

Macro and Micro-Institutional determinants of VSMEs' Access to Bank Financing in Morocco: An Empirical Analysis of Monetary Policy, Prudential Risk, and Public Support (2014–2024)

Adil Boutfssi , Youssef Zizi 

Adil Boutfssi: (corresponding author), Laboratory in Applied Economics and Finance, Hassan II University - Morocco, e-mail: Boutfssi.adil@gmail.com

Youssef Zizi: LAREMEF, ENCG-FEZ, Sidi Mohamed Ben Abdellah University, Morocco, e-mail: youssef.zizi@usmba.ac.ma

Abstract:

This article explores the determinants of bank credit granted to very small, small, and medium-sized enterprises (VSMEs) in Morocco over the period 2014–2024. The study focuses on the combined effects of monetary policy signals, prudential regulation, and government credit guarantees on this segment's access to finance. Using a quantitative approach, the analysis is based on a dataset of 799 lending decisions from two large commercial banks, combined with macroeconomic indicators. The econometric model uses linear regression to estimate the effects of the central bank's policy rate, bank lending rates, risk-weighted assets (RWA), government guarantee volumes, and the economic cycle (before, during, and after COVID-19). The results show that the central bank's policy rate has a statistically significant effect; however, its influence remains limited compared to the strong negative impact of lending rates applied to VSMEs. This confirms the importance of interest rate pass-through and bank pricing behavior in access to credit. The post-COVID period is associated with a marked increase in credit allocation, likely supported by strengthened government guarantees and economic stimulus programs.

The results suggest that monetary policy alone is not sufficient to unlock credit for VSMEs. The effectiveness of transmission depends on institutional factors, including risk perception, regulatory constraints, and risk-sharing tools.

Keywords: VSMEs, monetary policy, public guarantees, Bank financing, prudential regulation, Morocco.

JEL Classification: E52, E58, G18, G21

1. Introduction

The question of the role of monetary policy in real economic processes is a recurring topic of controversy within economic theory and is often illustrated by the sharply divergent views of Milton Friedman and John Maynard Keynes. Friedman (1968) was adamant that macroeconomic stability would require financial stabilization of the economy, accompanied by appropriate control of monetary aggregates and short-term interest rates. Keynes (1936), on the other hand, espoused the hypothesis that periods of uncertainty alter investment behavior, which becomes structured not only by interest rates, but also by expectations and confidence levels.

These two divergent theoretical frameworks are particularly relevant for developing economies, where the private sector, particularly small businesses, continues to face significant financing constraints. These persistent challenges stem primarily from agency costs and information asymmetry, which lead financial institutions to adopt excessively risk-averse lending policies. Stiglitz and Weiss (1981) point out that banks may limit access to credit not because of high interest rates, but rather because of the risk incurred by some borrowers in their risk assessment.

In Morocco, very small, small and medium-sized enterprises (VSMEs) represent more than 95% of businesses and contribute significantly to job creation. Despite their structural importance, their access to conventional financing remains a considerable challenge. In response to this problem, the Moroccan central bank has implemented an accommodative monetary policy since 2014, lowering its key interest rate to encourage credit allocation, particularly to small businesses. However, the empirical literature highlights several structural issues, including prudential regulation, imperfect transmission channels, and persistent information asymmetries, which continue to reduce the impact of monetary interventions on the small business segment. While a growing number of studies have explored the general channels of monetary transmission in emerging countries, few studies have explicitly examined the distinction of these processes with respect to small business financing, including microeconomic studies on credit rationing, the impact of bank risk assessment methods, and the influence of government support. This finding highlights a significant gap in the empirical literature linking monetary instruments to effective access to credit for VSMEs.

Aït Hmadouch (2023) argues that Morocco's transition toward greater monetary flexibility combined with a more liberal exchange rate regime, has made the transmission of monetary signals more complex. Eddani (2024) using a vector autoregression (VAR) model, finds that policy rate changes take time to affect Gross Domestic Product especially for small enterprises. Similarly, Lakhchen (2025) applying a Dynamic Stochastic General Equilibrium (DSGE) framework, confirms the presence of structural inertia in Morocco's monetary transmission, where rate impulses are absorbed slowly by the real economy.

From a regulatory perspective, the implementation of Basel III, particularly its capital adequacy and risk-weighted asset requirements, has further constrained credit supply to riskier borrowers. De Nicolò et al. (2021) argue that in the post-crisis era, the effectiveness of monetary policy has been diminished by the restrictive effects of enhanced prudential regulation. Even under low interest rate conditions, banks often refrain from expanding credit portfolios due to capital preservation motives, favoring low-risk clients. In a related study, Ayvazyan (2024) finds that although regulatory convergence toward Basel II/III has enhanced banking resilience in the *West African Economic and Monetary Union* (WAEMU), it has also led to concentrated credit exposures and heightened liquidity and sovereign risk vulnerabilities.

This dynamic was further accentuated during the COVID-19 pandemic (2020-2021). Najab et al. (2022) observed incomplete monetary policy transmission during the crisis, marked by cautious bank behavior and significant uncertainty. Despite the cut in the policy rate, Bank Al-Maghrib (2024) reported that interest rates on *VSMES* loans declined only marginally, reflecting banks' reluctance to ease lending conditions due to heightened risk perceptions.

To address these credit fluctuations, the Moroccan government has strengthened its public guarantee schemes to restore trust between lenders and borrowers. From 2021 to 2024, Tamwilcom, a public financial institution representing the main state actor in public financing guarantees, expanded its guarantee and co-financing programs, such as Damane Relance and Intelaka, to support firms excluded from traditional financing channels. Although these mechanisms are considered key elements of Morocco's recovery strategy, their concrete effects on bank behavior remain understudied. Koura et al. (2024) highlight the growing coordination between governments and financial institutions to promote SME financing, but also note that the actual impact of guarantee schemes depends heavily on the specific characteristics of firms. Similarly, Boutfssi and Quamar (2025), in a study focusing on the Casablanca-Settat region, identify SME characteristics such as legal status, ISO certifications, sector of activity, and the presence of personal guarantees as the main determinants of credit rationing. Their analysis does not directly assess the role of government guarantees in the evolution of access to credit, which requires further empirical research.

Furthermore, the theoretical framework of credit rationing, introduced by Stiglitz and Weiss (1981), remains highly relevant. Indeed, the presence of information asymmetry in the credit market allows banks to limit access to credit rather than increase rates, in order to avoid adverse selection (Akerlof 1970). Subsequent studies (Hillier and Ibrahim, 1993; Zizi et al., 2022) have shown that loan refusals often rely on internal credit rating systems, which are opaque to borrowers but strongly influence financing decisions.

These scientific contributions suggest that monetary policy is neither neutral nor automatic in its effects on the credit market. Thus, the effective transmission of monetary policies to VSMEs depends not only on the financial instruments deployed by central banks, but also on banks' internal risk management frameworks, prudential regulation, and the availability of risk-sharing tools such as government guarantees. This study aims to assess the combined effect of monetary policy and public credit guarantees on VSMEs' access to bank financing in Morocco between 2014 and 2024. It also examines the impact of implementing Basel III recommendations, the third series of Basel Committee accords after Basel I and Basel II, on banks' lending behavior. Drawing on a microeconomic and macroeconomic dataset covering 799 individual credit decisions from two Moroccan commercial banks, this approach provides a nuanced understanding of how monetary policy, risk assessment, and the presence of public guarantees jointly influence VSME financing in the context of a developing Moroccan economy.

This paper begins with a review of the main theoretical and empirical contributions relating to monetary policy, banking regulation, and VSME financing. It then presents the research hypotheses and the conceptual model that frames the analysis. The methodology section follows, describing the data, selected variables, and statistical techniques used. The final section presents and analyzes the main results.

2. Literature Review

This review synthesizes the theoretical and empirical developments addressing the issue of financing VSMEs in both macro and microeconomic contexts in order to better understand the underlying factors explaining the weak transmission of monetary policies to VSMEs.

2.1 Economic cycle and Monetary Transmission

Economic theory has long debated the effectiveness of monetary policy during crises. Keynes (1936) viewed monetary interventions as essential during periods of uncertainty, while Minsky (1986) emphasized the institutional role of money in maintaining financial system resilience. Building on these views, Tenreyro and Thwaites (2016) found that the impact of monetary shocks weakens during recessions, especially in sectors sensitive to uncertainty, such as durable goods and investment.

Barran (1995) using VAR models to analyze the effects of monetary policy shocks in the United States, Japan, and Germany, concluded that the bank credit channel does not appear to be the main transmission channel. At the macroeconomic level, credit volumes did not respond

significantly to changes in interest rates. The effectiveness of the lending channel also depends on macroeconomic conditions. In times of crisis or heightened uncertainty, banks tend to perceive greater risk and respond by tightening their lending standards, thereby weakening monetary policy transmission (Pamungkas et al., 2025). Financial shocks often damage bank balance sheets by diminishing asset values and increasing default risks, further discouraging lending, particularly in the riskiest segments (Zentefis, 2020).

Kolotioloman (2024) demonstrates, using an economic model, that the COVID-19 pandemic had a negative and significant effect on the supply of long-term bank credit in all West African Economic and Monetary Union (WAEMU) countries. In Turkey, Gayaker and Yalcin (2025) emphasize the importance of using time-varying models to account for the changing effects of monetary policy interventions. Their work, spanning the period 1994–2020, shows that traditional models often fail to capture the full complexity of dynamic monetary environments.

