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The impact of real economic activity on the effectiveness of monetary policy transmission: The case of Tunisia

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The impact of real economic activity on the effectiveness of monetary policy transmission: The case of Tunisia

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Abstract

We study the relationship between the strength of the bank credit channel (BCC) of monetary policy transmission and real GDP growth in Tunisia using quarterly commercial bank-level data between 2008 and 2019. We find evidence of the existence of the bank credit channel in Tunisia in both its broad and strict senses. Classification of banks by total assets allows us to conclude that funding-constrained banks are very reactive to changes in the policy rate regardless of the economic cycle. However, identification of the strength of the BCC during different economic cycles is not possible in our case due to the lack of significance of the coefficients of interest. Furthermore, we find that the BCC operated exclusively through specific loan categories and banks during the sample period.

JEL codes: E3, E5, G2

Keywords: Bank lending channel; monetary policy transmission; bank balance sheet channel; GDP growth.

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1. Introduction

In this paper, we assess the effectiveness of the bank credit channel as a monetary policy tool considering (post-Revolution) periods of low economic activity. Moreover, we investigate how the bank credit channel operates through a broader range of loan categories and banks than previously documented, underlining the economic relevance of this channel. The main contribution of this paper is to shed light on how economic activity influences the strength of the bank credit channel and what this effect looks like.

The motivation of this research is to address an empirical concern, namely, the transmission mechanism of monetary policy in Tunisia from 2008 to 2019, using quarterly bank data. The importance of different transmission channels depends on the characteristics of the economy under study and, in particular, on the level of development of its financial structures and their role in spreading monetary impulses. For the present case, since its creation, the financial market in Tunisia has remained very limited by regulations that are anachronistic in comparison with international standards, while the Tunisian banking system is overbanked and, more specifically, dominated by commercial banks. Given that the majority of borrowers are bank-dependent and that the intermediation role of the Tunisian stock market is very constrained, the banking sector is the cornerstone of the effectiveness of monetary policy actions. These stylized facts lead us to focus first on proving the existence of the bank credit channel—in narrow and broad terms—and then on explaining its role in transmitting monetary policy actions to different sectors of the economy.

The recurrence of monetary policy debates proves that there is certain continuity in the posed issues, despite the diversity of historical frameworks and trajectories of economic and financial systems in different countries. In fact, the conduct of monetary policy and attempts to understand its transmission mechanism and impact on the real economy date back to the 16th century with the development of the quantitative theory of money. Many authors have been interested in the study of the interaction between the financial sphere and the real sphere, and the relevant research outputs have highlighted two opposing approaches: a dichotomous approach, which supports monetary and financial neutrality, and an integrated approach, which affirms that monetary and financial behaviors, in particular the bank credit market, are determining variables of the general equilibrium.

The literature on the credit channel, among the various possible channels of monetary policy transmission, experienced strong development during the 1990s. The aim was to build on the traditional analysis of the transmission mechanism, largely based on Keynesian IS/LM models. Although this is a fairly old school of thought, it attracted renewed interest in this period for economic and theoretical reasons. The length of the recession of the early 1990s, especially in the United States, coupled with the deterioration of corporate balance sheet structures, stimulated research on new ways of integrating the real and monetary spheres. In addition, theoretical developments in the understanding of information asymmetries allowed for improvement of the financial market structure and thus a reassessment of the effects of monetary policy impulses on real economic activity.

In this research, we try to understand the functioning of the credit channel in general and through specific economic sectors while taking into account structural problems faced by the banking sector and pronounced instability in the nominal and real spheres of the economy. Additionally, some methodological changes to the procedure for collecting credit data series took place from December 2008, which delimits the period considered for the econometric

estimates. We find evidence of the existence in Tunisia of the two prongs of the bank credit channel: the bank lending channel and the balance sheet channel. Dividing our sample group of banks by total assets allows us to conclude that small banks are very reactive to changes in the policy rate, regardless of the economic cycle. Moreover, our results suggest that the bank credit channel is operative only for some lending categories.

Following related literature (Kashyap and Stein 2000 and Temesvary and Sapriza 2019, among others), we employ a continuous difference-in-difference (DID) estimation to identify the credit channel in its broad sense, that is, the balance sheet channel, focusing on the external finance premium in the credit market, and in its narrow sense, that is, the bank lending channel, measured in terms of the supply of bank loans. The DID method, a reference method in econometric and quantitative research, is a statistical technique for estimating the causal effects of certain policy interventions or regulation changes that do not affect all parties at the same time and in the same way.

The paper proceeds as follows. In the next section, we present the characteristics of the Tunisian economic environment and the specificities of monetary policy in the period under study. In Section 3, we present a literature review. In Section 4, we describe our bank-level and macroeconomic data, in addition to presenting our estimation methodology. In Section 5, we discuss the empirical results, and we conclude in Section 6.

2. The Tunisian economy

2.1. Post-Revolution macroeconomic environment: Ambitions face challenges

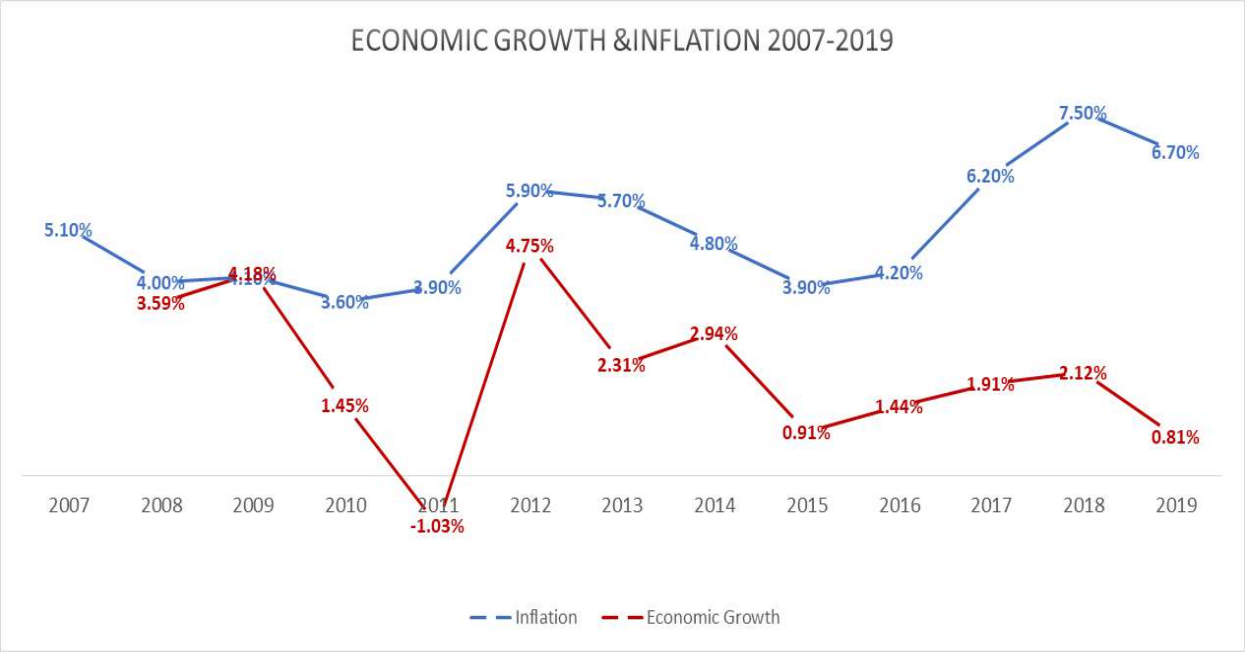
Almost ten years after the Revolution, Tunisia is still the most talked-about Arab country in the world: in the face of constant discussion of investment agreements, the resurgence of tourism and the increase in the public deficit, the Tunisian economy oscillates between challenges to be faced and a potential to unlock new value. Even if Tunisia's current economic and financial situation is characterized by vulnerability, this newborn democracy nevertheless presents positive signs of setting off on the path of growth.

However, even though the potential has long been recognized, the reality is that it has not yet been materialized. For the past decade, the economy has remained stagnant, with poor performance and an inability to take off. It is generally agreed that the lackluster economic performance is due to the 2011 Revolution, especially since Tunisia was known as “the good student of the IMF” before 2010 and was considered a model for other developing countries to follow by the World Bank. Additionally, the World Economic Forum had several times ranked Tunisia as the most competitive economy in Africa. In fact, beyond the shiny façade often presented by the former regime, the economic environment in Tunisia was (and still is) deeply defective. Rather than developing competitiveness, the current economic model has restricted it in almost all sectors with tough regulations. The banking sector is an example of the effects of limited competitiveness. The Tunisian banking system is characterized by low credit intermediation and significant vulnerabilities. Additionally, progress in terms of product innovation and service quality remains generally very limited. Surprisingly, despite the country’s large number of banks, the competitiveness level in the Tunisian banking sector is lower than the regional average.

