

Macroeconomic Policy Effects on Domestic Credit to the Private Sector in Developing Countries

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Abstract—This study analyzes the effects of the federal funds rate, non-performing loans, trade openness, inflation, lending interest rates, and exchange rates on domestic credit to the private sector in 31 small open developing economies during 2010–2024 using the System Generalized Method of Moments (System GMM) approach. The results show that the federal funds rate, non-performing loans, trade openness, inflation, and lending interest rates have a significant negative effect, while the exchange rate has a significant positive effect on domestic credit to the private sector. The finding on trade openness is inconsistent with the initial hypothesis, as it shows a negative coefficient of (−0.063) in the short run and (−0.535) in the long run. The results also indicate that long-run effects are greater than short-run effects. In the long run, the exchange rate has the largest effect with a coefficient of (8.629), while in the short run it also shows the largest coefficient of (1.016). These findings highlight the importance of adaptive macroprudential policies in maintaining credit intermediation stability in developing economies.

Keywords :Domestic Credit to Private Sector; Federal Funds Rate; Exchange Rate; Trade Openness; Small Open Economy

1. INTRODUCTION

Developing economies with open systems frequently face complex challenges in maintaining monetary stability and domestic liquidity. This phenomenon demands a profound understanding of how global capital flows affect internal funding capacities. Domestic credit allocation to the private sector serves as a key indicator of financial deepening, reflecting the capacity of the financial system to channel funds toward productive sectors. Drawing on Financial Intermediation Theory, (Gbadebo, 2024) posits that financial institutions act as intermediaries that mobilize funds from surplus units to deficit units, thereby fostering investment and economic growth through the banking intermediation mechanism. A significant body of empirical research confirms that the expansion of private sector credit contributes to heightened economic activity, broadened access to financing, and the strengthening of productive sectors in developing economies (Levine, 2021).

However, within an open economy framework, the effectiveness of banking intermediation is determined not only by domestic financial and macroeconomic conditions but also by external dynamics that influence liquidity conditions and cross-border capital flows. This perspective is consistent with the foundational Mundell–Fleming Model, which has been extended and validated in modern literature by Leightner (2024) as well as Tenderere and Mishi (2025). The framework explains that in a small open economy with high capital mobility, fluctuations in international interest rates can significantly affect capital movements, exchange rate stability, and domestic macroeconomic equilibrium, thereby shaping the banking sector's capacity to extend credit to the private sector. Consequently, credit dynamics in small open developing economies are the outcome of the simultaneous interaction between external financial pressures and domestic structural conditions, necessitating an integrated analytical approach.

Empirically, the ratio of domestic credit to the private sector relative to GDP across the 31 small open developing economies in this study exhibits a fluctuating pattern over the period 2010–2024, as illustrated in Figure 1. The credit-to-GDP ratio shows an overall upward trend during 2010–2016, increasing from 43.30% to 47.77% of GDP, reflecting the expansion of banking intermediation supported by relatively loose global liquidity conditions in the aftermath of the 2008 financial crisis. However, a decline to 46.39% was observed in 2017, coinciding with the normalization of U.S. monetary policy, as the Federal Funds Rate began to rise gradually, tightening global liquidity and curbing capital flows to developing economies a mechanism consistent with the Mundell–Fleming Model. A significant spike occurred in 2020, with the credit to GDP ratio surging to 50.46%. However, this did not reflect genuine credit expansion but was instead driven by a contraction in GDP due to the COVID-19 pandemic, which mechanically inflated the ratio. In the post-pandemic period of 2021–2024, the credit-to-GDP ratio corrected downward and has yet to fully recover, signaling structural pressures that hinder sustainable credit expansion. This pattern confirms that the banking intermediation function, as conceptualized in Financial Intermediation Theory, is dynamic and simultaneously vulnerable to both external shocks and domestic pressures. Consequently, this structural vulnerability forces domestic commercial banks to tighten credit standards and minimize risk exposure during periods of high global uncertainty. This cautious lending behavior, driven by localized liquidity constraints, prevents private sector borrowing from aligning with national economic growth goals. Ultimately, managing these domestic risk factors becomes imperative to ensure that local banking sectors can withstand external macro-financial reversals without triggering severe credit crunches.

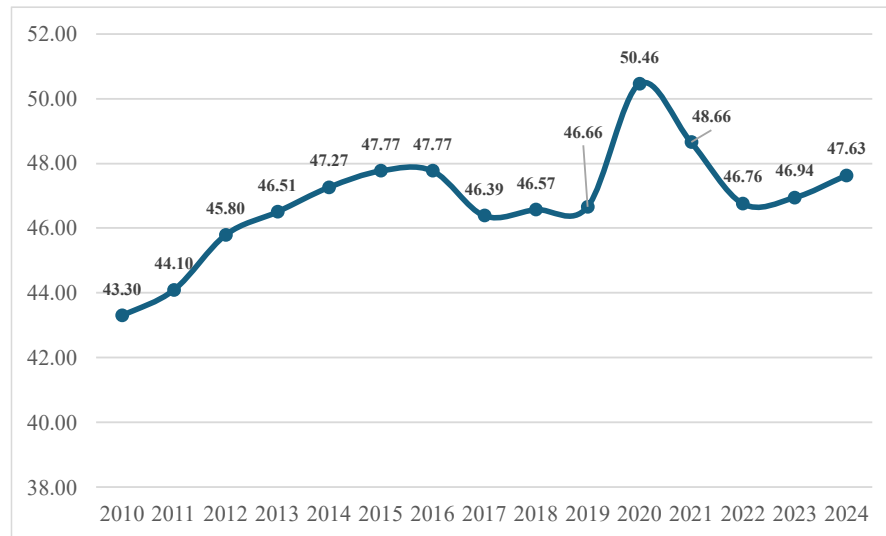


Figure 1. Average Domestic Credit to the Private Sector (Percent of GDP) in 31 Small Open Developing Economies, 2010–2024