These results are confirmed by several studies conducted in Morocco, particularly during the COVID-19 period. Najab et al. (2022) showed that SMEs were subject to credit restrictions despite falling interest rates. Their analysis highlighted that government guarantee programs largely benefited well-rated firms or those already well-established in the banking system. Similarly, Boutfssi and Quamar (2024) in a regional study focused on Casablanca-Settat, found that SMEs in this region faced direct total and partial credit rationing, as well as self-exclusion from the credit market due to anticipated rejection. Similarly, El Hassani and Ouali (2023) examining the relationship between economic growth and monetary policy in Morocco over the period 1990–2021, concluded that monetary policy had little effect on real output. Rather, its influence appeared limited to inflationary dynamics, highlighting structural weaknesses in the monetary transmission process.

2.2 The credit channels and monetary policy transmission

The central bank's policy rate remains the main conventional instrument for transmitting monetary policy to the real economy. In theory, a reduction in this rate should reduce borrowing costs and thus stimulate investment. This view is supported by Bernanke and Gertler (1995) and Mishkin (1996) who suggest that interest rate cuts could encourage bank lending and business expansion. This observation was supported by Freixas and Rochet (2008) who also suggested that monetary easing leads to increased access to credit in all sectors. While monetary policy can be transmitted to the real economy through interest rates, exchange rates, asset prices, and liquidity conditions (Can et al., 2020), the bank credit channel remains particularly important in economies where financial intermediation is primarily provided by banks.

According to official data from the Moroccan central bank (*Bank Al Maghrib-BAM*), the policy rate in Morocco followed a general downward trend between 2014 and 2024, falling from 3.00% at the beginning of 2014 to a historic low of 1.50% between 2020 and 2022, before gradually rising to 2.50% in December 2024. This trajectory reflects the shift from a moderately restrictive monetary policy to a more accommodative approach, notably in response to the COVID-19 crisis and its economic consequences. However, despite these successive adjustments, central bank reports systematically highlight a partial and slow transmission of the policy rate to lending conditions in the real economy, particularly for VSMEs BAM (2023, 2024).

In this sense, Najab et al. (2022) highlight that interest rates on loans to SMEs have remained high, and the impact of policy rate cuts on these lending rates has been limited. Their study highlights the reluctance of Moroccan banks to adjust their pricing for small businesses, even during periods of monetary easing. This behavior has contributed to a persistent financial gap between small and large businesses.

Furthermore, Najab et al. (2022) point out that banks tend to adopt more cautious lending practices towards SMEs during periods of economic volatility, thus limiting the effectiveness of monetary policy aimed at stimulating credit. Aït Hmadouch (2022) reinforces this view by arguing that in developing countries, institutional deficiencies significantly hamper the transmission of monetary impulses, particularly through interest rates. In the same context, Moussaoui and Benyacoub (2024) using an *ARDL* estimation, demonstrate that the transmission of the policy rate to lending rates remains both slow and partial, particularly in periods of significant uncertainty. This passive resistance in the adjustment of rates compromises the expected expansionary effects of monetary easing, particularly for SMEs.

A more in-depth analysis by the International Monetary Fund (2024) confirms the hypothesis that the low responsiveness of credit to changes in policy rates is linked to structural rigidities in the banking sector and the burden of prudential capital requirements.

Benetton et al. (2025) focusing on the United Kingdom, show that banks tend to adjust their pricing strategies in the context of unconventional monetary policies by manipulating not only interest rates but also processing fees. Their study reveals that credit institutions do not fully pass on policy rate cuts to borrowers, but rather manipulate pricing as an additional filter for credit, which consequently complicates the uniformity of transmission mechanisms. Thus, risk perception remains a key determinant of the credit granting process. In the *WAEMU* region, Nabaloum (2025) through a longitudinal study covering the period 1990–2021, finds that the reduction in the effectiveness of monetary transmission to bank credit is a consequence of the tightening of capital requirements. These results reflect the Moroccan economic experience. Indeed, Eddani (2024), using a VAR-based

estimation, confirms that monetary policy has had only a limited impact on the Moroccan real economy. Although interest rate shocks appear to affect inflation dynamics to some extent, their influence on output remains weak. His results also suggest that demand-side stimulus measures have only modest and short-lived effects, supporting the idea of a weak Keynesian multiplier in the Moroccan context. These findings are consistent with previous DSGE analysis by Lakhchem and Alaoui (2017) which found limited output responsiveness to monetary policy in developing countries. Similarly, De Leo et al. (2022) demonstrate that risk premia and policy rates can diverge considerably in the short run, especially when financial conditions are unstable. Ottonello and Winberry (2020) as well as Cloyne et al. (2023) also highlight that the effects of monetary policy are heterogeneous across firms, depending largely on their financial structure, solvency, and sensitivity to borrowing constraints. Checo et al. (2024) confirm the impact of monetary shocks on financial conditions and real activity in emerging markets, particularly for indebted firms. In Indonesia Pamungkas et al., (2025), show that even if the bank credit channel is active, its effectiveness varies considerably depending on the type of loan and the region.

2.3 Prudential Regulation and monetary policy transmission

The prudential regulatory environment is a crucial element in understanding credit access constraints for VSMEs. Under the Basel II and III frameworks, banks are required to maintain capital proportional to the risk-weighted value of their assets. As a result, credit institutions have gradually adopted more selective lending strategies, particularly under prudential pressure from members of the Basel Committee.

Fraisse and Mésonnier (2023) observe that unconventional monetary policy operations have had a positive impact on lending to large corporations and less risky SMEs. However, in times of increased prudential constraints, increased regulatory capital tends to reduce overall lending activity. Their research shows that this effect is partially mitigated in the case of small businesses by specific capital relief mechanisms targeting bank exposures to small businesses. Recent studies show that policy rate changes do not affect all types of credit equally. Rather, transmission depends on various factors, including the strength of banks' capital, asset quality, and funding stability (Albertazzi et al., 2021; Imbierowicz et al., 2021; Albrizio et al., 2019). In practice, different loan categories - such as corporate, consumer, or SME loans - respond differently to monetary policy changes (Caglio et al., 2021).

In Morocco, Bank Al-Maghrib (2024) notes that an increase in non-performing loans, generally perceived as riskier, has weakened banks' ability to finance small businesses. This finding implies that even under low interest rate conditions, lending to MSMEs remains limited by the need

to preserve regulatory capital buffers. This illustrates how the effectiveness of monetary policy can be mitigated when it conflicts with prudential objectives.

This finding is similar even for some developed countries. Indeed, Campanella et al. (2017) demonstrate that in Italy, stricter capital requirements under Basel III, combined with high default probabilities within bank client portfolios, significantly contribute to the credit contraction.

These results are also reflected in the Moroccan context. Quamar et al (2020) using a portfolio of 6,357 Moroccan SMEs, finds that the application of Basel II, whether through the standardized approach or the internal ratings approach, does not substantially reduce capital requirements for loans to SMEs as a whole and that only very small firms benefit from a lower capital charge than under Basel I, calling into question the supposed advantages of internal rating models. According to these results, high capital requirements could persist even under advanced risk-based frameworks, thus limiting banks' incentives to increase lending to small firms.

In several African countries, recent studies have highlighted the decisive role of credit risk management in improving financial performance and systemic stability. In the Democratic Republic of Congo, Musamu et al. (2025) show that rigorous credit risk control, particularly through the reduction of non-performing loan ratios, significantly improves the profitability indicators of commercial banks. In Nigeria, Ugorji et al. (2025) establish a negative relationship between bad loans and the financial stability of banks during the period 2015–2022. Their findings suggest that prudent lending practices are essential to ensure bank resilience. Pamela (2025) in a longitudinal study covering the period 2000–2023, also confirms that non-performing loans directly and negatively affect the profitability of Nigerian banks, thus reinforcing the need to strengthen internal risk assessment frameworks. In Morocco, a panel study of eight commercial banks over the period 2011–2018 conducted by Quamar et al. (2020) found that liquidity risk is positively correlated with return on equity and the solvency ratio, while it is negatively correlated with the loan-to-deposit ratio and return on assets. This indicates that short-term financing pressures influence lending behavior, particularly among SMEs.

Zouigui (2021) drawing on an econometric study of 200 Moroccan SMEs between 2013 and 2016, highlights that the adoption of new prudential regulations has encouraged banks to reduce their exposure to borrowers deemed too risky or insufficiently profitable. This behavior has contributed to widening the SME financing gap, particularly among smaller and less formalized firms, even though the total volume of credit has remained relatively stable. It is important to note that the effects of these regulatory and prudential reforms are not standardized in each banking institution but they differ from one institution to another. Indeed, according to Zouigui (2021) the impact of Basel-inspired rules strongly depends on the internal structure of each bank such as the composition of its balance sheet, available capital reserves, strategic orientation, the quality

of its internal risk rating systems and its past exposure to high-risk segments. Therefore, some banks maintain a proactive VSME lending strategy by ensuring sufficient capital flexibility, others, faced with stricter constraints, reduce their credit exposure or impose stricter lending conditions.

