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THE MONETARY POLICY TRANSMISSION MECHANISM AND ITS IMPACT ON BANKS' PROFITABILITY: EVIDENCE FROM VIETNAM

Huy Tan Lam Ngo*
Tomas Bata University,
Czech Republic;
FPT University,
Vietnam
tngo@utb.cz

Quynh Manh Vu
Tomas Bata University,
Czech Republic
qvu80@icloud.com

Juraj Sipko
Pan-European University,
Slovak Republic
jurajsipko@gmail.com

Abstract

This study investigates the monetary policy transmission mechanism and its impact on bank profitability in Vietnam, where comprehensive analyses of multiple transmission channels remain limited. Especially, the relationship between monetary policy changes and bank profitability in this emerging bank-based economy has received relatively little attention. Existing research often focuses on isolated channels or produces inconsistent findings due to variations in national financial structures. To address these gaps, this study examines how monetary policy influences the profitability of Vietnamese commercial banks through three primary channels: the interest rate channel, the exchange rate channel, and the bank lending (credit) channel. Using the Generalized Least Squares (GLS) method on annual data from 28 Vietnamese commercial banks over the period 2014–2023, the empirical analysis reveals significant responsiveness of bank profitability to

*Corresponding Author

monetary policy shifts. The interest rate and bank lending channels show negative correlations with profitability, whereas the exchange rate channel shows a positive effect. These findings confirm the substantial role of monetary policy transmission in shaping bank performance within Vietnam's bank-dominated financial system and highlight the consistent influence of various bank-specific determinants across different model specifications. The results provide valuable insights for policymakers and regulators seeking to design effective monetary frameworks suited to emerging economies.

Key Words

Bank profitability; lending channel; interest rate channel; exchange rate channel; monetary policy transmission mechanism.

INTRODUCTION

The study focuses on the Monetary Policy Transmission Mechanism (MPTM), particularly exploring how monetary policy affects bank profitability through the interest rate, exchange rate, and bank lending channels. Taylor (1995) plays a key role in shaping this concept by outlining how central bank policies influence economic and financial dynamics to stabilize prices and foster economic growth. He argues that financial market prices—such as short-term interest rates, bond yields, and exchange rates—are more effective transmission tools than financial quantities such as the money supply, credit growth, or the volume of government bonds (Taylor, 1995). However, debates persist about the extent of monetary policy's influence across various financial sectors and the pivotal role of commercial banks in this mechanism.

Mishkin (1996) adds to the discussion by concisely summarising how monetary policy is transmitted. He covers traditional interest rate channels, examines asset price channels, and emphasises the lending channel, which he considers more influential than the interest rate channel emphasised by Taylor (1995).

In recent years, driven by globalisation and grounded in classical theory, an expanding body of research has examined MPTM's nexus with bank risk-taking (Chen et al., 2017; Djatche, 2019), performance (Chen et al., 2015; Mamatzakis & Bermpei, 2016), loan growth (Yang & Shao, 2016; Muduli & Behera, 2023), and firm-bank dynamics (Ghosh et al., 2021). However, these studies often explore inconsistent results due to differences in each country's financial and banking systems. Despite extensive empirical work, the relationship between monetary policy and bank profitability remains underexplored in emerging economies such as Vietnam. Most existing research isolates one transmission channel, thereby limiting a comprehensive understanding. Therefore, this study aims to assess how

bank profitability in Vietnam responds to monetary policy changes through three primary channels: the interest rate, the exchange rate, and the credit (bank lending) channel, using Generalised Least Squares (GLS) and annual data from 28 Vietnamese banks between 2014 and 2023.

MACRO-VIEW AND MONETARY POLICY IN VIETNAM

Over the past 36 years, Vietnam has undergone a significant economic transformation, shifting from a centralised to a market-oriented system, primarily through the "Doi Moi" economic reform. Moreover, thanks to global integration, the country has shifted from an agrarian to an industrial and service-oriented economy. In achieving this accomplishment, it is widely recognized that monetary policy has been pivotal in developing and implementing macroeconomic strategies.

Conforming to the Law on the State Bank of Vietnam (SBV) 2010[1], two priorities of Vietnam's monetary policy are currency stability and inflation control, and the SBV can use various measures, including the base rate and policy rates (refinance and rediscount rate), to control market interest rates and open market operation (OMO)—a non-interest tool to manage market liquidity. The base rate helps the SBV set local banks' lending rates, but this tool has not been used efficiently since 2010. Instead, the SBV has regularly used the refinance rate to charge local banks for short-term loans (less than 1 year) and rediscount rates to discount banks' valuable papers. Meanwhile, the central bank aggressively uses the OMO to inject liquidity by purchasing and selling government bonds, its own bills, and other securities.