Source: World Bank (2024)

This phenomenon of credit fluctuation is inextricably linked to the simultaneous influence of various external and domestic factors. From the external perspective, increases in the Federal Funds Rate raise global funding costs, tighten international liquidity, and suppress capital flows to developing countries, thereby reducing banking credit capacity (Bationo, Murinde, & Soumar, 2025; Nzeh, Imoagwu, Okaforocha, & Tevin-Anyali, 2023; Unsal, 2023; Yahyaei, Singh, & Smith, 2024). However, most existing studies on Federal Funds Rate transmission analyze its effect in isolation from domestic banking conditions or are limited to specific regions, leaving a gap in cross-regional evidence that simultaneously integrates external and domestic determinants. Trade openness, as a defining characteristic of small open economies, also influences credit allocation, though with inconsistent directions in the literature; some studies find that greater openness stimulates credit expansion through increased financing needs (Asafo, Kuuwill, Kimengsi, & Jr, 2026; Islam, 2022; Saleem, 2024), while others show that it suppresses credit growth due to heightened external uncertainty (Bilalli & Sadiku, 2023; Farhat, 2023). This inconsistency suggests that the effect of trade openness on credit remains context-dependent and has yet to be comprehensively examined within a cross-regional dynamic framework.

From the domestic perspective, non-performing loans reflect a deterioration in banking asset quality that prompts stricter credit standards and constrains intermediation capacity (Hor & Lim, 2025; Romadhan, 2026; Sánchez Serrano, 2021; Tölö & Virén, 2021). However, most studies analyze NPL in isolation without linking them to the broader external financial environment, limiting the comprehensiveness of their findings. High inflation exacerbates macroeconomic uncertainty and business risks, which diminishes banking intermediation effectiveness (Alnabulsi, Kozarevi, & Hakimi, 2023; Bationo et al., 2025; Ndanshau & Semu, 2023; Sol Murta & Gama, 2024), although some studies find that inflation may stimulate nominal credit demand through increased financing needs (Bilalli & Sadiku, 2023; Nzeh et al., 2023), indicating that the dominant mechanism remains empirically unresolved. Lending interest rates consistently exert a negative effect, as higher borrowing costs dampen private sector credit demand (Saleem, 2024; Wajebo & Geda, 2025; Wiralaga, Dianta, & Nurlatifah, 2022), yet most existing studies rely on static approaches that fail to capture long-run credit dynamics. Exchange rate depreciation tends to encourage credit expansion through enhanced export competitiveness and real sector activity (Bationo et al., 2025; Modugu & Dempere, 2022), though it may also suppress credit by increasing foreign currency debt burdens (Wajebo & Geda, 2025), reflecting an unresolved directional ambiguity in the literature.

Although the individual gaps identified above have been partially addressed in prior studies, they share three overarching limitations that remain inadequately resolved. First, most studies analyze external and domestic variables in isolation. For instance, Unsal (2023) focuses on global monetary policy transmission without accounting for domestic banking conditions, while Hor and Lim (2025) as well as Sánchez Serrano (2021) analyze non-performing loans without linking them to external dynamics. Second, the scope of existing literature is geographically limited and fails to capture the cross-regional dynamics of small open developing economies. Prior works are often confined to specific areas, such as Asafo et al (2026) who focuses exclusively on African countries, while Bilalli and Sadiku (2023) are limited to Western Balkan economies. Third, the dominance of static econometric approaches in previous studies, such as those by Modugu and Dempere (2022) as well as Saleem (2024), fails to capture persistent credit dynamics and the endogenous relationships between variables in the long run. Furthermore, the empirical inconsistency regarding the effects of trade openness, inflation, and exchange rates on credit allocation underscores the need for a more comprehensive and dynamic analytical framework applied to a broader cross-regional sample of small open developing economies.

This study contributes to three aspects. Theoretically, it integrates Financial Intermediation Theory and the Mundell–Fleming Model into a single analytical framework to explain credit dynamics in small open developing

economies across regions. Methodologically, the System GMM approach enables the simultaneous treatment of endogeneity, individual heterogeneity, and panel dynamics, yielding more robust estimates compared to the static approaches dominant in prior literature. Empirically, this study provides more representative cross-regional evidence regarding the interaction between global monetary policy and domestic banking conditions in influencing credit allocation.

Based on the research gaps and contributions outlined above, this study aims to analyze the effects of the Federal Funds Rate, trade openness, non-performing loans, inflation, lending interest rates, and exchange rates on domestic credit to the private sector in 31 small open developing economies over the 2010–2024 period. The urgency of this study is increasingly relevant given the continuing uncertainty of global monetary policy in the post-pandemic era and its implications for the financial stability of developing countries, making a comprehensive understanding of credit determinants crucial for the formulation of well-targeted macroprudential policies.

