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Automation of the Financial Market: A Drag or a Driver for Bank Disintermediation?

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ABSTRACT: This paper discusses and analyzes how Information Technologies destabilize the banking sector and induce irrevocable changes in the sector that lead to new entrants, innovation and, above all, disintermediation. Our objective is to analyze the relationship between the financial market, IT and financial intermediation, in order to detect the impact of the automation of the financial market on the traditional intermediation activity of banks. Based on a descriptive analysis of the Tunisian banking sector, and over the 1998-2018 periods, we have shown that the disintermediation of Tunisian banks is the consequence of the automation of the financial market. The more the financial market invests in IT, the more banks are Disinter mediated. In Tunisia, IT is a driving force behind the disintermediation of banks. In any case, recent developments confirm the fact that rather than asserting that traditional banking is dead, the above analysis advocates a renewal of the banking economy. The role of banks is not about to diminish. The era of direct finance and new technologies has not so much created disintermediation but rather a new sharing of roles in the financial sphere.

KEYWORDS: Information technology, Commercial banks, Financial intermediation, Disintermediation, Financial market, Automation.

JEL Classification Codes: F61, G21, G23, O33.

INTRODUCTION

The profitability of banks has been declining worldwide since the 1980s through the 1990s. This has been attributed to several factors including the decline in traditional banking activities (deposit and loan income) and poor debt management (resulting from poor lending decisions). However, analyses of bank performance tend to be short-sighted and narrow in their perspectives, and rarely attempt to explain the underlying patterns and processes of change (Holland, Lockett and Blackman, 1997). This change is the result of two long-standing factors that have not yet run their course. These are financial innovation and deregulation, which have unleashed considerable forces that continue to influence banks' operating patterns and their restructuring. There are many significant consequences. On the one hand, these forces tend to destabilize and, above all, reduce the traditional role of banks in transmitting funds between depositors and borrowers (Languetin, 1999). On the other hand, they give savers the possibility of diversifying their investments and improving their income, and they offer borrowers the possibility of obtaining funds under conditions of interest rates, maturities and risks that better meet their needs.

Information technology (IT) is creating new opportunities for banks to organize product development, delivery and marketing. However, IT also enables other financial and even non-financial organizations to start offering banking services. Deregulation, both within European countries and across national borders, is leading to increased international competition between banks and financial and non-financial organizations. The combination of IT, globalization and deregulation ensures that new ideas and innovations spread rapidly and 'break through' traditional barriers to entering the banking sector. This can be clearly observed in the increased internationalization of the banking business that took place after the first oil shock in the 1970s, particularly across Europe and the United States, the development of new banking systems and the growth of new financial instruments. Competitive forces in banking led to the decline of traditional banking activity indicated by the reduction in bank profitability (Gorton and Rosen 1995, Edwards and Mishkin 1995, Danton 1992, Colwell 1991) and created what Angermueller (2000) called the “new finance”.

The Tunisian financial system has experienced many structural and cyclical changes during the 1986-2020 period, with the main objective of making the banking system the essential link that can promote a better allocation of resources by ensuring that banks have better capacities in mobilizing savings and in financing the economy. However, banks have been faced with a challenge: an acceleration of competition due to deregulation and an acceleration of financial and technological innovations via IT and the digitalization of financial activities. We are therefore witnessing, on the one hand, a destabilization of the banking sector which has led to its disintermediation and, on the other hand, the birth of new forms of financing via the financial market. Indeed, the latter is undergoing a major transformation in terms of capital invested and the speed of change. Digital technology has facilitated transactions and empowered customers, while bringing a renewed momentum to highly pyramidal organizations. The financial market relies heavily on digital transformation and on the huge opportunities offered by FinTech to improve its operations and achieve an informational position that allows for rapid and immediate dissemination of information at lower cost.

In this study, we will discuss and analyze how IT destabilizes the banking sector and induces irrevocable changes in the sector that lead to new entrants, innovation and, above all, disintermediation. Our objective is to analyze the relationship between the financial market, IT and financial intermediation, in order to detect the impact of the automation of the financial market on the traditional intermediation activity of banks. To this end, this paper will be organized as follows: Section 1 will present a review of the theoretical literature on financial intermediation. Section 2 will illustrate the main empirical works on the relationship between IT and the financial disintermediation phenomenon. Section 3 will focus on the impact of IT on the traditional intermediation of Tunisian banks, first by analyzing the rate of financial intermediation of banks over the period (1986-2020), then by focusing on the strategic reorientation of Tunisian banks through an analysis of the evolution of the structure of their balance sheets, and finally, by proposing an analysis of the net banking income (NBI) and of its components. Finally, section 4 will be devoted to the impact of the automation of the Tunisian financial market on the activity of traditional intermediation of Tunisian banks and the new prospects.

1. FINANCIAL INTERMEDIATION: A REVIEW OF THE THEORETICAL LITERATURE

The advent of the Modigliani-Miller (1958) hypothesis of pure and perfect competition and perfect capital markets, according to which banks do not differ from other financial intermediaries, helped justify the emergence of these financial intermediaries. Several more fruitful approaches have been developed and different economists have enriched the theory of financial intermediation. This resulted in the development of a new approach to the role of banks in a deregulated and globalized environment. We will first analyze the contribution of Diamond (1984), Boyd and Prescott (1986), which takes into account the informational dimension of banks. Second, the contribution of Allen and Santomero (2001) will be considered, focusing on the capacity of banks to manage risk and reduce participation costs. This review of the theoretical literature allows us to clarify the place of banks in relation to other financial intermediaries.

The theory of asymmetric information takes into account the informational advantage of banks over other lenders in the capital market during a financing transaction. Borrowers benefit from more advantageous financing conditions since banks produce information at a lower cost and increase its credibility thanks to the value of the signal given to the market (Lagoutte, 2002, based on Leland and Pyle, 1977). This approach was completed by Diamond and Dybvig (1983), who highlighted the transformation of risks by the bank. According to these two authors, banks, unlike capital markets, provide liquidity insurance to depositors and debtors. Thanks to the latter, the bank could use liquid liabilities to finance illiquid assets.

