The Structure of the Tunisian Banking Market: An Empirical Analysis

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Abstract
This survey analyses the structure of the Tunisian banking market for the 1996–2013 period. We propose a model based on the Panzar-Rosse approach to determine the degree of competitiveness.We find that in Tunisia, the banking market is oligopolistic during all the long and short periods and the increase of the number of commercial banks in the 2000s did not change the market structure. These new banks are small and they need time to reduce the degree of bank concentration and to influence the conditions of banking activities: Over the period 1996-2007 and the 2008-2013 period, the change of banking indicators was very slow.
Keywords: Panzar-Rosse model, markets structure, deposit banks; Tunisian bank
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1. Introduction
Economic growth should bring about intensive competition between the Tunisian commercial banks which from now onwards must be more efficient after the reforms imposed by the authorities. This efficiency is closely related to the market structures.

Intuitively, we would consider the implicit understanding between the banks and the quasi-immediate alignment of the majority of the banks to any decision made by one of them, mainly when their number is reduced.

The knowledge of the degree of concentration, the efficiency scale and the banks performance on one hand, the analysis of the loan demand and the increase of the interest rate on the other hand have always been insufficient to determine the real bank market structures. So, the market contestability theory represents an appropriate alternative to the so-called markets. It enables to implementation of a less restrictive analysis than .that of pure and perfect competition terms. This theory broadens the notion of competition by taking into account the potential competition for the firms operating in the market

The approach consists in gauging simultaneously the degree of competitiveness and the degree of balance of the market. In so doing, several models have been developed. Their use on industrialized country-markets yielded a more accurate idea about competition in terms of financial brokerage.

This paper is structured as follow: Section 2 is devoted to the Tunisian banking system. Section 3 deals with the characteristics of the banking markets. We present the impact of the market structure on the banks' performance in section 4.

2. The Tunisian banking industry
In 2014, the Tunisian banking system comprises around the Central Bank thirty banks among which 21 commercial banks.

The restructuring of the Tunisian banking industry is a continuous process that was launched more than twenty years ago and was urged simultaneously by economic growth and the expansion of the economic activity in Tunisia and throughout the world. The variety of the banks' statuses and the restricted specialization implemented by some of them were a hindrance for a harmonious growth of the sector and did not allow for the service range variation at each bank's level.

Among the successive reforms, we can state the 2001 reform which called for decloistering is set within a new direction aiming at providing new opportunities for the operating banking institutions.

In fact, the success in implementing these measures should have modified the configuration of the banking system further to new alliances or partnerships that shall be imposed by the market which urges for more and more efficiency.

Besides, the will of the state to disengage itself from the banking sector and the 2001 Law governing the global bank have changed the Tunisian banking landscape during the last decade. Following these milestones: All these measures were carried out for bolstering the banks' financial capabilities in order to cope with any crisis likely to affect any banking system.

Until 2001, the Tunisian banking system operated in a controlled and over-protected framework. For a long time, the commercial banks benefited from a situation of government funding when the lack of efficiency was never sanctioned. However, the new trends and the structural economic tendency had to impose a new operating system where profit would be the result of the global efficiency of each individual bank and of its performance. Success would therefore be dependent upon the strategic governance system which creates equivalence between

the bank organization and its markets and in a broader sense its environment.

Streamlining and developing a banking system through a financial deregulation process should bring about the evolution the banking market structures.

Indeed, the reform undertaken was mainly focused on freeing the banks from the direct control of the Central Bank or alleviating it, and the introduction of other tools so as to achieve a better brokerage. These goals shall be fulfilled only by the resort to the market mechanisms. Yet, have the market forces really been operative?

The changes witnessed at the level of intervention modalities of the Central Bank makes us believe that they would inexorably lead to the free decision-making of the deposit banks and thereby competition between them. This liberalization should have an impact upon the level and the variability of the interest rates, debtors and creditors as well as the results of the banks.

In this regard, although the liberalization of the interest rates was initiated in 1987 for the creditor rates followed by the debtors' rates in 1994, except those applicable to the priority activities which liberated only in 1996, the rate variations since 1989, revealed what follows:

-The rates applied by the banks are very close to each other and even equal.