The paper segments macroeconomic and banking data into two periods: 2011-2016 and 2017-2023 to analyse the impact of monetary policy on Vietnam's economy and banking sector.

Period 2011-2016

During the early months of 2011, the economy faced various challenges, including inflationary pressures, devaluation of the Dong, declining bank asset quality, liquidity constraints, and increased mergers and acquisitions in the banking sector. Therefore, robust measures were consistently implemented to tighten monetary policy, including caps on each bank's credit growth, strict control of the money supply, and simultaneous adjustments to refinance and discount rates, complemented by various administrative actions. Above all, the restructuring plan for the banking system from 2011 to 2015[2] was officially approved in March 2012 to restore the banking system's financial stability and operational capabilities.

Due to the aforementioned recession, the credit and money supply declined dramatically from 2011 to 2016, with growth rates of only 14.3%

[1] Law number 46/2010/QH12 on State Bank of Vietnam dated 16th June 2010
[2] Decision No. 254/QD-TTg dated 1st March 2012 of the Prime Minister approving the Scheme to Restructure the System of Credit Institutions during the period 2011–2015.

and 16.7%, respectively. These values were much lower than in the preceding period, 2005-2010. Meanwhile, the USD/VND exchange rate during 2011-2016 depreciated from 20,510 to 22,182, a decline of up to 8.15% under depreciation pressure. Refinance and rediscount rates were also trending downward, supporting banks' liquidity and fostering economic growth.

Table 1: Macro-economic indicators from 2011-2016

	2011	2012	2013	2014	2015	2016
The banking sector's credit growth	14.7%	8.9%	12.5%	14.2%	17.3%	18.3%
The banking sector's money supply growth	12.1%	18.5%	18.9%	17.7%	16.2%	18.4%
Average Central Bank's nominal exchange rate (USD/Vnd)	20,510	20,828	20,933	21,159	21,677	22,182
Average refinance rate	13.33%	11.58 %	7.5%	6.58%	6.50%	6.50%
Average rediscounted rate	11.83%	9.58%	5.67%	4.58%	4.50%	4.50%
Inflation, consumer price	18.7%	9.1%	6.6%	4.1%	0.6%	2.7%
GDP growth	6.24%	5.25%	5.42%	5.98%	6.68%	6.21%

Moving to the banking sector, this period saw significant challenges due to its earlier rapid expansion and inadequate risk management practices. All bank key performance indicators declined significantly due to high credit provisioning for loan losses. In 2015, banks' return on equity (ROE) and return on assets (ROA) met their lowest levels.

Table 2: Bank indicators from 2011-2016

	2011	2012	2013	2014	2015	2016
ROE	14.6%	11.0%	7.7%	8.0%	3.6%	4.9%
ROA	1.1%	0.8%	0.7%	0.6%	0.5%	0.7%
NIM	4%	4.3%	3.1%	2.7%	3.6%	3.0%
CIR	42.1%	51.2%	54.4%	51.3%	52.2%	51.7%
Z-score	16.1%	15%	14.7%	14.7%	13.9%	12.8%
NPL ratio	3.1%	4.1%	3.6%	3.3%	2.6%	10.1% (*)

Period 2017- 2023

This period saw ongoing restructuring of the financial sector and an enhanced role for VAMC (Vietnam Asset Management Company). The average growth rates for credit and the money supply were 14.3% and 13.5%, respectively, lower than those from 2011 to 2016, while the refinance and rediscount rates remained low. Depreciation pressure remained, but the devaluation was smaller than in the previous period.

Table 3: Macroeconomic indicators from 2017-2023

	2017	2018	2019	2020	2021	2022	2023

Credit growth	18.3%	13.9%	13.7%	12.2%	13.6%	14.2%	13.8%
Money supply growth	15%	12.4%	14.8%	14.5%	10.7%	6.2%	12.5%
Average Central Bank's nominal exchange rate (USD/Vnd)	22,370	22,602	23,050	23,208	23,160	23,272	23,754
Average refinance rate	6.38%	6.25%	6.17%	4.71%	4.0%	4.58%	5.0%
Average rediscount rate	4.38%	4.25%	4.17%	3.13%	2.5%	3.08%	3.38%
Inflation, consumer price	3.5%	3.5%	2.8%	3.2%	1.8%	3.2%	3.3%
GDP growth	6.81%	7.08%	7.02%	2.91%	2.58%	8.0%	5.05%

Regarding the banks' performance, all indicators are back on track, thanks to a significant decrease in NPLs and bad-debt recoveries, which have reduced loan-loss provisioning and increased income.