As a result of the decrease in information asymmetries between lending and borrowing agents associated with the introduction of IT, the theory of information asymmetry has been questioned by a number of authors, such as Allen and Santomero (2001). Technological developments in communication and information have led to a considerable decrease in transaction costs with the development of Internet and telephone transactions. This has made information more readily available to agents. Allen and Santomero (2001) have emphasized the new central role of financial intermediaries in managing market risk in an increasingly complex financial environment, given the diversity of products and the expansion of markets. In their article "*What do financial intermediaries do*?", Allen and Santomero argue that risk can be separated from other features of financial products and traded separately. In this context, we are witnessing a kind of shift in the activity of financial intermediaries from the management of financial assets to the management of the risks that underlie them. The focus seems to be on risk management, which is becoming a central concern because of the multiplicity of available products and the capabilities to hedge, detach and transform risks. But Scholtens and Van Wensween (2000) criticized the theory of financial intermediation presented by Allen and Santomero (2001), suggesting that the dynamic theory of intermediation should be able to explain financial innovation based on risk management (use of new techniques and inter-temporal smoothing) and on participation costs, which represent the opportunity costs of financial decision making for agents.

Allen and Santomero (2001) then introduced participation costs into their analysis to explain the services provided by financial intermediaries. Indeed, the use of an intermediary would reduce these costs since they have an advantage over non-financial agents because of their lower participation costs and their ability to create products with relatively stable return distributions, which tends to limit the participation costs of their clients. According to Lagoutte (2002), the theory of financial intermediation presented by Allen and Santomero (2001) does not actually represent a renewal of the traditional interpretation of the financial intermediary. Risk management does not appear as a new activity of financial intermediaries, but rather is implemented through new techniques and new financial instruments.

2. IT AND FINANCIAL INTERMEDIATION: A REVIEW OF THE EMPIRICAL LITERATURE

The end of conventional banking intermediation, i.e., the traditional activity of distributing credit through the use of deposits, is periodically announced. Some even claim that the traditional commercial bank, offering credit and collecting deposits, is disappearing (Rajan, 1998). The main cause behind this disappearance is, according to this author, the emergence of IT. Rose (1998) points out that during the 1993-1997 period, companies turned to the financial markets to meet their financing needs. Since 1997, banks have regained their role in the financing circuits through the growth of outstanding loans, which has exceeded the growth of GDP in value, and through the sustained growth of bank loans. According to Jallat (2000), the development of IT seems to favor the implementation of new reconfigurations. However, these upheavals do not systematically lead to the disappearance of intermediaries. This author emphasizes that if traditional intermediaries are maintained, it is possible to assert the failure of new entrants, which would result in their disappearance and the preservation of traditional actors and channels. But if the development of IT strategies leads to a process of substitution, then the success of a number of new entrants who will gradually be able to take over the market shares of the traditional players would be confirmed. The offer of the traditional operators, no longer corresponding to the expectations of the consumers, would force them to leave the market. In this case, a process of “disintermediation” takes place. According to Allen and Gale (1995) and Saidane (2001), the era of direct finance and IT did not generate so much disintermediation but rather a new sharing of roles in the financial sphere. These authors emphasize that alongside a declining traditional intermediation, banks continue to fare well; they have been able to adapt and find their place in the new forms of intermediation. The bank would be increasingly a service and risk management company backed by the capital market and whose growth is stimulated by technological and financial innovations.

In a study of British banks, Lagoutte (2002) emphasized that the main consequence of the development of distance banking was an increase in competition among banking institutions, resulting in an intense phase of product innovation, followed by the arrival of new entrants. This phase has been marked by a trend towards broadening the range of services offered by the various players: hence the strengthening of the universal banking model and digitalization. At the same time, interest-bearing products became attractive to households as short-term interest rates were high and inflation low. On the other hand, interest-bearing resources have increased. In addition, the share of bank loans fell sharply, a phenomenon resulting from the increase in competition following the liberalization of the market.

According to Goyeau and Tarazi (2006), deregulation has profoundly transformed stock markets following the emergence of electronic trading technologies and the dematerialization of shares. These authors point out that the disintermediation of banks is largely attributed to the transformation of the organization of stock markets, which have become trading companies thanks to IT. Indeed, these authors emphasize that the rise of financial innovations has led to an increased allocation of resources in the capital market: improved informational efficiency (i.e., the speed with which information is reflected in prices), market comprehensiveness (i.e., the possibility of hedging against all risks), the removal of constraints and the response to agents' needs, and the broadening of the choice of possible financing for borrowers and of the range of possible investments for lenders, leading to international portfolio diversification. According to De Boissieu and Fournier (2001), the effects of innovations on intermediation are ambivalent. By exerting downward pressure on transaction and information costs, IT reduces the usefulness of intermediation, but at the same time, by making finance more complex, it reinforces the importance of the expertise provided by financial intermediaries (advisory missions). These two authors add that the faster and wider availability of information increases the transparency of financial markets. This makes them more attractive to investors and borrowers and thus contributes to the trend towards financial disintermediation of banks. Muniesa (2000) points out that, in a context tending towards modernity, the financial markets have acquired a highly sophisticated technological framework: trading and information dissemination technologies now constitute a real industry. The challenge of the financial market is to abolish a traditional market by migrating the stock market towards an automatic confrontation of buy and sell orders. Moreover, the development of new financial products and services, favored by the growing integration of IT, has led to an increased disintermediation of banks, since investors prefer to get their financing from a market with informational efficiency and a wide choice of financing options. In addition, the development of derivatives allows them to manage risks more efficiently and at lower cost.

3. IT AND FINANCIAL INTERMEDIATION OF TUNISIAN BANKS

The evolution of the world economic situation characterized by globalization and liberalization has caused profound changes. Aware of the impact of these changes and to better face them, it becomes imperative for the Tunisian banking system to upgrade and strengthen its competitiveness. Moreover, in an economy where markets offer an alternative solution to meet, through the balance sheet of financial institutions, the needs and surpluses of non-financial agents, the evaluation of an intermediation rate, i.e. the ratio between the total of intermediated financing and the total of financing obtained by non-financial agents, constitutes an instrument to measure the place of financial institutions in financing the economy. The objective of this analysis is to characterize the changes that have marked Tunisian banks, and more particularly, to highlight the relative decline of their traditional activities. Therefore, we will, first, analyze the rate of financial intermediation of Tunisian banks over the period (1986-2020). Secondly, we will focus on the strategic reorientation of Tunisian banks through an analysis of the evolution of the structure of their balance sheets. Finally, we propose an analysis of the NBI and its components.