Since the Revolution of 2011, the banking sector has faced difficult moments, as banks have to evolve in an environment marked by a tightening of liquidity, more reactive monetary policy

(8 decreases and 3 increases in the policy rate during the last decade), stricter banking regulations, notably on capital requirements and liquidity standards, and closer prudential supervision.

Since the start of the Revolution, economic growth has steadily deteriorated. Each year, forecasts of economic growth by the government or by international institutions were optimistic and then revised downwards at the end of the year. This is partially due to a downturn in the agricultural sector and a decline in the value added of nonmanufacturing industries, particularly in the hydrocarbon and mining sectors. The deterioration in tourism activity may also be the cause of modest growth. Security instability and the series of attacks that hit the country in 2015 resulted in a 33% decline in tourism revenues between 2014 and 2015 and a further 4% in 2016.



With regard to inflation, the upward trend noted after the Revolution has begun to gradually decline since 2014. However, the level of inflation rebounded at the end of 2016. The rise in consumer prices constitutes a constraint on household consumption, which negatively affects growth. Household purchasing power is also marked by the depreciation of the Tunisian dinar, which increases the cost of imports.

In 2018, growth rebounded to 2.5% (year-on-year), compared to 2% in 2017, driven by agriculture, services (especially tourism services, which recorded a strong upswing) and the electrical and mechanical engineering industries. On the demand side, growth in 2018 was driven by a revival in exports and investment, while private consumption declined. Since 2017, inflation has accelerated considerably, and the Central Bank of Tunisia (CBT) has raised its policy rate four times, from 4.25% to 6.75%. Inflation started to decelerate in the second half of 2018 but remained above 7%.

Growth is expected to rise to 3% on average in 2019-2020 to reach its potential of approximately 4% in the medium term, assuming that urgent reforms intended to improve the investment climate and to strengthen security conditions and social stability are successfully completed. Growth will be supported by the expansion of agriculture, manufacturing and tourism and by the commissioning of the Nawara gas field, scheduled for mid-2019.

2.2. Tunisian monetary policy

Since the 1990s, the (CBT) has adopted a discretionary monetary policy to fulfill its main mission of preserving price stability. Inflation targeting, as reflected in the evolution of the consumer price index (CPI), is thus an ultimate goal. The latter consists of ensuring noninflationary growth, contributing to job creation and improving social welfare through the preservation of purchasing power. To do this, the CBT conducts monetary policy through its main instrument, the policy rate. Its decisions are transmitted to the economy via its impact on the money market interest rate (MMR) and consequently demand for goods and services.

The equilibrium between aggregate demand and the country's productive capacity represents the cornerstone of inflationary pressures in the economy. Transmission of CBT interventions to directly target inflation takes time. Thus, the optimal conduct of monetary policy first requires a good and precise assessment of the transmission degree and reaction times of each monetary policy transmission channel. As Milton Friedman said, “Monetary policy takes a long and uncertain time to act”. In fact, the timing of central bank interventions is very delicate. By making a decision, the monetary authority launches a whole series of reactions that begin to be observed first on the interbank market, through the variation in the daily rates charged by lending institutions, and that then spread to consumer, production and employment demand, finally influencing the general price level or, in other words, the rate of inflation. The latter, in turn, leads to changes in asset prices and the value of the country's local currency. In such circumstances, the monetary authority must estimate in advance the timing and magnitude of the reaction of different economic agents. Further, the adjustment of the economy does not take place instantaneously but depends on the current economic situation and the expectations of economic agents.

Before we turn to studying the conduct of monetary policy in Tunisia, it is worth mentioning some specificities of the Tunisian economy, with particular attention paid to the following variables: financial system soundness, the exchange rate regime, the goods market and the labor market.

- First, the exchange rate regime. This was—in the last two decades—a managed floating regime with the intermediate objective of adjusting the dinar exchange rate against a basket of currencies dominated by the euro and the ultimate objective of preserving the competitiveness of the Tunisian economy. Today, after reforms recommended by the IMF, the exchange rate regime in Tunisia is transitioning towards a more market-based (free-floating) regime. This is intended to curb the current account deficit by promoting Tunisian exports and replenishing international reserves. Inflation has also fallen, although it remained relatively high, at 6.7%, as of September 2019.

- Second, a partially and asymmetrically open capital account. The liberalization of the capital account permits the exploitation of foreign funds in the short term, and this leads to an investment boom and therefore to temporarily higher growth. However, when this boom becomes unsustainable, the country may experience an economic recession or even a financial crisis. Prior to the 1990s, the Tunisian monetary authority strengthened control over export revenues and capital account transactions, except for FDI inflows, which were allowed and encouraged in some cases. However, in 1992, Tunisia eased the exchange control provisions on current account transactions by introducing the convertibility of the dinar. In addition, portfolio investment inflows were partially liberalized in 1995. Liberalization remained limited in subsequent years, mainly due to administrative rules on export earnings and FDI outflows.

Today, only nonresidents have the possibility to repatriate invested capital—as well as the net proceeds of this investment—in foreign currency.

- Third, credit and deposit contracts that are indexed to the money market rate (MMR).

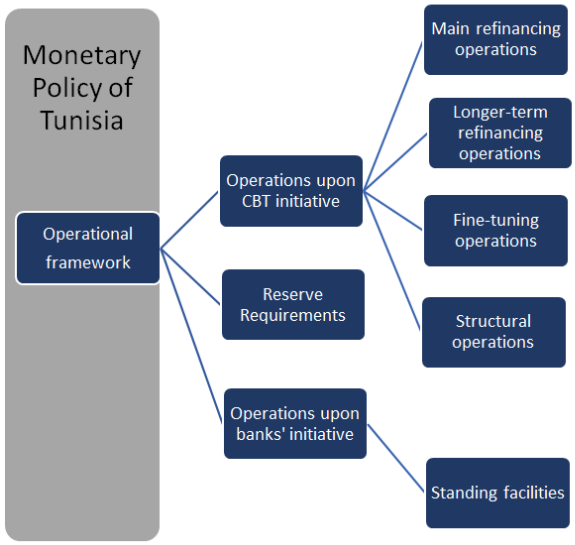
- Finally, a considerable weight of administered prices in the consumer basket.

2.3. Evolution of monetary policy instruments in Tunisia

While striving to simultaneously achieve several objectives—namely, preserving the stability of the financial system, controlling inflation, supporting economic activity and maintaining the viability of the net international investment position (NIIP)—in addition to its ultimate objective of preserving price stability, the (CBT) has pursued a discretionary monetary policy since the 1990s by using multiple instruments. This can be explained by the ambiguity surrounding the CBT's main mission, which focuses on the preservation of internal and external value of national currency, in addition to the absence of a reliable analytical framework to better guide monetary policy.

Each year, the CBT specifies the target growth of the money base while considering the macroeconomic framework previously established by the government. In the absence of debates on the content of the projections, the target money base is strongly impacted by the government's initial forecasts, and significant deviations from this target have been recorded. As a result, the assessment of inflationary pressures and monetary developments is rather indicative and does not significantly influence policy rate decisions.

Architecture of the operational framework of monetary policy



At the operational level, the CBT intervenes on the money market to regulate bank liquidity and influence the cost of financing economic activity, mainly by manipulating the policy rate (refinancing cost).

In conjunction with the use of the policy rate (the increase in the key rate by 350 bp since April 2017 and the widening of the corridor rate by 150 bp at the end of December 2017), the CBT has recently extended its action to unconventional measures. These "uncommon" instruments accelerate the transmission of monetary policy and enforce the monetary authority's

commitment to slowing consumer demand to ease inflationary pressures, restoring positive real interest rates to improve resource allocation and stimulate savings, directing the credit supply towards investment and encouraging banks to self-manage risk transformation and control the volume of refinancing.

The new trend towards these unusual measures has materialized in the following:

* The ceiling on the amount of the call for tenders at 7 billion dinars since July 2017; this procedure diverts banks from easy refinancing to more competitive means of refinancing, such as the interbank market or the lending facility.

* The introduction of a new allocation of eligible assets for refinancing, which limits the proportion of government securities to 40% of the collateral; this measure has been applicable since October 2018.