-Except the rate decrease decided by the authorities, the monetary –market rate has recorded insignificant variations and was constant during several straight years. Thus, the interest rates did not vary in such as a way as to reflect competition between the banks.

-Likewise, the monetary –market's rate has always been set by the Central Bank with a unilateral decision and without any explanation or precision related to the proposals made by the banks taking part in the bid for tenders. By keeping a steady monetary –market rate, the monetary authorities seek to gear the banking system towards meeting the requirements of the monetary policy.

No one can deny the importance of the economic environment evolution that affect the banks' operations.

As a matter of fact, a bank cannot assess that the overall circumstances in which it operates shall move in a positive trend as the tendency in the banking activity resting upon technological progress, the bank dynamic has to be powerful to cope with their market growth, with their regulation amendments, and with the choice made by the authorities in terms of monetary policy. Their performance depends upon their adaptation ability and their reaction to the environments moves.

The Tunisian banks have always strived to adjust both to the cyclical apparent shifts and to the slow radical transformations affecting the structural factors that shape the banking activity. The key banking operations take place in peculiar conditions triggered by the economic situation, the regulation and the preferences of the banks that they continuously undergo the effects of the environment moves.

The bank- market structure, the regulation, the attitude to the risk as well as the monetary policy are determining factors for the bank's assets', liabilities, and eventually for its results.

Banking concentration degree in Tunisia

The total assets, the credits' volume, the deposits, the number of banks as well as the number of bank branches constitute indices about the concentration degree.

The concentration in Tunisian banks can be measured by the proportion of transactions achieved by the most important ones in relation to the total of the whole banking industry for each one of the criteria here underneath mentioned.

Indeed, the share of the two first institutions in terms of assets has decreased from 42.55% in 1990 to 32.9% in2002 (-9.6) and to 30% in 2005. Likewise, the share of the three first ones has fallen from 8.95 points and that of the five first ranked has slumped by 2.52 points.

Regarding the customers' loans, the concentration has witnessed a downward trend since 1990. It has dropped by 14.42% for the two first banks, by 15.05% for the three first banks, and by 9.38% for the first ones.

As far as customers' savings are concerned, the concentration level has also shown a slowdown. It has stalled for the two first banks from 42.99% to 30.01%, for the three first banks, from 57.07% to 41.07%, and from 75.4% to 62.93% for the five first banks.

In 2002, the five first banks owned 62.20% of the whole bank branches in Tunisia, and perhaps 60% in 2005.

Three state-owned banks have always prevailed over the banking market. They benefited from the back-up of the public authorities which use them for the implementation for any new policy. In 2013, the same four banks dominate the banking industry.

3. Banking market characteristics
3.1.Theoretical and empirical evidence
The strict regulations and the interference of the monetary authorities make it difficult to carry out a normal functioning of the banking market mechanisms. As such, although the banks strive to meet the requirements of their customers, their freedom of action is very limited since they are hamstrung by the economic policy set by

the state.

With such an economic deformation, the referents of the economic theory related to the supply and demand and the balance might lose their significance. For instance, the rules related to bank' operation brings partially lose about distortions in the banking transactions and hamper the set of interest rates. Similarly the set of debtor rates as well as creditors' rates make wrong the traditional relationship between price and volume.

Regardless of these hindrances, the banking market present structural features that influence the banks' behavior. Their number overwhelmingly limited and small, makes these markets show particular structures.
The main features are as follows:
-The banking markets have a tendency to be small
-A limited number of suppliers (the banks) are confronted with the funding demand and the services of a big number of economic agents (individuals, companies, and administrations….)
-In the emerging economies, the number of deposit banks is small while the big size-banks seize upon the majority of the market share.
-Competition for savings collection is carried by the other financial institutions.
-The establishment of new banks in the market is regulated and strictly controlled.
-A « lateral » interdependence exists between each bank and the others. A given bank makes its decisions according to the potential decisions of all the other banks of each one of them or some of them. These decisions are the same as the supervising bank
-The existence of a coordinator who intervenes when deemed necessary in order to set the rates or the volume flow.