2.4 Public Guarantee and monetary policy transmission

Public credit guarantee schemes have become a key policy tool for improving access to finance for small and medium-sized enterprises. By sharing default risk with banks, these mechanisms aim to reduce the credit risk perceived by SME borrowers and encourage lenders to allocate credit to segments they would otherwise avoid. In Italy, Zecchini and Ventura (2009) demonstrate a causal relationship between public guarantees and increased leverage and lower borrowing costs for beneficiary firms. Their results support the idea that guarantee schemes can directly improve firms' access to finance in a context of credit market imperfection.

In the Spanish context, Martín-García and Morán (2021) demonstrate that public guarantees in the Madrid region have effectively alleviated credit constraints and stimulated private investment, with beneficial effects observed in both recessionary and expansionary phases. Their findings confirm the countercyclical role of these systems when properly targeted. In Morocco, the national public guarantee system managed by Tamwilcom has played an increasingly important role in recent years. The COVID-19 pandemic crisis marked an important turning point, as the government launched several large-scale guarantee initiatives aimed at stabilizing SME financing. According to Tamwilcom (2022, 2023), these programs mitigated the shock of the pandemic and helped maintain the flow of bank credit to the SME sector during a period of heightened financial uncertainty.

Despite these advances, implementation challenges still persist. In this context, Khanchaoui and El Moudden (2025) report that many VSEs remain excluded from guaranteed financing due to complex administrative procedures, high collateral requirements, and a general lack of awareness of available financial products. Their study also reveals that entrepreneurs express mixed satisfaction with the effectiveness of public programs and their coordination with banking institutions. These results suggest that public guarantee schemes, while important, need to be better adapted to the specific needs and capacities of very small businesses.

Further confirming the effectiveness of these unconventional instruments, Corredera-Catalán et al. (2021) show that public guarantees in various European regions have significantly improved SMEs' access to credit. Their results highlight the importance of continuously adapting these mechanisms to ensure their effectiveness in different economic contexts and business profiles.

3. Research Hypotheses

Before introducing the research hypotheses, it is necessary to clarify the analytical framework and the nature of the variables used in the empirical reasoning we followed. Indeed, our empirical demonstration is based on a combination of macroeconomic and microeconomic variables, providing a comprehensive view of the determinants of VSME financing.

Among the macroeconomic variables used in our models, we include the central bank’s key interest rate, which reflects monetary policy; the economic cycle (pre-COVID, COVID, post-COVID), which reflects the general macroeconomic environment; and the volume of government guarantees mobilized for each loan. In addition, the following microeconomic variables are specifically linked to each credit application: the interest rate applied to the VSME loan, which reflects the borrower’s pricing behavior and risk profile; and the risk-weighted assets (RWA) assigned by the bank to each credit risk exposure. Thus, this combination of macro and micro variables in the empirical approach allows a nuanced understanding of how external monetary and budgetary policy and internal banking practices jointly impact the access of VSMEs in Morocco to credit in different macroeconomic contexts (pre-COVID, COVID, post-COVID).

Table 1. Presentation of research hypotheses

[This table presents the main hypotheses tested in the study. It distinguishes between the macroeconomic and microeconomic determinants of the volume of credit to VSMEs. Each hypothesis reflects a relationship to be verified based on theory and empirical observations.]

independent variable	Order of hypotheses	Formulation of hypotheses
Central Bank Polity rate (Macroeconomic Variable)	H ₁	A reduction in the central bank’s policy rate does not have a statistically significant effect on the volume of credit granted to very small, small, and medium-sized enterprises (VSMEs).
Public guarantee (Macroeconomic Variable)	H ₂	The implementation of public credit guarantee schemes significantly enhances the volume of credit granted to VSMEs.
Economic cycle (Macroeconomic Variable)	H ₃	The total volume of VSMEs credit experienced a statistically significant variation during the post-COVID-19 period.
Interest rate by banks (Microeconomic Variable)	H ₄	lower bank lending rates are associated with higher volume of credit allocated to VSMEs.
Risk Weighting by Banks (Microeconomic Variable)	H ₅	A higher ratio of risk-weighted assets (RWA) is negatively associated with the volume of credit extended to VSMEs.

Source: Authors.

3.1 Conceptual Framework

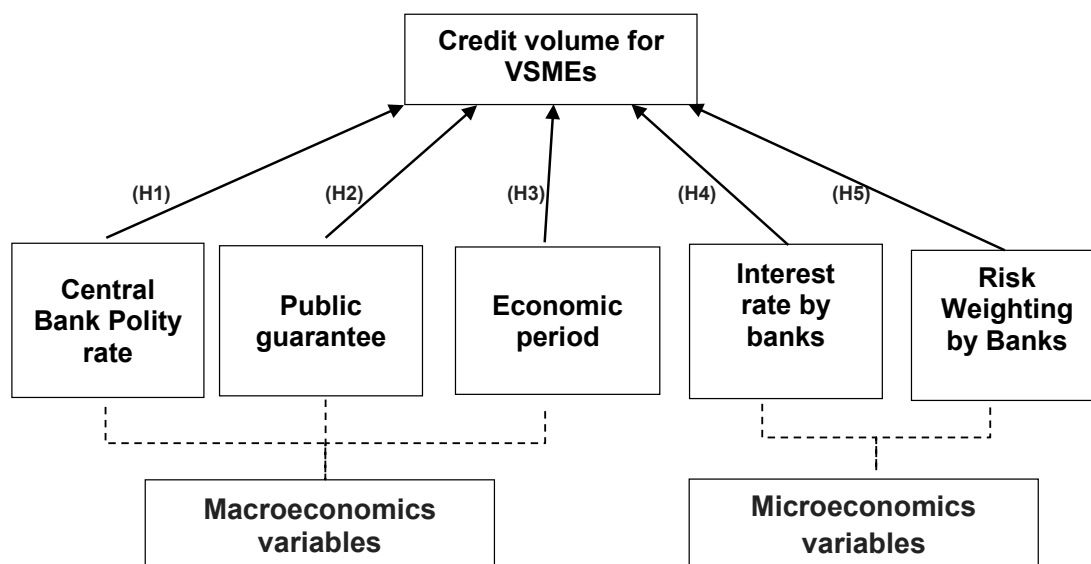
The conceptual framework developed in this study aligns the main variables identified in the literature review with those operationalized in the empirical strategy. It offers a unified understanding of the impact of monetary policy, prudential regulation, and public financial instruments on MSMEs' access to bank financing.

This framework is based on an empirical perspective focusing on the analysis of the total volume of credit granted to MSMEs. This approach integrates both macroeconomic factors, such as monetary signals and government interventions, and microeconomic mechanisms, such as pricing and regulatory capital requirements (RWA).

Temporal dimensions are also included in the analysis to account for the effects of recent economic cycles, particularly those related to the COVID-19 crisis and its influence on banking behavior. In this configuration, the framework offers a structured perspective for examining how monetary transmission operates in the case of VSMEs and how institutional mechanisms filter and reshape its effects.

Figure 1. Conceptual framework of credit volume determinants

[This figure illustrates the analytical approach used to examine the volume of credit to VSMEs. It illustrates the hypothetical relationships between macroeconomic and microeconomic determinants and their effects on the volume of credit.].



Source: Author.

4. Methodology

The study is based on a database consisting of 799 individual financing decisions collected from two Moroccan banks between 2014 and 2024. Each observation corresponds to a credit application reviewed by a bank credit committee, with a financing decision. This granularity makes it possible to accurately capture banking behaviors toward Moroccan SMEs over a period marked by major economic changes (before, during and after covid 19 pandemic).

Macroeconomic variables (The key interest rate of the central bank, share of public guarantees) were collected at the national level for each year between 2014 and 2024. To be integrated into the econometric model at the individual level, these variables were assigned to each observation according to the year of the financing decision.

This method makes it possible to examine how a specific macroeconomic environment affects the volume of credit allocated to VSMEs at the micro level. The data were analyzed using a combination of statistical tools such as Pearson correlations, ANOVA and an econometric model related to linear regression, in accordance with recommended best practices in applied economic research.

4.1 Sample

Given the exploratory orientation of this research, which aims to understand the macro- and micro-economic factors that influence credit allocation to VSMEs, the use of a non-probability purposive sampling method was necessary. As Yin (2018) and Coombs (2022) point out, this approach is commonly used to examine concrete financial decisions using documented and interpretable data, especially when random sampling is not feasible. Similarly, studies confirm the relevance of purposive sampling to analyze firms' financing behavior. Zecchini and Ventura (2009) used a selected sample of secured and unsecured loans to assess the effect of government guarantees in Italy. Levenson and Willard (2000) studied credit rationing in the United States using detailed banking data and emphasized the importance of observing actual lending decisions. In Morocco, Boutfssi and Quamar (2025) also used purposive sampling to study the determinants of credit rationing among SMEs in the Casablanca-Settat region, showing that this method reflects the diversity of business profiles and banking practices. This study uses a dataset consisting of 799 credit decisions made between 2014 and 2024 by two large Moroccan banks known for their involvement in financing VSMEs. These banks were selected based on the quality of their internal information systems, the scale of their lending operations to MSMEs, and their active use of public guarantee mechanisms. Each observed case includes the amount of credit requested and granted, the borrowing rate applied, the level of public guarantees mobilized, the level of risk-weighted assets (RWA), and the outcome of the financing decision, which can be full approval, partial approval, or rejection. These variables

were supplemented by the central bank's policy rate, which serves as a proxy for the monetary signal transmitted to banks. This rate is analyzed over three distinct economic cycle, identified as pre-COVID (2014—2020), COVID (2020—2021), and post-COVID (2021—2024), to examine the impact of expansionary policies on banks' lending behavior at different periods.

