

Can Conventional Monetary Policy Stimulate Bank Credit? Evidence from a Developing Country

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Received 19.11.2023 (revision received 11.1.2024), Accepted (reviewed) 8.2.2024, Published 14.6.2024

Abstract

The predominance of bank credit in financing the economies of less developed countries is prompting policymakers to stimulate this mode of financing. This study tests the ability of conventional monetary policy to stimulate the supply of bank credit to the private sector in Morocco. Based on the lending channel as a theoretical framework, an analytical framework to explore the conduct of monetary policy and the preconditions for the functioning of this channel was developed. In addition, a test of the impact of monetary policy on credit supply was conducted using bank-level data from a representative sample of the Moroccan banking sector.

The results show that demand factors and the quality of potential borrowers are the main drivers of bank credit growth. They also show that monetary policy in Morocco directly affects credit growth. However, no evidence that this impact is mediated through credit supply was provided, indicating that the credit channel is not operational in Morocco. The policy implications of these results are discussed.

Keywords

Monetary policy, lending channel, bank credit, Morocco

DOI

<https://doi.org/10.54694/stat.2023.54>

JEL code

E4, E5, G2

INTRODUCTION

Since the 1970s, the emergence of literature regarding the impact of information asymmetries on the smooth functioning of the banking sector and economic activity has led to intense debate on the importance of macro-financial linkages (Levine, 1997). This debate is all the more relevant in the case of developing countries with less efficient financial systems, where the banking sector dominates

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the financing of economic agents. In these countries, the banking sector represents the main source of financing for businesses and households (Nyasha and Odhiambo, 2014). Thus, the empirical results of several studies show that the development of the banking sector promotes economic growth in developing countries (Kchikeche and Mafamane, 2023).

Although the primacy of the price stability objective guides monetary policy (Criste and Lupu, 2014), promoting bank credit by the latter is a decisive lever for supporting economic growth without conflict with its primary objective. The theoretical underpinnings of this link are grounded in the role of bank credit in monetary policy transmission (Bernanke and Gertler, 1995). Moreover, while the stance of monetary policy can be a decisive lever for affecting bank credit, its effectiveness in stimulating banking activity remains dependent on the quality and operability of this transmission.

Since economic policy considers economic growth to be a decisive goal of economic development (Friedman, 1968) and based on the role of bank credit in promoting economic growth in developing countries, the stimulation of bank credit by an accommodating monetary policy becomes a necessity, particularly in the absence of inflationary pressures, and where bank credit is primordial to monetary policy transmission to real economic activity.

In Morocco, the simultaneous slowdown in economic growth and bank credit over the last decade, against a backdrop of accommodating monetary policy with successive cuts in policy rates from 3.25% to 1.5% and reserve requirements from 16.5% to 0% between 2006 and 2021, suggests the malfunctioning of Bank-Al-Maghrib's monetary policy transmission channels, particularly the lending channel, and prompts us to question the effectiveness of this policy by examining the operability of this channel. Therefore, this paper assesses the ability of conventional monetary policy to stimulate bank credit to the private sector in Morocco between 2006 and 2021. Looking at the available data, it is reasonable to assume that the monetary policy transmission to bank credit is hindered.

This paper distinguishes itself from the existing literature, which focuses on the restrictive effects of monetary policy on economic activity, by analyzing its effect on bank credit. In addition, an analytical approach defines monetary policy shifts and enables a clearer exploratory analysis of the conduct of monetary policy. Using this analytical framework, the operational framework and conduct of monetary policy are explored to assess their potential impact on bank credit and the prerequisites of the lending channels.

Finally, the study verifies the lending channel's existence in Morocco, employing bank-level data between 2006 and 2021. The empirical specification detects heterogeneity in the response of individual banks to changes in monetary policy stance by measuring the moderating effect of bank-specific characteristics on the response of credit growth to changes in the policy rate. After conducting a battery of statistical tests, fixed effect (FE) and generalized least squares (GLS) estimators are employed to ensure the robustness of the results.

This paper is structured as follows. The first section reviews the theoretical literature on the lending channel of monetary policy transmission before exploring the existing empirical evidence. The second section examines the conduct of monetary policy in Morocco and the preconditions for the functioning of the lending channel. The third section presents the data and empirical methodology used throughout this paper. The fourth section reports the results, and the final section concludes the paper by discussing policy implications.

1 LITERATURE SURVEY

1.1 Monetary policy transmission and the supply of bank credit: theoretical underpinnings

The impact of monetary policy on bank credit hinges on the credit view's validity, a view that opposes the traditional money view, which represents the traditional Keynesian and monetarist interpretation of the monetary policy transmission mechanism (Gertler and Gilchrist, 1993) and emphasizes the functioning

of the interest rate channel. The transmission of monetary policy through this channel depends on the sensitivity of the interbank interest rate to variations in the supply of reserves by the central bank and, ultimately, on the sensitivity of business and household spending to variations in lending rates. This transmission is mainly due to the unique role of commercial banks' liabilities in the money-creation process (Oliner and Rudebusch, 1996).

In contrast, Bernanke and Gertler (1995) argued that in the presence of the effect of informational asymmetries and other frictions, the interest rate channel is limited by its inability to fully explain the magnitude, timing, and composition of aggregate demand response to monetary policy shocks. With these imperfections, the adjustment of interest rates to changes in credit supply remains limited and can lead to credit rationing (Romer et al., 1990).

The credit view of monetary policy transmission provides a way of approaching the impact of monetary policy on bank credit. This view stipulates that monetary policy is transmitted through the assets side of the bank balance sheet, mainly through bank credit supply (Romer et al., 1990). Bernanke and Gertler (1995) reveals that the size of the financing premium reflects various types of imperfections in credit markets that lead to divergences between banks' expected returns and potential borrowers' expected costs. Accordingly, the lending channel, which shows the potential effect of monetary policy shocks on the supply of bank credit, stipulates that the credit supply amplifies the transmission of monetary policy (Loupias et al., 2001). However, the impact of monetary policy on credit supply requires the validity of the lending channel. This channel can work alongside other monetary policy transmission channels (Loupias et al., 2001) and even amplify the interest rate channel (Bernanke and Gertler, 1995).

Two conditions should be met for the lending channel to be operational (Oliner and Rudebusch, 1996). First, banks must be unable to completely isolate their credit supply from variations in their stock of reserves by issuing liabilities that are not subject to reserve requirements or liquidating existing assets. Second, because of the additional costs involved in accessing capital markets, a subset of bank-dependent borrowers who cannot completely isolate their spending from the supply of bank credit should exist. Accordingly, the lending channel is operational in countries with less developed financial markets where banks are the dominant lenders (Bernanke and Gertler, 1995).

1.2 Verifying the operationality of the lending channel: the empirical debate

While explaining the inner workings of the lending channel is relatively straightforward. Proving its operationality and distinguishing it from other channels proved to be a challenging task. While earlier studies relied heavily on aggregate data and vector autoregression, these methods face substantial identification problems, mainly distinguishing changes in credit supply from changes in demand. As a result, new literature using disaggregated data and panel econometric methods emerged by providing new identification strategies to verify the lending channel.

1.2.1 Evidence using aggregated data

Aggregate data methods were first used to settle the debate between the money and the credit view. Some notable works along these lines include Bernanke and Blinder (1988), who emphasized the role of relaxing the assumptions of the substitutability of credit and bonds and that the price fully compensates the bond market and provided evidence that the monetary policy is transmitted through bank assets.

This argument was countered by Romer et al. (1990), who argued that, in the absence of reserve requirements on certificates of deposit, bank lending loses its role in transmitting monetary policy. Therefore, the substitutability between securities issued inside and outside the banking system implies that monetary policy shocks do not impact the supply of bank credit. On the other hand, Bernanke and Blinder (1992) support both channels' coexistence.