Over the 1986-2020 period, the calculations are made on the basis of the annual statements of 10 Tunisian commercial banks[1]. Our choice is limited to these banks since, on the one hand, we can have a regular series of data over the period 1986-2020 and, on the other hand, unlike development banks and other financial institutions, these deposit banks have the right, since 1986, to collect demand deposits and have access to refinancing from the Central Bank.

3.1 Trends in the Financial Intermediation Rates of Tunisian Banks

To highlight the collapse of traditional activities and the extent of the phenomenon of disintermediation of Tunisian banks, we will first try to calculate their intermediation rates. First, we need to define the denominator. The latter is understood as the total financing obtained by resident non-financial agents in the form of loans or securities (money market securities, bonds, shares). As regards the numerator, it is possible to consider as intermediated financing only loans granted directly by resident credit institutions and the alike. This approach results in the calculation of an intermediation rate in the narrow sense. However, this first approach ignores the subscribers of securities by credit institutions as well as other financial intermediaries and their effects on the satisfaction of the financing needs of non-financial agents. We can therefore consider an alternative approach that consists in defining the intermediation rate more broadly. Intermediated financing would thus include financing provided to non-financial agents not only by credit institutions, but also by mutual funds, whether they result from the granting of loans or the purchase of debt and equity securities, at issue or on the secondary market. In this way, we calculate an intermediation rate in the broad sense.

Figure (1) presents the financial intermediation rates of Tunisian banks expressed in terms of demand for financing (rate in the narrow sense) and supply of financing (rate in the broad sense). In other words, in a first approach, we contrast financing through credits, most often obtained from banks, with financing through the issuance of securities on financial markets. In a second, broader approach, we contrast intermediated financing (obtained from financial intermediaries, regardless of the medium, credit or security) with direct financing. The calculations are made on the basis of the annual situations of the 10 Tunisian banks that have the right to collect demand deposits and have access to refinancing from the Central Bank. For the period from 1986 to 2020, we obtain indicators that allow us to assess the evolution of intermediation over a period where profound changes have affected the financial sphere (development of the financial market, financial innovations, etc.). With[2]:

- **(A)** : Loans from financial institutions to non-financial agents;
- **(B)** : Other disintermediated financing (obtained on the markets from non-financial agents[3]);
- **(C)** : Securities portfolio (stocks, bonds, money market securities...issued by non-financial agents) of financial institutions;
- **(D)** : Total financing = **A+B+C**

Two intermediation rates can be defined [4] :

- Intermediation rate in the narrow sense: **A/D** ;
- Intermediation rate in the broad sense: **(A+C)/D**.

[1] National Agricultural Bank (BNA), Tunisian Banking Company (STB), Arab International Bank of Tunisia (BIAT), Bank of Tunisia (BT), Arab Tunisian Bank (ATB), Attijari Bank, Housing Bank (BH), International Union of Banks (UIB), Amen Bank and Banking Union for Commerce and Industry (UBCI).

[2] This is the method proposed by The Van (1991) for calculating the financial intermediation rate of banks; see Bank Strategy No. 181 - April 2001, pp. 7-9.

[3] For the calculation, we have only considered investment companies (Investment companies with fixed capital SICAFs, bond and mixed investment companies with variable capital SICAVs and risk capital SICARs). Insurance companies were not considered in our study.

[4] The first rate was calculated for the post-liberalization period (1986-2020), while the second was considered for the 1994-2020 period, since mutual funds did not exist before this period.

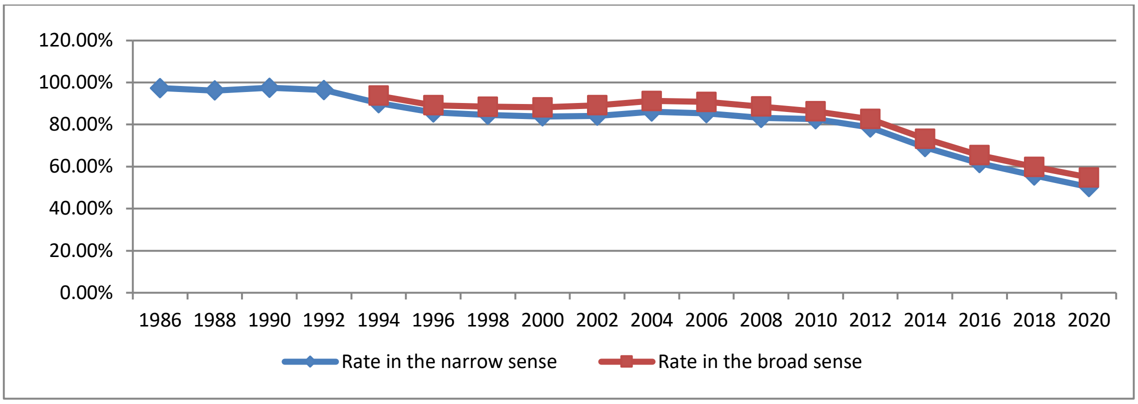

Figure 1: Evolution of financial intermediation rates of Tunisian banks (1986-2020)

At the balance sheet level, financial intermediation rates, in both the broad and narrow senses, have been declining for more than thirty years. This decline is explained by the continuous increase in the share of debt securities issuance in total financing. This context of market openness has therefore influenced the way companies are financed in Tunisia. Their indebtedness to credit institutions has decreased. We also note the existence of a strong component of debt securities issues. This is undoubtedly favored by the higher average real interest rates and by a more sustained economic growth which limited the financing of companies, in particular by indebtedness.

3.2 Changes in the Structure of Bank Balance Sheets

Given the changes in the structure and financing of the financial system through financial changes and the movement of deregulation, it becomes legitimate to ask, following Rajan (1998), Rose (1998) and Saidane (2001): *"is the traditional commercial bank disappearing?"* Let us examine the relevance of such a question for the case of Tunisian banks through an examination of the evolution of the structure of their balance sheets.