Table 4: Bank indicators from 2017-2023

	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
ROE	7.3%	9.2%	12.8%	11.0%	14.7%	15.8%	14.2%
ROA	0.7%	0.9%	1.0%	1.0%	1.2%	1.38%	1.3%
NIM	2.8%	2.9%	3.1%	3.0%	3.4%	-	-
CIR	48.3%	46.5%	43.6%	42.4%	34.7%	-	-
Z-score	12.6%	13.3%	13.0%	13.6%	14.7%	-	-
NPL ratio (*)	7.4%	5.9%	4.4%	5.1%	7.3%	-	-

The prior analysis of Vietnam's macroeconomic landscape elucidates the effects of expansionary or contractionary monetary policy on the economy and banking performance. To understand the magnitude of these consequences, it is essential to examine each channel's transmission mechanism, with particular focus on the interest rate, exchange rate, and lending channels.

LITERATURE REVIEWS

Theoretical underpinnings of the research

Learned from theoretical research about the monetary policy transmission mechanism (MPTM) provided by Cecchetti (1995), Mishkin (1996), Borio & Zhu (2008), Agénor & Montiel (2015), Walsh (2017), and Warjiyo & Juhro (2019), the functioning of MPTM starts with the implementation of monetary policy by the central bank, which involves decisions and utilization of various monetary tools, including interest rate, exchange rate, reserve requirements, monetary operations, and other unconventional instruments. Afterwards, the mechanism is affected by financial and real economic activities through MPTM. As Bernanke and Gertler (1995) suggested, the MPTM is often referred to as the "black box" because of its complex process. Thus, regulators' role is to identify which MPTM channels are most effective for efficiently implementing and achieving their ultimate goals (Bhoi, 2017).

This research paper presents its interest in three prominent channels: the interest rate, the exchange rate, and the credit channel (bank lending), and examines how these channels affect bank profitability in Vietnam.

The interest rate channel and bank profitability

The MPTM framework, which incorporates the interest rate channel proposed in the Keynesian IS-LM model, has gained significant recognition among economists worldwide. The concept underlying this prominent theory is as follows:

M ↑ ➔ Int ↓ ➔ I ↑ ➔ Y ↑ (Mishkin 1996, pg 2)

In this context, the variables M, Int, I, and Y represent monetary policy, the interest rate, investment in residential housing and consumer durable goods, and total output (GDP), respectively. The theory suggests that the government's expansionary monetary policy, denoted M ↑, decreases real interest rates, denoted Int ↓. Consequently, lower interest rates reduce the cost of capital, leading to increased investment expenditure, denoted as I ↑. This increase in investment spending subsequently raises aggregate demand and total output, represented as Y ↑, and vice versa (Walsh, 2017; Warjiyo & Juhro, 2019).

Regarding the impact of the interest rate channel on bank profitability, Demirgüç-Kunt and Huizinga (1999) conclude in their significant cross-country study that higher interest rates are associated with higher net interest margins and profits. Conversely, lower interest rates correspond to diminished profitability because they reduce net interest margins, as banks are hesitant to lower deposit rates to a point where depositors may opt for alternative savings methods or financial instruments (Claessens et al., 2018). Similarly, Alessandri and Nelson (2015) assert that the level and slope of the yield curve positively influence bank profitability in the long term. A flat yield curve adversely affects banks' net interest margin because they are funded by short-term obligations while investing in long-term assets (Borio & Gambacorta, 2017).

Nevertheless, other studies by Scheiber et al. (2016) and Madaschi and Pablos Nuevo (2017) observe the opposite effects in Denmark, Sweden, and Switzerland. They agree that low (negative) interest rates do not significantly reduce bank profitability, particularly net interest income, because the decline in banks' interest expenses would be faster and greater than the decline in interest revenue (Scheiber et al., 2016). Altavilla's (2018) research on European banks from 2000 to 2016 also found similar results. They suggest that the relaxation of monetary policy, characterized by a reduction in short-term interest rates and/or a flat yield curve, does not correlate with diminished bank profitability, as such loose policies bolster economic activities, enhancing banks' lending operations and profitability, thereby offsetting the adverse effects. Due to the mixed previous findings, the study aims to test the hypothesis:

Hypothesis 1: The interest rate channel negatively affects bank profitability.