2. RESEARCH METHODS

2.1 Research Type and Data Sources

This study employs a quantitative approach using panel data that combines time-series observations for the 2010–2024 period and cross-sectional data from 31 developing countries categorized as small open economies. The sample countries consist of Albania, Algeria, Armenia, Bangladesh, Belarus, Bolivia, Botswana, Brazil, Bulgaria, Colombia, Costa Rica, Georgia, Hungary, Indonesia, Kenya, Malaysia, Mexico, Moldova, Montenegro, Namibia, Nicaragua, North Macedonia, Paraguay, Peru, Philippines, Romania, South Africa, Thailand, Ukraine, Vietnam, and Zambia. The selection of these countries is based on their relatively open economies to international trade and global capital flows. This characteristic makes them highly relevant for analyzing the impact of global monetary policy on domestic credit to the private sector. The secondary data used in this study are obtained from the World Bank's World Development Indicators, the International Monetary Fund, and the Federal Reserve Economic Data.

Table 1. Operational Variables

No	Variable	Variable Definition	Symbol	Unit	Source
1	Domestic Credit to the Private Sector	Domestic credit to the private sector refers to financial resources provided by the banking system to the private sector to facilitate economic activity and stimulate growth.	DCPS	Percent of GDP	World Bank
2	Federal Funds Rate	The short-term benchmark interest rate serves as the primary instrument used by the central bank to influence monetary conditions and broader economic activity.	FED	percent	Federal Reserve Economic Data (FRED)
3	Non-Performing Loans	The ratio of non-performing loans serves as a key indicator that reflects the level of credit risk and the overall quality of banking assets.	NPL	percent	International Monetary Fund (IMF)
4	Trade Openness	Trade openness is measured as the ratio of total international trade to domestic output and serves as an indicator of a country's integration into the global economy.	TO	Percent of GDP	World Bank
5	Inflation	Inflation represents a continuous general increase in price levels that reflects the declining purchasing power of money within the economy.	INF	percent	World Bank
6	Lending Interest Rate	The lending interest rate represents the cost charged by financial institutions to borrowers as a fee for the utilization of funds.	LIR	percent	World Bank
7	Exchange Rate	The exchange rate represents the value of a domestic currency relative to a foreign currency and serves as a reflection of external economic conditions and international competitiveness.	ER	LCU per US\$	World Bank

2.2 Conceptual Framework

This framework illustrates the effects of the Federal Funds Rate, Non-Performing Loans, Trade Openness, Inflation, Lending Interest Rate, and Exchange Rate on Domestic Credit to the Private Sector across 31 developing countries, and is used to analyze both the partial and simultaneous effects of each independent variable on the dependent variable in this study.

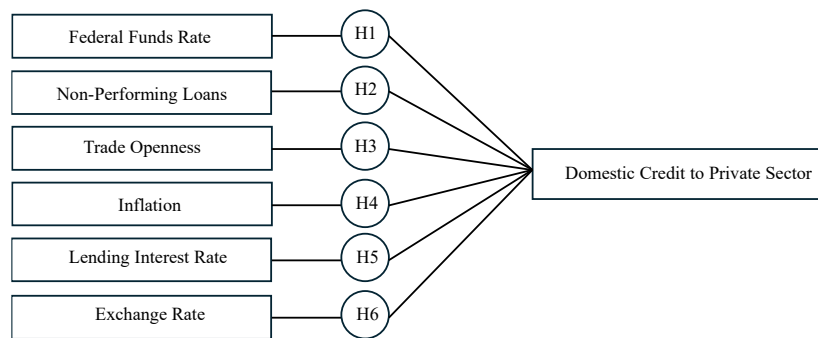


Figure 2. Research Conceptual Framework

Based on the conceptual framework presented in Figure 2, this study identifies the relationships between the independent variables and the dependent variable that constitute the focus of the analysis. Referring to the empirical evidence documented in previous studies, the hypotheses proposed in this research are formulated as follows:

H₁: The Federal Funds Rate has a significant negative effect on Domestic Credit to the Private Sector.

H₂: Non-performing loans has a significant negative effect on Domestic Credit to the Private Sector.

H₃: Trade openness has a significant positive effect on Domestic Credit to the Private Sector.

H₄: Inflation has a significant negative effect on Domestic Credit to the Private Sector.

H₅: The Lending Interest Rate has a significant negative effect on Domestic Credit to the Private Sector.

H₆: The Exchange Rate has a significant positive effect on Domestic Credit to the Private Sector.