For Morocco, most studies used VAR techniques to verify the existence of a lending channel in Morocco and provided evidence for the coexistence of the two monetary policy transmission channels (Bennouna et al., 2016; Boughrara, 2009; García-Ortíz and Pizarro-Barceló, 2010; Ouchchikh, 2018).

Overall, studies using aggregate data and impulse response functions to analyze correlations between money, credit, and output or the lead-lag relationship between these variables suffer from significant identification problems relating to the nature of the data used and the econometric methods employed. These methods fail to consider the endogeneity problem (Kashyap et al., 1993), as money and credit can also be contemporaneously affected by changes in output (Bernanke and Gertler, 1995). This problem stems mainly from the possible counter-cyclicality of credit demand, as firms and households often increase their demand for credit to counteract falling incomes. Thus, a variation in credit demand caused by changes in activity can explain the variation in aggregate credit in response to a monetary policy shock (Kashyap et al., 1993). Also, Abuka et al. (2019) argue that these empirical studies cannot distinguish between changes in credit supply and demand. Hence, the reaction of bank credit to a monetary policy shock does not reflect whether this change results from a change in credit supply or demand (Oliner and Rudebusch, 1996).

1.2.2 Evidence using disaggregated data

Based on the criticism above of aggregate data evidence, studies using disaggregated data provided more elaborate identification strategies to verify the existence of the lending channel. For instance, several studies used disaggregated data to identify the heterogeneity of banks' responses with dissimilar characteristics (size, liquidity, and capitalization) to monetary policy shocks. Most notably, Kakes and Sturm (2002), Kashyap and Stein (1995, 2000), and Loupias et al. (2001) revealed a differentiated response of banks' credit and securities portfolios to monetary policy shocks. They argued that capital market imperfections cause a disproportionate response of small banks constrained in their ability to finance themselves on capital markets to monetary policy shocks.

Nevertheless, Frühwirth-Schnatter and Kaufmann (2006) show that the widely used bank-specific characteristics do not explain differences in bank reactions to monetary shocks and developed an alternative identification approach using Bayesian estimation methods. Similarly, Hussain and Bashir (2019) argued that the lending channel in China operates primarily through other sparkly considered bank-specific characteristics such as market structure and competition. In particular, High market concentration harms monetary policy transmission through the lending channel. Furthermore, by affecting banks' access to alternative sources of funds, the market's structure can moderate the lending channel's quality.

The operationality of this channel is also affected by external structural factors. Boukhatem and Djelassi (2022) argue that the lending channel is more efficient in developing countries where banks are the source of financing. However, financial frictions and structural rigidities that constrain banks in these countries limit this efficiency (Modugu and Dempere, 2022) and weaken the transmission of monetary policy (Abuka et al., 2019; Modugu and Dempere, 2022). Studies on developing countries support these observations. In particular, Amidu (2006) shows the significant impact of bank size and liquidity on bank credit and the functioning of the lending channel in Ghana. Similarly, Shokr et al. (2014) support the operationality of the lending channel of monetary policy in Egypt and that small banks are more affected by monetary policy shocks than large ones.

In Morocco, the only empirical study mobilizing bank-level data was conducted by Boughrara and Ghazouani (2010), who examined the lending channel during the period 1989–2007 in the case of four MENA countries, including Morocco, demonstrating the operationality of the lending channel.

In light of this review and the aggregate data limitations, the present study empirically identifies the impact of monetary policy on credit supply using a mix of microeconomic and macroeconomic data spanning from 2006 to 2021. Based on a representative sample of the Moroccan banking sector,

we estimate two panel data econometric models. The present work provides updated and more comprehensive evidence for a period characterized by bank credit slowdown and accommodative monetary policy stance.

2 MONETARY POLICY IN MOROCCO AND THE OPERATION OF THE LENDING CHANNEL

2.1 Monetary policy in Morocco: the operational framework and implications for the lending channel

Against a backdrop of financial liberalization, monetary policy in Morocco has undergone a series of operational and institutional reforms over the last few decades, setting price stability as the central bank's ultimate objective while reinforcing its independence. With the abandonment of direct monetary policy instruments, these reforms have consolidated the actions of the Moroccan central bank on the money market to regulate the latter through liquidity injections or withdrawals. This intervention aims to steer the interbank rate to align with the primary policy (the rate on weekly advances) rate while eventually remaining within a corridor set at plus or minus 100 basis points of this rate (Akaaboune, 2017). Currently, BAM's operational framework relies on its interventions in the money market to maintain the interbank rate at a level compatible with the monetary policy stance (Mafamane and Qachar, 2018). As a result, the interbank market interest rate constitutes the operational objective of Morocco's monetary policy (Daoui, 2020).

The analysis of conventional monetary policy starts by exploring its effectiveness in achieving its stated operational objective. This analysis shows that, over the study period, the interbank market rate was close to the primary policy rate in most quarters while remaining within the aforementioned corridor, as shown in the upper panel of Figure A1 (in the Annex). In addition, to evaluate the misalignment of the interbank market rate with the policy rate, the difference between the policy rate and the interbank market rate relative to the policy rate is used to measure the extent of this misalignment.

Overall, the second panel of Figure A1 shows that the interbank market rate aligned well with the policy rate over the study period. Furthermore, the value of the misalignment index is within the interval $[-0.05; +0.05]$ (i.e., the absolute value of the misalignment is less than 5% of the policy rate) for most of the study period. Accordingly, the gap between the declared objective and the actual results remains marginal, suggesting that Morocco's monetary policy effectively achieves its operational objective. Moreover, to measure Moroccan banks' liquidity needs and their level of dependence on the central bank refinancing, the structural position of bank liquidity, which measures the structural surplus or deficit of bank liquidity, reflecting the net effect of autonomous monetary policy factors on bank reserves, reveals a quasi-structural liquidity deficit that has grown in recent years, as shown in the first panel of Figure A2 (in the Annex). This deficit reveals Moroccan banks' expenditure of liquidity from BAM's liquidity injections on the money market. Furthermore, the second panel of Figure A2 shows that the Moroccan central bank has provided Moroccan banks with all the demanded liquidity.

To dive deeper into the conduct of monetary policy in Morocco during the study period, multiple subperiods where the stance of monetary policy in Morocco changed are defined. Each sub-period starts as the quarter in which the Bank Al-Maghrib Board decided to change the primary policy rate. In addition, each period subperiod ends with the quarter preceding the following change in the primary policy rate. Quarterly data is used for simplicity, as Bank Al-Maghrib's Board of Directors meets regularly in the first month of each quarter. The analysis of primary change data revealed seven periods when the primary key rate changed.

Table 1 presents a deeper exploration of monetary policy conduct in Morocco by focusing on interpreting the indicators that play crucial roles in the transmission of monetary policy to bank credit. These figures show a strong downward trend in the policy rate, with a drop of over 175 basis points between 2006 and 2021, backed by reasonable control of BAM's operational target, with a very marginal deviation from the policy rate. However, with such an accommodating stance and the movement of the interbank

market and lending rates, the growth of bank credit to the private sector in Morocco did not follow the same trend. This observation shed doubt on the operability of lending channel over the last decade.