This situation corresponds to the oligopolistic structure where the competition degree is influenced by the concentration level. Each bank has to take into account its competitors' behavior implying that there is interdependence in the decision-making of the banks. As such, common understanding is easy. In this case two possibilities can be considered:
1- Having no benefit in to engage themselves in an endless competition, the banks agree to cooperate. This situation occurs when the bank sizes are so "equal» that none of them prevails. A common understanding is established and the banks have no more freedom to set the rates. The latter become identical and operate with a reference rate whose range and trend are set according to a common agreement.
2- The bank sizes are so various. The biggest ones therefore implement a leader policy to which the smaller ones shall adjust in order to survive and keep maximizing their profit by adapting a "follower" policy and thus the market power that enables them to handle the different rates and act upon the input and output volume. Following the policy of the leader banks would bring about better opportunities and a higher performance for the same risk. This defensive position is chosen especially by the non-risk taking managers.

The great banks, having a broader power in terms of rate setting act in a monopolizing behavior. To escape from their grip, the small banks endeavor to increase their activity volume whose potentialities are not fully covered and exploited by the great banks. It is the differentiation of the financial products and innovation that meet the needs of the customers.

The relationship customer-bank i.e. customer loyalty by differentiation and long term-commitments constitutes a hurdle for competition. Any decision or action, or any scheme set by the greatest banks has its repercussions upon all banks, especially the small ones. In both cases the link between price and quantity is loose owing to this noticeable oligopolistic connivance. Competition takes place only for deposits to be collected and loans to be allocated hence affecting the banks' behavior. Heggestad and Mingo (1976) affirmed that "at the same time traditions and regulations governing the banking industry act for substituting competition with quantity and competition by the prices". The interest rate does not represent the key bone of commercial banks.

This competition may be altered following implicit agreements between bankers regarding their geographical expansion so as to limit the number of branches to the requirements and space where they are established. Therefore the trend becomes monopolistic. As a matter of fact, "the banks cannot ignore their interdependence and raise the number of their branches beyond the level that would maximize their revenue."

Without concentration, the commercial banks will expand their network by anticipation or by response to positive signs heralding a growth of the markets. Their average costs would become very high and reflect the surplus of their productive potentiality. Such behavior affect their profit as long as the forecast evolution of the market did take place.

3.2. Impact of the market structure on the banks' performance.
Although the market structures represent an important determinant factor of the banks' performance and has imminent effect upon their behavior, the economic theory did not yield an appropriate shape for the performance-market structure relationship.

The main performance measurements of a bank are: Its profit rate, its interest rates on loans and its deposits' rates. These three rates make up the competition-degree indices between the banks.

Focusing on the concentration degree on the banking market we can assert that hiking it leads to high-loan rates, a decrease in the customer services and significant profits. This entails that a banks' efficiency can be subdued

On the contrary, any action aiming at concentration reduction minimizes the "monopoly income", stabilizes the debtors' and creditors' rates to a plausible level and keeps the banks' productive efficiency at a good level.

As regards the rates' configuration, the more limited the banks' number, the closer they are to a monopoly. Two alternative specifications are likely: the first, as stated below: the banks set owing the loan-demand increase and because they are unable to impact the refinancing cost, and the rates that allow them to maximize profit. The second alternative is due to keeping a constant intermediation margin regardless of the debtors' rate set by the authorities and reflects an exaggerated taxation of customers in need of bank services.

Neither of two behavior specification is satisfactory to assess properly the banks' performance. Indeed, the lack of a rational underpinning for these behaviors rules out any positive evaluation of the funds' use policy. The lack of efficiency is cut off by the achievement of significant profits.

The banks benefiting from the protection of the monopolistic or the oligopolistic framework, and the regulations seem more performing thanks to their profitability which is often interpreted as a recapitulating performance index.

In fact, in the monopolistic, or similar, markets, productivity rises sharply for the same risks and at the same time the operating as well as the resources' costs can be easily shrunk without having negative effects upon the tax level and the depositors' loyalty.

Widening the intermediation margin by all the banks to the detriment of customers (debtors' or creditors) stumps the banks' performance and their efficiency. The productivity of all the assets surge and the banks have a tendency to increase the ratio: Profits / variance of profit. In other words, the will meet the requirements of only less risky loans or shall invest only in the profitable and low- risk or even risk - free interests.

