial banks between 1988 and 1995, also find that non-traditional activities of banks are associated with both higher revenue volatility and higher total leverage. Valverde and Fernandez (2007), using bank data, find that revenue and market power increase as output becomes more diversified toward non-traditional activities in banking.

Given the literature which treats the relationships between the banking strategy and the level of noninterest income we can put the following hypothesis: *H3 the banking strategy can affects the non- interest income*

2.3 The macro factors

Theorical determinants of bank performance and financial resilience stem from two broad sources: micro bank-specific factors and macro factors. In this development we will be interested for the macro factors which include (*GDP)* growth and inflation rate (*INF)*. Previous studies have reported a positive association between inflation and bank profitability. High inflation rates are generally associated with high loan interest rates. However, if inflation are not anticipated and banks are sluggish in adjusting their interest rates then there is a possibility that bank costs may increase faster than bank revenues and hence adversely affect bank profitability. The GDP per capital growth is expected to have a positive impact on bank's performance according to the well documented literature on the association between economic growth and financial sector performance. Ben Naceur and Goaied (2008). As the macroeconomic factors can affect the performance of the banks, they can affect the level of non-interest income. *H4 the macro factors exert an effect on the NII.*

The empirical study

Data and methodology

To analyze the determinants of the NII, we use data related to 10 Tunisian banks observed during the period 1998-2009. Data was collected from reports of the Tunisian central banks and from the Tunisian professional association of banks and financial institutions. For macroeconomic variables they were obtained from the national institute of statistics (INS). The econometric method used in this paper is the panel data estimation.

The non-interest income is a function of some variables which can affect it level. These variables are classified into three different components: technological components, banking components and macroeconomic components. The equation of the model can be written as follows:

NII = f {Technology, banking characteristics and Macro factors}

$$NII = \beta_0 + \beta_1 ATM_{i,t} + \beta_2 CARD_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 EQUITY_{i,t} + \beta_5 STRAT_{i,t} + \beta_6 NIM_{i,t} + \beta_7 DEPOSIT_{i,t} + \beta_8 CREDQ_{i,t} + \beta_9 EFFEC_{i,t} + \beta_{10} HHI + + \beta_{11} GDP + \beta_{12} INF + \varepsilon_{i,t} \quad (1)$$

Where;
(NII) the ratio of non-interest income, measured by noninterest income divided by the total assets. *(ATM)* the number of the ATM per capita. *(CARD)* the number of credit card per capita. *(SIZE)*, the bank size measured by the natural logarithm of total assets. *(EQUITY)* value of equity measured by the total equity to the total assets. *(STRAT)* the banking strategy measured by total credits to total assets. *(NIM)* net interest margin measured by the differential of interest divided by the total assets. *(DEPOSIT)* total deposits to total assets. *(CREDQ)* credit quality (credit risk) measured by the total credit to the total assets. *(EFFEC)* the banking efficiency measured by the total interest received by the total interest on deposit. *(HHI)*, measured by the Herfindahl-Hirschman Index. (DEREG), dummy variable to measure the banking deregulation. It takes 1 in the period of deregulation, 0 otherwise. *(GDP)* measured by the growth of real GDP per capita. *(INF)* is the inflation rate.

Results and interpretation

In this section, we discuss the results of the equation 1.

We show that the result of the Hausman test is not significant and the R-sq *between* at the level of 24,91% is higher than the R-sq *within* 54,14%. So the Random effect estimation is the proper method. For more detail on the descriptive statistic and the correlation matrix, see appendix 3 table 1 and table 2.

For the variables which have negative and significant effect on the NII there are: interest margin (NIM), the level of concentration (HHI) and the inflation rate (INF). Regarding variables which are correlated significantly and

positively with the dependent variable we notes the size of the banks (SIZE), the credit quality (CREDQ) the banking strategy (STRAT), the number of ATM and the number of credit CARD. The other variables- equity, the credit quality, the efficiency and the growth of GDP- do not have any significant effect.

The variable *SIZE* has a positive and significant effect on the non-interest income with a level of 5% and with a weak coefficient of 0,72%. The more a bank has big size, the more its services are diversified. Among these services there are the electronic means of payments which have become a principal source of revenue due to the fees and commission. indeed; banks offering new electronic platforms and new payments solutions see their profit increase drastically. This conclusion lead to accept the hypothesis *H2 the size of the bank can affect the level of the non-interest income* is accepted.