Table 1 Changes in monetary policy indicators and bank lending conditions between 2006 and 2021

Sub-periods	Policy rate	Interbank rate	Lending rate	Growth of bank credit to the private sector
2006Q1–2008Q2	3.25	2.90	6.49	16.00
2008Q3–2009Q1	3.50	3.46	6.30	18.97
2009Q2–2012Q1	3.25	3.28	6.40	9.43
2012Q2–2014Q3	3.00	3.06	6.16	2.65
2014Q4–2016Q1	2.50	2.52	5.75	–0.56
2016Q2–2020Q1	2.25	2.26	5.19	2.37
2020Q2–2021Q4	1.50	1.50	4.37	2.67

Source: Compiled by the authors based on Bank Al-Maghrib's data

The above descriptive analysis can in no way be inferential, and its main objective is to explore the existence or absence of simultaneous movements in the indicators of interest to justify the interpretation of the results. Thus, the existence of confounding variables is likely to influence the evolution of these indicators, which would bias any causal interpretation derived from the simple descriptive analysis of these figures.

2.2 The conditions of the validity of the lending channel in Morocco

For Oliner and Rudebusch (1996), the functioning of the lending channel hinges on the existence of a set of borrowers that are dependent on bank credit and the inability of banks to raise alternative funds to central bank refinancing without additional cost. Therefore, the evolution of these two conditions is examined to assess the strengthening or weakening of the prerequisites for the functioning of the lending channel in Morocco.

2.2.1 Analysis of borrowers' dependency on bank credit in Morocco

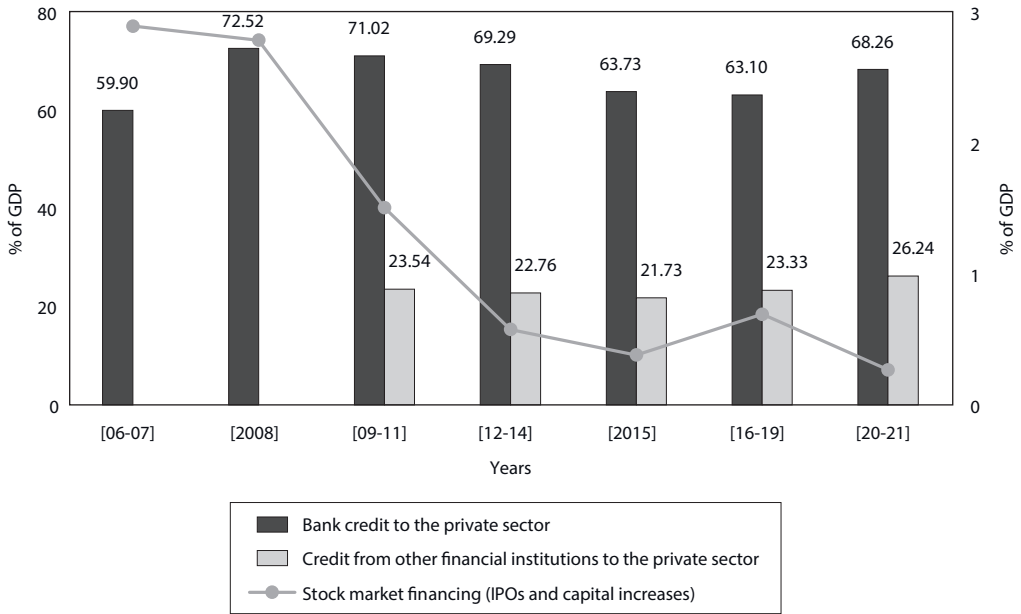
The existence of a set of borrowers that are unable to substitute bank credit with alternative sources of financing without additional costs is an expression of their inability to completely isolate their demand for financing from monetary policy shocks, given that bank credit and other types of financing are not perfect substitutes for these borrowers. Theoretically, the transmission of monetary policy through lending channels should be strengthened with the reliance of a higher proportion of borrowers on bank credit.²

Figure 1 shows the predominance of bank credit in private sector financing in Morocco, compared with stock market financing and financing from other financial institutions. This figure illustrates that bank credit to the private sector is more than three times greater than the credit granted by other financial institutions. All other things being equal, strengthening the lending channel's functioning is likely correlated with a higher role of bank credit in financing the private sector in Morocco. Therefore, even with the gradual decline in bank credit (as % of GDP) between 2009 and 2019, the first condition for

² If the policy rate and the interest rates on bank credit substitutes, such as credit by non-bank financial intermediaries and securities, are correlated, the transmission of monetary policy shocks could also go through these debt instruments. However, this is outside the scope of our paper as we are only interested in monetary policy transmission through credit supply.

the functioning of the lending channel seems to have been met during the study period, as the other sources of financing did have either slightly improved (in the case of credit from other financial institutions) or declined (in the case of stock market financing) during the study's period.

Figure 1 Evolution of financing indicators for the Moroccan economy by financial sector segment (as % of GDP) between 2006 and 2021



Source: Elaborated by the authors based on data compiled from the World Bank's Global Financial Development database and Casablanca Stock Exchange's statistics reports

Two additional indicators may be helpful for the analysis of borrowers' dependency on bank credit in Morocco. The first indicator that we present in Table 2 describes the relative role of bank credit in financing the Moroccan economy by contrasting it with financing through securities. The high proportion of bank loans (as % of total claims on the economy) shows the high preference of borrowers for bank credit and, therefore, indicates the dependence of a large proportion of firms and households on bank credit in Morocco.

Table 2 Evolution of the claims on the Moroccan economy by type of instrument between 2006 and 2021

	Loans (as % of total claims)	Securities (as % of total claims)
2006Q1–2008Q2	92.80	7.14
2008Q3–2009Q1	92.88	7.12
2009Q2–2012Q1	91.53	8.47
2012Q2–2014Q3	90.33	9.67
2014Q4–2016Q1	90.26	9.74
2016Q2–2020Q1	88.78	11.22
2020Q2–2021Q4	88.11	11.89

Source: Compiled by the authors based on Bank Al-Maghrib's data

The second indicator of borrowers' reliance on bank credit measures Moroccan firms' recourse to commercial paper as a short-term financing source. Table 3 shows the evolution of issuances and holdings of commercial paper during the study period. These figures reveal that commercial paper holdings and emissions remain low and insignificant, at less than 10% over most of the study period, showing Moroccan firms' dependence on banks.

Table 3 Evolution of commercial paper issuance and holdings in Morocco between 2006 and 2021

	Commercial paper (as % of negotiable debt instruments holdings)	Commercial paper (% of total emissions of private negotiable debt securities)
2006Q1–2008Q2	11.88	16.50
2008Q3–2009Q1	6.80	19.70
2009Q2–2012Q1	5.02	13.30
2012Q2–2014Q3	5.06	13.30
2014Q4–2016Q1	5.11	27.20
2016Q2–2020Q1	2.85	6.00
2020Q2–2021Q4	2.24	4.60

Source: Compiled by the authors based on Bank Al-Maghrib's data

Overall, these figures show the supremacy of bank credit as the primary source of financing for Moroccan firms and households.

2.2.2 Analysis of banks' access to alternative sources of financing

The second condition for the functioning of the lending channel requires the inability of banks to isolate their credit supply from monetary policy shocks completely. For this to be true, refinancing through the open market and the issuance and/or sale of bank-owned securities should not be perfect substitutes.

To illustrate this condition, Table 4 shows a fall in the banking sector's securities holdings (as % of total assets) by around four percentage points and a rise in issued securities and CDs (as % of bank liabilities) from 1.75% before the crisis to around 4% after the 2008 monetary policy shock, indicating a liquidation of some securities holdings and the issuance of new debt. These changes can, therefore, be interpreted as an insulation of credit supply from restrictive monetary policy effects. However, this trend changed with Morocco's monetary policy shifting towards an accommodating stance in the third quarter of 2008. Banks no longer had any incentive to liquidate their asset holdings or issue a new debt instrument, which resulted in a rebound of securities holding to around 18% and a stagnation of securities issuance at around 4.5% during the rest of the study period.