The exchange rate channel and bank profitability

The exchange rate channel has gained considerable importance in MPTM thanks to the growing global economic integration. It has remained a prominent tool in achieving economic stability in some advanced economies worldwide. As expressed by Mishkin (1996), Boivin et al. (2010), and Warjiyo and Juhro (2019), in the following:

M ↑ ➔ Int ↓ ➔ E↓ ➔ NX ↑ ➔ Y ↑

When an expansionary monetary policy (M ↑) is implemented, it causes a reduction in the interest rate (Int ↓). Consequently, the domestic currency is less attractive for deposits than other foreign currencies, leading to the depreciation (E↓) of the local currency relative to others. Following that, domestic foods would be cheaper than foreign foods, thus creating a rise in net exports (NX ↑) and total output (Y ↑).

The presence of the exchange rate channel is observable in several countries, including the Czech Republic, Hungary, and Poland (Golinelli & Rovelli, 2005), the Eurozone (Bjørnland & Halvorsen, 2014), and developing and advanced economies that have high trade openness, correlation with the US (Ćorić et al., 2016). However, in some economies, this is found to be weak or absent, as governments in those countries strictly supervise, control, and intervene in the foreign exchange market. This is due to fears of floating exchange rates among these governments (Sánchez-Fung, 2023), which leads them to pursue exchange rate market stability through direct interventions (Chen et al., 2017). Moreover, poor integration with the international financial market in those developing economies is another key hindrance that weakens the exchange rate channel (Mishra & Montiel, 2013). Therefore, the paper aims to test the following:

Hypothesis 2: The exchange rate channel positively affects bank profitability.

The lending channel and bank profitability

Due to asymmetric information in the financial system, the monetary policy transmission mechanism (MPTM) can use two primary credit channels: bank lending and the balance sheet channel (Bernanke & Gertler, 1995).

This research focuses solely on the lending channel that is well-suited to the bank-based system. The transmission mechanism of the bank lending channel is expressed as follows: M ↑ ➔ Bank deposits ↑ ➔ Bank loans ↑ ➔ I ↑ ➔ Y ↑ *(Mishkin, 1996, pg 9)*

Expansionary monetary policy increases bank deposits, thereby raising banks' lending capacity and boosting investment spending and total output, and vice versa (Mishkin, 1996; Walsh, 2017). If borrowers cannot access alternative capital markets, this negatively affects real economic activity, including investment, employment, and output (Bernanke & Gertler, 1995).

Turning to a deeper evaluation of the nexus between the lending channel and bank performance, it is evident that bank profits are undoubtedly affected, as banks' loan supply is influenced by contractionary or expansionary monetary policy (Chen et al., 2015). This is understandable,

since an increase or decrease in loan supply affects banks' interest income, a significant share of their total operating income, which in turn impacts their profitability. For instance, Mamatzakis and Bermpei (2016) employ the purchase of the central bank's assets (CBA) to capture the stance of monetary policy and explore the negative correlation between increased CBA, or expansionary policy, and bank profitability, including ROA, ROE, net interest margin (NIM), and pre-tax operating income (POI). Other studies, such as those by Gambacorta et al. (2014) and Hamilton and Wu (2012), also revealed a significant effect of CBA on the profitability of US banks.

Moving to Vietnam, a country recognised as a bank-based economy, only a few studies have given attention to the in-depth analysis of the lending channel and its correlation with bank profitability, given that in less financially developed economies, the credit channel is the primary source of companies' financing (Sanfilippo-Azofra et al., 2018). Therefore, the paper aims to test the following:

Hypothesis 3: The credit channel (bank lending) negatively affects bank profitability.

DATA AND METHOD

Econometric Model

$$Prof_{i,t} = \alpha_0 + \alpha_1 MP_t + \alpha_2 BV_{i,t} + \alpha_3 Macro_t + \varepsilon_{i,t}$$

$Prof_{i,t}$ is the profitability of bank i in year t, measured by ROA. MP_t is referred to as monetary policy indicators, including credit growth (%), average rediscounting rates (%), and the log of the average central bank's nominal exchange rate in year t; $BV_{i,t}$ are bank determinant variables of bank i in year t, and $Macro_t$ displays macroeconomic indicators in year t.