Henceforth, with a high-concentration level and thereby an understanding likelihood, the proportion of risky assets shows a weak trend. Likewise the firms, and customers whose economic activities are characterized by a high-activity risk or do not show good solvency-indices are unlikely to receive positive responses for their financing applications

Furthermore, applications for different kinds of loans is inelastic towards the rates, and if it so high, the aversion for ,the risk, owing to the reasons below stated does not mean no more use diversification. (With the assumption that this diversification is an obligation due to the regulations). We can wonder, however, if the banks' economic efficiency is not sought since their endeavor for financing the economy is focused on types of use, thus compelling the non-banking institutions to fill in the gap and therefore compete with the banks. Within the medium and the long run; such a trend, may reduce the activity scale of the banks, and so affect their adjustment capacity to their environment.

Adopting a low-risk and high-profitability portfolio, in an environment presenting an absence of the least competition and deposit mobility and loan demand, does not necessarily lead to a market share reduction of the banks. Without ever being a specialization sign, forsaking some assets is never detrimental in such a situation.

In these similar markets, the banks are able to master the rise of their costs by limiting the steady fees owed by setting up new branches and by keeping the deposits' management fees, of loans and other financial services at proportions that are set by them.

By having a full mastery of the costs, the commercial banks can have very-slow growth- marginal costs. This enables them, because of the revenue-equality rule and the optimum-marginal costs to increase the intermediation volume.

All the advantages benefited by the banks operating in the monopolistic or oligopolistic markets can be lost as soon as competitiveness occurs in the banking sphere. The debtors' differential rates on the one hand and

those of creditors on the other hand, the policy divergence in terms of credit and resources collection and the costs' differences makes it that the banks no longer have the same strategic reference and the same performance.

The acquired efficiency and performance in such a case are no more only due to market forces but rather to the bankers themselves and to the pertinence and the accuracy of their scope.

3.3. Banking markets structures approaches

The Panzar-Rosse approach (1977) based upon the determination of H statistics for testing the competitiveness degree and the banking market balance is until now the most used for the market structures' survey. It has been reapplied by Shaffer (1982), Nathan and Deave (1982), Molyneux et al. (1994 and 1996), Lang (1997), Kent Matthews (2005), Ayuso and Jorge (2006), Jason and Liu (2007) …, to propose models that help to determine the competitiveness degree.

Most empirical studies have been conducted in developed countries, such as China, Chun-Yu Ho (2008), Germany, Molyneux et al. (1996). Italia, Coccorose P. (2002).. European Union, Bandt and Davis (2000). Japan,

Uchida and Tsutsui (2002), Central and Eastern European, Yildrim and Philippatos (2002), Hong Kong Wong et al. (2006).

In emerging countries, studies are very limited we cite that of Al-Muharrami et al. (20060 for CCG countries and that of Gelos and, Roldos (2002).

Except for the input prices, which are used by all the models, neither the other explanatory variables of the interest revenue nor their number are the same.

As a matter of fact, the choice of these variables and the variation of their number have an effect on the input price ratios. This yields different H statistics. If the effect of input price is weak, the variation of an H>0 to an H < 0 may be weak

The banking markets' structure depends on the economic situation of each country (growth rate, investment increase, liquidity….) and its institutional context. Most of the models did not take into account the aggregates of the economic variables, the regulation and the decisions imposed by the economic and monetary constraints related to the credits.

The outcome diversity for the various countries urges us to raise a question on the developed models universality.

4. Methodology and Model

The sample includes only 12 Tunisian deposit banks. All the new deposit banks founded in the 2002-2010 period are excluded because they are newly created and they have no connection with the structures of banking markets in the period of the study. The BTS, (solidarity bank) is excluded because it is a recent creation and does not play the traditional role of a bank deposit.

Data are extracted from the interim balance sheets and year-end balance sheets of banks, different banks activity reports and annual reports of the professional association of banks in Tunisia (APBT).

The study period extends from 1996 to 2013. The proposed model is applied for two sub-periods: the first from 1996 to 2001 before the reform of 2001 and the second from 2002 to 2007. It also applied for a long period 1996- 2007 and for the period 2008-2013 to show the effect of the increase in the number of banks on the market structure.