On the asset side: The financial liberalization process has allowed banks greater freedom in granting loans, particularly following the removal of credit rationing and the liberalization of interest rates. Thus, the volume of credit granted by Tunisian banks (claims on customers and those on banking and financial institutions) and the share of credit in total assets have increased significantly over the study period. On the side of the assets as well, the movement of the average outstanding securities portfolio of banks is characterized during the 1986-1996 period by a strong volatility that has not generated a significant shift in the outstanding balance. However, a clear growth is noticeable from 1998 onwards. The security portfolio held on companies still represented a small share of the banks' assets, markedly so in 1996, although a slight increase has been recorded since 1998. This situation results from the fact that Tunisian banks, structurally borrowers, have little availability to invest (figure 2).

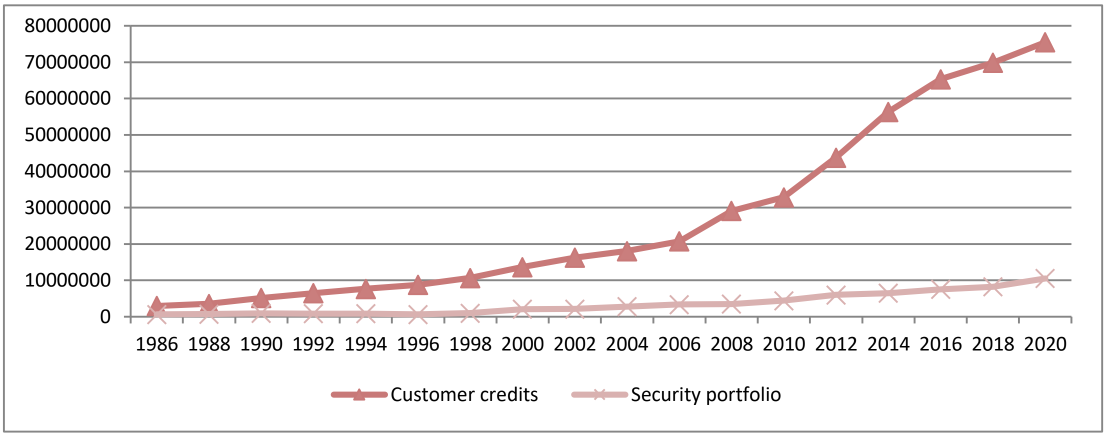

Figure 2: Changes in the structure of Tunisian banks' assets (1986-2020)

On the liability side: On the liabilities side, it is in the collection of deposits that the changes in behavior of non-financial agents have suffered the clearest consequences prima facie. Indeed, Tunisian banks have tried to compensate for the decline in the share of customer deposits, recorded during the period 1986-1992 with market resources. This change in the structure of banks' liabilities seems to be occurring over time (Figure 3).

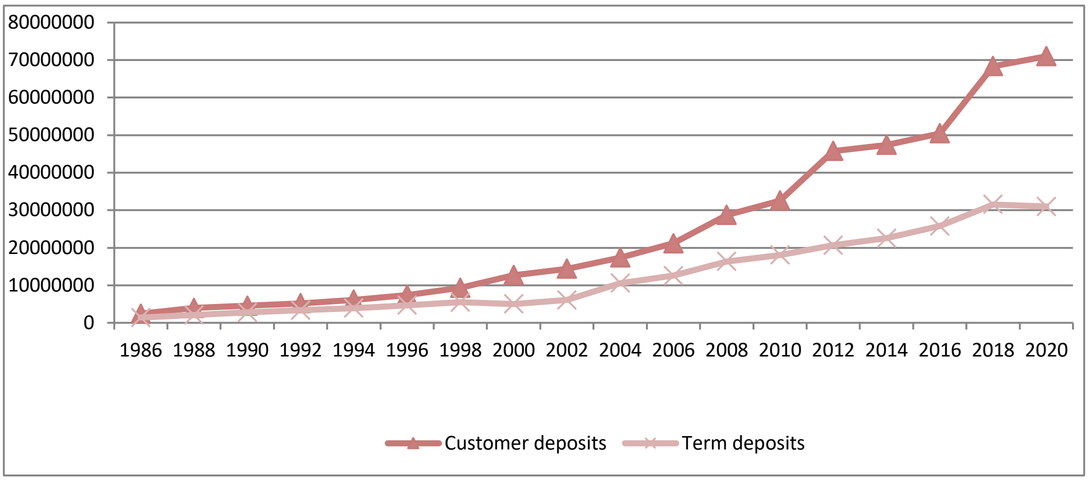

Figure 3: Changes in the structure of Tunisian banks' liabilities (1986-2020)

The corollary of such a development is that Tunisian banks are trying to compensate for the decline in demand deposits, i.e. non-interest-bearing resources, by developing market-rate resources. The share of customer resources (demand deposits) in total deposits has decreased from one year to another. This deceleration is essentially due to efforts to promote financial savings, particularly through SICAVs, which offer increasingly attractive yield rates to potential savers. On the other hand, the relative share of resources collected through term deposits, the issuance of deposit certificates, and special savings accounts continued to increase, reflecting the effect of deregulation of deposit rates, which favored the growth of time investments with these banks (Figure 4).

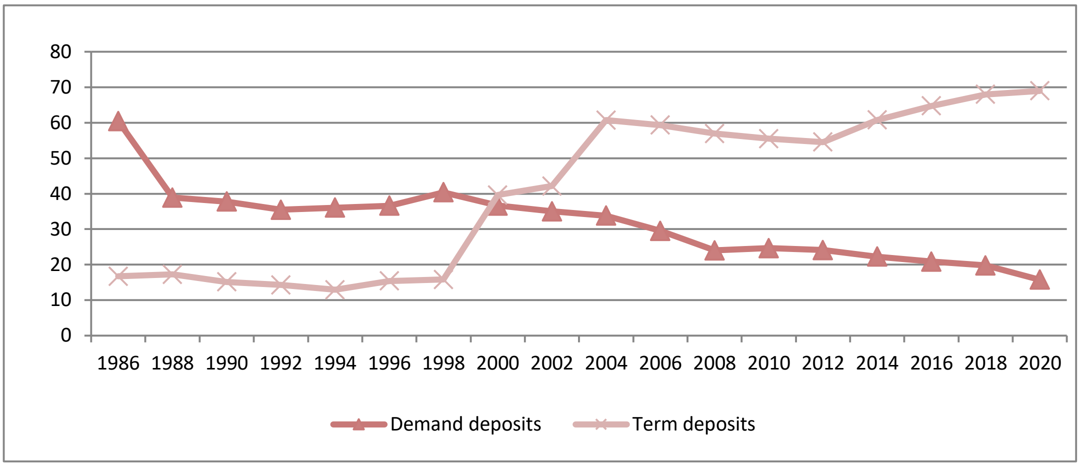

Figure 4: Changes in the share of paid and unpaid resources in total client resources (in %)