2.3 Analytical Techniques

The Generalized Method of Moments (GMM) for dynamic panels developed by (Blundell & Bond, 2023) is utilized in dynamic panel models that include lags of the dependent variable in the regression equation. The presence of lags of the dependent variable can lead to endogeneity and autocorrelation issues which cause estimates obtained using conventional methods to be biased and inconsistent. Therefore, the GMM approach is used because it is capable of producing more consistent and efficient estimators in dynamic panel data analysis (Baltagi, 2021; Blundell & Bond, 2023). The entire estimation process was conducted using Stata 17 software. According to (Blundell & Bond, 2023), there are three main criteria for determining a robust GMM model. First, the estimates must be unbiased, which is indicated when the coefficient estimates fall between the Pooled Least Squares and Fixed-Effects results. Second, the instruments must be valid, as shown by the Sargan or Hansen test indicating no correlation between the instruments and the error term. Third, the model's consistency is confirmed through the Arellano-Bond test for AR(1) and AR(2), where the model is deemed consistent if there is first-order autocorrelation but no second-order autocorrelation in the first-difference residuals.

In this study, the analytical model used is a dynamic panel model employing the System Generalized Method of Moments approach. The dynamic panel model is characterized by the presence of lags of the dependent variable in the regression equation. The mathematical formulation of this model is presented below.

$$Y_{it} = \alpha_i + \beta Y_{it-1} + \gamma X_{it} + \varepsilon_{it} \quad (1)$$

In this equation, Y_{it} is the dependent variable for individual i and period t , while Y_{it-1} represents the lag of the dependent variable from the previous period, reflecting the dynamic nature of the model. The variable X_{it} is the independent variable that influences the dependent variable. Furthermore, α_i represents the individual fixed effect that is constant for each individual, while ε_{it} is the error term in the model. Additionally, i denotes the number of cross-sectional observations, and t denotes the number of time periods in the study.

2.4 Model Specification and Significance Tests

Before performing estimations using the System GMM approach, model specification and significance tests were conducted to ensure that the model is valid and consistent. These procedures include an instrument validity test using the Sargan Test and a model consistency test via the Arellano-Bond test. Furthermore, the analysis incorporates parameter significance tests consisting of a simultaneous test using the Wald Test and a partial test using the z-test as suggested by (Blundell & Bond, 2023).

The Sargan Test is utilized to examine the validity of instruments under over-identifying restrictions in the GMM model (Baltagi, 2021). The null hypothesis states that all instruments used are valid, while the alternative hypothesis suggests otherwise. In this framework, the null hypothesis is not rejected if the p-value is greater than the 5 % significance level. The Arellano-Bond test is utilized to assess the consistency of a model by detecting autocorrelation in the residuals of the first-difference form. The null hypothesis states that there is no autocorrelation of a certain order, specifically for AR(1) or AR(2), while the alternative hypothesis suggests that autocorrelation exists. Consequently, the null hypothesis is rejected if the p-value is less than the 5 % significance level.

The significance of the model parameters was examined using both simultaneous and partial tests. The Wald test was utilized to evaluate the combined effect of all independent variables on the dependent variable. In this test, the null hypothesis states that all independent variable coefficients are simultaneously insignificant, and this hypothesis is rejected if the Prob > Chi-squared value is less than the 5 % significance level. Meanwhile, the partial test employs the z-test to determine the effect of each independent variable individually. In this instance, the null hypothesis states that each independent variable has no significant effect, and this hypothesis is rejected if the p-value is less than the 5 % significance level.

3. RESULTS AND DISCUSSION

3.1 Research Results

This study uses the System Generalized Method of Moments (System GMM) to analyze the effects of the Federal Funds Rate, non-performing loans, trade openness, inflation, lending interest rates, and exchange rates on domestic credit supply to the private sector in developing countries with small open economy characteristics. The System GMM approach was chosen because it can accommodate dynamic panel models, address potential endogeneity among variables, and produce more consistent estimators for data characterized by individual heterogeneity and persistence in the dependent variable (Baltagi, 2021; Blundell & Bond, 2023). Model suitability was verified through unbiasedness testing by ensuring that the coefficient estimates fell between the results of the pooled least squares (PLS) and fixed effects (FE) methods, instrument validity testing using the Sargan Test, and consistency testing via the Arellano–Bond AR(1) and AR(2) tests.

Table 2. Generalized Method of Moments (GMM) Regression Test Results

Variable	FEM	SYSGMM	PLS
L1.	0.804***	0.882***	0.984***
FED	-0.0365	-0.122**	-0.182
NPL	-0.0375	-0.239***	-0.0890***
TO	0.0136	-0.063***	0.00133
INF	-0.212***	-0.207***	-0.218***
LIR	-0.311***	-0.233**	0.0171
LnER	-2.239**	1.0165***	-0.0120
_cons	21.368	12,374***	2.708**
N	433	433	433
r ²	0.739		0.971
r ² a	0.714		0.971

* p<0.05; ** p<0.01; *** p<0.001

Based on the results presented in Table 2, the lag coefficient value of the dependent variable in the System GMM model of 0.882 lies between the fixed-effects (FEM) estimate of 0.804 and the pooled least squares (PLS) estimate of 0.984. This indicates that the System GMM estimator is unbiased and consistent because it is able to overcome Nickell bias and endogeneity issues in dynamic panel models.

Table 3. Sargan Test Results

Statistical value	P-value
27.81734	0.3163

Based on the results presented in Table 3, the Sargan test produced a statistical value of 27.81734 with a p-value of 0.3163. Since the p-value is greater than the 5% significance level, the instruments used in the System GMM model are valid and uncorrelated with the error term, indicating that the model estimates are consistent.