Adopting the Panzar-Rosse approach, the model proposed for the Tunisian banks is as follows:

$$\text{Ln } R_{it} = \beta_0 + \beta_1 \ln(PF_{it}) + \beta_2 \ln(PL_{it}) + \beta_3 \ln(PK_{it}) + \gamma_1 \ln(CREDP_{it}) + \gamma_2 \ln(PORTF_{it})$$
$$+ \gamma_3 \ln(COMB_{it}) + \gamma_4 \ln(RISB_{it}) + \gamma_5 \ln(T_{it}) + \gamma_6 \ln(NBAG_{it}) + \varepsilon_{it} \qquad (1)$$

With:

R: total income is the sum of net interest income and other incomes

PF: the unit price of the fund, the average rate of remuneration of the funds represented by the ratio "Interests and similar expenses / total loans and deposits".

PL: the unit price of labor measured by the payrolls of the total workforce.

PK: the unit price of physical capital measured by the ratio "Other operating expenses / net fixed assets"

CREDP: the operating ratio (total loans to total deposits).

POTRF: This is the report "wallet / equity + debt capital"

COMB: bank commissions / operating costs

T: Total assets of bank i / Total assets of all banks

RISB: risk is approximated by the ratio "bank reserves / total loans to customers."

NBAG: Number of branches per bank / Total bank branches in the country.

ε_{it}: error term.

i: Banks Index i = 1 ... 21.

t: t period ranging from January 1996 to December 2013

According to the Panzar-Rosse approach, variables PF, PL and PK are input prices, namely the funds respectively, labor and physical capital. All components of bank assets and financial resources are present in the model.

The CREDEP variable represents the operating ratio (e.g. intermediation rate). It is an indicator of the volume of activity of commercial banks.t. The higher the volume of activity and the greater the bank is supposed to be profitable and able to benefit from economies of scale.

The POTRF variable, represented by the portfolio over total equity and loans, a measure expanding activity in Tunisian banks that placement. This is an investable index that measures the securitization effort. This effort should increase bank revenue. When this ratio is greater than 1, banking transformation is low. This latter reflects the banks' policies and directions.

To avoid collinearity between the floating rate and investment intermediation index, deposits were not considered in determining the POTRF variable.

The variable (T), which represents the bank size, is measured the ratio "Total assets of bank i / Total assets of all banks". It is used to control the economy of scale and to measure the costs level: the more assets are

relatively large, the greater the degree of irrcuperability investment is great. The variable size was retained by most models and was measured by total assets, which, according Gelos and Roldós (2002) , is an indicator of the presence or absence of economies of scale. But according to Bikker et al. (2006) the total assets variable swells Statistics H thus distorting the findings on market structure.

The variable risk (RISB) is incorporated in the model to highlight the impact of risk on total income of commercial banks. The risk is approximated by the ratio "banking Provisions / Total loans to customers." Only loans to clients were selected. Therefore, interbank credits are not taken into consideration. To Tunisian banks, provisions are unpaid portion of loans. Shrives and Dahl (1992), Jacques and Nigro (1997) and Murinde and Yassen (2004) suggested to measure the overall risk of a bank by the ratio risky assets / Total Assets. This report was adopted by several authors. We tested for the application of our model and found that the introduction of total assets reduces the coefficient of the risk variable swells and other factors. The differential at the inputs coefficients are relatively large and have an impact on statistical H. It is for this reason that a new approximation was used.

The NBAG variable, the number of branches per bank on total number of branches in the country, is a measure of the market size effect on the interest margin and related income. Nathan and Neave (1989), Coccorose (2000) and Prasad and Saibal Ghosh (2005) introduced into their models similar variables.

The variable (COMB) is determined by the ratio "banking commissions / operating costs". These fees are a significant source of income for commercial banks. Their growth has enabled Tunisian banks to improve their profitability with a high ratio of operating expenses coverage. Although they are in their majority controlled by the central bank, these fees represent an additional competitive factor. Their introduction in the model as an explanatory variable to determine the actual effect of the cost of inputs labor and physical capital and to highlight their impact on the banking income.

Our linear model includes the main variables offered by most researchers on the competitive structure of banking markets according to the Panzar-Rosse approach but suggests new methods of determining endogenous variable banking. It includes new variables: The proportion of branches per bank, the coverage ratio "banking commissions / operating costs" and the ratio "reserves / total loans"

5. Empirical Results
5.1. Results for the period 1996-2007
5.1.1. Significance of the model and its variables

The Hausman test helped out a probability of 0.1024. Thus, at the 5% level, the null hypothesis is accepted and regression by the random effects model is confirmed. The regression results by applying a random effects model are presented in Appendix 1.