However, even if the amounts of credits and deposits in absolute value are increasing, the activity of the banking sector seems to be increasingly concentrated on a market activity which is reflected in particular in the off-balance sheet. The off-balance sheet operations of Tunisian banks include non-traditional activities to which they have turned in order to make additional profits. In Tunisia, off-balance sheet operations consist mainly of security operations, since the use of derivatives is not yet prevalent. Figure (5) shows that total off-balance sheet transactions have increased considerably since the early 1990s. However, the share of off-balance sheet in the total balance sheet has not fluctuated significantly, with the exception of 1994, when there was a considerable increase in this ratio, as figure (5) clearly shows. The significant proportion recorded during this period can be explained by the implementation of numerous reforms by the Tunisian public authorities from 1986 onwards, which affected the country's economic and financial situation.

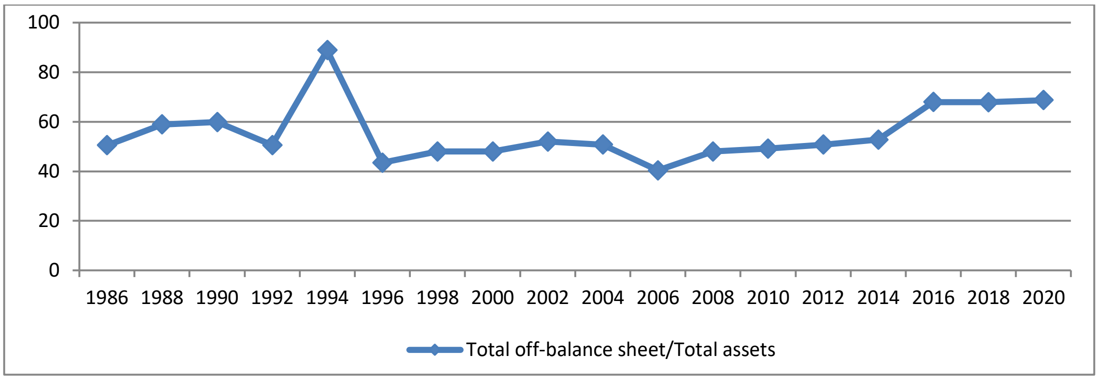

Figure 5: Changes in the relative share of off-balance sheet transactions in banks' total assets

Ultimately, Tunisian banks are increasingly resorting to resources remunerated at market rates. Non-financial agents indeed show a growing preference for remunerations close to those of the market, as far as they are offered sufficiently attractive products, notably in terms
of liquidity or coverage against the rate risk. The existence of mutual funds, and in particular short-term funds, reinforces this preference by offering market products that can be substituted for traditional intermediated investments. This trend toward non-traditional activities has had a major impact on the NBI structure, with the share of each of its components changing as a result of the use of non-traditional activities and the decline in the interest margin from lending activities.

3.3 Changes in NBI Determinants

The observation of revenues and their trends provides a second illustration of the diversity of the performance of credit institutions. Figure (6) shows the components of the NBI of the surveyed banks between 1986 and 2020. It shows a clear improvement in NBI despite the decline in banking income resulting from the reduction in interest rates due to the increase in interbank competition, particularly at the end of the period, since competition is likely to reduce the margins and income of banking financial intermediaries from their traditional activity. This decline in interest margins was offset by an increase in the share of commissions and income from the security portfolio in the NBI structure. This increase explains the significant improvement in NBI in recent years. Figure (6) shows that lending activities account for the largest share of income, even though their share has declined. The share of security portfolio income has increased, and the share of commission income remains fluctuating during the 1986-1996 period. These results explicitly reflect an increasing orientation of banks towards non-traditional activities.

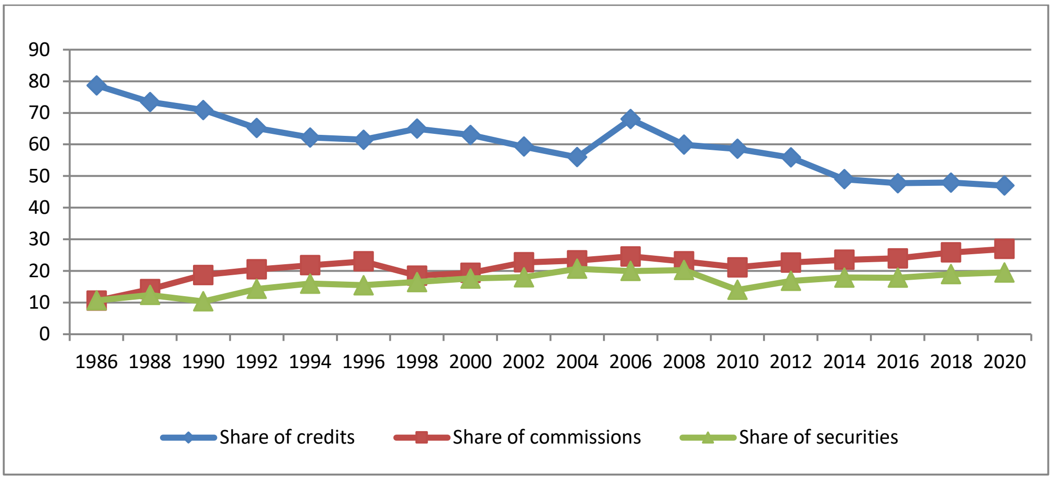

Figure 6: Changes in NBI components

Thus, despite the disintermediation process underway, balance sheets have relatively developed according to the major trends observed in recent years. Overall, the process of bank intermediation is not shrinking in absolute terms, although it is declining in relative terms compared to the overall financing of the economy. In this respect, we can note that the measures taken by the public authorities to de-intermediate have helped this category of deposit-taking institutions, which could have been the most affected. The issue of disintermediation is therefore subject to change.