In line with the recommendations of Miles et al. (2014), this sampling strategy maximizes internal validity while ensuring consistency between theoretical concepts, available data, and statistical tests. It is consistent with the methodological standards of applied economic research in emerging economies where banking systems are dominant.

4.2 Variables Measurement

4.2.1 Typology of the Variables

The variables used in this study include continuous quantitative variables and ordinal variable. Continuous variables include the total volume of credit granted, the interest rate applied to VSMEs, the share of government guarantees used, and regulatory exposure measured by RWA. These variables were analyzed in linear regression models as explanatory variables. Ordinal variable includes the economic cycle, reflecting the periods before, during, and after the COVID-19 pandemic.

Table 2. Typology of variables used

[This table lists the variables according to their type, analytical level, and role in the study and links them to the corresponding research approaches].

Variable	Type
Credit volume allocated to VSMEs	continuous quantitative (dependent variable)
Policy rate (key interest rate)	continuous quantitative (Independent variable)
Interest rate (Banks)	continuous quantitative (Independent variable)
Risk-weighted assets (RWA)	continuous quantitative (Independent variable)
Public guarantee (loan amount guaranteed)	continuous quantitative (Independent variable)
Economic cycle (before, during and after COVID-19 pandemic)	Ordinal qualitative (Independent variable)

Source: Authors

4.2.2 Variable Measurement

Several statistical techniques were used to analyze the relationships between variables. Pearson correlation tests were applied to assess linear associations between continuous variables, including lending rate, policy rate, credit volume, government guarantees, and RWA. ANOVA tests were performed to compare the mean values of these variables across different categories, such as financing decision and economic cycle.

Multicollinearity statistical tests were performed to detect highly correlated independent variables before moving on to final linear regression tests to identify the main determinants of credit volume, taking into account both continuous and ordinal factors.

Although artificial intelligence and machine learning are increasingly widespread in predictive finance, these tools are less relevant in hypothesis-driven research aimed at testing economic relationships in regulatory contexts. As Rudin (2020) noted, the complex and opaque nature of these models makes them difficult to interpret, posing challenges to empirical work focused on causal inference and policy evaluation.

In contrast, classical econometric models offer clear advantages in this context. They produce interpretable coefficients, allow for formal hypothesis testing, and are based on economic theory, as Angrist and Pischke (2009) point out. Moreover, the data used in this study do not meet the conditions for optimization by machine learning.

As Athey (2019) and Varian (2014) suggest, machine learning techniques are best suited for large-scale datasets with strong predictive intent, while their accuracy tends to decline in contexts marked by multicollinearity or limited variance. Moreover, these models are not suited to research questions requiring transparency, interpretability, and causal identification. This study follows a hypothesis testing framework rooted in economic reasoning. For this purpose, parametric models such as linear and multinomial regressions are recommended, as they allow for clear identification of marginal effects and consistent inference, even if they are less flexible than machine learning algorithms in terms of pure prediction. As Imbens and Rubin (2015) argue, these models are an appropriate methodological choice given the study objectives and data structure.

4.2.3 Statistical tests

To analyze the relationships between the selected variables, we relied on IBM SPSS Statistics, a widely used tool in applied economic and social science research. Given the mixed nature of our dataset combining continuous and categorical variables SPSS offered both analytical flexibility and clarity of interpretation, making it particularly suitable for hypothesis-driven research involving both macroeconomic and microeconomic factors.

4.2.3.1 Pearson Correlation

Pearson's correlation coefficient was used to measure the strength and direction of linear relationships between pairs of continuous variables. This test was particularly useful during the exploratory phase to detect basic associations that could guide the subsequent modeling process.

The coefficient is calculated as:

$$r = \frac{n \sum XY - \sum X \sum Y}{\sqrt{(n \sum X^2 - (\sum X)^2) \cdot (n \sum Y^2 - (\sum Y)^2)}} \quad (1)$$

Where:

n is number of paired observations,

$\sum XY$ is sum of the products of the paired scores,

$\sum X, \sum Y$ is sum of each variable,

$\sum X^2, \sum Y^2$ is sum of squared scores.

Hypotheses:

$H_0: r = 0$ (no significant linear relationship)

$H_1: r \neq 0$ (a significant linear relationship exists)

4.2.2.2 Analysis of Variance (ANOVA)

To determine whether a continuous variable differed significantly across multiple categories (e.g., economic periods or types of financing decisions), we applied one-way ANOVA. This test compares the variance between group means to the variance within groups.

The F-statistic is computed as:

$$F = MSC / MSE \quad (2)$$

Where:

MSC is mean square between groups,

MSE is mean square within groups.

Hypotheses:

$H_0: \mu_1 = \mu_2 = \mu_3$ (all group means are equal)

$H_1: \exists i \neq j$ such as $\mu_i \neq \mu_j$ (at least one group mean differs)

4.2.3.2 Tukey's HSD Post-Hoc Test

When ANOVA yielded significant results, we applied Tukey's Honest Significant Difference (HSD) test to identify which specific pairs of group means differed significantly. This post-hoc test offers robust control over type I error when conducting multiple comparisons.

The formula used is:

$$HSD = q\alpha(k, df) \times \sqrt{\frac{MSE}{n}} \quad (3)$$

Where:

$q\alpha$ is critical value from Tukey distribution,

k is number of groups,

df are degrees of freedom,

n is group size (or harmonic mean if unequal).

Hypotheses:

$H_0: \mu_i = \mu_j$ for any pair (no significant difference)

$H_1: \exists i \neq j$ such that $\mu_i \neq \mu_j$ (at least one pair has a significant difference)

4.2.3.3 Multicollinearity test

To ensure the reliability of our regression results, we assessed multicollinearity among the independent variables. High multicollinearity can distort coefficient estimates and reduce the overall interpretability of the model.

We used two standard indicators:

a) Variance Inflation Factor (VIF):

The Variance Inflation Factor measures how much the variance of a regression coefficient is increased due to multicollinearity with other independent variables.

$$VIF_i = 1 / (1 - R_i^2) \quad (4)$$

Where R_i^2 is the coefficient of determination from regressing each independent variable against all others.

VIF < 5: acceptable

VIF > 5: moderate concern

VIF > 10: high multicollinearity requiring further action

b) Tolerance

Tolerance is the reciprocal of VIF and indicates the proportion of a variable's variance not explained by other independent variables.

$$\text{Tolerance } i = 1/VIF_i \quad (5)$$

Tolerance $i < 0.2$: moderate multicollinearity

Tolerance $i < 0.1$: strong multicollinearity

4.2.3.4 Linear Regression

We used multiple linear regression to identify the main predictors of the total volume of credit granted to VSMEs. This method allows for the estimation of each independent variable's effect while holding others constant, making it particularly suited for policy evaluation in financial contexts.

General model specification:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \varepsilon \quad (6)$$

Where:

Y is dependent variable (credit volume),

$X_1 \dots X_k$ are independent variables,

β_0 is intercept,

$\beta_1 \dots \beta_k$ are coefficients,

ε is error term.

Hypotheses:

$H_0: \beta_i = 0$ (no significant effect)

$H_1: \beta_i \neq 0$ (significant effect of X_i on Y)

4.3 Characteristics of the Sample

Prior to conducting the econometric modelling, we present a descriptive statistical overview of the sample to clarify the structure of the dataset, assess the distribution of key variables, and ensure the empirical relevance of the regression framework.

Table 3: Sample Characteristics

[This table presents the descriptive statistics of the main variables used in the regression model. It includes the number of responses per variable over the period 2014–2024].

Variable	variable category	Type	Unit	Mini- mum	Maxi- mum	Standard Deviation	Number of Obser- vations
VSME Crédit volume Million DH	Dependent	Quantitative	13.3	31.3	20.04	6.22	799
Public Guarantee Million DH	Independent	Quantitative	1.6	7.4	4.23	1.78	799
Risk- Weighted Assets Million DH	Independent	Quantitative	11.0	21.0	15.09	3.0	799
Interest rate %	Independent	Quantitative	5.6	6.5	5.94	0.28	799
Policy Rate %	Independent	Quantitative	1.5	3.0	2.26	0.46	799

Source: Statistical Results, Authors.

The table provides summarizes the descriptive statistics of the main variables used in this study, based on 799 individual loan decisions made between 2014 and 2024. The dependent variable the amount of credit granted to VSMEs (in million Moroccan dirhams) shows an average of 13.3 million DH, with values ranging from 3 to 31.3 million DH. This wide dispersion, confirmed by a standard deviation of 6.22, reflects the diversity of financing needs and conditions among small and medium-sized enterprises over the period.

As for the independent variables, the volume of public guarantees mobilized for these loans averages 4.23 million DH, with a standard deviation of 1.78. This indicates varying levels of public support across the sample, which may be linked to the perceived risk profile of borrowers. Similarly, the average value of risk-weighted assets (RWAs) associated with these loans is 15.09 million DH, with a range between 11 and 21 million DH, suggesting heterogeneous prudential treatment depending on creditworthiness and sectoral risk.