Adjusted R² equals 0.774183, which means that the explanatory variables can explain 77.5% of bank interest income. The regression allows to summarize 77.5% of the information on income bank interest this also implies a strong association among the dependent variable and the explanatory variables.

Regression exudes a Prob (F-statistic) $0.000000 = <\alpha = 0.05$; therefore we reject H_0, which means that the model is globally significant at the 5% level. With the test Breusch- Godfrey, Si (n-ρ)> χ2 (p), then we reject H_0.

In our regression, n-ρ = 12-1 = 11 <χ2 (0,05) = 20.948. Therefore, we retain H_0: ρ = 0: absence of autocorrelation of order 1 errors.

Table 1: Variables Significance

Variables	t Student calculted	Probability of Coefficients	Significance of estimators at threshold of 10%
LOG(PL)	-1.178345	0.0136	significant
LOG(PK)	-1.672961	0.0684	significant
LOG(PF)	1.069525	0.1220	no significant
LOG(CREDEP)	1.364813	0.1089	no significant
LOG(PORTF)	1.176822	0.0718	significant
LOG(T)	1.482754	0.0000	significant
LOG(COMB)	1.639743	0.0068	significant
LOG(RISB)	1.414575	0.1342	no significant
LOG(NBAG)	1.186423	0.0523	significant

As shown in Table 2 below, all the relations of the model are consistent with those expected except between bank income and the cost of funds and that between income and banking risks. Any interest accruing on the deposits collected and loans are a cost item for the bank and its increase should act negatively on the banking income. But often when the average cost of funds increase interest rates on loans increased in turn. The brokerage margin remains constant and sometimes it increases if the positive change in lending rates is higher than deposit rates, or their negative variation is lower than deposit rates. In addition, the increase in interest on

deposits and loans may be offset by the increased volume of intermediation.

As for the relationship between bank risk and income, it can be explained by the higher volume of credit and banking transformation that make increase the interest margin on the one hand and on the other hand, by the changes in the structure of bank income the existence of other sources of income which offset the increase in bank reserves: bank fees and income from portfolio securities increased compensates the increase in bank reserves.

The number of branches relationship - banking income is positive which means that the creation of new agencies provides additional income. But this is true only to the optimum number of branches for each bank.

Beyond the optimum, the costs of creating an agency may not be offset by the registered products. This is due to limited number of customers and the weakness of its business volume.

Table 2 : Relationships revenue-explanatory variables

Variables	Coefficients	Sign of the relationship
LOG(PL)	-0,0924997	negative
LOG(PK)	-0,0791752	negative
LOG(PF)	0,0434836	Positive
LOG(CREDEP)	0,0542574	Positive
LOG(PORTF)	0,0405698	Positive
LOG(T)	0,1342286	Positive
LOG(COMB)	0,0945679	Positive
LOG (RISB)	-0,0316542	negative
LOG(NBAG	0,0876948	positive

The positive relationship between the operating ratio of Tunisian banks and their income is a sign on the fact that this rate has reached unacceptable levels, which reduce profitability. A relatively high intermediation rate may be the cause of an increase in the elasticity of bank income fund prices. Indeed, when the loan / deposit ratio, a bank may use expensive resources which reduced its intermediation revenues and therefore its total income. Despite the change in the structure of deposits, the deposit banks were able to maintain the average cost of funds at a relatively low level, due to successive cuts in interest rates. The same relationships and degrees of significance have been found to all the regressions of sub periods. R² have almost the same levels. Overall, the model is significant.

5.1.2. Structure of Tunisian banking market

The tests of competitiveness and balance developed by Panzar and Rosse (1987) aim to determine the structure of the banking market and its equilibrium. These authors define H statistic, as the sum of the elasticities of income over labor input prices, funds and physical capital including:

$$H = \Sigma\beta_i \qquad\qquad (2)$$

Three situations are possible:

If H <0: Oligopoly.

If 0 <H <1 Monopolistic Competition.

If H = 1: Perfect competition and natural monopoly in a perfectly contestable market.

Statistic H of Tunisian banks during the period 1996-2007 was -0,223582 therefore the structure is the oligopoly.