4. BANK INTERMEDIATION VERSUS FINANCIAL MARKET AUTOMATION

The new organization of the Tunisian financial market, as decided by Law N° 94-117 dated November 14, 1994, has established a new redistribution of tasks and powers. It is based on a trilogy of institutions which are: a regulatory body (Financial Market Council, CMF), a body in charge of the management of the market (Stock Exchange of Tunis, BVMT) and a body in charge of deposit and clearing (Tunisie Clearing). Under this structure, the investment chain in the stock market starts with the transmission of a stock market order through a stock market intermediary and ends with the settlement of the transaction with the delivery of a security or the collection of its counter value. The various stages are performed by an electronic network between the three organizations (extract from the CMF Report, 2001).

With the rapid progress of technology, the increase in the volume of transactions and, above all, the intensification of competition in capital markets, the latter have paid particular attention to the choice of trading systems in order to improve the quality of their operation and, consequently, to attract more investors. Thus, during the last two decades, the financial markets have been subject to reform movements aiming at replacing the quotation systems organized on the floor by automatic computer-assisted quotation systems. This movement which concerned mainly developed markets such as the Paris stock exchange and the London stock exchange did not spare the emerging markets, in particular the stock exchanges of Singapore, Taiwan, Lebanon, Brazil as well as Morocco. The Tunisian financial market was not left out of what is happening in most financial markets. Thus, after a long period of reform, it adopted on 25/10/1996 a new system of electronic quotation in replacement of the system of written multiple quotes organized on the floor.

Information is one of the fundamental elements in the operation of financial markets. Indeed, financial information is key in the decision-making process of investors. According to Domowitz (1993) and Domowitz and Steil (1998), automation, IT use and the transparency of the electronic market are an advantage for speculators who are always looking for more information, especially on the economic situation, the financial situation and the performance of listed companies. Similarly, in the January 2001 report of the Global Financial System Committee, it was noted that innovation and automation in the financial market is accelerating the speed of disclosure of relevant price and volume information. This should help market participants make decisions in the financial market. For their part, stock market intermediaries rely heavily on the development of IT use (Internet, cell phones...), to improve the functioning of the market, and to reach a position of informational efficiency allowing a fast and immediate dissemination of information at lower cost. Figure (7) traces the changes in the budget allocated by the Tunisian financial market to IT over the 1998-2018 period.

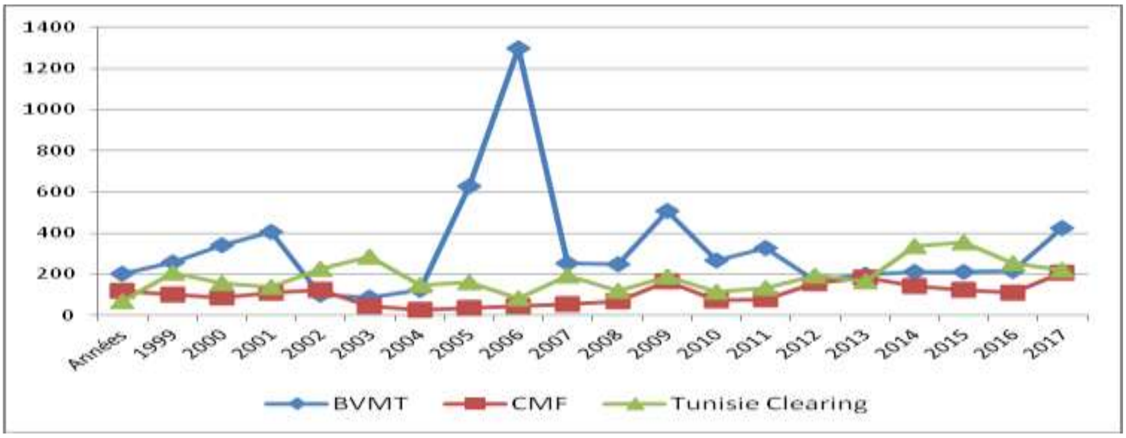

Figure 7: Changes in IT investment in the Tunisian financial market over the 1998-2018 period (In MDT)

IT investment in the Tunisian financial market is highly fluctuating. This investment can decrease as well as increase by almost half every year. BVMT appears to be the Tunisian financial organization investing the most in IT compared to CMF and Tunisie Clearing, especially in 2007, when we observe a considerable increase in the amount allocated to IT, which reached almost 1300 thousand Tunisian dinars (MTD). Indeed, BVMT has implemented a new version of its electronic quotation system which started on December 3, 2007, and which uses the technologies of open systems UNIX and ORACLE. This new version allows securing remote access to the system, to meet the performance needs, to facilitate the automation of the processing chain of investors' orders and to promote the development of online trading. Tunisie Clearing's investment in IT has also fluctuated considerably over the study period. CMF did not remain on the sidelines. This financial organization has consistently allocated a portion of its budget to IT.

Figures 8, 9 and 10 illustrate investment in hardware, software and services (training and maintenance) by BVMT, CMF and Tunisie Clearing over the 1998-2018 period. These figures show that Tunisian financial market organizations give more importance to

tangible investments than to intangible and service-related investments over the whole studied period. However, in 2007, almost 930 MTD were allocated by BVMT to intangible investments compared to almost 276 MTD devoted to tangible investments.
This large gap results from the fact that BVMT was faced with a very expensive project, namely the SEMS (Stock Exchange Management System). This is the new version of the electronic quotation system of BVMT which offers the Tunis Stock Exchange new development prospects such as the extension of a market model towards a hybrid market, by integrating price problem and market making functionalities. It also facilitates the interconnection between the stock market and other market entities, including regional stock markets. It also makes it possible to consider the feasibility of an evolution towards derivatives markets.