The lending rates applied by banks to VSMEs are relatively stable, with a mean of 5.94% and a small standard deviation (0.28). In contrast, the central bank policy rate used here as an indicator of the monetary stance fluctuates more significantly over the decade, ranging from 1.5% to 3.0%, with a mean of 2.26% and a standard deviation of 0.46. This evolution reflects the changing macroeconomic environment between 2014 and 2024, including periods of expansionary and neutral monetary policies.

It is important to clarify that while some variables (such as the policy rate or public guarantees) originate from national-level data, they were systematically matched with each individual loan decision based on the year it was issued. This methodological choice allows us to assess how macroeconomic and regulatory shifts over time have influenced micro-level credit allocation, a practice well-established in the empirical literature on VSME financing.

5. Econometric Analysis

5.1 Determinant of the volume of credit to VSMEs

The empirical analysis begins with a series of preliminary statistical tests to explore the relationships between the main explanatory variables and the volume of credit allocated to VSMEs. Pearson correlation tests are first used to identify significant linear associations between continuous variables such as interest rates, government guarantees, and risk-weighted assets. In addition, ANOVA tests assess whether credit volume differ significantly between the three economic periods considered. Where applicable, the Tukey post-hoc test helps identify specific differences between groups. Finally, a multicollinearity detection test was performed before launching the final multiple linear regression model applied to determine the individual and combined effects of macroeconomic variables on credit allocation. This series of tests provides a solid basis for understanding the structural factors that shape lending to VSMEs over time.

5.1.1 Bivariate Analysis – Pearson Correlation

The Pearson correlation matrix reveals important information on the transmission of monetary and institutional variables to the allocation of credit to the VSMEs in our sample. In particular, the interest rate applied by banks is strongly and negatively correlated with the volume of credit allocated to VSMEs ($r = -0.810$). This effect is compounded by a negative association with risk-weighted assets ($r = -0.874$), suggesting that loans granted at higher rates are perceived as riskier in the prudential framework. Similarly, the inverse correlation between interest rates and government guarantees ($r = -0.555$) shows that high-risk loans are less likely to be supported by government-guaranteed

risk-sharing mechanisms. Conversely, the economic cycle variable is positively correlated with credit volume ($r = 0.802$), government guarantees ($r = 0.917$), and risk-weighted asset levels ($r = 0.926$), indicating that during and after the COVID-19 period, banks increased their lending despite high risk, largely due to the strengthening of government guarantee systems. The correlation between government guarantees and credit volume ($r = 0.536$), as well as with risk-weighted assets ($r = 0.851$), highlights the important role of these mechanisms in unlocking access to finance for riskier VSME profiles. It is also interesting to note that the central bank's policy rate, which is a macroeconomic variable, has low or negligible correlations with most variables, including the lending rate ($r = 0.075$) and the volume of credit ($r = -0.208$), which reinforces the hypothesis that conventional monetary policy signals are not directly transmitted to VSMEs.

Table 4: Pearson Correlation test results

[This table presents the Pearson correlation coefficients. It highlights the strength and significance of linear relationships influencing credit volume allocation to VSMEs].

		Interest Rate (Bank)	Monetary policy rates	Economic cycle	Credit volume	Public Guarantee	Risk-Weighted Assets –
Interest rate (Bank)	Pearson Corrélation	1	.075	–.681	–.810	–.555	–.874
	Sig.		.033	.000	.000	.000	.000
	N	799	799	799	799	799	799
Monetary policy rates	Pearson Corrélation	.075	1	.353	–.208	.622	.206
	Sig.	.033		.000	.000	.000	.000
	N	799	799	799	799	799	799
Economic cycle	Pearson Corrélation	–.681	.353	1	.802	.917	.926
	Sig.	.000	.000		.000	.000	.000
	N	799	799	799	799	799	799
Credit volume	Pearson Corrélation	–.810	–.208	.902	1	.536	.830
	Sig.	.000	.000	.000		.000	.000
	N	799	799	799	799	799	799
Public Guarantee	Pearson Corrélation	–.555	.622	.917	.536	1	.851
	Sig	.000	.000	.000	.000		.000
	N	799	799	799	799	799	799
Risk-Weighted Assets –	Pearson Corrélation	–.874	.206	.926	–.830	.851	1
	Sig	.000	.000	.000	.000	.000	
	N	799	799	799	799	799	799

Source: Statistical Results, Authors.

5.1.2 ANOVA Test

The ANOVA test was used to determine whether the share of credit allocated to VSMEs varied significantly across three distinct economic periods: pre-COVID (2014–2020), COVID (2020–2021), and post-COVID (2021–2024). The test confirmed statistically significant differences between the periods, suggesting that macroeconomic shifts have materially affected lending patterns.

Table 5: Anova test results

[This table presents the results of the ANOVA test, used to assess whether the share of credit allocated to VSMEs significantly differed across the three economic periods (pre-COVID, COVID, post-COVID). The findings indicate statistically significant differences between at least two of these periods].

	Sum of squares	ddl	Mean square	F	Sig.
Inter-group	2.5260	3	1.263	2081.583	.000
Intra-group	4.8297	796	6.067		
Total	3.0089	799			

Source: Statistical Results, Authors.

The Anova test is globally significant ($F = 2081.58$; $p < 0.001$), suggesting that there is a significant difference in the share of financing of VSMEs between at least two of the three economic periods.

5.1.3 Post-Hoc Tukey HSD Test

To better understand the evolution of credit allocation to VSMEs over time, a Tukey HSD post-hoc test was conducted to compare the three economic periods defined as pre-COVID (2014–2020), COVID (2020–2021), and post-COVID (2021–2024). The results reveal that all pairwise comparisons are statistically significant at the 5% level.

A Tukey HSD post-hoc test was conducted to further explore these differences. The results show that credit to MSMEs decreased during the COVID-19 crisis compared to the pre-COVID period (mean difference = -1.22674 , $p < 0.001$). In contrast, the post-COVID period saw a marked recovery in lending to VSMEs, with significant increases compared to the COVID phase (mean difference = 1.77785 , $p < 0.001$) and the pre-COVID period (mean difference = 1.04896 , $p < 0.001$). This rebound likely reflects the effects of economic stimulus measures.

Table 6: Post-Hoc Tukey test results

[This table shows the pairwise comparisons between economic periods following the ANOVA test. The significant mean differences confirm notable shifts in credit allocation across the pre-COVID, COVID, and post-COVID phases].

(I) period	(J) period	Mean difference (I-J)	Standard error	Sig.
Pre-Covid 2014—2020	Covid	–1.2267	2,3168	.000
	Post covid	–1.0489	2.0787	.000
Covid 2020—2021	Pre-Covid	1.2267	2.3168	.000
	Post covid	1.7778	2.6338	.000
Post covid 2021—2024	Ante covid	1.0489	2.0787	.000
	Covid	–1.7778	2.6338	.000

Source: Statistical Results, Authors.

5.1.4 Multicollinearity test

Before proceeding with the linear regression models, we conducted a multicollinearity diagnosis in three stages to ensure that the explanatory variables were not excessively correlated with one another. In the first step, several variables showed very high Variance Inflation Factor (VIF) values well above the conventional thresholds (commonly set at 5 or 10). These included risk-weighted assets (VIF = 37.419), the bank lending rate (VIF = 29.629), and the economic cycle (VIF = 13.332). Due to their strong interdependence with other variables, we made the methodological decision to exclude them from the model.

In the second step, after removing the most problematic variables, the public guarantees variable also revealed a high VIF value (12.451) and a low tolerance level (0.08), indicating residual multicollinearity. It was therefore removed as well, to further improve model reliability.

Finally, in the third step, the remaining variables showed acceptable levels of multicollinearity: economic cycle (VIF = 2.685), lending rate (VIF = 2.365), and policy rate (VIF = 1.449). These values fall within tolerable limits, suggesting that the refined model is statistically more stable and allows for a clearer interpretation of each variable's effect on VSME credit allocation.

Table 7 – Multicollinearity test (VIF and Tolerance Values)

[This table presents the variance inflation factor (VIF) and tolerance statistics across the three modeling steps. It illustrates the progressive elimination of variables with high collinearity to improve the robustness of the final regression model].

Model		Collinearity statistics	
		Tolerance	VIF
Step 1	Risk-Weighted Assets –	0.007	37.419
	Interest rate (Bank)	0.034	29.629
	Monetary policy rates	0.502	1.993
	Public Guarantee	0.029	34.333
	Economic period	0.075	13.332
Step 2	Monetary policy rates	0.662	1.511
	Public Guarantee	0.08	12.451
	Economic period	0.174	5.751
	Interest rate (Bank)	0.168	5.941
Step 3	Monetary policy rates	0.69	1.449
	Economic period	0.372	2.685
	Interest rate (Bank)	0.423	2.365

Source: Statistical Results, Authors

5.1.5 Linear Regression Test

To identify the primary factors influencing the evolution of VSME credit between 2014 and 2024, a multiple linear regression was performed using the variables previously identified as significant in the bivariate analysis. The dependent variable represents the share of bank credit allocated to VSMEs relative to total credit to the private sector.

Table 8: Linear Regression test results

[This table presents the outcomes of the linear regression model assessing the impact of selected macro-economic and microeconomic variables on the volume of VSME credit. It highlights the statistical significance and direction of each factor's influence during the 2014–2024 period].