* The introduction of a new transformation ratio, capping the loan-to-deposits ratio at 120%; this measure has been in effect since the last quarter of 2018 and aims to slow money creation, control risk transformation, rationalize the reliance on refinancing from the CBT and encourage banks to intensify their efforts to find other financing resources (customer deposits and external financing lines).

* The creation of a new refinancing window dedicated to six-month refinancing for medium- and long-term loans; this window is devoted to investment projects in the productive sectors, particularly those initiated by small and medium-sized businesses.

Together with the econometric estimates, all these elements will help us understand the structural and institutional reality of Tunisia. In this paper, these estimates are based on available macroeconomic and microeconomic data. It should be noted that econometric estimates of the effects of monetary policy are, in general, very uncertain, as are those reported in this paper. In fact, the delays in transmitting the effects of monetary policy have led most central banks to set medium-term objectives. Predominately, it should be borne in mind that—due to their uncertainty—measurements of the effects of monetary policy are only one of the elements on which monetary policy decisions are based; therefore, the objective of this study is not to quantify the effects but rather to understand the underlying phenomena.

2.4. The credit market in Tunisia

The Tunisian credit market is characterized by two main features: a loan rate indexed to the money market rate and a considerable weakness in the assessment and management of credit risk, albeit to different degrees from one bank to another.

The spread over the money market rate serves as a reference for banks and their clients, which negotiate based on an interest rate systematically quoted at a deviation from the MMR.

This standard of indexation of bank rates in Tunisia to the MMR induces a quasiautomatic transmission of monetary policy to the effective financial costs of borrowers. This mechanism enables the CBT to directly influence the remaining disposable income after deductions of interest charges for a typical Tunisian household or firm. The CBT can reduce these costs in the context of a decline in activity or increase them when activity strengthens. This practice also safeguards the banking system from interest rate risk, which has in several circumstances

(for example, in the US banking system in 2007) proven to be devastating. The payoff for this protection of the banking system is that interest rate risk is inherently borne by depositors and borrowers, as banks are exposed to the resulting credit risk of their borrowers.

The evolution of credit volume in Tunisia has been dominated by the deepening of nonperforming loans since 2001 and, for some banks, by the implementation of more rigorous credit risk management practices in recent years. An important point that has emerged from banks is their ability to use the guarantees taken on the credits granted. While stressing the fact that their clients are reliable payers, bankers are unanimous in underlining the need to avoid recourse to the courts for the exercise of the guarantees provided at the time of the contract underwriting. The time it takes to obtain a positive legal decision and obtain the repayment of a loan is at least several years. This explains the high rate of guarantees requested by banks (often above 100%), even though it now falls below 80% if one takes into account not only equipment loans but also overdrafts or short-term credits, on which no guarantee is requested.

3. Literature review

3.1. Theoretical framework

In a market free from financial and fiscal imperfections, corporate investment decisions do not depend on the financial structure of the firm. Rather, internal and external sources of financing are perfectly substitutable; that is, when the central bank changes its policy rate, there is no effect on the cost of capital (whether through bank loans or bond issues). However, the reality is very far from the theoretical hypothesis. Sources of financial imperfections are abundant: transaction costs, asymmetric information issues, research costs, etc. Theory on the narrow credit channel, also known as the traditional bank lending channel, emphasizes the fundamental role of information asymmetries in financial markets in the transmission of monetary policy impulses. In this context, compared to other financial intermediaries, banks play a specific role. In this respect, many studies build on this theory and draw relevant inferences on the consequences of information asymmetries for the functioning of financial markets.

In the case of symmetrical information, a decrease in prices comes with an increase in demand; this can be explained by uncertainty over the characteristics of the product or a sign of poor quality. In the medium term, this can lead to a reduction in demand or even the total disappearance of the product.

The creditworthiness and characteristics of borrowers in general play a crucial role in explaining financial frictions1. Generally, the borrower is assumed to have better information than the lender on the quality of the investment projects to be financed as well as the probability of success. However, the lender does not have access to such information, so it may have a different perception in terms of the risks and contingencies that the borrower will face.

In addition, the lender must assess which borrowers are most likely to repay their debt, knowing that there is a difference between borrowers' ability and willingness to pay the amounts due. In this context, banks emerge as an endogenous response to financial imperfections, providing

[1]Frictions are the "stickiness" faced in the execution of a transaction and can involve the time, effort, research, and money necessary to complete a transaction.

different types of information services. In this regard, if banks have the intended information, they facilitate the financing process while including all information and research costs in the loan price.

The credit channel theory was originated and its relevance emphasized by Bernanke (1983), who underlines the importance of the conditions of bank credit supply, in terms of price and quantities, as a vector of transmission of monetary policy impulses to the real economy. This theory emphasizes the spread and amplification of shocks affecting the financial sphere and focuses on the particularity of banks compared to other sources of external funding. The actual situation is somewhat paradoxical: as we witness the significant liberalization of economies, it makes more sense for part of the funding from financial markets to grow at the expense of banks.

In fact, the introduction of financial factors into the explanation of economic cycles has been highly present in many studies throughout history, from Wicksell (1898) and Roosa (1951) to Sapriza and Temesvary (2019), whose results are very interesting: "The bank credit channel is operative almost exclusively in a low-growth environment." Indeed, these authors do not find a relevant existence of the bank credit channel or effect of the economic cycle on its strength in the post-2007 period, indicating a significant post-financial crisis change in the transmission mechanism of monetary policy through bank lending in the United States.

The synchronization of the dysfunction of the financial systems with economic downturns and structural transformations of the most industrialized countries throughout history leads us to believe that financial liberalization, generally characterized by a particularly intense process of financial innovation and lax regulation, has played an important role in the resurgence of the debate on the conduct of monetary policy and its mechanism of transmission to real economic activity.

3.2. The bank lending channel: previous articles

The theory that bank loans can be considered a major source of diffusion of macroeconomic shocks is quite old. However, the approach of highlighting the role of bank lending volume and its response to monetary impulses has only recently received particular attention, both theoretically and empirically.

Bernanke (1983), who originated this trend, reassessed the Great Depression of the 1930s in the United States considering this channel. In 1963, Friedman and Schwartz affirmed that the crisis was due to a contraction in the money supply, while the bank failures were due to a change in the preferences of consumers (holding cash instead of bank deposits). As a result, the money multiplier as well as the money supply decreased steadily, as market actors knew that the Fed would not intervene in the interbank market to compensate for this shortage of liquidity. Thus, this analysis focused on the impact of the decrease in the money supply as the main reason for the crisis and placed the direct effect of bank insolvency on economic activity in the shadow.

Later, Bernanke (1983) shed light on the collapse of the financial system as a major factor causing the Great Depression to last a long period of time. The bankruptcy of half of the banking system led to a sharp increase in the cost of intermediation, depriving bank-dependent

borrowers—who constituted an important share of economic agents—of financing to ensure the sustainability of their business. At the same time, the level of interest rates in financial markets gave a false impression that monetary conditions were accommodative.

Blinder and Stiglitz (1983) also drew attention to the role of credit in the transmission process in contemporary financial systems. They noted that a restrictive policy toward open market transactions, by modifying the money base (M0) of banks, modified loans and deposits. As there is no perfect substitute for bank loans, especially for a certain category of borrowers, this had a significant impact on the real economy. The fact that there are no close substitutes for bank credit for certain categories of borrowers can have real macroeconomic consequences. Moreover, the authors pointed out that the growth rate of aggregate M1 between 1979 and 1981 could reflect in all circumstances the severity of the crisis triggered by the Federal Reserve during this period; they also mentioned that restrictions on available credit can be a good explanation in this regard.

* The modified IS/LM Model: Bernanke and Blinder (1988b)

Bernanke and Blinder (1988b) contributed to developing the theoretical approach of the IS/LM model and developed the modified IS/LM model or narrow credit channel mechanism. This macroeconomic model has been extended many times since then.

In fact, Bernanke and Blinder (1988b) modified the standard IS/LM model based on theoretical advances on the role of banks in managing information asymmetries. To highlight the importance of bank loans in the transmission mechanism of monetary impulses, the key assumption of imperfect substitutability between loans and securities was introduced, in addition to the assumption of imperfect substitutability between money and securities. This hypothesis is explained by the existence of informational asymmetries in financial markets and, more specifically, by the particular role of banks compared to other financial intermediaries in corporate financing. As a result, bank loans cannot be assimilated into securities issued in a financial market, as assumed by the standard IS/LM model. Consequently, in contrast to the money channel theory, banks are not indifferent to the composition of their assets, just as firms are not indifferent to the composition of their liabilities. The main result postulated by Bernanke and Blinder (1988b) is that under these conditions, the narrow credit channel systematically amplifies the action of the traditional monetary channel.