Description and data sources

This study analyses annual data from a sample of 28 local banks in Vietnam, excluding banks under SBV's restructuring program and small banks, from 2014 to 2023. The data on credit growth (CG), rediscount rate (Redis), exchange rate (Exch), GDP, and CPI are sourced from Vietnam's Government official websites, such as the General Statistics Office (GSO) and the SBV. Meanwhile, data on banks' ROA, ROE, CIR, LAR, LDR, CAP, NPL, and Z-score are primarily collected and calculated from banks' audited consolidated financial statements.

Table 5: Data description

Variable	Notation	Measure	References
Dependent variables:	**Prof.**		
Return on assets	ROA	Profit after tax/average total assets (%)	Klein & Weill (2018); Djalilov &
Return on equity (robustness)	ROE	Profit after tax/average equity (%)	

			Piesse (2016),
Independent variables			
Monetary variables			Dang (2022); Varlik & Berument (2017); Chionis Liargovas (2003).
Credit growth	CG	Yearly credit growth (%)	
Money supply (robustness)	MS	Yearly money supply (%)	
Rediscount rate	Redis	Yearly average rediscount rates (%)	
Refinance rate (robustness)	Refin	Yearly average refinance rates (%)	
Nominal exchange rate (USD/Vnd)	Exch	Log of average yearly SBV nominal exchange rate	
Bank determinant variables			Rudhani and Balaj (2019); Thakor (2018); Ho et al.(2023; Varga, et al. (2020); Paleckov (2019).
Cost-to-income ratio	CIR	Total operating expenses/total operating income (%)	
Loans to deposits ratio	LDR	Total loans/total deposits (%)	
Loans to assets ratio	LAR	Total loans/total assets (%)	
Capital ratio	CAP	Total equity/average total assets (%)	
Non-Performing Loans ratio	NPL	Total NPLs/Total loans (%)	
Zscore	Zscore	Insolvency risk index as σROA/(ROA+equity/assets)	
Macro-economic variables			Oussama et al. (2024).
Gross Domestic Product	GDP	Yearly GDP growth rate (%)	
Headline inflation	INF	Yearly percentage change in CPI (%)	

Regression methods

To provide clear insight into the regression results supporting the study hypothesis, the results section begins with a data description that presents an overview of the mean, standard deviation, minimum, and maximum values for all variables. Next, the study examines correlations among variables and uses the VIF test to assess the presence of significant multicollinearity. Subsequently, for each monetary channel, the study examines the ROA quantiles (25%, 50%, 75%, and 95%) to assess the spread of the banks' ROA. This part, on the one hand, provides initial insight into the diverse effects of variables on the dependent variable, ROA, across quantile levels; on the other hand, it is vital for assessing model robustness before running the regression.

Along with the quantile examination, the study also step-by-step tests all models for issues such as heteroskedasticity (Modified test) and autocorrelation (Wooldridge test) when running the regression, to ensure the robustness of the findings across methods. More specifically, for each model, the study applies four regression methods: POLS (Pooled Ordinary Least Squares), REM (Random Effects Model), and FEM (Fixed Effects Model). However, both REM and FEM are unable to address autocorrelation and heteroskedasticity when tested in their respective models. So, the study employs FGLS (Feasible Generalised Least Squares) to address these two issues. This approach enhances the study's convincingness in presenting the regression results and validating the hypotheses. For each model, the study presents all regression results using POLS, REM, FEM, and FGLS in a single table to demonstrate consistent validation results across models.

Finally, to further confirm the findings, the study conducts a robustness check, replacing ROA with ROE, the rediscount rate (Redis) with the refinance rate (Refin), and credit growth (CG) with money supply (MS).

RESULTS AND DISCUSSION

Table 6: Descriptive statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Dependent					
ROA	280	0.009413	0.007514	-0.0072	0.036526
ROE	280	0.114214	0.079753	-0.12332	0.303316
Independent					
Monetary					
CG	280	0.1494	0.020702	0.122	0.183
Redis	280	0.038458	0.00714	0.025	0.045833
Exch	280	10.02705	0.034047	9.959797	10.0755
Bank variables					
CIR	280	0.504874	0.157289	0.227062	1.722475
LAR	280	0.610163	0.103081	0.225254	0.800625
LDR	280	0.908664	0.157445	0.371874	1.469094
CAR	280	0.120695	0.030747	0.08	0.2453
CAP	280	0.089881	0.032855	0.043375	0.228519
NPL	280	0.020943	0.02199	0.0034	0.297573
Zscore	280	0.054007	0.02376	0.016323	0.131447
Macroeconomic					
GDP	280	0.06002	0.018321	0.0255	0.0812
INF	280	0.0286	0.009487	0.006	0.041

Regarding some monetary variables, the average credit growth (CG) for the period is 14.94%, a level acceptable for banks' credit supply to the economy, and significantly lower than in previous years. This reflects the SBV's controllable credit to avoid inefficient monetary measures that may trigger inflationary pressures and lead to macroeconomic instability. Meanwhile, the average rediscount interest rate is merely 3.84%, a significantly lower figure than in prior years.