Model	B	Bêta	t	Sig.
(Constante)	1.13797	–	43.9	0.000
Monetary policy rates (Central Bank)	–1.1446	–0.120	–8.073	0.000
Economic cycle (2014-2024)	2.0911	0.280	13.819	0.000
Interest rate (Bank)	–1.6003	–0.710	–37.366	0.000

Source: Statistical Results, Authors.

The multiple linear regression results indicate that the three selected variables – the central bank's policy rate, the lending rate applied to VSMEs, and the economic cycle all have statistically significant effects ($p < 0.001$) on the share of bank credit allocated to VSMEs over the 2014–2024 period. The policy rate shows a moderate negative impact ($\beta = -0.120$), suggesting that a decrease in the key interest rate tends to slightly improve credit allocation toward VSMEs. This aligns with the logic of monetary easing, although the overall transmission appears limited, likely due to structural rigidities and cautious bank behavior. In contrast, the lending rate applied to VSMEs exerts a strong restrictive effect ($\beta = -0.710$). Higher borrowing costs significantly reduce financial inclusion for smaller firms, supporting the idea of price-based credit rationing in this segment. The economic cycle variable yields a positive coefficient ($\beta = 0.280$), reflecting improved VSMEs credit allocation during the post-COVID years. This trend likely captures the combined impact of public support measures, economic recovery, and more flexible banking practices. Although the variable representing public guarantees was excluded due to collinearity, part of its influence may be indirectly embedded within the broader temporal dynamics.

5.1.5 Discussion of Results

The first empirical approach of this study aimed to identify the macro-financial determinants influencing the share of bank credit allocated to (VSMEs) in Morocco over the period 2014–2024. Based on a multiple linear regression model and a preliminary multicollinearity diagnosis, several

key results emerge, helping to shed light on the transmission mechanisms of monetary policy and its interaction with banking behavior.

Before proceeding with the regression analysis, a collinearity test was performed to ensure that the independent variables were sufficiently decorrelated. The variance inflation factor (VIF) test revealed significant multicollinearity between certain variables, notably the “share of public guarantee” and “risk-weighted assets (RWA),” whose VIF scores exceeded the conventional threshold of 5. Consequently, these two variables were excluded from the final model to preserve the robustness of the estimates. The final specification retained three key explanatory variables: the central bank’s policy rate, the effective lending rate applied to VSMEs, and a variable capturing the 2014—2024 economic period.

The results confirm several theoretical and empirical expectations. First, the policy rate set by Bank Al-Maghrib shows a negative and statistically significant effect on the share of bank credit granted to VSMEs ($\beta = -0.120$; $p < 0.05$). This result is consistent with Keynesian monetary theory, which posits that a lower policy rate reduces banks’ refinancing costs, thereby stimulating credit distribution. However, the modest absolute value of the coefficient suggests a limited and partial transmission, raising questions about the effectiveness of the interest rate channel in the Moroccan context.

This result is corroborated by several empirical studies. Aït Hmadouch (2022) highlights that monetary policy transmission in Morocco is weakened by institutional frictions, including restricted banking access for small businesses, rigid lending criteria, and insufficient competition within the banking sector. Using a VAR model, Eddani (2024) also concludes that changes in the policy rate have only a delayed and modest impact on investment and credit to the private sector. Similarly, Cloyne et al. (2023) highlight that the effectiveness of monetary signals depends heavily on macro-economic stability, prudential frameworks, and risk perception, particularly in times of uncertainty.

The second explanatory variable, the lending rate applied to VSMEs, shows a strongly negative and highly significant coefficient ($\beta = -0.710$; $p < 0.05$), highlighting the central role of the cost of credit in access to finance. This suggests that rising lending rates significantly reduce small businesses’ ability to obtain credit, not necessarily due to explicit refusals, but rather due to increasingly unaffordable terms that limit their effective demand for credit.

This sensitivity to borrowing costs is consistent with the work of Ottonello and Winberry (2020), who show that the effects of interest rate fluctuations vary considerably depending on firms’ financial structure and flexibility margins. Firms lacking collateral or cash reserves are disproportionately penalized by interest rate increases, even under expansionary monetary regimes. Moreover, Benetton et al. (2025) argue that banks’ responses to monetary easing are not limited to interest rate adjustments but also involve indirect constraints such as increased fees, administrative

complexity, and selective customer engagement, all of which influence VSMEs' access to credit. Interestingly, the economic cycle variable exhibits a positive and significant effect ($\beta = 0.280$; $p < 0.05$), suggesting a relative improvement in access to credit for small businesses during the post-COVID economic recovery phase of 2021–2024. This result could reflect the combined effects of targeted public measures, increased risk sharing by financial institutions, and a gradual shift in banks' internal practices in response to new economic priorities. As De Leo et al. (2022) point out, the spread between policy and lending rates often narrows during recovery periods, suggesting a relative easing of credit conditions, even when formal regulatory constraints remain in place.

These results confirm theoretical predictions that, while the monetary channel remains active, its effectiveness is closely conditioned by real interest rates, prudential incentives, and general economic dynamics. It is also important to note that some variables with strong managerial and policy implications, namely government guarantees and risk-weighted assets (RWA), were excluded from the final regression due to concerns about multicollinearity. However, their exclusion does not mean that they are irrelevant from a theoretical or operational perspective. On the contrary, numerous studies highlight their strategic role in credit allocation decisions. Stiglitz and Weiss (1981) demonstrated that guarantees serve as a signal to mitigate information asymmetries and reduce perceived risk, thereby facilitating access to credit. More recent work by Martín-García and Morán (2021) demonstrate that public guarantees in the Madrid region have effectively alleviated credit constraints and stimulated private investment, with beneficial effects observed in both recessionary and expansionary phases.

Similarly, the Basel III regulatory framework, which incorporates RWA as a key determinant of capital requirements, strongly influences banks' portfolio strategies. As Fraisse and Mésonnier (2023) observe that unconventional monetary policy operations had a positive impact on lending to large firms and less risky SMEs. However, in times of increased prudential constraints, increased regulatory capital tends to reduce overall lending activity.

First, the estimates show that the policy rate has a negative and significant effect on the share of credit allocated to VSMEs. This result leads us to reject hypothesis H_1 , which states that the policy rate has no significant effect. Hypothesis H_2 , concerning the positive effect of government guarantees, cannot be directly validated in the final model, as the variable was excluded due to collinearity with other independent variables. Hypothesis H_3 is confirmed to. The positive and significant coefficient of the “economic period” variable indicates a resurgence in credit granted to VSMEs after the COVID-19 pandemic. This result likely reflects the combined effect of public support policies, economic recovery, and a gradual adjustment of banking practices in favor of VSMEs. Similarly, for hypothesis H_4 , the observed coefficient is strongly negative and significant. This

result affirms that a lower cost of credit promotes access to financing. Finally, hypothesis H_5 , which postulates a restrictive effect of risk-weighted assets, could not be tested in the final model due to excessive collinearity with other independent variables.

These results not only highlight the differentiated impact of monetary policy instruments, but also emphasize the importance of institutional and structural factors in amplifying or dampening their effects. For monetary policy to be fully effective in promoting financial inclusion among VSMEs, it must be complemented by tailored banking practices, regulatory flexibility, and strategic deployment of public support instruments.

6. Conclusion

This study analyzed the macroeconomic and microeconomic determinants of the volume of bank credit granted to very small, small, and medium-sized enterprises (VSMEs) in Morocco between 2014 and 2024. Using a linear regression model refined by collinearity tests, the results reveal that the direct transmission of the policy rate to credit targeting VSMEs remains weak and incomplete. Despite successive reductions in the policy rate over the period, the expected increase in credit volume did not materialize significantly.

Conversely, the lending rate charged by banks appears to be a central and negative determinant of credit volume, confirming the structuring role of risk-based pricing strategies and current prudential requirements. This result corroborates the limits of monetary leverage in a context marked by banks' reluctance to relax their selection criteria, particularly for companies perceived as risky or lacking transparency.

Furthermore, the analysis of temporal variations highlights a decline in credit during the 2020–2021 COVID-19 crisis, followed by a significant recovery in the post-COVID 2021–2024 phase. This dynamic confirms that credit volumes are sensitive not only to monetary signals, but especially to the economic context.

It is also important to note that certain variables with strong managerial and institutional relevance, notably government guarantees and risk-weighted assets (RWA), were excluded from the final model due to significant multicollinearity, identified by the variance inflation factor (VIF) test. These methodological adjustments were necessary to ensure the statistical robustness of the regression, but they do not imply that the excluded variables are irrelevant from a financial or strategic perspective.

Indeed, this study, based on a dataset of 799 individual financing decisions, highlights the

crucial influence of these variables on banking decision-making. Their exclusion from the econometric model should not obscure their determining role. Similarly, prudential requirements arising from Basel III regulations, reflected in RWAs, influence banks' portfolio strategies and their propensity to lend to the riskiest segments.

Therefore, although the statistical model does not directly quantify the effects of these levers, their implicit role is evident. Their impact is often integrated into broader dynamics such as risk perception, internal rating systems, and the economic context—which can partially absorb their effect in the final estimates.