The intuition underlying the amplification effect of the credit channel after a monetary shock is that it changes the quantity of deposits subject to the minimum reserve requirement and induces a change in banks' loan supply, which ultimately affects the investment decisions of bank-dependent borrowers beyond any impact on economic activity resulting from the change in the interest rate on securities. In other words, the narrow credit channel would act, via the change in the supply of credit, independently of the money channel, thus causing a strengthening of monetary transmission. At the same time, this effect would be reflected in an upward variation in the spread between the loan rate and the securities rate.

Proving the existence of the narrow credit channel would therefore mean identifying an impact of monetary policy on either the credit supply or the interest rate spread. Thus, this conclusion was considered a good starting point for the vast majority of empirical studies that investigate the existence of the credit channel. However, many challenges have arisen: namely, if we

choose to work using aggregate variables and compare the response times of monetary aggregates or their predictive power, we face an identification problem that cannot be solved using previous approaches.

For that reason, studies have gradually been reoriented towards the use of microeconomic banking data and integrated the heterogeneity of banks into the analysis, which involves the use of bank size, capitalization, capital structure and degree of liquidity as the main determinants to measure to what extent the credit channel is efficient in transmitting monetary impulses. At this level, a new question arises, especially regarding the differentiation between small banks and large banks: If loans by small (illiquid and/or undercapitalized) banks are more sensitive to changes in monetary policy than those of other financial institutions, what is the macroeconomic impact of a narrow credit channel? What about the reaction of large (liquid and/or well-capitalized) banks? Moreover, what is their function in regard to the monetary transmission process? The literature has concluded on many occasions that the lending channel does not operate through large banks. Thus, is it still reasonable to talk about central banks and monetary transmission in an economy dominated by large banks?

The identification of the bank lending channel using the spread between the credit rate and the securities rate is relevant, nevertheless, as it proves the existence of the channel under study (as stated by Bernanke and Blinder 1988b); in some cases, it even shows that banks smooth rather than amplify the evolution of monetary rates.

The fact that banks can smooth changes in monetary policy through the lending channel can be explained by starting from the fact that bank-dependent borrowers with weak financial positions will be highly impacted by an increase in the loan price—keeping in mind that this category of borrowers has no access to alternative financing on the financial market. In such cases, larger increases in the policy rate after bank lending rates could compromise the solvency of these borrowers, who will find themselves unable to meet their obligations towards their banks. Therefore, banks might wish to protect the financial situation of this category of borrowers and, as a result, absorb increases in interest rates as much as possible, thus reducing the overall impact of monetary policy.

3.3. Bank balance sheet channel

The idea behind the credit channel in its broad sense, also known as the balance sheet channel, is that financial imperfections affect not only the bank credit market but also the capital market more generally. In this approach, all external means of financing are imperfect substitutes for internal financing. The difference between the costs of internal and external financing is the external finance premium, which depends on the borrower's net wealth (for example, the sum of internal resources and those accepted as collateral). The greater the net wealth, the lower is the potential conflict of interest between lender and borrower, as the latter can either self-finance a larger part of its investment project or offer more collateral to secure the debts it issues. Thus, lenders benefit from a premium that is smaller if agency costs are reduced. For example, Bernanke and Gertler (1989) show, in an overlapping-generation real-cycle model, that the premium demanded by lenders is a decreasing function of the net wealth to external financing ratio.

The external finance premium fluctuates in the same direction as the initial shock and in the opposite direction as the borrower's net wealth. Consequently, a restrictive monetary shock that increases key interest rates affects borrowers' balance sheets and income statements and weakens their borrowing capacity. It thus causes an endogenous increase in the external financing premium, leading to a decline in investment spending. The initial shock is transmitted and amplified through its effect on the external finance premium. Thus, as in the case of the narrow credit channel, friction in financial markets amplifies the initial monetary shock. Unlike the narrow credit channel, in this channel, banks do not play a specific role in the transmission process: monetary policy can have real effects without directly affecting the supply of bank credit.

The scope of this mechanism is not limited to monetary policy shocks alone. Generally, any type of shock can have an impact on external finance premiums and, consequently, affect agents' investment decisions. The mechanism acts in a similar way: insofar as the borrower's net wealth is procyclical, a shock leads to a countercyclical change in the external finance premium, amplifying the fluctuations in borrowing and, ultimately, those in investment, expenditure and output.

There is a large theoretical and empirical literature underlining this transmission channel (cf. Bernanke, Gertler and Gilchrist, 1996, 1999; Clerc, 2001). This approach has been supported by empirical work linking balance sheet and self-financing variables to the different investment choices made by firms (in fixed capital or inventories) and to household decisions regarding the purchase of durable goods and housing.

3.4. Monetary policy effects in accordance with bank heterogeneity

Various studies have shown that smaller banks are more sensitive to changes in monetary policy and are more likely to reduce their credit commitments in the event of a monetary contraction than larger banks.

In their paper “The impact of monetary policy on bank balance sheets”, Kashyap and Stein (1995) construct a theoretical model based on the idea that the marginal cost of external financing is increasing and is higher for smaller banks than for larger ones. External financing stands for issuing certificates of deposits not subject to minimum reserve requirements, subordinated debt or capital issues from the financial market. In this paper, the authors conclude that to confirm monetary transmission via the bank lending channel, we need to simultaneously prove that the volume of bank loans and securities holdings both decrease more rapidly for small banks than for larger ones, considering that small banks are faced with inelastic credit demand and higher external financing costs.

If the empirical results affirm that only the volume of loans is decreasing more rapidly for small banks, it would not be sufficient to infer that it is a decrease in loan supply due to a monetary policy contraction. In fact, the volume of credit for small banks could decrease due to an economic slowdown, as small banks lend generally to small borrowers, who are very sensitive to economic conditions.

Kashyap and Stein (1995) use US quarterly data for the period 1976-1992 from call reports, which focus on the balance sheets of commercial banks at an intermediate level of disaggregation. The authors extend the analysis to 2000 banks by using quarterly individual bank data for the period 1976-1993, which represent approximately 1 million observations. On

this basis, they distinguish between small and large banks by applying as a size criterion the amount of assets, an indicator of the ability to access external financing.

The tests carried out indicate that the first condition is fully satisfied: bank loans are decreasing more rapidly for small banks than for large institutions. On the other hand, the second condition is not fully verified, as the relative evolution of the securities is more sensitive to the specification used.

The purpose of the study is to analyze, using the panel method, whether there are significant differences in the reactions of banks of different sizes to a monetary policy impulse. From a banking perspective, a bank that is facing difficulty in compensating for a decrease in deposits via external financing should at least hold liquid assets so that it can liquidate securities rather than loans. In other words, it must manage its liquidity issues through the asset side. The data confirm that smaller banks hold a larger proportion of their assets in securities and cash than larger banks. In addition, they cannot borrow on the federal funds market, where debt issues are not coupled with the provision of collateral (i.e., credit risk is present). However, even among smaller banks, where the tendency to hold buffer stocks of assets is more pronounced, those with more securities and cash balances respond differently to a monetary contraction than less liquid banks. More specifically, within the category of small banks, monetary policy changes have a greater impact on the credit activity of banks with the least liquid assets. According to the authors, these results cannot be plausibly explained by using an alternative interpretation deduced from the logic of the interest rate channel: this would require banks whose clients are more sensitive to monetary policy to systematically choose to hold fewer liquid assets.

4. Broad description of the model/regression

As in the related literature (Kashyap and Stein 2000), we employ a continuous diff-in-diff estimation to identify two main monetary policy channels: bank lending and bank balance sheet. Important steps will be taken beyond the estimation methodology of earlier papers by:

- Examining the interaction of the bank's credit channel with economic activity.
- Including fixed effects and extensive sets of controls to eliminate non-monetary policy related confounding effects on lending flows.

Diff-in-diff estimation is a statistical method used to estimate the effect of a treatment by comparing the difference between the control and treatment groups before and after the introduction of treatment. This method is used in public policy evaluation to estimate the effect of a treatment within the theoretical framework of Neyman-Rubin's causal model. The logic underlying the technique was used in the 1850s by John Snow, and the method is called the 'controlled before-and-after study' in some social sciences.