Table 4. Arellano Bond Test Results

Order	z	P-value
AR(1)	-2.6148	0.0089
AR(2)	-1.5568	0.1195

Based on the results presented in Table 4, the Arellano-Bond test shows that the p-value for AR(1) is 0.0089 < 0.05, while the p-value for AR(2) is 0.1195 > 0.05. These results indicate that the model exhibits first-order autocorrelation but does not exhibit second-order autocorrelation. Therefore, the System GMM model is considered consistent and fulfills the validity assumptions for dynamic panel estimation.

Table 5. Wald Test

Wald Statistic	P-value
145814.63	0.0000

Based on the results presented in Table 5, the Wald test yields a statistic value of 145814.63 with a p-value of $0.000 < 0.05$. Since the p-value is below the 5% significance level, all independent variables jointly have a statistically significant effect on domestic credit allocation to the private sector. Therefore, the model is considered appropriate and suitable for further analysis.

Table 6. System Generalized Method of Moments (Sys-GMM) Model Test Results

Variable	z	P>z	SYSGMM
DCPS L1.	67.04	0.000	0.882***
FED	-2.9	0.004	-0.122**
NPL	-10.74	0.000	-0.239***
TO	-5.92	0.000	-0.063***
INF	-10.60	0.000	-0.207***
LIR	-2.72	0.007	-0.233**
LnER	6.38	0.000	1.0165***
cons	8.12	0.000	12.374

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Based on the results presented in Table 6, all independent variables in this study were found to have a significant effect on domestic credit disbursement to the private sector, as indicated by p-values for each variable that were less than the 5% significance level. The Federal Funds Rate, Non-Performing Loans, Trade Openness, inflation, and Lending Interest Rate variables showed a negative and significant effect on domestic credit to the private sector. Meanwhile, the Exchange Rate variable had a positive and significant effect. In addition, the significant lag coefficient of the dependent variable of 0.882 indicates the persistence of credit supply from the previous period to the current period.

Table 7. Long-Run Estimation Test Results

Variable	z	P>z	Coefficient
FED	-3.04	0.002	-1.038
NPL	-6.31	0.000	-2.029
TO	-4.28	0.000	-0.535
INF	-6.11	0.000	-1.764
LIR	-3.28	0.001	-1.979
LnER	5.96	0.000	8.629

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Based on the long-run estimation results presented in Table 7, all independent variables have a significant effect on domestic credit allocation to the private sector, as indicated by the p-values of each variable being less than the 5% significance level. The Federal Funds Rate, Non-Performing Loans, Trade Openness, inflation, and Lending Interest Rate have a negative and significant effect, while the Exchange Rate has a positive and significant effect in the long run.

3.2 Discussion

3.2.1 The Impact of Federal Funds Rate on Domestic Credit to Private Sector

The System-GMM estimation results indicate that the Federal Funds Rate has a negative and significant effect on domestic credit to the private sector, with a short-run coefficient of -0.122 (p-value = 0.004) and a long-run coefficient of -1.038 (p-value = 0.002), meaning that H1 is not rejected. This implies that a 1 percent point increase in the Federal Funds Rate reduces the private sector credit to GDP ratio by 0.122 percent points in the short run and 1.038 percent points in the long run, ceteris paribus. This finding directly addresses the identified research gap by demonstrating that the effect of the Federal Funds Rate remains highly significant even after simultaneously controlling for domestic banking health, a comprehensive dimension frequently overlooked by studies that analyze international monetary policy transmission in isolation (Unsal, 2023).

These results are highly consistent with the modern applications of the Mundell–Fleming framework, which explains that in an open economy with high capital mobility, an increase in U.S. interest rates triggers capital outflows from developing countries, reduces banking system liquidity, and lowers domestic credit supply capacity. In the context of the 31 small open developing economies over the 2010–2024 period, this macro-financial mechanism was particularly pronounced during 2017–2018 when the Federal Funds Rate was raised gradually, coinciding with a contraction in the average credit-to-GDP ratio from 47.77 percent to 46.39 percent. The long-run effect, which is substantially larger than the short-run one, indicates that global liquidity pressures persistently accumulate within the banking systems of developing nations over time. This implies that the contractionary impact of U.S. monetary tightening does not dissolve when the rate-hiking cycle ends but continues to structurally constrain local credit intermediation. Empirically, this persistent negative transmission aligns with modern literature confirming that external monetary shocks directly dictate domestic liquidity conditions (Leightner, 2024; Tenderere & Mishi, 2025) and persistently suppress aggregate credit availability in recipient developing economies (Bationo et al., 2025; Nzeh et al., 2023; Yahyaoui et al., 2024).

3.2.2 The Impact of Non-Performing Loans on Domestic Credit to Private Sector

The System GMM estimation results indicate that non-performing loans have a negative and significant effect on domestic credit to the private sector, with a short-run coefficient of -0.239 (p-value 0.000) and a long-run coefficient of -2.029 (p-value 0.000), so H2 is not rejected. This means that a 1 percent increase in NPL reduces the private sector credit-to-GDP ratio by 0.239 percent in the short run and 2.029 percent in the long run, *ceteris paribus*. This finding addresses the research gap in which previous studies analyzed NPL in isolation without linking them to the broader external financial environment (Hor & Lim, 2025; Sánchez Serrano, 2021) in this study, NPL are estimated alongside other external and domestic variables so that the results reflect the pure impact of banking asset quality after controlling for global monetary conditions.