The data provide some insights into the determinants of banks. For instance, CIR has a mean of 50.5%, a very high ratio that reflects the inefficient operation of some local banks, which incur high operating expenses that account for a large share of their income. LDR averaged 90.86%, with some banks exceeding 100%, suggesting they lend more than they have in deposits.

Table 7: Correlation matrix

|	Redis	CG	Exch	CIR	LAR	LDR	CAP	NPL	Zscore	GDP	INF	VIF
Redis	1											5.3
CG	0.6166	1										2.05
Exch	-0.7639	-0.5131	1									3.22
CIR	0.3466	0.2212	-0.3157	1								1.85
LAR	-0.2376	-0.1455	0.3576	-0.2908	1							1.65

LDR	-0.3614	-0.2227	0.4512	-0.4828	0.5474	1						2.12
CAP	-0.0262	-0.0318	-0.035	-0.1433	-0.0808	0.2349	1					1.24
NPL	-0.0563	-0.0581	0.0734	0.4546	-0.1307	-0.1049	-0.07	1				1.40
Zscore	0.1509	0.1362	-0.1185	-0.0182	-0.1434	-0.0494	-0.1882	-0.0187	1			1.13
GDP	0.64	0.461	-0.303	0.1479	-0.0518	-0.0677	-0.0137	-0.0158	0.0508	1		2.08
INF	0.1017	-0.2779	0.0585	-0.0005	0.0058	0.0481	-0.0122	0.0692	0.0086	0.1112	1	1.31
Mean VIF												2.12

Those variables show no significant correlation, as most coefficients are below 0.8 (Gujarati, 2021). As a result, we conclude that there is no significant multicollinearity in the model. We also conducted the variance inflation factor (VIF) test to re-check for multicollinearity. All VIFs are low, mostly below 10, indicating no multicollinearity.

The interest rate channel

$$ROA_{i,t} = \alpha_0 + \alpha_1 Redis_t + \alpha_2 CIR_{i,t} + \alpha_3 LAR_{i,t} + \alpha_4 LDR_{i,t} + \alpha_5 CAP_{i,t} + \alpha_6 NPL_{i,t} + \alpha_7 Zscore_{i,t} + \alpha_8 GDP_t + \alpha_9 INF_t + \varepsilon_{i,t}$$

Table 8: Quantile regression for the interest rate channel

Dependent Variable (ROA)	Q25	Q50	Q75	Q95
Redis	-0.175***	-0.179***	-0.205***	-0.252**
	(-3.02)	(-2.86)	(-3.60)	(-2.48)
CIR	-0.0138***	-0.0214***	-0.0280***	-0.0236***
	(-4.52)	(-5.27)	(-11.12)	(-5.86)
LAR	-0.00426	-0.00936**	-0.00225	-0.00335
	(-0.86)	(-2.05)	(-0.55)	(-0.60)
LDR	0.0121***	0.0149***	0.00966***	0.00738***
	(2.89)	(4.49)	(4.67)	(3.17)
CAP	0.0390**	0.0652***	0.107***	0.146***
	(2.57)	(2.87)	(5.8)	(10.95)
NPL	-0.0968	-0.0112	-0.00288	0.0432
	(-1.62)	(-0.18)	(-0.07)	(0.93)
Zscore	0.0504***	0.0677***	0.109***	0.0952***
	(4.28)	(3.84)	(4.99)	(6.55)
GDP	0.0221	0.0339	0.0466**	0.0699***
	(0.77)	(1.08)	(2.07)	(2.63)
INF	0.0568*	0.0387	0.0877***	0.0368
	(1.75)	(0.98)	(3.39)	(0.93)
_cons	0.00434	0.00687	0.00644	0.00851

	(0.95)	(1.18)	(1.54)	(1.48)
No				280

Firstly, it is observed that Redis significantly and negatively correlate with ROA across all quantile levels (25th, 50th, 75th, and 90th), meaning higher Redis is associated with lower ROA. This implies that higher Redis results in higher borrowing costs, thereby discouraging local businesses from making loan demands. This reflects the reality of the Vietnamese banks, where their primary source of operating income comes from lending activities.