× ***Equation***

$$\Delta \ln(Y)_{j,t}^{n} = \alpha + \sum_{k=1}^{4} \eta \Delta \ln (Y)_{j,t-K}^{n} + \sum_{k=1}^{4} \beta_k MP_{t-k}^{tn} + \sum_{k=1}^{4} \gamma_k MP_{t-k}^{tn} \cdot C_{j,t-k} + \sum_{k=1}^{4} \delta_k \cdot C_{j,t-k}$$
$$+ \sum_{k=1}^{4} \zeta (Bank\ Controls)_{j,t-k}$$
$$+ \left(\sum_{k=1}^{4} \theta_k . MP_{t-k}^{tn} + \sum_{k=1}^{4} \lambda_k . MP_{t-k}^{tn} \cdot C_{j,t-k} + \sum_{k=1}^{4} \pi_k \cdot C_{j,t-k} \right) \cdot \Delta GDP + \varepsilon_{j,t}^{n}$$

$(Y)_{j,t}^{n}$: The bank portfolio of loans, where n is the total of loans to different sectors, including commercial and industrial (C&I), housing and household sector.

$\Delta \ln(Y)_{j,t}^{n}$: The quarterly change in the natural log of a bank's loan holdings.

MP_{t-k}^{tn}: The change in the money market rate in the Tunisian economy from t-1 to t on a quarterly basis.

$C_{j,t-k}$: The loan to deposits ratio of each Tunisian bank.

The use of lagged values of bank data (ratios) ensures that they reflect past strategic choices of managers.

The use of lagged values for the change in the money market rate ensures that we detect the cumulative effect of a change in the monetary policy one year before.

ΔGDP: The change in GDP of the Tunisian economy.

- × Description of data

Lending flows and balance sheet controls: We use data from 21 Tunisian commercial banks on a quarterly basis from 2008Q4 to 2019Q3.

- The dependent variable: Total loans and the loans of each sector: service sector, residential sector and consumption loans. This variable is defined as the quarterly change in the natural logarithm of each bank's stock of loans multiplied by 100.
- Explanatory variable: The sensitivity of the bank after a change in monetary policy.

The estimation is performed with these proxies.

a. The securities to assets ratio: A proxy of funding constraints for studying the bank lending channel (in accordance with the definition in Kashyap and Stein, 2000).
b. The equity capital ratio: A proxy of funding constraints for studying the bank balance sheet channel (in accordance with the definition of Temesvary et al. 2018).

- Control Variables: It is crucial to track the effect of credit supply changes in bank balance sheets to distinguish changes with nonmonetary origins.

- Bank Controls: Total assets, ROA. These variables ensure that the observed effects are related to the monetary policy transmission mechanism and not to other factors specific to the bank business model and governance issues.

* Monetary policy and real economic activity measures:

We need macroeconomic variables that capture the changes in Tunisian monetary policy and serve as a proxy for real economic activity.

As in related literature (Kashyap and Stein, 2000), we use the quarterly changes in the money market rate (MMR) to capture changes in monetary policy and the quarterly change in real Tunisian GDP to measure real economic growth during the studied period.

* Controls for changes in credit demand:

The most important challenge here is to control for macroeconomic changes that may influence banking clients' demand for credit in Tunisia. It is fundamental to track these effects because they are unobservable. These controls allow us to identify the relationship between changes in Tunisian monetary policy and bank credit supply.

Two macroeconomic variables serve as proxies for macro controls, namely, the unemployment rate and the inflation rate.

While the findings must be interpreted with utmost caution, given the modest size of the sample due to the poor reporting quality before 2008 and the aforementioned data limitations, the strategy used to capture the BCC of Tunisian monetary policy is to focus on the sign of the cumulative coefficients on the interaction term of the bank funding ratio and the Tunisian monetary policy change, $\sum_{k=1}^{4} \gamma_k$ (later called the coefficient of the variable C1). We expect this coefficient to be positive if Tunisian banks with high equity capital reduce their lending flows less in response to a monetary policy tightening than banks with lower equity capital.

Concerning the sign of the coefficient$\sum_{k=1}^{4} \delta_k$, expectations are mixed: some researchers believe that funding-constrained banks maintain higher lending flows, and others find a positive relationship between capitalization and lending.

The cornerstone of this paper is to investigate the role of real economic activity in strengthening the BCC. This monetary policy channel remains dependent on access to external funding, inelastic supply of such funding or agency fees. We expect these frictions to be more noticeable during economic downturns, and as a result, we expect that the BCC is more efficient in times of subdued economic activity.

5. Estimation results

As mentioned before, in this section, we examine the two types of bank credit channels: the bank lending channel and the balance sheet channel. This part of the research is organized as follows: For each of the two prongs of the credit channel, we test for the existence of the channel in question for all Tunisian banks and then only for small banks. After this, we look at different economic sectors and interpret their interaction with changes in Tunisian monetary policy. Last but not least, we interact the credit channel strength measures with the Tunisian real GDP growth rate.

The strategy for proving the existence of the credit channel is based on the sign of the coefficient on the interaction term of the money market rate (MMR) and the securities to assets ratio (SEC) or the equity capital to assets ratio (CAR) (later called the coefficient of the variable C1). If this coefficient is consistently positive across specifications (including those with fixed effects and macro control variables), we can conclude that the credit channel is operative.

On the other hand, the strategy for identifying the effectiveness of the credit channel in different economic cycles focuses on the sign of the coefficients on the interaction term of MMR and GDP growth (the coefficient of C2) and the sign of the coefficients on the double interaction term of the money market rate (MMR), securities to assets ratio (SEC) or equity capital to assets ratio (CAR) and GDP growth (the coefficient of C3).

If the coefficient of C2 is positive and the coefficient of C3 is negative, the bank credit channel is stronger in times of low economic growth. In other words, we expect that higher GDP growth attenuates the strength of the bank credit channel of monetary policy transmission by reducing the market frictions that the bank credit channel rests on.

5.1. Estimation results for the bank lending channel

Let us start with the estimation results on all Tunisian banks' total lending and their responses to changes in the money market rate (our proxy for changes in monetary policy). In Table 2, Columns 1 and 3 examine the role of bank securities holdings as a proxy for the bank lending channel in Tunisia. Our results show that the coefficient of interaction between the SEC and MMR is consistently positive and statistically significant at the 5% level only after a lag of 3 periods (9 months). These results are also robust to the introduction of lagged macroeconomic control variables; these effects are also significant. The effect of adding macroeconomic variables can only be tracked after at least one year, and the Tunisian economy takes a considerable amount of time to react to changes in monetary policy due to the diversity of political and sociological events occurring during the studied period.

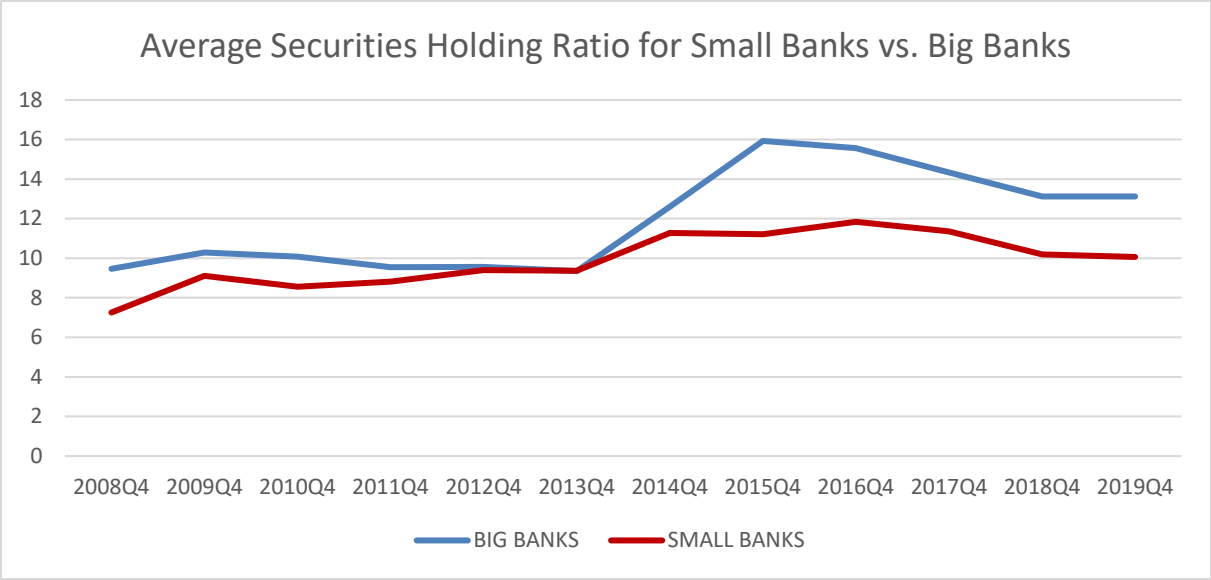
Another important coefficient is that on the interaction of the MMR and GDP growth, which measures the effectiveness of the credit channel in different economic cycles. In our case, this coefficient is consistently positive and significant at the 1% level.