Table 4 Evolution of the holdings and emissions of securities and CDs by Moroccan banks between 2006 and 2021

	Securities held (as % of bank assets)	Securities and CDs issued (% of bank liabilities)	CD holdings (% of PND securities holdings)	CD emissions (% of PND securities emissions)
2006Q1–2008Q2	18.02	1.75	53.70	72.40
2008Q3–2009Q1	13.98	3.64	82.60	76.90
2009Q2–2012Q1	13.95	4.28	75.41	71.60
2012Q2–2014Q3	17.27	4.76	74.96	64.00
2014Q4–2016Q1	17.58	4.11	72.89	37.40
2016Q2–2020Q1	18.22	4.73	71.89	54.20
2020Q2–2021Q4	20.18	4.73	66.37	48.20

Source: Compiled by the authors based on Bank Al-Maghrib's data

Following the tightening of monetary policy in 2008, commercial banks in Morocco significantly increased their issuance of certificates of deposit, rising from an annual average of 9 billion DH between 2006 and 2007 to 30 billion in 2008, an observation that can be interpreted as a weakening of the lending channel. However, this development does not seem to be reversed over the rest of the study period, characterized by an accommodating stance of monetary policy in Morocco. Overall, data from Table 4 showed that, as a response to monetary tightening in the aftermath of the 2008 crisis, the behavior of Moroccan banks is in line with a weak lending channel as banks liquidated a part of held assets and issued more CDs.

Furthermore, Bernanke and Gertler (1995) argue that the lending channel is weakened if certificates of deposits are (i) less liquid, (ii) not protected by deposit insurance, and (iii) not subject to the same reserve requirements as deposits. In Morocco, two of these three conditions are valid; namely, certificates of deposit are less liquid than bank deposits and are subject to reserve requirements while remaining uncovered by the Moroccan Deposits Funds Management Society (Société Marocaine de Gestion des Fonds des Dépôts, n.d.).

Accordingly, it can be argued that the preconditions for the functioning of the lending channel are reasonably verified during the study period; empirical verification of such a finding is required before any conclusions can be drawn.

3 METHODS

To verify the existence of the lending channel in Morocco, panel data models are estimated using a representative sample of Moroccan banks' yearly data from 2006 to 2021, a study period mainly determined by data availability considerations. In the absence of quarterly balance sheet data, changes in annual data may not capture the variations in policy rate changes, raising questions about the central bank's frequency of monetary policy adjustments. However, during the study period, Bank Al-Maghrib did not change its primary policy rate twice in the same year, rendering this issue irrelevant.

3.1 Sample and data

The sample includes eight Moroccan banks listed in Table 5, including their balance sheet size, and the amount of bank loans granted to the private sector in 2021. This table shows the non-proportional contribution of large banks to private-sector financing. In particular, the larger the bank, the smaller its contribution to total private-sector lending.

Table 5 List of banks included in the empirical study sample

Code	Name	Total assets in 2021		Credits to the private sector in 2021	
		in billions	% of total	in billions	% of total
AWF	Attijariwafa Bank	386.73	29	158.97	26.7
BCP	Banque Centrale Populaire	281.11	21.1	70.93	11.9
BMCE	Bank of Africa	227.10	17	99.45	16.7
CAM	Crédit Agricole du Maroc	127.72	9.6	81.96	13.8
SGMB	Société Générale marocaine des Banques	96.73	7.3	58.03	9.7
CIH	Crédit Immobilier et Hôtelier	91.41	6.9	49.90	8.4
BMCI	Banque marocaine pour le Commerce et l'Industrie	64.85	4.9	39.21	6.6
CDM	Crédit du Maroc	58.17	4.4	37.39	6.3
Totals		1333.83	100	595.84	100

Source: Compiled by the authors based on data collected from individual financial statements

Admittedly, the number of banks included in the sample seems limited. However, this sample represents the majority of the Moroccan banking sector. Indeed, the banking sector in Morocco is characterized by a high concentration level. Based on Bank Al-Maghrib (2021) and data collected from the balance sheets of Morocco's eight largest banks, the banks in the sample hold over 90% of banking assets and grant 97.1% of bank loans. Consequently, our sample is representative of the behavior of the Moroccan banking sector.

The data is collected manually from banks' financial statements from three sources. Financial statements from the Bourse de Casablanca's (n.d.) website are used for banks listed on the stock market. For the rest of the banks, the website of the Autorité Marocaine du Marché des Capitaux (n.d.) is the data source. In the absence of financial statements from the first two sources, the annual reports published by the banks on their websites are employed.

3.2 Specification and empirical methodology

The specification captures the determinants of credit growth to understand bank credit dynamics better. Furthermore, the model tests the effect of the monetary policy stance on bank credit growth by identifying the lending channel in Morocco.

This specification is presented in the equation below:

$$\Delta C_{i,t} = \alpha X_{i,t-1} + \beta \Delta i_t + \gamma \Delta Y_{t-1} + \delta Z_{t-1} + \theta (\Delta i_t \times X_{i,t-1}) + \varepsilon_{i,t}, \quad (1)$$

where $C_{i,t}$ represents the logarithm of credit granted by a bank to the private sector. The first difference of this variable, $\Delta C_{i,t}$ represents a linear approximation of this variable.

Bank credit growth is explained by the monetary policy stance (Δi_t), bank-specific determinants ($X_{i,t-1}$ and Z_{t-1}) and macroeconomic conditions (ΔY_{t-1}).

The first difference in the policy rate (i_t) is employed to define the monetary policy stance. Thus, β represents the response of a representative bank to shifts in the stance of monetary policy (Boughrara and Ghazouani, 2010). According to Borio and Gambacorta (2017), this indicator is a proxy for the marginal cost of short-term financing. In particular, a positive (negative) value of Δi_t represents a restrictive (accommodative) monetary policy stance by Bank Al-Maghrib. In this sense, a negative value of β represents the banking sector's appropriate response to the monetary policy stance.

$X_{i,t-1} = [Size_{i,t-1}, Liq_{i,t-1}, Cap_{i,t-1}]$ represents size, liquidity, and capitalization; bank-specific variables most widely used in the empirical literature: size, liquidity, and capitalization. According to Boughrara and Ghazouani (2010), bank-specific characteristics affect the growth of credit linearly. Thus, the lagged value of these characteristics is included to account for their correlation with bank credit growth.

A bank's relative size $Size_{i,t-1}$ is represented by the logarithm of its total assets $A_{i,t-1}$ during $t-1$ minus the average level of bank assets during the same period.

$$Size_{i,t-1} = A_{i,t-1} - \frac{1}{N} \sum_{i=1}^N A_{i,t-1}. \quad (2)$$

According to Loupiaz et al. (2001), bank size represents the cost of external financing due to information asymmetry. Indeed, as discussed, larger banks have more internal resources and can easily access capital markets. On the other hand, in the presence of capital market imperfections, small banks find it comparatively more difficult to access these markets (Kashyap and Stein, 1995).

Bank capitalization is calculated based on the ratio ($kp_{i,t-1} = \frac{K_{i,t-1}}{A_{i,t-1}}$) between a bank's equity and total assets minus its average value over the studied period. Thus, $Cap_{i,t-1}$ is defined as follows:

$$\text{Cap}_{i,t-1} = kp_{i,t-1} - \frac{\left(\sum_{i=1}^N kp_{i,t-1} / N\right)}{T} \tag{3}$$

In the presence of asymmetric information, raising capital becomes costly for undercapitalized banks (Loupias et al., 2001). Faced with such a situation, undercapitalized banks can only grant low-risk loans or reduce their credit supply altogether to meet the capital adequacy ratio (Watanabe, 2007). The more-capitalized banks have easier access to capital markets.