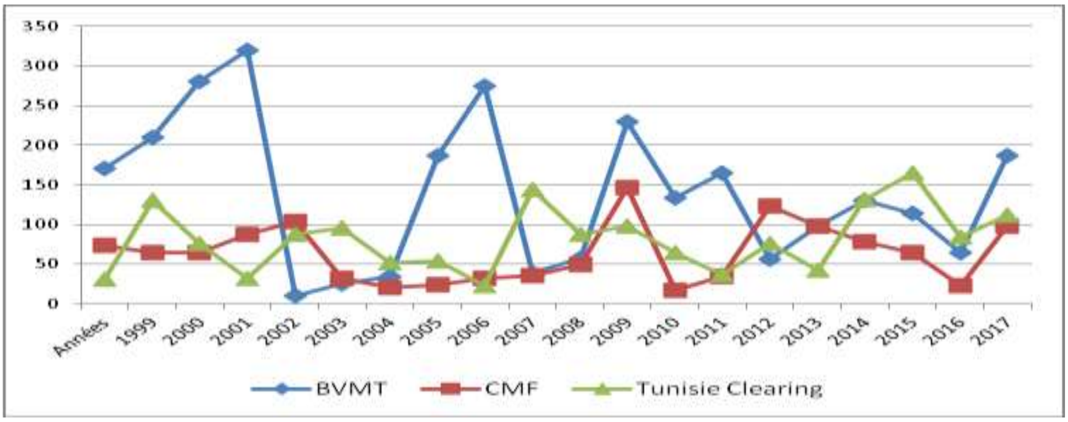

Figure 8: Changes in tangible investments in the Tunisian financial market (In MTD)

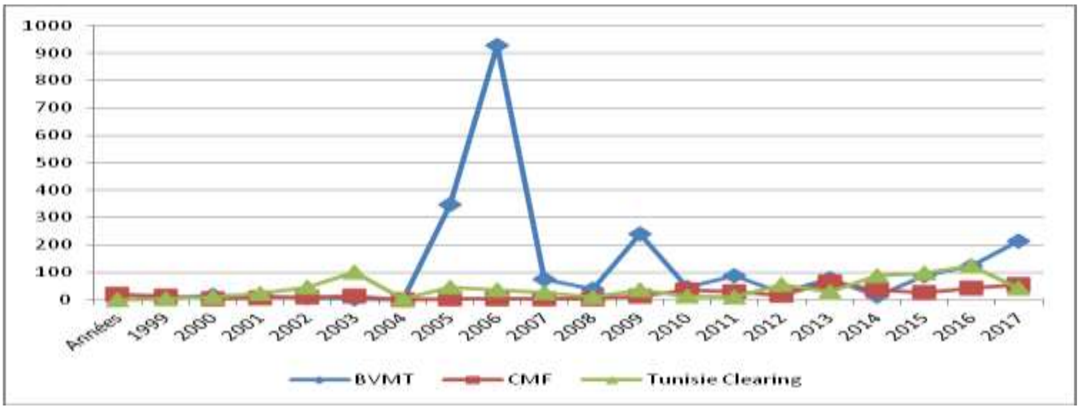

Figure 9: Changes in intangible investments in the Tunisian financial market (In MTD)

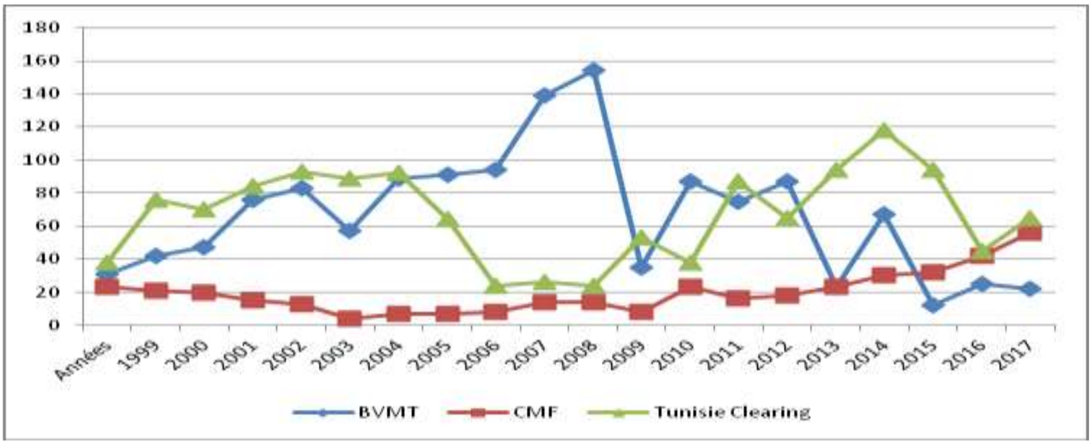

Figure 10: Changes in maintenance and training expenses in the Tunisian financial market (In MD)

After having made this typology of the Tunisian financial market, and after having outlined the automation of this market, it is necessary to determine whether this phenomenon is behind the disintermediation of banks. To this end, we will compare the evolution of financial intermediation rates (in the broad and narrow sense) of Tunisian banks to that of IT investments in the Tunisian capital market. Figure (11) shows the evolution of the total investment in IT of the Tunisian financial market, composed of CMF, Tunisie Clearing and BVMT, and the corresponding intermediation phases of Tunisian banks over the 1998-2018 period (The choice of this period lies in the fact that on 23/06/1997, the Tunisian financial market introduced its first electronic quotation system). According to this figure, we notice that during the years 1998-2000, a period characterized by a disintermediation of banks, total investment in IT of the financial market has increased. On the other hand, the 2002-2005 period is characterized by a clear movement of reintermediation by banks, where both narrow and broad intermediation rates increased.

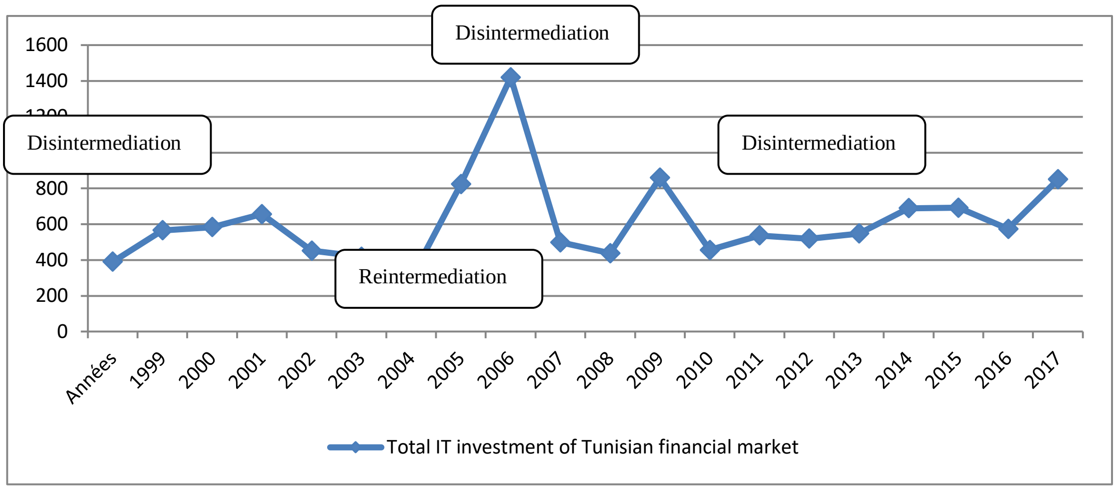

Figure 11: Evolution of total IT investment of the Tunisian financial market (In MTD) and financial intermediation