Additional calculations reveal that in times of low economic growth (at the 10th percentile of GDP growth), Tunisian banks reduce their lending by almost the same amount as in periods of

high economic growth in response to a 100-bps tightening in monetary policy. This can be explained by the high credit demand of different sectors of the economy, which will be discussed later.

The large heterogeneity in bank characteristics—asset size, business model and contribution of governments to capital—has an important effect on the transmission of monetary impulses, which is why, in the following, we divide Tunisian banks into small and large banks: smaller Tunisian banks are those below the 75th percentile of the cross-sectional distribution of asset size. According to this classification, more than 85% of the Tunisian banking sector is constituted by small banks. However, if we consider the definition of a large bank of Temesvary and Horacio (2019)—which introduces large banks as those above the 95th percentile of the cross-sectional distribution of asset size—we find only one private bank in Tunisia that can be classified as a large bank. Therefore, it is more attractive to study the response of the majority of banks in Tunisia rather than studying the impact of one or three banks, which can distort the whole effect.

For small banks, overall (Table 3, columns 1 to 3), we begin to detect evidence of the existence of the bank lending channel in the Tunisian banking system after a two-period lag on the interaction term of the securities to assets ratio (SEC) and quarterly changes in the MMR. The coefficient is positive and statistically significant at the 5% level. Moreover, the results also confirm that the monetary policy transmission effect starts to be convincing with three periods lags on the double interaction terms (money market rate with SEC and change in GDP). The coefficient is negative and statically significant at the 1% level. These results are robust to the inclusion of extensive sets of macroeconomic and bank controls. This outcome can be explained by the fact that these banks are funding constrained, and as a result, they reduce their lending more in response to a tightening in monetary policy than would a less constrained bank. In fact, small banks face many challenges in raising funds from sources other than refinancing from the central bank or the interbank market. Generally, during the studied period, they do not have access to capital markets and have only modest securities holdings, in terms of both volume and composition. Thus, they cannot convert their securities holdings into loanable resources, especially with the new collateral requirements policy launched by the Central Bank of Tunisia.



Our evidence of the existence of the bank lending channel for small banks' total lending in Table 3 leads us to go further with the analysis and examine the more relevant core lending. We start by checking for the presence of the bank lending channel in business financing, household financing and commercial real estate financing.

Table 4 (columns 1 to 3) shows the results for commercial and industrial (C&I) lending flows. The simple interaction term of changes in MMR and SEC are consistently negative with weak significance (at the 10% level), which attests to the weak presence of the bank lending channel in business lending in different economic cycles. The double interaction term of the change in MMR with SEC and GDP growth is also negative and significant at the 1% level after three lag periods. This shows the important impact of the economic cycle in boosting the activity of Tunisian firms. In fact, firms in Tunisia that lack competitiveness faced long years of economic swings, which significantly weakened their capacity to survive in the market without external financing.

Indeed, bank financing of Tunisian companies is fundamental in both the startup and operational phases; it remains the predominant means of financing for the private sector in the country. It is also the preferred fund-raising tool compared to forms of nonbank financing (factoring, leasing, stock market, venture capital). Nevertheless, bank lending to the productive sectors in Tunisia is limited in most cases to short-term credits and remains low compared to other emerging countries. In fact, the significant and recurrent problems of access to bank financing sources for Tunisian companies, especially SME-SMIs, are mainly attributable to the exorbitant borrowing costs and collateral constraints due to restrictive requirements, generally backed by mortgage guarantees that are much higher than in those in other countries.

The exorbitant cost of bank credit in Tunisia is the main obstacle to financing. Interest rates in Tunisia are much higher than those observed elsewhere. In particular, the gradual liberalization of banking conditions has led to the free setting by banks of lending interest rates applied to all forms of credit regardless of maturity, plus exchange and guarantee fees. The margins applied

to the granting of bank loans to companies are indexed to the average monthly money market rate (MMR). The cost of bank financing for Tunisian companies is therefore directly dependent on the MMR, which reflects the CBT's management of bank liquidity and, in particular, the trend in the policy rate, which represents the key rate of the issuing institution and which remains high given the financing needs of companies, structurally inducing excessive borrowing costs.

Looking at consumer lending in Table 5 (columns 1 to 3), the magnitude of the coefficient is different from those of total lending or C&I, but the simple interaction term is consistently negative with weak significance at the 10% level. This explains the weak presence of the bank lending channel in Tunisia during the studied period. Moreover, the double interaction term is not significant across specifications.

Over the past ten years, Tunisian consumers have been going through a period of increased consumption. They have embraced a new consumer culture by following a pace of life comparable to that of developed countries, which also exceeds their true financial capacity. To cover these expenses, these consumers have found themselves obliged to borrow from banks or private individuals. Given that this new trend is attributable to a low disposable income, the result is an overindebted Tunisian population, similar to households in developed countries but with a much lower average income. In any case, if this phenomenon persists, the fear is that an important portion of society will become even more fragile, particularly during this post-Revolutionary period marked by an obvious increase in the general level of prices.

Turning now to residential flows, in Table 6 (columns 1 to 3), we see that the magnitude of the coefficients is much higher than in all previous results. In addition, the coefficients of interest change in sign across specifications and show a negative relation on the simple interaction term, which indicates that the bank lending channel did not operate through commercial real estate (CRE) lending during our sample period. This result can be explained by the specificities of the Tunisian housing sector.

In fact, private developers only became involved in the local market in the late 1980s, and their activity has grown significantly over the last two decades. They have focused on the development of housing estates and the construction of economic and luxury housing, particularly in large urban areas, with a lesser degree of involvement in the promotion of social and economic housing.

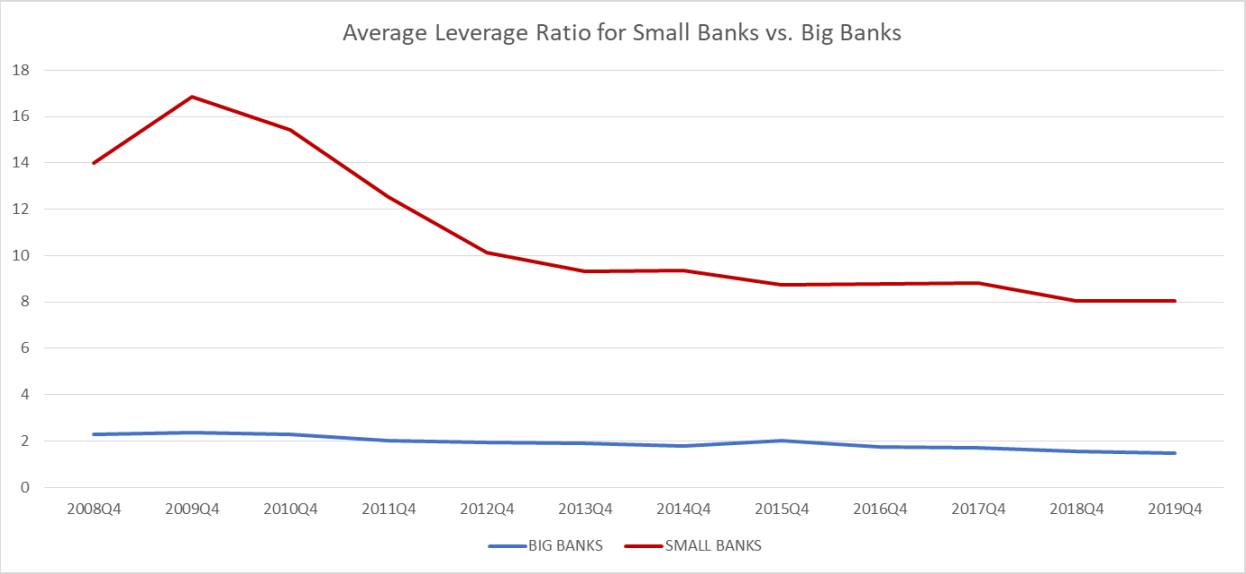
However, during the years following the Revolution (2011-2012), the real estate market exploded in Tunisia. In addition to real estate developers, the majority of the population invested in the promotion and acquisition of housing, in line with a tendency to invest in anything that can make money. The boom in the sector led to an increase in land prices, and the degradation of the sector is the result of a radical change in the behavior of Tunisians, who now have other priorities. Today, the real estate sector is suffering from multiple problems that have been aggravated by the difficult economic context. This sector has been no exception to the rule: the current crisis has finally caught up with real estate and rising prices, and fiscal

pressures have also started to weigh on the sector. As of October 11, 2019, the commitments of real estate developers to banks were close to 5,600 million dinars. Another worrying observation is that, according to figures from the Ministry of Equipment, Housing and Land Management, the number of households able to obtain a bank loan for the acquisition of housing decreased from 80% to 11.5% between 2011 and 2018. Further, the country needs 500 thousand social housing units for low-income categories by 2030.