Liquidity is calculated based on the ratio ($lq_{i,t-1} = \frac{L_{i,t-1}}{A_{i,t-1}}$) between liquid and total assets minus the average per bank over the period studied. Thus, $\text{Liq}_{i,t-1}$ is defined as follows:

$$\text{Liq}_{i,t-1} = lq_{i,t-1} - \frac{\left(\sum_{i=1}^N lq_{i,t-1} / N\right)}{T} \tag{4}$$

This variable measures each bank’s perception of its excess liquidity. In this sense, banks internally assess excess liquidity based on the characteristics of their balance sheet and their perception of risk. Thus, the variable measures each bank’s estimated risk of liquidity insufficiency to cope with deposit withdrawals and the risk of insolvency. Indeed, more liquid banks are more capable of liquidating part of their asset holdings to protect themselves from the effects of monetary policy (Loupias et al., 2001).

By defining liquidity and capitalization in this way, bank-specific characteristics capture pure differential effects. For each period, bank-specific variables are equal to zero on average, being negative for banks whose specific characteristics (liquidity and capitalization) are below average (hereafter referred to as small banks or less liquid/capitalized banks) and positive for banks whose specific characteristic is above average (hereafter referred to as large banks or more liquid/capitalized banks). This definition permits interpreting the coefficients of the monetary policy indicators as the effect of monetary policy on bank credit growth (Boughrara and Ghazouani, 2010).

ΔY_{t-1} represents the log difference of the macroeconomic indicators. Thus, $Y_t = [GDP_t^{na}, CPI_t, RRPI_t]$ is a vector of macroeconomic indicators that control the effect of credit demand characteristics. The first difference of these variables represents a linear approximation of the non-agricultural economic growth rate, the inflation rate, and the growth in residential real estate asset prices. These variables control cyclical trends in economic activity.

For instance, more favorable economic conditions positively affect bank credit growth (Borio and Gambacorta, 2017). In particular, an increase in the economic growth rate stimulates demand for bank credit by influencing private economic agents’ debt and repayment capacity and their expectations about the economic outlook. Agricultural GDP is excluded from the calculation of economic growth as this component of aggregate supply in Morocco is highly volatile as it is mainly affected by the exogenously determined rainfall rate (Kchikeche and Khallouk, 2021). This volatility renders agricultural GDP a poor indicator of endogenous credit demand factors. In fact, credit extended to agriculture and fishing sectors did not exceed 5% during the study period. In addition, the inflation rate measures the impact of price variations on the purchasing power of economic agents. According to Tamini and Petey (2021), this variable harms the demand for bank credit. Moreover, growth in the price index of residential real estate assets indicates both a potential increase in demand for the acquisition of real estate assets and an increase in their net value and the value of collateral when applying for bank financing. Thus, an increase in this variable is positively linked to bank credit.

$Z_i = [NIM_{i,t-1}, NPLR_{i,t-1}]$ contain two variables: interest margin and nonperforming loan ratio. The first represents the profitability of the lending activity. As a measure of profitability, this variable should positively impact credit growth. The second variable represents the risk perception in the lending activity. An increase in NPLR indicates an increase in the level of borrower risk and should adversely affect bank credit growth. In this sense, a higher level of this variable indicates an increase in banks' risk perception and a deterioration in the quality of their loan portfolios.

The vector $(\Delta_i \times X_{it-1})$ represents the interaction between the monetary policy stance indicator and bank-specific characteristics [size, liquidity, capitalization]. These three bank-specific characteristics interact with the monetary policy stance indicator. Thus, the coefficients $\theta = [\theta_1, \theta_2, \theta_3]$ describe how responses to monetary policy differ according to bank-specific characteristics. These interaction terms test for asymmetries in the effect of monetary policy on individual banks. Consequently, the test for the bank lending channel checks whether the coefficients of the interaction terms are statistically significant. If so, the lending channel can be considered operational (Boughrara and Ghazouani, 2010).

Indeed, the significance of the interaction terms between the monetary policy stance coefficients and the bank-specific characteristics is – la pièce de résistance – of the empirical identification strategy of the lending channel currently employed in the literature using bank-level data. This empirical identification strategy relies mainly on verifying the second prerequisite of the lending channel advanced by Oliner and Rudebusch (1996). This condition is based on the fact that monetary policy mainly works through the supply of reserves by the central banks to the banking sector. Thus, monetary policy transmission through the lending channel is hindered if banks can acquire these reserves by other means.

Banks can acquire reserves independently from the central bank through capital markets by selling their assets or issuing new debt. This way, they could mitigate the effect of monetary policy shocks on their credit supply. So, by empirically detecting that the credit growth of more established banks (bigger, more liquid, and more capitalized banks) that have easier access to capital markets (and thus are less affected by information asymmetry and market imperfections) are less affected by the monetary policy shocks, we establish that the credit growth of less established banks (with less access to capital markets) is comparatively – more affected by monetary policy shocks. Therefore, the lending channel works through these reserve-constrained banks. This is where the significance of the interaction term comes into play; a positive interaction term means bank-specific characteristics moderate the effect of monetary policy on credit growth, i.e., banks with higher-than-average bank-specific characteristics are less affected by monetary policy shocks, and vice versa. Accordingly, the lending channel is operational if the coefficient of the monetary policy stance is negative while the interaction terms' coefficients are positive. Otherwise, the lending channel is not operational.

Fixed-effect ordinary least squares are used as the estimation method. This bank-specific choice of effect type is based on the results of the Hausman test. The use of individual-effect models aims to capture unobservable heterogeneity between individuals. Thus, a fixed-effect model can be represented as follows:

$$Y_{i,t} = \alpha_i + \beta X_{i,t} + \mu_i + e_{it}, \quad (5)$$

where $Y_{i,t}$ is the endogenous variable, α_i is the unknown constant for each individual, $X_{i,t}$ is a vector of exogenous variables, μ_i is the intra-individual error term and e_{it} is the error term. By including individual constants for each bank, the fixed-effect model controls for all time-invariant differences between banks, so the estimated coefficients cannot be biased due to omitting these characteristics (Awdeh, 2016). Finally, to account for period-specific effects, yearly time dummies are employed. Furthermore, to account for serial autocorrelation and groupwise heteroscedasticity. The model is estimated using Kmenta's (1988)

and Parks’s (1967) Feasible Generalized Least Squares method. This method allows the estimation of heteroskedastic and correlated errors across panels. This method is appropriate for panels with $T > N$. The FGLS model can be represented in the following equation:

$$Y_{i,t} = a_i + \beta X_{i,t} + e_{it} \tag{6}$$

4 RESULTS AND DISCUSSION

4.1 Descriptive statistics and preliminary tests

To examine the descriptive characteristics of the variables, Table 6 presents the descriptive statistics for the studied variables. These figures show that the three bank-specific variables have zero means but different standard deviations. In particular, the sample is characterized by size and capitalization heterogeneity. However, the variability of the level of capitalization remains low. In addition, the mean value of the net interest margin is 3%, with a standard deviation of 0.01 and a range of 0.05. The rate of provisions on customer loans shows moderate heterogeneity. Furthermore, the average of the policy stance indicator representing the monetary policy stance amounts to 0.08, testifying to the accommodating stance of this policy during most of the study period.