Table -1 Random effects regression of the determinants of NII

Nii	Coef.	Std. Err.	z	P>|z
size	.0054659	.0026489	2.06	0.039**
equity	-.0327362	.0253844	-1.29	0.197
strat	.008254	.0044447	1.86	0.063*
nim	-.3725853	.0107907	-3.45	0.001***
credq	.0221968	.0073254	3.03	0.002***
deposit	.0774106	.0608994	1.27	0.204
effec	.0410315	.0308362	1.33	0.183
hhi	-.071574	.0243518	-2.94	0.003***
ATM	.1638908	.0530391	3.09	0.002***
card	.1550211	.0570049	2.72	0.007***
inf	-.1758621	.0831965	-2.11	0.035**
gdp	.0303428	.0569247	0.53	0.594
_cons	.1013369	.0369104	2.75	0.006***
R-sq:within	0.2491			
Between	0.5414			
Nbre obs	120			

There is a positive and significative relation between the banking strategy *(STRAT)* and the level of the non-interest income. The banking strategy indicator; measured by total credits to total assets, shows that an orientation toward new activities rather than traditional activities can bring back other return different from those coming from the interest on loans. Banks that invest in new technology and that diversify their revenues may reduce the liquidity risk because non-interest income plus play a major role in the banking profitability. For the Tunisian case, there is a positive relation between STRAT and NII, so we can conclude that the Tunisian banks are interested in the diversification of their activities and in investment in the new means of payment based on the information technology and communication. This result leads to accept the hypothesis *H3 the banking strategy can affects the non-interest income.*

The net interest margin *(NIM)*, is negatively and significantly correlated with the non-interest income. We can say that there is an inverse function between those two variables. Once the level of the net interest margin increases it causes a reduction in the non interest income. A banks with a higher net interest margin compared to the NII indicates that there is an orientation toward the development of the traditional activities rather than the new activities based on the information

and communication technology and which generates more fees and commissions.

The credit quality *(CREDQ)* exerts a positive and significative effect on the non-interest income. This relation is not surprising because when the credit risk is well managed the net interest margin increases. The level of the non-interest income is negatively and significantly correlated with the level of concentration of the Tunisian banks. A more concentrated banking system presents a weak competition characterized by the absence of the incentive to more innovation and modernization of the banking system. This did not means that the Tunisian banking system has not knew an effort of modernization but it requires a more development of the process of innovation and more adoption of the IT.

For the variables representing the advance in information technology (ATM and CARD), they exert a positive and significant effect on the dependent variable (NII). This finding can be interpreted as follows. The more the number of credit cards and banking automated teller machine increase, the more fees and commissions increase. Thus, the level of the interest income increases. With this result, we can accept the hypothesis *H1 the advance in information and communication technology exert an effect on the level of the non-interest income*

The results show that there is no significant effect of the variables: equity, deposit, efficiency and growth domestic product on the level of non-interest income for the Tunisian banks. For the macro factor, we find that only the inflation rate *(INF)* exerts a negative and significative effect on the level of non-interest income. The coefficient of inflation rate is significantly negative with the non-interest income. These results suggest that a higher inflation environment limits the non-interest income expansion of commercial banks. So, we reject the hypothesis *H4 the macro factors exert an effect on the NII* since the effect of GDP is positive and not significant.

Conclusion

The non-interest income constitutes the revenue that banks earn from activities other than lending operations. An increase of the NII improves the banking profitability and reduces the risk of the lending operations by more diversification of banking activity.

The growth and the diffusion of the non-interest income is explained in the literature by the advance in information and telecommunication technology and the deregulation witch are associated with the birth of the new activities. Thus, the non-interest is a basket of new revenues based on deposit and transaction fees, annual fees, monthly account service charges; inactivity fees, check and deposit slip fees.

In this paper, we analyzed the determinants of the non-interest income for the Tunisian context by the use of data of 10 Tunisian banks observed during the period 1998-2009. Using panel data estimation; our findings indicate that the adoption of innovations based on the information and telecommunication technology such as ATMs; Cards and the banking characteristics are the main factors which explain the expansion of non-interest income at Tunisian deposit banks.