In 2018, several real estate companies declared bankruptcy and were forced to close down. Indeed, many real estate developers are unable to fulfill their commitments to banks, which have also not been spared from suffering the impact of this crisis.

5.2. Estimation results for the bank balance sheet channel

Now we turn to analyzing the other mechanism of the bank credit channel of monetary policy transmission, the bank balance sheet channel, for all banks and then for small banks. To do so, we consider the interaction of changes in monetary policy with each bank's equity capital to assets ratio (CAR). That is, the SEC previously used to test the bank lending channel is now replaced by the CAR as a proxy for the balance sheet channel, as described in the previous section.



The results in Table 2 (columns 4 to 6) confirm the existence of the balance sheet channel in Tunisian banks' total lending, and the simple interaction term is consistently positive and significant at the 5% level across specifications. However, the coefficients are significant only after 4 lags on all variables. The other coefficient of interest, the double interaction term, is also negative and significant at the 5% level; however, the coefficient on the interaction of MMR and GDP growth is not significant and has a negative sign, which makes it hard to determine the effectiveness of the balance sheet channel across different economic cycles.

Looking at the total lending of small banks, we have almost the same result as for the total lending of all Tunisian banks because our sample is composed of 3 large banks and 18 small banks. The coefficient of interest is presented in Table 3 (columns 4 to 6). The simple interaction term is positive and significant at the 5% level, which confirms the existence of the balance sheet channel in Tunisian small banks' lending flows. However, the double interaction term is not significant and displays an unexpected sign. The weak significance of the coefficient of interaction of different variables with GDP causes issues regarding the interpretation of the response of total credit to changes in monetary policy in different economic cycles.

On the other hand, as we have strong evidence on the existence of the balance sheet channel, we can go further with the analysis and look at the lending of different sectors. We first evaluate the presence of the balance sheet channel in the business financing of small banks in Tunisia. Both the simple and the double interaction terms (Table 4, columns 4 to 6) have the expected sign and are consistently significant at the 5% level across specifications. As mentioned before, the majority of Tunisian companies are bank-dependent, which makes the external finance premium very large.

Regarding other types of credits, namely, to the residential and household sectors, we do not find evidence of the balance sheet channel; the simple interaction term displays a negative coefficient with a lack of significance across specifications. Banks' lending incentives may be different during the studied period for these categories of loans, and as we mentioned before, Tunisian spending behavior has been increasing quickly regardless of economic cycles. Nevertheless, it is an interesting finding vis-à-vis other research that also finds evidence of the credit channel for all banks without testing for different sectors.

Conclusion

We study the bank credit channel of monetary policy transmission in Tunisian commercial banks' lending flows. We find evidence of the existence of the bank credit channel in both its broad and narrow sense. We then focus on studying the reaction of the majority of banks—classified as small banks—to monetary policy impulses, and we find that these funding-constrained banks are very reactive to changes in the policy rate regardless of the economic cycle. In addition, we provide evidence of various types of lending by smaller Tunisian banks from 2009-2019. We show that the bank lending channel operates through business and household lending but does not operate through commercial residential lending, as the housing sector has been plagued with many challenges in the last decade. We also provide evidence of the existence of the balance sheet channel through business lending. Unfortunately, the identification of the reactions of banks during different economic cycles is not always possible due to changes in sign and a lack of significance of the coefficients of interest. Last but not least, it is worth mentioning that the main constraint of these results is the relatively short period under study, which is due to poor data quality before 2010.

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Appendix

Table 1: Summary statistics and definition of model variables

Variables	Units	Definition	Frequency	Mean	Median	Max	Min	SD	N
Lending flows									
Total	%	Delta LN of each bank's stock of total loans multiplied by 100	*Quarterly*	2.725	1.706	104.406	(56.290)	8.598	945
Commercial & Industrial (C&I)	%	Delta LN of each bank's stock of C&I loans multiplied by 100	*Quarterly*	2.819	1.750	103.701	(56.292)	9.569	945
Residential	%	Delta LN of each bank's stock of residential loans multiplied by 100	*Quarterly*	5.357	0.872	1,447.113	(961.581)	102.036	945
Households	%	Delta LN of each bank's stock of Household consumption loan multiplied by 100	*Quarterly*	4.026	1.978	101.988	(30.858)	9.299	945
Measures of funding constraint			*Quarterly*						
Securities to assets ratio	%	Total securities divided by total assets multiplied by 100	*Quarterly*	0.081	-	24.364	(31.046)	2.163	945
Leverage Ratio	%	Total equity capital divided by total assets multiplied by 100	*Quarterly*	9.391	4.853	133.867	-	14.479	945
Bank characteristics									
Return on assets	%	Total income divided by total assets multiplied by 100	*Quarterly*	0.578	0.700	7.100	(10.100)	1.363	945
Growth of real total assets	%	Delta LN total assets multiplied by 100	*Quarterly*	(0.000)	-	13.178	(16.302)	1.141	945
Macro controls									
Unemployment rate	%	Qarterly change in the number of unemployed divided by the labor force	*Quarterly*	9.391	4.853	133.867	-	14.479	945
Change in the money market average rate	%	Quarterly change in the money market rate multiplied by 100	*Quarterly*	0.001	0.000	0.008	(0.013)	0.004	945
Real GDP growth	%	Delta LN of real Tunisian GDP multiplied by 100	*Quarterly*	0.005	0.005	0.017	(0.030)	0.008	945
Inflation	%	Change in inflation '(The National institute of statistics)' multiplied by 100	*Quarterly*	0.050	0.048	0.077	0.030	0.013	945

Table 2: The impact of changes in Tunisian monetary policy on the total lending of ALL Tunisian banks with different Securities to Assets /Leverage Ratio

Variables			[1]	[2]	[3]		[4]	[5]	[6]
Lending flows	*TL*		Total	Total	Total		Total	Total	Total
Variables		LAG				LAG			
Ratio			Securities-to-Assets	Securities-to-Assets	Securities-to-Assets		Leverage Ratio	Leverage Ratio	Leverage Ratio
Quarterly change in MMR	MMR		-1.110	-1.155	-1.441	1	-0.723	-0.723	-1.034
			[0.0043]	[0.0049]	[0.001]		[0.0088]	[0.0101]	[0.0133]
Quarterly change in the Bank Ratio	DSA/ LR		-0.250	-0.231	-0.238	4	0.143	0.130	0.135
			[0.0063]	[0.0122]	[0.0072]		[0.0000]	[0.0000]	[0.000]
Quarterly change in MMR X Ratio	C1	3	0.358	0.367	0.411	4	0.067	0.068	0.091
			[0.0425]	[0.0355]	[0.0224]		[0.0400]	[0.0377]	[0.0067]
Quarterly change in MMR X GDP Growth	C2	1	1.621	1.630	1.951	4	-0.637	-0.754	-1.599
			[0.0032]	[0.005]	[0.0009]		[0.1745]	[0.1242]	[0.0379]
Quarterly change in MMR X Ratio X GDP Growth	C3	3	-0.904	-0.872	-0.957	4	-0.171	-0.162	-0.158
			[0.0006]	[0.0011]	[0.0002]		[0.0096]	[0.0140]	[0.0195]
Ratio X GDP Growth	C4	2	0.196	0.214	0.187	4	-0.007	-0.006	-0.003
			[0.0087]	[0.0041]	[0.0120]		[0.6413]	[0.6678]	[0.8333]
Bank Controls			NO	YES	YES		NO	YES	YES
Macro Controls		4	NO	NO	YES	4	NO	NO	YES
Bank fixed effects			YES	YES	YES		YES	YES	YES
R-squared			0.1733	0.1893	0.1867		0.1971	0.2202	0.2363