Over this period, although the total IT investment in the Tunisian financial market has decreased despite considerable fluctuations. Finally, the 2006-2018 period was characterized by a huge investment in IT by the Tunisian financial market which reached more than 1 400 MTD in 2007, hence a considerable increase of the curve over this year. In turn, Tunisian commercial banks recorded over this period a decrease in their rate of financial intermediation in both narrow and broad senses.

The previous analysis supports the conclusions of De Boissieu and Fournier (2001), Jallat (2000), Goyeau and Tarazi (2006). The introduction by the financial market of its first electronic quotation system in 1997 has led to a reduced role for bank intermediation. We can affirm that the more the financial market invests in IT, the more we witness a disintermediation of banks. The latter will undoubtedly intensify in the coming years, especially with the implementation by BVMT of the new version of the electronic quotation system which took place in December 2007 and with the development of the online stock market. Indeed, the improvement of the informational efficiency and the widening of the choice of financing alternatives for borrowers and of the range of alternative investments for lenders, will be possible thanks to this automation, hence an international diversification of portfolios.

In response to this trend, credit institutions will have to redefine their business and move towards supporting agents in the financial market. Thus, consulting will take a dominant place in the banking activity, even if many players will still need banks to finance their investments.

At this level, it is appropriate to ask the following question: *Is there actually a decline in the role of banks following the emergence of IT, or rather a transformation*? Disintermediation does not mean the dismantling of the banking sector. The role of banks (and their insurance subsidiaries and the mutual funds they manage) is not likely to diminish. Even if banks are gradually losing their traditional role as intermediaries-transformers, which consist of collecting deposits and granting credit, they are omnipresent in all segments of the financial markets. Banks' knowledge of the markets allows them to connect borrowers and lenders. The challenge that they face is to organize banking and market activities in a complementary manner and instead of transforming their clients' assets, banks will ensure that they guide their clients in the financial markets. These are new forms of intermediation.

The development of “market” activities stems from a search for new sources of profit. Banks have tried to adapt by turning to higher value-added products for which technology cannot be a substitute, i.e. more sophisticated products or personalized financial consulting services, by marketing new financial products, such as options, swaps, negotiable certificates of deposit, which are likely to generate a significant part of their net banking income. The bank, which previously used private information on the client, managed its internal credit portfolio thanks to a very detailed knowledge of individual risk (and normally better than that of the market). Today, it must adjust to a simpler and stricter information system. Banks are moving from the role of financial intermediaries to that of providers of financial expertise.

Furthermore, the decisive stimulus for the evolution of banking services came from the development and emergence of IT and digitalization. The Internet has breathed new life into the banks and has made it possible for new instruments to appear and existing methods to be refined. The bank can actually enter a vast market of intermediation and second-degree organizations with a comparative advantage, that of its initial expertise. To achieve this, it will be fundamental for the bank to be vigilant, to follow innovations and to adopt an offer behavior, anticipating the alliances of services that it could offer based on new technologies, digitalization and the new organizations that the economy is developing.

CONCLUSION

The development of theories of financial intermediation was necessary to understand the changes in the different financial systems. However, these theories should be updated. They are no longer able to explain the contemporary financial landscape. Technological developments in communication and information have led to a considerable decrease in transaction costs with the development of Internet-based operations. These approaches, which justify the rationale for the existence of banks and which form the basis of the theory of financial intermediation, have developed in a context of a "debt economy". Nowadays, the vast majority of economic agents use the financial market to raise funds.

Based on a descriptive analysis of the Tunisian banking sector, we have shown that the various financial reforms implemented over the last thirty years have had an impact on financial intermediation rates in the narrow and broad sense and on the main indicators of the Tunisian banking industry. Banks have moved towards activities other than deposit taking and credit granting as a result of the shrinking income from pure intermediation activity, namely the interest margin. On the other hand, the relative decline in the share of loans in financing has had as a counterpart, on the balance sheet of financial intermediaries, the increase in the share of securities. In a second stage, and following the intensification of competition, a new orientation of banks towards non-traditional and essentially market-oriented activities is beginning to appear. Thus, the composition of the GNP of the Tunisian banks is modified, and the share of the non-financial income generated by the new banking activities took a significant weight in the composition of the NBI.

The objective of this paper was to study and analyze the impact of IT on the phenomenon of disintermediation of Tunisian banks. By the same token, it allows to gain a better understanding of the new roles played by banks through a recent perspective of financial intermediation, and to analyze the performance of the Tunisian banking sector, which is called to face the increased mutations of the banking activities generated not only by the liberalization of the economy and its gradual integration into the global economic circuit, but also by the automation of the financial market. To this end, and over the 1998-2018 period, we have shown that the disintermediation of Tunisian banks is the consequence of the automation of the financial market. The more the financial market invests in IT, the more banks are disintermediated. In Tunisia, IT is a driving force behind the disintermediation of banks.

In any case, recent developments confirm the fact that rather than asserting that traditional banking is dead, the above analysis advocates a renewal of the banking economy. The role of banks is not about to diminish. The era of direct finance and new technologies has not so much created disintermediation but rather a new sharing of roles in the financial sphere. The new regulatory and technological context thus requires an update of the theory of financial intermediation. This can be done by emphasizing the role of financial intermediaries in risk management and by showing their capacity to provide participation services to non-financial economic agents via the market. As for competition from non-banks, the experience of banks in financial intermediation has allowed them to accumulate know-how and skills that represent important barriers to entry into the banking market. Finally, banks are facing a challenge: an acceleration of competition due to deregulation and an acceleration of financial and technological innovations via the marketization of balance sheets and the introduction of IT. The latter, in particular, are considerably changing the architecture of traditional distribution channels for banking products.

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