Moreover, the effect of Redis on banks with high ROA will be larger than that on banks with lower ROA, as shown by the coefficient increasing when moving toward higher quantile levels (e.g., -0.252** at q95 versus -0.205*** at q75).

The following table presents the regression results through the application of four regression methods:

Table 9: Regression results for the interest rate channel

Dependent variable (ROA)	POLS	REM	FEM	FGLS
Redis	-0.242***	-0.233***	-0.197***	-0.159***
	(-4.43)	(-5.22)	(-4.62)	(-4.04)
CIR	-0.0221***	-0.0147***	-0.00941***	-0.0149***
	(-9.97)	(-6.30)	(-4.06)	(-9.25)
LAR	-0.00526*	-0.00683	-0.00311	-0.00177
	(-1.67)	(-1.64)	(-0.72)	(-0.56)
LDR	0.0123***	0.0146***	0.0113***	0.00763***
	(5.25)	(6.15)	(4.77)	(3.73)
CAP	0.0705***	0.0512***	-0.0422**	0.0752***
	(8.18)	(3.85)	(-2.24)	(6.25)
NPL	0.00577	-0.00502	-0.0161	0.00403
	(0.42)	(-0.44)	(-1.48)	(0.34)
Zscore	0.0811***	-0.0172	-0.199***	0.0201
	(7.1)	(-0.85)	(-6.33)	(1.39)
GDP	0.0390**	0.0338**	0.0267**	0.0335***
	(2.07)	(2.5)	(2.14)	(4.37)
INF	0.0475*	0.0492***	0.0522***	0.0257**
	(1.73)	(2.58)	(2.99)	(2.54)
_cons	0.00736**	0.00970***	0.0252***	0.00585*
	(2.25)	(2.76)	(6.33)	(1.95)
N	280	280	280	280
R-sq	0.686		0.733	

Overall, consistent results regarding the effect of Redis on banks' performance have been found, which aligns with the foregoing analysis in the quantile regression section. More specifically, Redis has a significant negative impact on banks' ROA at the 1% significance level, with a 1% increase in Redis associated with a 0.159 percentage-point decrease in ROA. To clarify, such an increase in interest rates in Vietnam may discourage borrowers' demand but still pressure banks to incur higher

funding costs from depositors, leading to a drop in the net interest income margin and, ultimately, a decline in net profit. Therefore, these findings support *Hypothesis 1: The interest rate channel negatively affects bank profitability.*

Our results align with the theory proposed by Bernanke and Gertler (1995), which suggests that rising interest rates can increase borrowing costs, weaken repayment capacity, and heighten the risk of loan defaults if not adequately managed. Consequently, banks face rising non-performing loans (NPLs) and higher provisioning expenses, ultimately reducing their overall profitability.

The exchange rate channel

$$ROA_{i,t} = \alpha_0 + \alpha_1 Exch_t + \alpha_2 CIR_{i,t} + \alpha_3 LAR_{i,t} + \alpha_4 LDR_{i,t} + \alpha_5 CAP_{i,t} + \alpha_6 NPL_{i,t} + \alpha_7 Zscore_{i,t} + \alpha_8 GDP_t + \alpha_9 INF_t + \varepsilon_{i,t}$$

Table 10: Quantile regression for the exchange rate channel

Dependent variable (ROA)	Q25	Q50	Q75	Q95
Exch	0.0202*	0.0172*	0.0402***	0.0483***
	(1.84)	(1.69)	(4.84)	(3.87)
CIR	-0.0160***	-0.0215***	-0.0278***	-0.0236***
	(-7.22)	(-5.68)	(-14.29)	(-5.55)
LAR	-0.00449	-0.00895	-0.00618	-0.00153
	(-0.79)	(-1.53)	(-1.05)	(-0.27)
LDR	0.0111***	0.0150***	0.00940***	0.00664***
	(3.44)	(3.38)	(3.44)	(2.82)
CAP	0.0366**	0.0613**	0.111***	0.154***
	(2.23)	(2.41)	(7.01)	(6.65)
NPL	-0.0849	-0.0173	-0.00405	0.0391
	(-1.00)	(-0.21)	(-0.07)	-0.96
Zscore	0.0467***	0.0665***	0.104***	0.0781***
	(3.22)	(4.13)	(6.1)	(4.56)
GDP	-0.01	-0.00745	0.0104	0.0344**
	(-0.53)	(-0.37)	(0.52)	(2.01)
INF	0.0449	0.0369	0.0667***	0.00229
	(1.37)	(1.34)	(2.71)	(0.06)
_cons	-0.201*	-0.170*	-0.400***	-0.483***
	(-1.81)	(-1.72)	(-4.92)	(-3.92)
No				280