The estimation results indicate that non-performing loans exert a severe contractionary impact on credit availability, as an increase in non-performing loans prompts banks to aggressively raise loan loss provisions and implement stricter credit tightening, thereby directly reducing their capacity to extend new loans. The long-run NPL coefficient of -2.029 is the largest among all variables in this study, demonstrating that banking asset quality serves as the most critical domestic determinant of long-run credit dynamics in small open developing economies. This vulnerability is significantly exacerbated by the relatively shallow financial system structures of the sampled nations, where balance sheet shocks to banking asset quality produce larger and more persistent credit contractions over time. Empirically, this persistent negative relationship aligns with contemporary literature confirming that heightened credit risk and deteriorating asset quality structurally constrains aggregate bank lending capacity (Hor & Lim, 2025; Romadhan, 2026; Sánchez Serrano, 2021; Tölö & Virén, 2021).

3.2.3 The Impact of Trade Openness on Domestic Credit to Private Sector

The System GMM estimation results indicate that trade openness has a negative and significant effect on domestic credit to the private sector, with a short-run coefficient of -0.063 (p-value 0.000) and a long-run coefficient of -0.535 (p-value 0.000), thus H3 is rejected. This means that a 1 percent increase in trade openness reduces the private sector credit-to-GDP ratio by 0.063 percent in the short run and 0.535 percent in the long run, *ceteris paribus*. This finding contributes to resolving the empirical inconsistency identified in the literature regarding the direction of trade openness effects on credit, where studies finding a positive effect (Asafo et al., 2026; Islam, 2022; Saleem, 2024) and those finding a negative effect (Bilalli & Sadiku, 2023; Farhat, 2023) have yet to reach a consensus; the present study provides cross-regional dynamic evidence that the contractionary effect dominates in the context of small open developing economies. Within the framework of modern applications of the Mundell–Fleming model, as validated by Leightner (2024) and Tenderere and Mishi (2025), increased trade openness in small open developing economies heightens exposure to external shocks such as commodity price volatility and fluctuations in global demand. This heightened exposure increases uncertainty in business sector cash flows and prompts commercial banks to implement strict credit tightening. Furthermore, intensifying competitive pressure from imports has the potential to weaken domestic sector profitability, thereby reducing the structural demand for productive credit. The relatively small coefficient compared to other variables reflects that this contractionary impact operates gradually yet remains significant and persistently accumulates over the long run. Empirically, this finding aligns with contemporary literature demonstrating that trade openness suppresses aggregate credit growth due to increased vulnerability to external macroeconomic uncertainty (Bilalli & Sadiku, 2023; Farhat, 2023).

3.2.4 The Impact of Inflation on Domestic Credit to Private Sector

The System GMM estimation results indicate that inflation has a negative and significant effect on domestic credit to the private sector, with a short-run coefficient of -0.207 (p-value 0.000) and a long-run coefficient of -1.764 (p-value 0.000), so H4 is not rejected. This means that a 1 percent increase in inflation reduces the private sector credit-to-GDP ratio by 0.207 percent in the short run and 1.764 percent in the long run, *ceteris paribus*. This finding resolves the empirical ambiguity in the literature, where some studies show that inflation suppresses credit through increased macroeconomic uncertainty (Alnabulsi et al., 2023; Bationo et al., 2025; Ndanshau & Semu, 2023; Sol Murta & Gama, 2024) while others find that inflation stimulates nominal credit demand (Bilalli & Sadiku, 2023; Nzeh et al., 2023) in the context of this study, the negative effect is confirmed as dominant. High inflation increases production costs and reduces business sector profitability, thereby raising the risk of borrower default and prompting banks to tighten credit standards. On the demand side, inflation weakens real purchasing power and the stability of economic expectations, thereby reducing investment incentives and ultimately suppressing demand for productive credit. In the context of small open developing economies during the 2010–2024 period, inflationary pressures stemming from commodity price volatility and exchange rate depreciation have consistently constrained banking intermediation functions. The long-run coefficient, which is significantly larger than the short-run one, indicates the cumulative effect of inflation increasingly burdening credit intermediation over time. Empirically, this finding is consistent with previous studies showing that inflation negatively impacts credit supply (Alnabulsi et al., 2023; Bationo et al., 2025; Ndanshau & Semu, 2023; Sol Murta & Gama, 2024).

3.2.5 The Impact of Lending Interest Rate on Domestic Credit to Private Sector

The System GMM estimation results indicate that the lending interest rate has a negative and significant effect on domestic credit to the private sector, with a short-run coefficient of -0.233 (p-value 0.007) and a long-run coefficient of

−1.979 (p-value 0.001), so H5 is not rejected. This means that a 1 percent increase in the lending interest rate reduces the private sector credit to GDP ratio by 0.233 percent in the short run and 1.979 percent in the long run, *ceteris paribus*. This finding reinforces the consistent negative effect of lending interest rates on credit as documented in prior literature, while extending the evidence to a cross-regional dynamic panel context that captures long-run persistence a dimension absent in the static approaches of previous studies (Saleem, 2024; Wiralaga et al., 2022).