Table 6 Descriptive statistics

Variable	Observations	Mean	S.D.	Minimum	Maximum
Size _{i,t}	128	0.00	0.28	-0.44	0.50
Liq _{i,t}	128	0.00	0.11	-0.16	0.54
Cap _{i,t}	128	0.00	0.03	-0.08	0.11
NIM _{i,t}	128	0.03	0.01	0.00	0.05
NPLR _{i,t}	128	0.11	0.07	0.00	0.55
Δ GDP _t ^{na}	128	0.04	0.04	-0.07	0.13
Δ CPI _t	128	0.01	0.01	0.00	0.04
Δ RRPI _t	128	-0.01	0.04	-0.10	0.07
Δ i _t	128	-0.08	0.29	-0.52	0.80

Source: Compiled by the authors

The correlation matrix between the variables of interest is reported in Table A1 (in the Annex). These figures show a correlation between bank credit growth and its determinants. In particular, a positive correlation exists between growth in bank credit and liquidity. Indeed, banks holding more liquid assets tend to lend more. However, there is a negative correlation between the growth in bank credit and bank capitalization. In other words, more capitalized banks tend to lend less. This counterintuitive correlation is surprising and requires further analysis.

Furthermore, the correlation coefficient between credit growth and relative bank size is insignificant and does not exceed 0.08. In addition, bank credit growth is negatively correlated with net interest margin and provision rate. The negative correlation between bank growth and NIM is surprising and means that the increase in the intermediation margin is combined with a fall in the growth of bank credit to the private sector. Moreover, the correlation matrix shows that the monetary policy stance indicator positively

correlates with growth in bank credit, which contradicts the expected sign of this relationship. Finally, growth in bank credit is positively correlated with non-agricultural economic growth and the inflation rate but not with the growth rate of the real estate asset price index.

Before turning to the results of the estimations, Table 7 presents the results of the stationarity tests, showing that all the variables are stationary.

Table 7 Unit root test results

Variable	Specification: with constant		Specification: without constant	
	Levin, Lin & Chu	ADF-Fisher	Levin, Lin & Chu	ADF-Fisher
$\Delta C_{i,t}$	-4.235***	27.664**	-7.393***	68.177***
$Size_{i,t}$	-1.661**	27.473**	0.7268	16.537
$Liq_{i,t}$	-6.057***	53.113***	-3.093***	27.010**
$Cap_{i,t}$	-4.189***	31.637**	-3.878***	41.632**
$NIM_{i,t}$	-4.458***	28.165**	-2.193**	26.432**
$NPL_{i,t}$	-7.941***	37.962***	-2.173**	26.193**
ΔGDP_t^{na}	-3.132***	49.394***	-4.299***	32.914***
ΔCPI_t	-1.382*	22.813	-4.155***	31.634**
$\Delta RRP_{i,t}$	-16.404***	159.754**	-4.186***	30.530**
Δi_t	-6.637***	42.663***	-6.637***	42.663***

Note: ***, **, * indicate that the results reject the null hypothesis of the existence of a unit root in the variable at the 1%, 5%, and 10% significance levels, respectively.

Source: Compiled by the authors

Choosing the appropriate estimation method is crucial for the validity of the model. This choice is based on the characteristics of the data and the model's specifications. The fixed effect model is appropriate as a correlation between unobserved individual characteristics (e.g., management characteristics) and the regressors can be reasonably assumed. This choice is validated by conducting Hausman's (1978) specification test. Accordingly, the null hypothesis of this test is rejected. The inappropriateness of the random effect model is further illustrated by conducting the Breusch and Pagan's (1980) LM test. Based on the result of these specification tests, a fixed-effect model is estimated. The results of this model show that the coefficients are jointly significant with an R^2 of 0.58.

Furthermore, since bank credit growth has changed substantially over the study period, a test of whether adding time-fixed effects would improve the model is conducted by examining the joint significance of added yearly time dummies. The result of this test shows that the time dummies improve the model's explanatory power ($R^2 = 0.69$). Next, the Modified Wald test for groupwise heteroscedasticity is conducted. The results of this test indicate the rejection of the null hypothesis of error homoscedasticity. Two more diagnostic tests are conducted to validate the resulting model. The first is Pesaran's (2021) test for cross-sectional dependence, and the second is Woodridge's (2002) test for autocorrelation. The results of the first and second diagnostic tests indicate the inexistence of cross-sectional dependence and first-order autocorrelation, respectively. However, following Pesaran (2015), the results show that the fixed-effect model suffers from serial autocorrelation. Based on these results, the fixed-effect model is estimated using clustered robust standard errors to account for heteroscedasticity and serial correlation. The results of all these tests are summarized in Table 8.

Table 8 Results of diagnostic tests

	Test statistic	P-value
Hasman specification test	23.54	0.001
Breusch & Pagan's LM test	00.00	1.000
Joint significance of time dummies	3.11	0.002
Joint significance of explanatory variables	11.43	0.000
Modified Wald test for groupwise heteroscedasticity	96.02	0.000
Pesaran's test for cross-sectional dependence	2.564	0.153
Woodridge's test for autocorrelation	-1.546	0.122
Pesaran test for serial autocorrelation	48.886	0.009

Source: Compiled by the authors

4.2 Estimation results

The results of the FE and FGLS models are presented in Table 9.

Table 9 Estimation results for Fixed-Effect and Feasible Generalized Least Squares models

	FE	FGLS
Size _{it-1}	-0.342*** (0.093)	-0.028* (0.016)
Liq _{it-1}	0.292** (0.089)	0.165** (0.076)
Cap _{it-1}	-0.835 (0.473)	-0.142 (0.100)
NIM _{it-1}	5.409 (4.372)	0.604 (0.734)
NPL _{it-1}	-0.354** (0.141)	-0.183** (0.072)
ΔGDP _t ^a	0.007** (0.003)	0.010*** (0.001)
ΔCPI _t	-0.022** (0.006)	-0.017*** (0.002)
ΔRRPI _t	0.004* (0.002)	0.006*** (0.000)
Δi _t	-0.130** (0.037)	-0.152*** (0.013)
Size _{it-1} × Δi _t	0.092 (0.124)	0.052 (0.081)
Liq _{it-1} × Δi _t	-0.781 (0.623)	-0.164 (0.374)
Cap _{it-1} × Δi _t	3.232 (1.652)	0.790 (0.574)
C	-0.069 (0.087)	0.012 (0.013)

Note: Standard deviations are shown in parentheses. ***, **, * indicate that the regression coefficient is significant at the 1%, 5%, and 10% significance levels, respectively.

Source: Compiled by the authors

The results in Table 9 show that our specification captures our models' dynamics reasonably well. Our model includes nine proper explanatory variables, excluding the interaction terms and the intercepts. Our results show that three out of five bank-specific variables and four out of five macroeconomic variables (thus, only two out of five variables are insignificant).

Our results show that two of the three bank-specific variables significantly affect credit growth. In particular, size (liquidity) negatively (positively) affects the growth of credit. Additionally, they show that the nonperforming loan ratio negatively affects bank credit while the net interest margin has no explanatory power. In particular, the slowdown of bank credit can be explained by the rise in nonperforming loans from 6% in 2009 to 8.6% in 2021. These results show that bigger banks lend less to the private sector (which confirms data from Table 5). This surprising result aligns with the findings of Laidroo (2014), who suggests that smaller banks had to aggressively expand their lending to maintain their already low market share. In contrast, bigger banks that expanded aggressively in the pre-2008 crisis period had to disproportionately reduce their lending growth to improve the quality of their loan portfolios, which was worsened by their expansion during the 2006–2008 credit boom. This interpretation is supported by the negative correlation coefficient ($r_{\text{size/nplr}} = -0.550$) between bank size and the NPL ratio. Moreover, as expected, more liquid banks lend more. The results also show that capitalization has no impact on their extended loans.