The balance of the Tunisian banking market

According to the theory of contestable markets, a banking market works in equilibrium if no firm looking to enter this corresponds to a situation of lack of super profits, and no bank would seek to leave because of lack of losses. The latter situation is verified on the Tunisian banking market because the outputs are unjustifiable. But more entries were recorded during the last decade. In addition, the market is balanced if the pricing is equal to marginal cost, something that cannot be verified on the Tunisian banking market. Indeed, this type of pricing does not exist on banking markets in general, as the criterion atomicity is never observed and the banks do not have the objective of minimizing their average long-term cost.

According to the Panzar-Ross approach, if H <0: The market is unbalanced and if H = 1: The market is balanced.

Since for Tunisian banks H <0, the market was unbalanced from 1996 to 2007.

The regression of the model for Tunisian commercial banks has led to results that are meaningful in general. These banks are oligopolistic market and is unbalanced. Our results do not confirm those of most models applied in many industrialized countries during different periods and under which commercial banks generate revenue by monopolistic competition. Our model confirms the results of the model Molyneux et al. (1994) who saw a oligopolistic competitive structure on the German banking sector in 1986.

5.2. Results for sub periods

The application of the model to sub periods confirms its long-term results. For both applications, the model is globally significant at the 5% threshold, R^2 is still around 96% and about 4% of the variability of the model remains unexplained as indicated in the following table:

Table 3: Sub periods regressions result

Results	1996-2001	2002-2007
ajusted R^2	0.647183	0.708275
SCR	4,093468	4.473642

The relationship 'banking income - cost of funds' was negative during the sub periods 1996 -2001 and 2002-2007.

As for the relationship between income and bank risks, it was negative for all the periods, but it's declined. This can be explained by product diversification, by increased investment income and commissions during in the second period. In addition, the increased volume of intermediation and lower ratio "provisions / total loans to customers," explain the changing nature of the relationship.

The H statistics in 1996-2001 and in 2002-2007 periods are:

Table 4: Sub periods H statistics

	1996-2001	2002-2007
test H	-0,170582	-0,190536
Structure	Oligopoly in disequilibrium	Oligopoly in disequilibrium

The H obtained show that the market structures do not change rapidly in the short and medium term. First, the elasticities of factor prices do not fluctuate in a remarkable way in the short term. On the other hand, neither the changes in interest rates, nor those of the banks' sizes, their staff or their heritages were so important for the medium term alter market structures .:

These results confirm those of the 1996-2007 period show that reactions to various reforms and the many changes in the economic and financial situation were slow and insufficient to alter the market structure.

However, the variation coefficients of different variables and the tendency of the H statistics to 0 can be indicators of increasing the degree of competitiveness in the Tunisian banking market. In addition, the decrease in the relative number of branches of the first three commercial banks and their intermediation rate are other indicators of the development of competition. Statistic H approaches zero because the elasticities with respect to the three main inputs are becoming weaker. These changes are observable after the 2001 reform: These are the variables intermediation rate (CREDEP), bank fees (COMB) and risk (RISB) that have more and more influence on the banking income.

Degree of competitiveness from 2008 to 2013

The increase in the number of commercial banks following the transformation of development banks into deposit banks and the creation of new banks should affect the structure of the banking market. Indeed, market shares are not the same and the degree of concentration should decrease.

Table 5: H statistic 2008-2013

2008-2013	Competitiveness
Test H	-0,18206
Structure	Oligopoly in disequilibrium

Then, we have the same structure oligopoly in disequilibrium

But, the restriction, the creation of Islamic banking, the privatization and the entry of foreign banks have not had any immediate impact on the market structure.

The signs of the different relationships have not changed but the coefficients of the explanatory variables have varied which could mean that there are very slow changes in the behavior of banks and their degree of competitiveness.

All the new banks are small and the number of their branches is reduced. The degree of concentration remains high and the same banks dominate the market and it takes time for the competition to be established.

6. Conclusion

Our model application has allowed us to draw two main conclusions: Tunisian banking market is oligopolistic and unbalanced. The increase of the number of commercial banks in the 2000s did not change the market structure.