Table 3: The impact of changes in Tunisian monetary policy on the Total lending of small Tunisian banks with different Securities to Assets/Leverage Ratio

Variables			[1]	[2]	[3]		[4]	[5]	[6]
Lending flows	*TL*		TL	TL	TL		TL	TL	TL
Variables		LAG				LAG			
Ratio			Securities-to-Assets	Securities-to-Assets	Securities-to-Assets		Leverage Ratio	Leverage Ratio	Leverage Ratio
Quarterly change in the Bank Ratio	DSA/LR		-0.242	-0.223	-0.204	1	0.101	0.093	0.094
			[0.0123]	[0.0223]	[0.0331]		[0.0014]	[0.0037]	[0.0036]
Quarterly change in MMR	MMR		-0.629	-0.692	-0.922	1	-0.803	-0.713	-0.821
			[0.0522]	[0.0423]	[0.0317]		[0.0094]	[0.0287]	[0.0129]
Quarterly change in MMR X Ratio	C1	3	0.344	0.363	0.361	2	0.098	0.092	0.094
			[0.0482]	[0.0355]	[0.0437]		[0.0056]	[0.0079]	[0.0078]
Quarterly change in MMR X GDP Growth	C2		-0.915	-0.799	-0.988	2	-1.240	-1.211	-1.319
			[0.0463]	[0.0953]	[0.1008]		[0.0393]	[0.0667]	[0.0478]
Quarterly change in MMR X Ratio X GDP Growth	C3	3	-0.816	-0.796	-0.802	2	0.072	0.075	0.078
			[0.0025]	[0.0032]	[0.0026]		[0.3458]	[0.3297]	[0.3163]
Ratio X GDP Growth	C4		-0.090	-0.075	-0.073	2	-0.033	-0.032	-0.030
			[0.2933]	[0.3871]	[0.3969]		[0.0472]	[0.0485]	[0.0639]
Bank Controls			NO	YES	YES		NO	YES	YES
Macro Controls		4	NO	NO	YES		NO	NO	YES
Bank fixed effects			YES	YES	YES		YES	YES	YES
R-squared			0.163	0.177	0.187		0.185	0.210	0.213

Table 4: The impact of changes in Tunisian monetary policy on the business lending of small Tunisian banks with different Securities-to-Assets/Leverage Ratio

Variables			[1]	[2]	[3]		[4]	[5]	[6]
Lending flows	*C&I*		C&I	C&I	C&I		C&I	C&I	C&I
Variables		LAG				LAG			
Ratio			Securities-to-Assets	Securities-to-Assets	Securities-to-Assets		Leverage Ratio	Leverage Ratio	Leverage Ratio
Quarterly change in the Bank Ratio	DSA/LR		-0.262	-0.234	-0.227	4	0.116	0.104	0.102
			[0.0114]	[0.0238]	[0.0266]		[0.0005]	[0.0020]	[0.0023]
Quarterly change in MMR	MMR		-0.656	-0.778	-1.021	4	-0.432	-0.561	-0.707
			[0.0449]	[0.0241]	[0.0221]		[0.1980]	[0.1083]	[0.0532]
Quarterly change in MMR X Ratio	C1	3	0.333	0.326	0.321	4	0.112	0.108	0.108
			[0.0793]	[0.0836]	[0.0993]		[0.0122]	[0.0183]	[0.0180]
Quarterly change in MMR X GDP Growth	C2		-1.032	-0.774	-0.906	4	-0.832	-0.883	-0.772
			[0.0258]	[0.1097]	[0.1449]		[0.0987]	[0.0933]	[0.1607]
Quarterly change in MMR X Ratio X GDP Growth	C3	3	-0.846	-0.813	-0.826	4	-0.248	-0.232	-0.243
			[0.0025]	[0.0039]	[0.0033]		[0.0008]	[0.0022]	[0.0014]
Ratio X GDP Growth	C4		-0.128	-0.116	-0.115	4	-0.016	-0.013	-0.014
			[0.1545]	[0.1962]	[0.2020]		[0.3453]	[0.4329]	[0.3876]
Bank Controls			NO	YES	YES		NO	YES	YES
Macro Controls		4	NO	NO	YES	2	NO	NO	YES
Bank fixed effects			YES	YES	YES		YES	YES	YES
R-squared			0.141	0.156	0.168		0.186	0.210	0.223

Table 5: The impact of changes in Tunisian monetary policy on the household lending of small Tunisian banks with different Securities-to-Assets/Leverage Ratio

Variables			[1]	[2]	[3]		[4]	[5]	[6]
Lending flows	*IN*	*LAG*	IN	IN	IN	LAG	IN	IN	IN
Variables									
Ratio			Securities-to-Assets	Securities-to-Assets	Securities-to-Assets		Leverage Ratio	Leverage Ratio	Leverage Ratio
Quarterly change in the bank ratio	DSA/LR	1	-0.175	-0.161	-0.189		0.339	0.364	0.361
			[0.0480]	[0.0745]	[0.0399]		[0.000]	[0.0000]	[0.000]
Quarterly change in MMR	MMR	4	-0.967	-1.418	-0.891		-0.943	-1.139	-1.103
			[0.0531]	[0.0042]	[0.0745]		[0.10875]	[0.0370]	[0.0498]
Quarterly change in MMR X Ratio	C1		0.569	0.566	0.691	2	-0.290	-0.277	-0.266
			[0.0521]	[0.0532]	[0.0213]		[0.0001]	[0.0002]	[0.0004]
Quarterly change in MMR X GDP Growth	C2		-1.152	-0.914	-0.409		1.937	2.123	1.842
			[0.1429]	[0.2353]	[0.5871]		[0.0951]	[0.0540]	[0.1329]
Quarterly change in MMR X Ratio X GDP Growth	C3		0.393	0.430	0.349		-0.354	-0.319	-0.323
			[0.1325]	[0.1066]	[0.2004]		[0.0318]	[0.0503]	[0.0473]
Ratio X GDP Growth	C4		-0.113	-0.088	-0.122	1	0.037	0.046	0.042
			[0.2609]	[0.3828]	[0.2399]		[0.2894]	[0.2148]	[0.2682]
Bank Controls		4	NO	YES	YES	1	NO	YES	YES
Macro Controls		4	NO	NO	YES		NO	NO	YES
Bank fixed effects			YES	YES	YES		YES	YES	YES
R-squared			0.220	0.222	0.223		0.216	0.221	0.220

Table 6: The impact of changes in Tunisian monetary policy on the mortgage lending of small Tunisian banks with different Securities to Assets Ratio

Variables			[1]	[2]	[3]		[4]	[5]	[6]
Lending flows	*IM*		IM	IM	IM		IM	IM	IM
Variables		LAG				LAG			
Ratio			Securities-to-Assets	Securities-to-Assets	Securities-to-Assets		Leverage Ratio	Leverage Ratio	Leverage Ratio
Quarterly change in the bank Ratio	DSA/LR		-2.771	-2.603	3.640		0.007	0.008	0.007
			[0.0179]	[0.0504]	[0.1229]		[0.0000]	[0.0000]	[0.0000]
Quarterly change in MMR	MMR		-0.013	-0.010	-0.021		5.306	5.097	6.279
			[0.0143]	[0.0790]	[0.0000]		[0.0000]	[0.0001]	[0.0000]
Quarterly change in MMR X Ratio	C1	1	-8.841	-7.664	3.355		-1.582	-1.555	-1.423
			[0.0000]	[0.000]	[0.0000]		[0.0000]	[0.0000]	[0.0000]
Quarterly change in MMR X GDP Growth	C2	1	2.234	2.915	-8.863		3.752	4.046	2.508
			[0.2198]	[0.1674]	[0.0009]		[0.0488]	[0.0485]	[0.2851]
Quarterly change in MMR X Ratio X GDP Growth	C3	1	9.913	8.467	-1.505		-0.863	-0.919	-1.006
			[0.0000]	[0.011]	[0.0598]		[0.0452]	[0.0470]	[0.0359]
Ratio X GDP Growth	C4	1	6.457	5.533	-0.973		0.068	0.060	0.127
			[0.0000]	[0,000]	[0.0001]		[0.1029]	[0.1719]	[0.1079]
Bank Controls			NO	YES	YES		NO	YES	YES
Macro Controls		4	NO	NO	YES	1	NO	NO	YES
Bank fixed effects			YES	YES	YES		YES	YES	YES
R-squared			0.201	0.169	0.216		0.220	0.233	0.219