As for the impact of the macroeconomic environment, the findings support the importance of demand-specific factors. Notably, credit growth is positively affected by the growth of non-agricultural GDP and the residential real estate price index and negatively by the inflation rate. Economic growth affects the demand for bank credit by improving economic agents' borrowing and repayment capacity and their anticipation of economic prospects. Similarly, real estate prices positively impact the supply and demand for credit as they indicate a rise in the demand for housing financing and collateral value. Finally, the inflation rate harms the demand for bank credit by negatively affecting purchasing power.

Furthermore, as expected, growth in bank credit is negatively affected by the increase in the monetary policy stance indicator. Indeed, a more restrictive monetary policy stance negatively affects the growth of bank credit. However, this result alone does not allow us to verify the existence of the lending channel in Morocco, as the effect of monetary policy on lending rates may pass through the demand for credit.

In this sense, the terms of interaction between the monetary policy stance and bank-specific characteristics are crucial to understand the role of the lending channel in Morocco. The results show that all interaction terms are insignificant, which indicates that the lending channel is not operational. This result validates the exploratory analysis that shows the disconnection between monetary policy stance and credit growth. Thus, based on the empirical results of Bennouna et al. (2016), Boughrara (2009), and Ouchchikh (2018), providing evidence of the operability of the interest channel and the lack thereof in the case of the exchange rate and the asset price channels, monetary policy in Morocco is transmitted to the Moroccan economy only through the interest rate channel. Further evidence of the operability of the interest rate channel in Morocco was also provided by (Boughrara, 2009; García-Ortíz and Pizarro-Barceló, 2010; Moumni and Nahhal, 2016; Ouchchikh, 2018).

CONCLUSION

The aim of this paper is to test the ability of conventional monetary policy to stimulate bank credit to the private sector in Morocco. The explored stylized facts show that the operational framework of conventional monetary policy in Morocco revolves mainly around regulating liquidity on the interbank market by injecting or withdrawing it in the short term, in line with BAM's orientations in achieving its ultimate objective of price stability.

Moreover, this policy is mainly accommodating in the absence of inflationary pressures characterizing the last decade. However, such a policy has not translated into a significant improvement in the pace

of growth of bank credit to the private sector in Morocco. Therefore, the relevant literature on monetary policy transmission is discussed to shape the analytical framework for the empirical study.

To establish an empirical link between the stance of monetary policy and the supply of bank credit in Morocco, microeconomic data is collected from the financial statements of a representative sample of the eight largest Moroccan banks, which account for over 97% of bank credit to the private sector in Morocco. Based on these data, econometric models capable of verifying the functioning of the bank lending channel in Morocco are estimated.

The results show that bank-specific characteristics play a decisive role in explaining the growth of bank credit to the private sector. In particular, while liquidity positively impacts bank lending, the bigger banks lend less. Furthermore, the results show that banks' perception of the risk associated with lending activity negatively affects bank credit growth. These results may be explained by a flight to quality by established banks. Faced with deteriorating borrower quality, banks are reducing the credit supply to preserve their margins and the quality of their loan portfolios.

The findings provide evidence that the illiquidity of certificates of deposits and their non-eligibility to bank deposit insurance is a possible reason for the weakening the lending channel in developing countries, suggesting that monetary policy in Morocco does not influence the supply of bank credit to the Moroccan private sector and calls into question the operationality and functioning of the lending channel. Thus, although the results show that monetary policy directly affects the growth of bank credit in Morocco, there is no empirical evidence that this policy can stimulate growth in the supply of bank credit.

Our results contrast with those of Boughrara and Ghazouani (2010), who suggest the existence of a capitalization-based lending channel. This contrast could be attributed to the weakened functioning of the lending channel. Boughrara (2009) attributed this possible weakening to a deterioration in the capitalization level of banks, an interpretation disproved by the improvement in the capitalization of the Moroccan sector, which rose from 8.4% in 2006 to 9.5% in 2021.

Our results also contradict the aggregate data results of (Bennouna et al., 2016; García-Ortíz and Pizarro-Barceló, 2010; Ouchchikh, 2018), which suggest the operation of the lending channel in Morocco in tandem with the traditional interest rate channel. As mentioned in the literature review, the results in aggregate data do not distinguish the operationality of the credit channel, as its response results from demand shifts.

In light of these results, the observed disconnect between the stance of monetary policy and the growth of bank credit to the private sector can be explained either by the fact that the fall in bank credit is the result of a tightening of credit supply, or by the fact that the impact of monetary policy is insufficient to counter existing depressors of credit demand.

The inoperability of the lending channel in Morocco may be a consequence of the underdeveloped capital market, constraining the ability of banks to hedge against monetary policy action by issuing certificates of deposits. As Moumni and Nahhal (2016) point out, further development and modernization of capital markets, improving the formality of the Moroccan economy, and improving the banking sector's competitiveness would all ameliorate the effectiveness of monetary policy in Morocco through the lending channel.

The weakening of the lending channel could also be attributed to the rise of non-bank institutions during the study period. In fact, the aggregate balance sheet of financing companies and microcredit associations rose by 63.1% and 64.5%, respectively, between 2009Q2 (the start of the observed decline of bank credit to the private sector and the change of Bank Al-Maghrib monetary stance) and 2021Q4. In comparison, the banking sector's balance sheet only rose by 49.4%. In their recently published work, Cafiso and Rivolta (2023), provided evidence that the transmission of monetary policy through the lending channel weakens with the rise in the size of non-bank lenders.

Finally, given these results, while remaining perfectly synchronized with the objective of price stability in the absence of alarming inflationary pressures, and with the predominance of bank credit in the financing of the Moroccan economy and the strong recourse of a large proportion of economic agents to this means of financing, the central bank must ensure that its monetary policy is increasingly geared towards stimulating bank credit. To achieve this, Bank Al-Maghrib may adjust the monetary policy framework to accommodate further private-sector financing. It could also make greater use of its non-conventional instruments, mainly by targeted refinancing operations conditional on improving the credit supply for SMEs and households – the cornerstone of credit demand and economic activity in Morocco.