From an academic perspective, we recommend integrating public guarantees and risk-weighting measures into their research. At the same time, public authorities would benefit from strengthening guarantee mechanisms specifically tailored to companies with limited collateral or a moderate risk profile, particularly in the post-COVID economic context.

Furthermore, the results suggest that monetary policy, while important, is not sufficient on its own to stimulate credit growth to VSMEs in a banking landscape subject to prudential constraints. For monetary easing to be effective, it must be accompanied by coordinated efforts to reduce information asymmetries, improve banking margins, and encourage credit flows to underserved segments.

While this study provides empirical insights into the determinants of bank credit allocation to Moroccan VSMEs, several limitations must be acknowledged. First, the data used come from only two banking institutions, which limits the generalizability of the results to the entire national banking system. Differences in credit policies, strategic orientations, and risk appetite between banks could lead to heterogeneous effects that are not accounted for in this analysis.

Second, some structural explanatory variables such as government guarantees and RWAs were excluded from the final specification due to their multicollinearity, thus reducing the model's ability to directly capture the role of key institutional levers, even though their influence is partially reflected by other selected variables, such as the economic period.

Finally, the study does not account for the sectoral characteristics of the financed firms (growth dynamics, financial performance, or default history), even though credit responsiveness can vary considerably depending on the firm's sector of activity, size, or stage of development.

These limitations open several avenues for future research. Expanding the database to a broader set of Moroccan banks, incorporating qualitative information from interviews with loan officers or managers of VSMEs, or disaggregating the analysis by economic sector or region would provide a better understanding of the differentiated logics underlying credit allocation. Such extensions

would significantly contribute to the literature on monetary transmission in emerging economies and provide more precise guidance for public policies aimed at improving VSME financing.

Ultimately, even if some of their effects are not explicitly reflected in the regression equations, institutional levers such as public guarantees, prudential standards, and the real cost of credit must remain central to any strategy aimed at improving financial inclusion. Better coordination between monetary policy, prudential regulation, and risk-sharing instruments is essential to improve the efficiency of the credit channel and ensure broader access to financing for Moroccan VSMEs.

References

- Abuka, C., Alinda, RK, Minoiu, C., Peydró, J.L., and Presbitero, A.F. (2019). Monetary Policy and Bank Lending in Developing Countries: Loan Demand, Rates, and Real Effects. *Journal of Development Economics*, 139, 185–202. <https://doi.org/10.1016/j.jdeveco.2019.03.004>
- Aït Hmadouch, Y. (2023). An Attempt to Theorize the Transmission Channels of Monetary Policy Instruments in a Developing Country Context: A Critical Review of the Moroccan Case Before and After Liberalization. *Revue Finance Finance Internationale*, 1(26). DOI : <https://doi.org/10.34874/IMIST.PRSM/ffi-v1i26.41493>
- Albertazzi, U., Nobili, A., and Signoretti, F.M. (2021). The Bank Credit Channel in Conventional and Unconventional Monetary Policy. *Journal of Money, Credit and Banking*, 53 (2–3), 261–299. 2. <https://doi.org/10.1111/jmcb.12766>
- Albrizio, S., Choi, S., Furceri, D., and Yoon, C. (2019). The International Bank Lending Channel in Monetary Policy. *IMF Working Papers*, 19 (234) <https://doi.org/10.5089/9781513518770.001>
- Angrist, J. D., Pischke, J.-S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press. <https://doi.org/10.2307/j.ctvc4j72>
- Athey, S., Imbens, G. W. (2019). Machine learning methods that economists should know about. *Annual Review of Economics*, 11, 685–725. <https://doi.org/10.1146/annurev-economics-080217-053433>
- Ayvazyan, K. (2024). Key banking system risks in the WAEMU. IMF Selected Issues Paper (SIP/2024/014). Washington, DC: International Monetary Fund. <https://share.google/NvGNisB9F24aSP43b>
- Bank Al Maghrib (2023). Annual Report. <https://www.bkam.ma/en/Publications-and-research/Institutional-publications/Annual-report-presented-to-his-majesty-the-king/Annual-report-20239.research/Institutional-publications/Annual-report-presented-to-his-majesty-the-king/Annual-report-2024>
- Barran, F., and Coudert, V., and Mojon, B. (1995). Monetary policy transmission and bank credit: An application to three OECD countries. *Economic Review*, 46(2), 393–413. <https://doi.org/10.2307/3502196>

- Benetton, M., Gavazza, A., Surico, P. (2025). Mortgage pricing and monetary policy. *American Economic Review*, 115(3), 823–863. <https://doi.org/10.1257/aer.20211229>
- Bernanke, B.S., Gertler, M. (1995). Inside the black box: The credit channel of monetary policy transmission. *Journal of Economic Perspectives*, 9(4), 27–48. <https://doi.org/10.1257/jep.9.4.27>
- Bester, H. (1987). The role of collateral in credit markets with imperfect information. *European Economic Review*, 31, 887–889. [https://doi.org/10.1016/0014-2921\(87\)90005-5](https://doi.org/10.1016/0014-2921(87)90005-5)
- Boutfssi, A. and Quamar, T. (2025). SME credit rationing in Morocco: between the characteristics of the requested financing and the bank-SME relationship: The case of SMEs in the Casablanca-Settat region, *M&I Review*, No. 11. <https://doi.org/10.3917/rmi.211.0069>
- Boutfssi, A. and Quamar, T. (2024). Asymmetry of information and SME credit rationing in Morocco. *TPREF Volume XV*, Issue 4(32), <https://doi.org/10.71420/ijref.v1i4.31>
- Briozzo, A., Vigier, H. (2014). The role of personal loans in the financing of SMEs. *Academia Revista Latinoamericana de Administración*, 27, 209–225. <https://doi.org/10.1108/ARLA-10-2013-0167>
- Caglio, C.R., Darst, R.M., and Kalemli-Özcan, S. (2021). Collateral Heterogeneity and Monetary Policy Transmission: Evidence from Lending to SMEs and Large Firms (28685; NBER Working Paper Series). <https://doi.org/10.3386/w28685>
- Campanella, F., Mustilli, M., D'Angelo, E. (2017). Basel III and Credit Crunch: An Empirical Test with Focus on Europe. *Journal of Applied Finance and Banking*, 7, issue 3, https://EconPapers.repec.org/RePEc:spt:apfiba:v:7:y:2017:i:3:f:7_3_3.
- Can, U., Bocuoglu, M.E., and Can, Z.G. (2020). How Does the Monetary Transmission Mechanism Work? Evidence from Turkey. *Borsa Istanbul Review*, 20 (4), 375–382. <https://doi.org/10.1016/j.bir.2020.05.004>
- Checo, A., Grigoli, F., Sandri, D. (2024). Monetary policy transmission in emerging markets: Proverbial concerns, novel evidence. BIS Working Papers No. 1170. Bank for International Settlements. <https://www.bis.org/publ/work1170.htm>
- Cloyne, J., Ferreira, C., Froemel, M., Surico, P. (2023). Monetary policy, corporate finance, and investment. *Journal of the European Economic Association*. <https://doi.org/10.1093/jeea/jvad019>
- Coombs, H. (2022). Case study research: single or multiple [White paper]. Southern Utah University. <https://doi.org/10.5281/zenodo.7604301>
- Corredera-Catalán, F., di Pietro, F., Trujillo-Ponce, A. (2021). Post-COVID-19 SME financing constraints and the credit guarantee scheme solution in Spain. *Journal of Banking Regulation*, 22, 250–260. <https://doi.org/10.1057/s41261-021-00143-7>
- De Leo, P., Gopinath, G., Kalemli-Özcan, Ş. (2022). Monetary policy and the short-rate disconnect in emerging economies. NBER Working Paper No. 30458. National Bureau of Economic Research. <https://doi.org/10.3386/w30458>