Reforms and changes in economic conditions have had a limited impact on the conduct of the Tunisian commercial banks but the degree of competitiveness changed. These new banks are small and they need time to reduce the degree of bank concentration and to influence the conditions of banking activities: Over the period 1996-2013, the change of banking indicators was very slow.

Our model confirms the results of those of Molyneux et al (1994) who saw a oligopolistic competitive structure in the German banking sector in 1986, but did not confirm those models applied in many industrialized countries during different periods and under which commercial banks generate revenue by monopolistic competition.

The similarity of the results of the proposed model for periods of unequal duration, means that it is applicable as well for short periods than for long periods.

To further ensure the reliability of this model and effectiveness of Statistics H as a measure of how competitive it would be wise to test the presence of economies of scale in Tunisian banks. This will see if they have decreasing costs and whether the entry costs to the sector are low.

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APPENDICES

Appendix 1: Regressions results 1996-2007

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.465272	0.463769	-2.081036	0.2484
LOG(PL)	-0,092499	0.032918	-1.178345	0.0136
LOG(PK)	-0,079175	0.026584	-1.672961	0.0684
LOG(PF)	- 0,043483	0.012391	1.069525	0.1220
LOG(CREDP)	0,054257	0.022864	1.364813	0.1089
LOG(PORTF)	0,040572	0.025373	1.176822	0.0718
LOG(T)	0,134228	0.041653	1.482754	0.0000
LOG(COMB)	0,094567	0.024152	1.639743	0.0068
LOG(RISB)	-0,131654	0.012564	1.414575	0.1342
LOG(NBAG)	0,087694	0.036357	1.186423	0.0523
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.788572	Mean dependent var		10.465134
Adjusted R-squared	0.774183	S.D. dependent var		0.967025
S.E. of regression	0.279265	Akaike info criterion		0.551720
Sum squared resid	4,386541	Schwarz criterion		1.126301
Log likelihood	-0.146026	F-statistic		42.83732
Durbin-Watson stat	1.793271	Prob(F-statistic)		0.000000

Appendix 2: Regressions results 1996-2001

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.634244	4.327068	-1.070989	0.2890
LOG(PL)	-0.084824	0.073847	1.826533	0.0734
LOG(PK)	-0.041863	0.044158	-1.081557	0.0843
LOG(PF)	-0.043895	0.013649	1.463802	0.1092
LOG(CREDP)	0.096301	0.070808	-0.187854	0.0857
LOG(PORTF)	0.036822	0.011538	1.149628	0.0697
LOG(COMB)	0.072498	0.037156	-2.316938	0.0052
LOG(T)	1.552399	0.276853	5.607297	0.0000
LOG(RISB)	-0.124005	0.044152	-2.808560	0.0070
LOG(NBAG)	0.092361	0.879125	-1.855956	0.0690
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.661562	Mean dependent var		10.14618
Adjusted R-squared	0.647183	S.D. dependent var		0.958490
S.E. of regression	0.269675	Akaike info criterion		0.523562
Sum squared resid	4.093468	Schwarz criterion		1.118907
Log likelihood	-0.154027	F-statistic		41.75362
Durbin-Watson stat	1.942374	Prob(F-statistic)		0.000000

Appendix 3: Regressions results 2002-2007

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.487265	3.924081	-1.128419	0.2318
LOG(PL)	-0.094884	0.081362	1.796154	0.0673
LOG(PK)	-0.043759	0.048749	-1.047917	0.1985
LOG(PF)	-0.051893	0.043695	1.316842	0.1492
LOG(CREDP)	0.104617	0.059723	-0.162845	0.0761
LOG(PORTF)	0.086228	0.028766	1.540626	0.0746
LOG(COMB)	0.115892	0.076297	-1.712798	0.0087
LOG(T)	0.957233	0.229148	4.967147	0.0000
LOG(RISB)	- 0.129422	0.036953	-2.584523	0.0066
LOG(NBAG)	1.461326	0.759267	-1.729536	0.0708

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.720631	Mean dependent var	9.514528
Adjusted R-squared	0.708275	S.D. dependent var	0.964729
S.E. of regression	0.295264	Akaike info criterion	0.545372
Sum squared resid	4.473642	Schwarz criterion	1.146172
Log likelihood	-0.172189	F-statistic	42.569351
Durbin-Watson stat	1.925171	Prob(F-statistic)	0.000000