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ANNEX

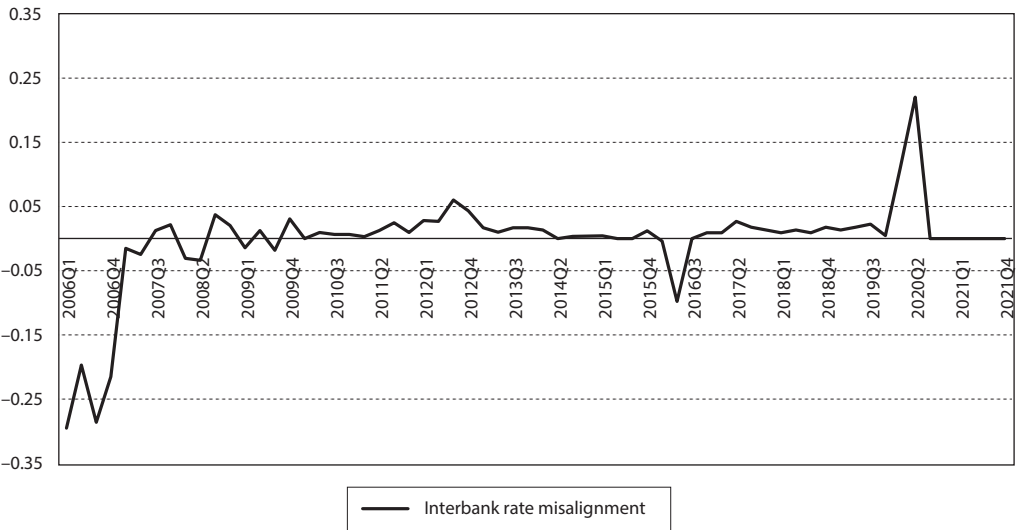
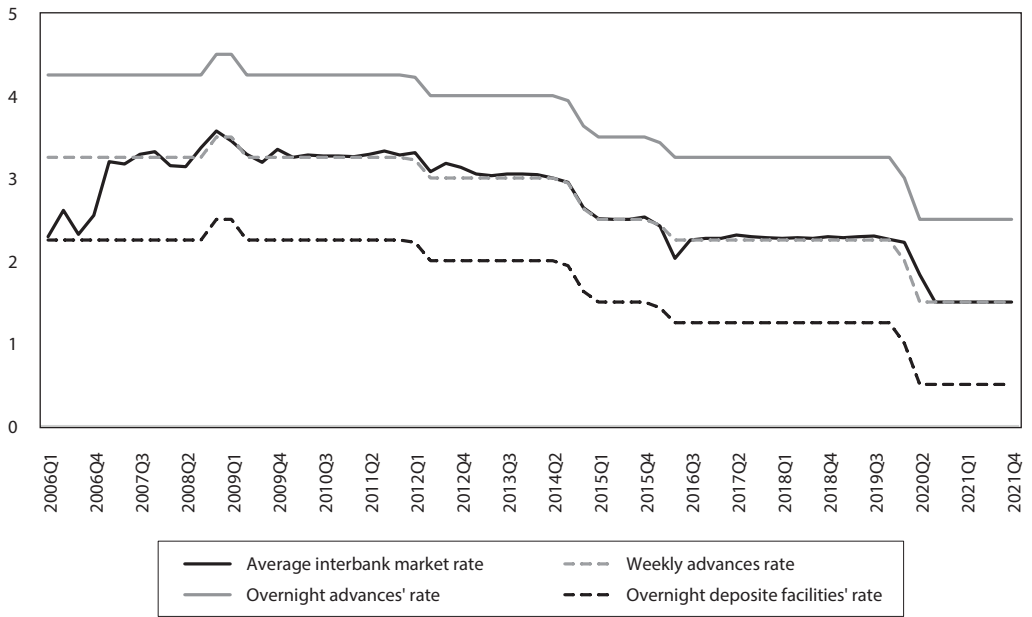
Table A1 Correlation matrix between bank credit to the private sector and its determinants

	$\Delta C_{i,t}$	Size _{i,t}	Liq _{i,t}	Cap _{i,t}	NPLR _{i,t}	NIM _{i,t}	ΔGDP	$\Delta RRP_{i,t}$	ΔCPI_t	Δi_t
$\Delta C_{i,t}$	1									
Size _{i,t}	0.08	1								
Liq _{i,t}	0.328***	0.593***	1							
Cap _{i,t}	-0.409***	-0.055	-0.246***	1						
NPLR _{i,t}	-0.194**	-0.550***	-0.496***	0.380***	1					
NIM _{i,t}	-0.183**	-0.694***	-0.826***	0.288***	0.667***	1				
ΔGDP_t^{na}	0.412***	0.000	0.081	-0.159*	0.016	0.096	1			
$\Delta RRP_{i,t}$	0.025	0.000	-0.056	0.037	-0.093	0.019	-0.236***	1		
ΔCPI_t	0.336***	0.000	0.171*	-0.166*	0.131	0.063	0.584***	-0.294***	1	
Δi_t	0.370***	0.000	-0.025	-0.160*	-0.123	0.151***	0.485	0.178**	0.367***	1

Note: *, **, *** mean that the correlation coefficient is significant at the 10%, 5%, and 1% threshold, respectively.

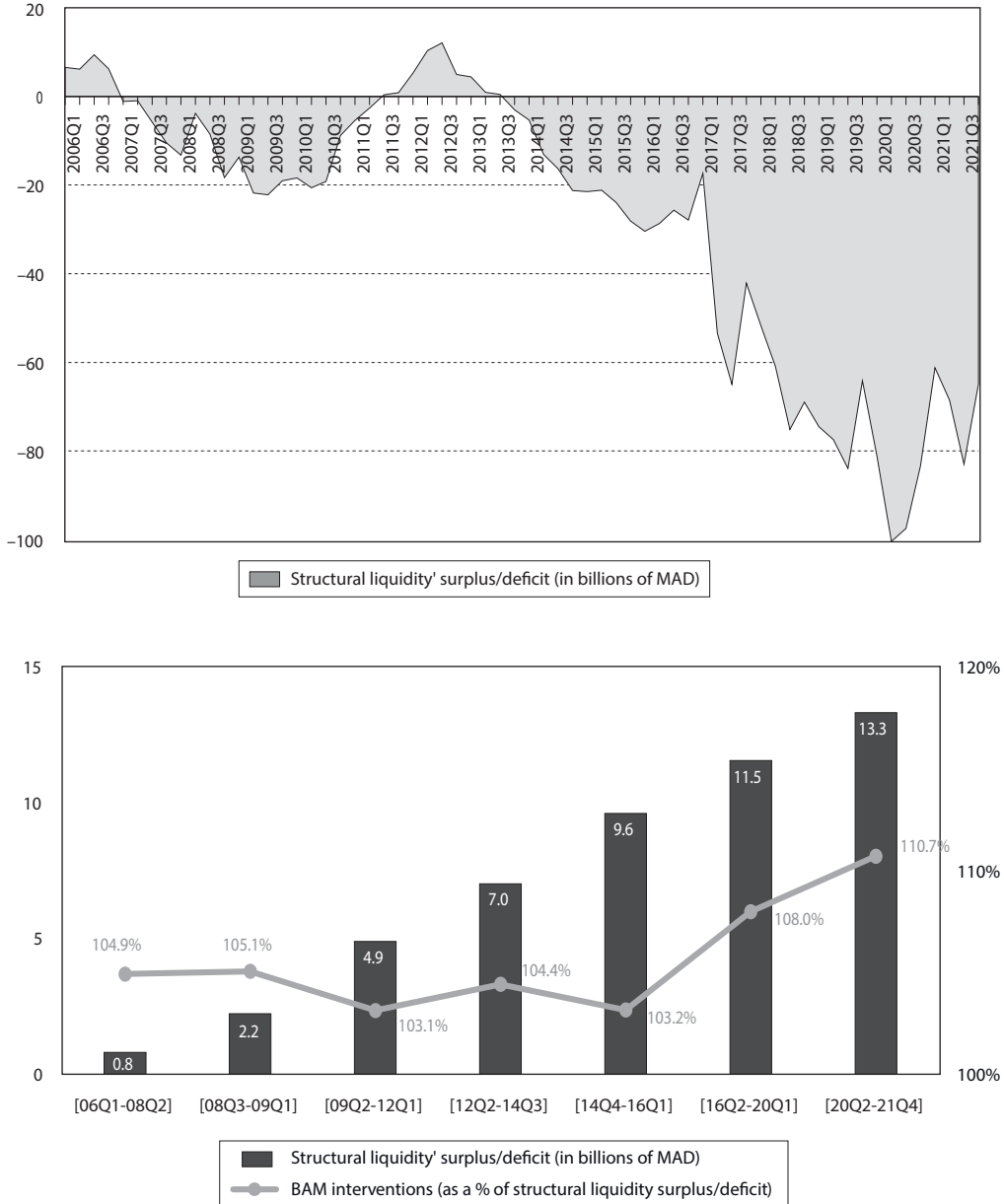
Source: Compiled by the authors

Figure A1 The misalignment of the operational objective of monetary policy in Morocco between 2006 and 2021



Source: Elaborated by the authors based on Bank Al-Maghrib data

Figure A2 Changes in the banking sector's structural liquidity position and BAM's intervention in the Moroccan money market between 2006 and 2021



Source: Elaborated by the authors based on Bank Al-Maghrib data