Mechanically, lending interest rates function as a primary determinant of corporate investment decisions, where an increase in borrowing costs directly elevates the cost of capital for the private sector, thereby reducing the financial viability of investment projects and suppressing aggregate credit demand. Within small open developing economies, elevated lending rates also reflect a substantial risk premium driven by systemic macroeconomic uncertainty and localized financial market inefficiencies, causing their contractionary effect on private credit allocation to be structurally more pronounced than in advanced economies. The magnitude of the long-run lending interest rate coefficient −1.979, which closely approaches the non-performing loan coefficient −2.029, confirms that borrowing costs and banking asset quality serve as the two most powerful domestic determinants of private credit dynamics in this study. Empirically, this pronounced negative transmission aligns with contemporary literature confirming that higher borrowing costs systematically dampen private sector credit utilization over time (Romadhan, 2026; Saleem, 2024; Wajebo & Geda, 2025; Wiralaga et al., 2022).

3.2.6 The Impact of Exchange Rate on Domestic Credit to Private Sector

The System GMM estimation results indicate that the exchange rate has a positive and significant effect on domestic credit to the private sector, with a short-run coefficient of 1.0165 (p-value 0.000) and a long-run coefficient of 8.629 (p-value 0.000), so H6 is not rejected. This means that exchange rate depreciation (an increase in LCU per US\$) increases the private sector credit-to-GDP ratio by 1.0165 percent in the short run and 8.629 percent in the long run, *ceteris paribus*. This finding resolves the directional ambiguity in the literature, where some studies find that depreciation stimulates credit through export competitiveness (Bationo et al., 2025; Modugu & Dempere, 2022) while others find that it suppresses credit through increased foreign currency debt burdens (Wajebo & Geda, 2025). In the context of small open developing economies, the positive effect is confirmed as dominant.

Currency depreciation enhances the price competitiveness of domestic products in international markets, thereby driving export expansion and real sector production activity, which ultimately creates additional financing needs and increases demand for bank credit. The dominance of this positive effect can be explained by the large share of commodity-based and manufacturing export sectors in the economic structure of the sample countries, such that depreciation directly drives the expansion of credit-intensive productive activities. The long-run coefficient, which is significantly larger than the short-run one (8.629 vs. 1.0165), indicates that the impact of depreciation is cumulative through the sustained expansion of economic activity, so that credit demand continues to rise as the export sector strengthens over the long run. Empirically, this finding is consistent with previous studies showing that exchange rate depreciation drives an increase in credit supply in developing countries (Bationo et al., 2025; Modugu & Dempere, 2022).

4. CONCLUSION

This study analyzes the effects of the Federal Funds Rate, Non-Performing Loans, Trade Openness, Inflation, Lending Interest Rates, and the Exchange Rate on domestic credit supply to the private sector in 31 small open economies among developing countries over the period 2010–2024 using the System GMM approach. The estimation results show that the Federal Funds Rate has a negative and significant effect on Domestic Credit to the Private Sector, indicating that the tightening of United States monetary policy reduces global liquidity and constrains banking intermediation capacity in developing countries through the capital outflow mechanism as described in the Mundell–Fleming Model. Non-Performing Loans and the Lending Interest Rate proved to be the two strongest domestic determinants with long-term coefficients, indicating that deteriorating banking asset quality and high credit costs cumulatively and persistently constrain intermediation functions in the long term. Trade Openness and Inflation also have a negative and significant effect, reflecting that increased external exposure and macroeconomic uncertainty tend to tighten credit supply in small open economies. Conversely, the Exchange Rate has a positive and significant effect, indicating that currency depreciation drives credit expansion through increased export competitiveness and real sector activity. Overall, the findings of this study confirm that the dynamics of credit supply in small open economies are the result of the simultaneous interaction between external pressures and domestic structural conditions. Therefore, effective macroprudential policies need to be designed in an integrated manner by taking both dimensions into account simultaneously. This study has limitations in that it has not yet incorporated micro-banking factors such as bank capital and liquidity, nor has it specifically considered the heterogeneity of institutional characteristics across countries. Consequently, future research is recommended to explore these dimensions to produce a more comprehensive understanding of the determinants of private sector credit.

REFERENCES

- Alnabulsi, K., Kozarevi, E., & Hakimi, A. (2023). Non-performing loans as a driver of banking distress: A systematic literature review. *Commodities*, 2(2), 111–130. <https://doi.org/10.3390/commodities2020007>
- Asafo, J. K., Kuuwill, A., Kimengsi, J. N., & Jr, B. A. (2026). Domestic credit to the private sector, institutional quality and tropical