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Appendix N°1: Values of NII per bank in MDT

	BNA	***STB***	***BIAT***	***UIB***	***BH***
1998	*64216*	*71558*	*60645*	*29280*	*28920*
1999	44030	42956	42131	28426	16612
2000	47500	67471	56070	32259	18950
2001	53678	62089	62401	38831	30135
2002	55367	69086	69772	35890	31562
2003	55518	63938	68026	29743	29991
2004	56493	69215	82296	36319	34005
2005	63051	64458	86083	34023	42589
2006	82156	69322	141597	36956	52598
2007	91463	71352	150270	35558	64559
2008	102881	74243	171563	40663	62748
2009	*101460*	*84527*	*183479*	*40861*	*65113*

	ATTIJARI	***BT***	***UBCI***	***ATB***	***AB***
1998	*27754*	*23762*	*30371*	*17527*	*32292*
1999	17210	18412	17484	17646	25243
2000	20231	20626	19537	18363	27517
2001	20875	18903	19376	22423	30978
2002	23176	24399	19175	24386	33451
2003	23235	26342	21564	37469	35726
2004	27852	27955	24503	43483	37104
2005	38204	33198	27900	56206	41714
2006	43242	43641	37403	68732	45216
2007	58055	40671	43479	77486	50852
2008	68763	42079	41039	85670	63128
2009	*84715*	*48315*	*41957*	*95645*	*73222*

Source: *Tunisian professional association of the banks and the financial establishments*

Appendix N°2

Table 1: Presentation of banks

Abbreviation	Full Name
AB	Amen Bank
ABC	Arab Banking Corporation (Branch onshore)
ATB	Arab Tunisian Bank
ATTIJARI	Attijari Bank
BIAT	Internationale Arabe Tunisian Bank
BFPME	Banks of Financing of Small and medium-sized firms
BFT	Franco-Tunisian Bank
BH	Banque de l'Habitat
BNA	Nationale Agricole Bank
BT	Tunisian Bank
BTE	Tunisian Emirates Bank
BTK	Tuniso-kuweitienne Bank
BTL	Tuniso Lybienne Bank
BTS	Tunisian Bank of Solidarity
Citibank	CitiBank (branche onshore)
STB	Tunisian company Bank
STUSID	Bank Société Tuniso Séoudienne d'Investissement et de Tunisian
TQB	developpement Qatari Bank
UBCI	Union Banks of trade and industry
UIB	International Union of Banks

Source: Tunisian Central Bank and the Tunisian association of banks and financial establishments

Appendix N°3:

Table 1: descriptive statistics of the three regressions

Variable	Obs	Mean	Std. Dev.	Min	Max
nii	120	.0211382	.0058061	.0128129	.043066
size	120	14.57534	.5212384	13.62969	15.74801
fp	120	.0917461	.0274043	-.0109848	.1871569
strat	120	.7133845	.1647161	.0302931	1.845829
nim	120	.0272321	.0089555	.0044348	.0585486
dep	120	.435136	.1121987	.2693281	1.346369
credq	120	-.0116103	.0116993	-.0997496	0
effec	120	.0009735	.0206367	-.1030483	.1175545
hhi	120	.0150496	.0116134	.0021065	.0434322
gab	120	.0000678	.0000349	.0000221	.000135
card	120	.0904013	.0542387	.0198215	.1995196
inf	120	.0324167	.0083762	.021	.05
gdp	120	.0341917	.0169095	.0165835	.063

Table 2: Correlation matrix

	nii	size	equity	strat	nim	dep	credq	effec	hhi	gab	card	inf	gdp
nii	1.0000												
size	0.1594	1.0000											
equity	-0.0273	-0.3127	1.0000										
strat	0.0287	0.0687	0.3060	1.0000									
nim	-0.0624	-0.4558	0.0796	0.2529	1.0000								
dep	0.2758	-0.1479	0.2335	0.5992	0.3838	1.0000							
credq	0.0084	0.0695	0.3470	-0.1905	-0.0943	-0.3432	1.0000						
effec	0.0805	0.0856	0.3614	-0.0708	-0.1006	-0.1763	0.0333	1.0000					
hhi	-0.1442	0.3787	-0.3154	-0.1628	-0.2638	-0.0942	0.0745	0.0641	1.0000				
gab	0.1611	0.1963	-0.0077	0.2987	-0.2565	0.2089	-0.0470	0.0233	-0.0775	1.0000			
card	0.1291	0.0975	-0.0032	0.2975	-0.2581	0.1977	0.0018	0.0444	-0.0699	0.1832	1.0000		
inf	-0.0343	0.3013	-0.1197	0.0224	-0.2971	-0.0283	-0.0117	0.0326	-0.0459	0.3912	0.2169	1.0000	
gdp	0.1961	0.0292	-0.0148	0.2268	-0.1016	0.2931	-0.0700	-0.0458	-0.0835	0.2107	0.4027	0.3958	1.0000