- De Nicolò, G., Klimenko, N., Pfeil, S., Rochet, J.-C. (2021). The long-term effects of capital requirements (CESifo Working Paper Series No. 9115). *CESifo*.
<http://dx.doi.org/10.2139/ssrn.3865304>
- Eddani, M. (2024). Investigation of the effectiveness of monetary policy transmission to the real economy in Morocco: Analysis using a VAR model. *Revue Alternatives Managériales Économiques*, 6 (Special Issue 1). <https://doi.org/10.25103/ijbesar.111.05%0A>
- El Hassani, H., Ouali, I. (2023). The impact of monetary policy on economic growth in Morocco: An econometric study using the ARDL model. *International Journal of Accounting, Finance, Auditing, Management and Economics*, 4 (2-2), 272–285.
<https://doi.org/10.5281/zenodo.7826269>
- Fraisse, H., Mésonnier, J.-S. (2023). Access to credit for SMEs since the great financial crisis: What are the effects of new monetary and prudential policies? *Revue d'économie financière*, 150(2), 35–56. <https://doi.org/10.3917/ecofi.150.0035>
- Freixas, X and Rochet J.C., (2008). *Microeconomics of Banking*. 2nd Edition. MIT Press Books,. The MIT Press, edition 2, volume 1.
https://www.researchgate.net/publication/227458433_The_Microeconomics_of_Banking
- Friedman, M. (1968). The Role of Monetary Policy. *American Economic Review*, 58, 1-17.
<https://www.aeaweb.org/aer/top20/58.1.1-17.pdf>
- Gayaker, S., Yalcin, Y. (2025). Examining the impact of monetary policy in Turkey: TVP-VAR with stochastic volatility. *Panoeconomicus*, 1–30. <https://doi.org/10.2298/PAN230325007G>
- Guercio, M., Briozzo, A. E., Vigier, P. H., Martinez, L. B. (2020). The financial structure of technology-based firms. *Revista Contabilidade Finanças*, 31, 444–457.
<https://doi.org/10.1590/1808-057x201909580>
- Hillier, B., Ibrahim, M. V. (1993). Asymmetric information and models of credit rationing. *Bulletin of Economic Research*, 45(4), 271–304. <https://doi.org/10.1111/j.1467-8586.1993.tb00571.x>
- Imbens, G. W., Rubin, D. B. (2015). *Causal inference for statistics, social, and biomedical sciences: An introduction*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139025751>
- Imbierowicz, B., Löffler, A. Vogel, U. (2021). Transmission of bank capital requirements and monetary policy to bank lending in Germany. *Review of International Economics*, 29(1), 144–164. <https://doi.org/10.1111/roie.12500>
- International Monetary Fund, (2024). Annual report.
- Ivashina, V., Laeven, L., and Moral-Benito, E. (2022). Types of loans and bank lending channel. *Journal of Monetary Economics*, 126, 171–187. 1.
<https://doi.org/10.1016/j.jmoneco.2021.11.006>
- Jaffee, D. M., Russell, T. (1976). Imperfect information, uncertainty, and credit rationing. *The Quarterly Journal of Economics*, 90(4), 651–666. <https://doi.org/10.2307/1885327>
- Jaffee, D., Stiglitz, J.E. (1990). Credit rationing. In B. Friedman F. Hahn (Eds.), *Handbook of Monetary Economics* (Vol. 2, pp. 837–888). Elsevier.

- Kashyap, A. K., Stein, J. C. (2000). What do a million observations on banks say about the transmission of monetary policy? *American Economic Review*, 90(3), 407–428. <https://doi.org/10.1257/aer.90.3.407>
- Keeton, W. (1979). *Equilibrium credit rationing*. Garland Press. <https://doi.org/10.4324/9781315207223>
- Keynes, J. M. (1936) *The General Theory of Employment, Interest and Money*. Palgrave Macmillan, London.
- Khanchaoui, Y., El Moudden, A. (2025). Impact of state and banking programs on VSEs development in Morocco: Facilitating access to financing. *International Journal of Strategic Management and Economic Studies (IJSMES)*, 4(1), 95–111. <https://doi.org/10.5281/zenodo.14840685>
- Kolotioloman, S. (2024). COVID-19, Liquidity Measures and Credit Supply in the WAEMU. *The International Journal of French-Language Economists*, 9(2), 34–58. <https://doi.org/10.18559/rielf.2024.2.2009>
- Koura, A., Boudhar, A., Oudgou, M. (2024). Advancements in the Moroccan SMEs' Financing Ecosystem: Catalysing SME Development through Funding Strategic Investment. *African Scientific Journal*, 3(25), 654–685. <https://doi.org/10.5281/zenodo.13381585>
- Lakhchen, F. (2025). Financial Frictions and Monetary Policy in Developing Economies: An Estimated DSGE Model with a Banking Sector for Morocco. *International Economic Journal*, 1–23. <https://doi.org/10.1080/10168737.2025.2459146>
- Levenson, A. R., Willard, K. L. (2000). Do firms get the financing they want? Measuring credit rationing experienced by small businesses in the U.S. *Small Business Economics*, 14(2), 83–94. <https://doi.org/10.1023/A:1008196002780>
- Martín-García, R., Morán Santor, J. (2021). Public guarantees: A countercyclical instrument for SME growth. Evidence from the Spanish Region of Madrid. *Small Business Economics*, 56, 427–449. <https://doi.org/10.1007/s11187-019-00214-0>
- McKillop, D. G., Hutchinson, P. (1994). Small businesses and bank financing: A regional review. *Applied Financial Economics*, 4(1), 69–73.
- Miles, M., B., Huberman, A. M., Saldana, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). SAGE Publications. <https://www.metodos.work/wp-content/uploads/2024/01/Qualitative-Data-Analysis.pdf>
- Mishkin, F. S. (1996). The channels of monetary transmission: Lessons for monetary policy. NBER Working Paper No. 5464. National Bureau of Economic Research. <https://doi.org/10.3386/w5464>
- Moussaoui, N., Benyacoub, B. (2024). Pass-through of the interest rate in Morocco: An econometric study using the ARDL model. *Revue Alternatives Managériales Économiques*, 6(2), 225–244. <https://doi.org/10.48374/IMIST.PRSM/ame-v6i2.48459>

- Musamu, P. T., Kweyi, J. E., Bongwa, L. K. (2025). Correlation between credit risk management and the financial performance of banks in the DRC. *Journal of Economics, Finance and Management*, 12(1), 45–60. <https://doi.org/10.5281/zenodo.15245688>
- Nabaloum, K. (2025). Regulatory constraints and the transmission of monetary policy to bank lending in the WAEMU. *African Development Review-Revue Africaine de Developpement*, 37(2). <https://doi.org/10.1111/1467-8268.70008>
- Najab, A., Lajfari, K., Amrani, O. (2022). Monetary policy under uncertainty: The case of COVID-19 health crisis in Morocco. *European Journal of Business and Management Research*, 7(5), 70–76. <https://doi.org/10.24018/ejbmr.2022.7.5.1642>
- Ogundele, O. A., Nzama, M. D. (2025). Risk management practices and financial performance: Analyzing credit and liquidity risk management and disclosures by Nigerian banks. *Journal of Risk and Financial Management*, 18(4), 198. <https://doi.org/10.3390/jrfm18040198>
- Ottonello, P., Winberry, T. (2020). Financial heterogeneity and the investment channel of monetary policy. *Econometrica*, 88(6), 2473–2502. <https://doi.org/10.3982/ECTA17477>
- Pamela, U.C. (2025). Effect of credit risk management on the financial performance of selected deposit money banks in Nigeria. *Journal of Management Science and Entrepreneurship*, 13(2), 78–93. <https://doi.org/10.70382/bejmse.v7i7.011>
- Pamungkas, P., Septianto, F., Trinugroho, I., Ab-Rahim, R., Ridhwan, M.M., and Sergi, B.S. (2025). Monetary Policy Through the Bank Credit Channel: Evidence from Credit Decomposition. *Journal of Risk and Financial Management*, 18(5), 249. <https://doi.org/10.3390/jrfm18050249>
- Quamar, T. (2008). Bank Financing of SMEs under Basel II Prudential Regulation: The Case of Moroccan SMEs [PhD thesis, University of Montpellier 1].
- Quamar, T., Maniani, A., Fawzi, S. (2020). The Determinants of Liquidity Risk in Moroccan Banks: A Panel Data Analysis. *Revue Française d'Économie et de Gestion*, 1(3). <https://www.revuefreg.fr/index.php/home/article/view/51/33>
- Repullo, R., Suarez, J. (2004). Loan pricing under Basel capital requirements. *Journal of Financial Intermediation*, 13(4), 496–521. <https://doi.org/10.1016/j.jfi.2004.06.001>
- Rudin, C. (2019). Stop explaining black box machine learning models for high stakes decisions and use interpretable models instead. *Nature Machine Intelligence*, 1(5), 206–215. <https://doi.org/10.1038/s42256-019-0048-x>
- Stiglitz, J.E., Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American Economic Review*, 71(3), 393–410. https://www.researchgate.net/publication/4733120_Credit_Rationing_in_Markets_With_Imperfect_Information
- Tamwilcom, (2022). Annual Report.
- Tamwilcom, (2023). Annual Report.
- Tenreyro, S., Thwaites, G. (2016). Pushing on a string: US monetary policy is less powerful in recessions. *American Economic Journal: Macroeconomics*, 8(4), 43–74. <https://doi.org/10.1257/mac.20150016>

- Varian, H.R. (2014). Big data: New tricks for econometrics. *Journal of Economic Perspectives*, 28(2), 3–28. <https://doi.org/10.1257/jep.28.2.3>
- Yin, R.K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.
<https://ebooks.umu.ac.ug/librarian/books-file/Case%20Study%20Research%20and%20Applications.pdf>
- Zecchini, S., Ventura, M. (2009). The impact of public guarantees on credit to SMEs. *Small Business Economics*, 32, 191–206. <https://doi.org/10.1007/s11187-007-9077-7>
- Zentefis, A. K. (2020). Bank Wealth and Frustrated Monetary Policy. *Journal of Financial Economics*, 138 (3), 687–699. <https://doi.org/10.1016/j.jfineco.2020.06.007>
- Zizi, Y., Oudgou. M., El Moudden A., (2022). The Macroeconomic Determinants of Moroccan Corporate Bankruptcy. *International Journal of Applied Economics, Finance and Accounting*, Academic Press, vol. 14(1), pp. 25–33. <https://doi.org/10.33094/ijaefa.v14i1.636>
- Zouigui, M. (2021). Impact of Basel III Prudential Regulation on Bank Financing of Moroccan Small and Medium-Sized Enterprises. *International Journal of Innovation and Applied Studies*, 32(1). <https://ijias.issr-journals.org/abstract.php?article=IJIAS-20-350-01>