- deforestation: A panel data analysis of 24 African countries. *Journal Pre-Proof*, 101274. <https://doi.org/10.1016/j.tfp.2026.101274>
- Baltagi, B. H. (2021). *Econometric analysis of panel data* (6th ed.). Cham, Switzerland: Springer. <https://doi.org/10.1007/978-3-030-53953-5>
- Bationo, F. d'Assises B., Murinde, V., & Soumar, I. (2025). Cross-border banking and the transmission of global shocks to credit cycles in developing economies: A commodity price cycles channel. *International Review of Financial Analysis*, 106. <https://doi.org/10.1016/j.irfa.2025.104515>
- Bilalli, A., & Sadiku, M. (2023). The impact of inflation on financial sector performance: Evidence from Western. *SEEU Review*, 18(2), 74–89. <https://doi.org/10.2478/seeur-2023-0071>
- Blundell, R., & Bond, S. (2023). Initial conditions and Blundell-Bond estimators. *Journal of Econometrics*, 234, 101–110. <https://doi.org/10.1016/j.jeconom.2023.01.020>
- Farhat, C. (2023). Determinants of banking sector development in developing and emerging economies: Unveiling the role of economic growth, trade openness, and financial liberalization. *Banks and Bank Systems*, 18(3), 177–191. [https://doi.org/10.21511/BBS.18\(3\).2023.15](https://doi.org/10.21511/BBS.18(3).2023.15)
- Gbadebo, A. D. (2024). Theories of financial intermediation: Evaluation and empirical relevance. *Journal of Law and Sustainable Development*, 12(9), 1–16. <https://doi.org/10.55908/sdgs.v12i9.3950>
- Hor, B., & Lim, S. (2025). The impact of non-performing loans on credit growth of commercial banks in Cambodia. *Journal of Risk and Financial Management*, 18(11), 635. <https://doi.org/10.3390/jrfm18110635>
- Islam, D. (2022). Determinants of domestic bank credit to private sectors in Bangladesh: An empirical investigation. *Journal of Economic Impact*, 4(2), 65–74. <https://doi.org/10.52223/jei4022208>
- Leightner, J. E. (2024). Small-Country Mundell – Fleming (IS / LM / BP) Model Predictions Under Both Fixed and Flexible Exchange Rates: Evidence from Australia and S . Korea. *Journal of Risk and Financial Management*, 17, 495. <https://doi.org/10.3390/jrfm17110495>
- Levine, R. (2021). Finance, growth, and inequality. *IMF Working Papers*, 2021(164), 1–80. <https://doi.org/10.5089/9781513583365.001>
- Modugu, K. P., & Dempere, J. (2022). Monetary policies and bank lending in developing countries: Evidence from Sub-Sahara Africa. *Journal of Economics and Development*, 24(3), 217–229. <https://doi.org/10.1108/JED-09-2021-0144>
- Ndashau, M. O. A., & Semu, A. M. (2023). Determinants of bank credit supply to the private sector in Tanzania. *African Journal of Economic Review*, 11, 92–115. <https://doi.org/10.22004/ag.econ.333993>
- Nzeh, I. C., Imoagwu, C. P., Okaforocha, C. M., & Tevin-Anyali, C. (2023). An Examination of the Factors that Influence the Provision of Credit to the Private Sector in Nigeria. *Futurity Economics & Law*, 3, 86–102. <https://doi.org/10.57125/fel.2023.12.25.06>
- Romadhan, R. (2026). The effect of liquidity and monetary policy on bank credit distribution. *Priviet Social Sciences Journal*, 6(1), 247–258. <https://doi.org/10.55942/pssj.v6i1.1203>
- Saleem, M. S. (2024). Financial development in the SAARC region: Identifying influential factors. *Bulletin of Business and Economics*, 13(2), 513–525. <https://doi.org/10.61506/01.00360>
- Sánchez Serrano, A. (2021). The impact of non-performing loans on bank lending in Europe: An empirical analysis. *North American Journal of Economics and Finance*, 55, 101312. <https://doi.org/10.1016/j.najef.2020.101312>
- Sol Murta, F., & Gama, P. M. (2024). Sustainability and the domestic credit market: Worldwide evidence. *Eurasian Economic Review*, 14(4), 827–845. <https://doi.org/10.1007/s40822-024-00282-y>
- Tenderere, M., & Mishi, S. (2025). Interest rates and capital flows: An application of the Mundell-Fleming model in emerging markets. *Africa's Public Service Delivery & Performance Review*, 13(1), 1–10. <https://doi.org/10.4102/apsdpr.v13i1.904>
- Tölö, E., & Virén, M. (2021). How much do non-performing loans hinder loan growth in Europe? *European Economic Review*, 136, 103773. <https://doi.org/10.1016/j.euroecorev.2021.103773>
- Unsal, F. (2023). Global transmission of Fed hikes: The role of policy credibility and balance sheets. *Brookings Papers on Economic Activity*, 2023(2), 169–248. <https://doi.org/10.1353/eca.2023.a935420>
- Wajebo, T. W., & Geda, A. (2025). Impact of exchange volatility on private- sector credit access in sub-Saharan African. *Borsa Istanbul Review*, 26(1), 100758. <https://doi.org/10.1016/j.bir.2025.10.031>
- Wiralaga, H. K., Dianta, K., & Nurlatifah, D. (2022). The Effect Of Interest Rate Of Credit And Third Party Funds On The Number Of Credit Distribution At National Private Commercial Banks In Indonesia , 2015- 2019. *Jurnal Pendidikan Ekonomi, Perkantoran Dan Akuntansi*, 3(3), 231–244. <https://doi.org/10.21009/JPEPA.007.x.x>
- Yahyaeci, H., Singh, A., & Smith, T. (2024). International transmission of monetary policy shocks and the bank lending channel: Evidence from Australia. *Journal of Financial Stability*, 75, 101343. <https://doi.org/10.1016/j.jfs.2024.101343>