Unlike the interest rate channel, the nexus between exchange rates and banks' profitability shows a positive correlation, suggesting that a higher Exch (a local currency depreciating against the USD) is associated with a higher ROA. Furthermore, the influence of the exchange rate is more pronounced in highly profitable banks, as reflected by the increasing coefficient values across quantiles (0.0172* at q50, 0.0402*** at q75, and 0.0483*** at q95). Given Vietnam's status as an export-driven economy, the weakening of the VND supports local businesses' export expansion, boosts

capital demand for growth, and, consequently, stimulates banks' credit operations.

Table 11 presents the regression results for the exchange rate channel, which reveal a consistent positive correlation between Exch and ROA. This further reinforces our earlier view that a higher Exch (i.e., a local currency depreciation against the USD) is significantly associated with higher ROA, supporting *Hypothesis 2: The exchange rate channel positively affects bank profitability.*

Table 11: Regression results for the exchange rate channel

Dependent variable (ROA)	POLS	REM	FEM	FGLS
Exch	0.0365***	0.0368***	0.0269***	0.0277***
	(3.86)	(4.52)	(3.28)	(4.37)
CIR	-0.0231***	-0.0166***	-0.0117***	-0.0166***
	(-10.56)	(-7.37)	(-5.17)	(-10.90)
LAR	-0.00646**	-0.0115***	-0.00754	-0.00552*
	(-2.02)	(-2.65)	(-1.60)	(-1.77)
LDR	0.0124***	0.0153***	0.0126***	0.00771***
	(5.2)	(6.41)	(5.31)	(3.98)
CAP	0.0713***	0.0542***	-0.0417**	0.0763***
	(8.16)	(3.97)	(-2.07)	(6.45)
NPL	0.00887	0.00116	-0.00827	0.00903
	(0.64)	(0.1)	(-0.77)	(0.81)
Zscore	0.0773***	-0.0194	-0.202***	0.0132
	(6.77)	(-0.95)	(-6.17)	(0.96)
GDP	0.00151	-0.00061	-0.00375	0.0175***
	(0.1)	(-0.06)	(-0.39)	(3.23)
INF	0.0289	0.03	0.0360**	0.0167*
	(1.05)	(1.56)	(2.04)	(1.85)
_cons	-0.364***	-0.363***	-0.247***	-0.274***
	(-3.84)	(-4.45)	(-3.00)	(-4.33)
N	280	280	280	280
R-sq	0.681		0.722	

More specifically, the results show that a 1% increase in Exch in Vietnam is associated with a 0.0277 percentage-point increase in ROA. Some studies, including those by Mishra and Montiel (2013), indicate that in developing and emerging economies such as Vietnam, the exchange rate channel is often weak, primarily due to frequent government interventions aimed at maintaining exchange rate stability. Additionally, the underdeveloped debt and capital markets further hamper the effectiveness of exchange rate transmission mechanisms.

The credit channel (bank lending)

$$ROA_{i,t} = \alpha_0 + \alpha_1 CG_t + \alpha_2 CIR_{i,t} + \alpha_3 LAR_{i,t} + \alpha_4 LDR_{i,t} + \alpha_5 CAP_{i,t} + \alpha_6 NPL_{i,t} + \alpha_7 Zscore_{i,t} + \alpha_8 GDP_t + \alpha_9 INF_t + \varepsilon_{i,t}$$

Table 12: Quantile regression for the credit channel (bank lending)

Dependent variable (ROA)	Q25	Q50	Q75	Q95
CG	-0.0335	-0.0537***	-0.0547***	-0.0686***
	(-1.35)	(-2.89)	(-3.17)	(-2.67)
CIR	-0.0152***	-0.0234***	-0.0286***	-0.0255***
	(-5.49)	(-7.14)	(-13.75)	(-9.93)
LAR	-0.00352	-0.00901**	-0.00188	-0.00892
	(-0.75)	(-1.98)	(-0.47)	(-1.33)
LDR	0.0115***	0.0163***	0.00938***	0.00764**
	(3.57)	(4.68)	(3.44)	(2.41)
CAP	0.0323**	0.0617***	0.112***	0.150***
	(2.29)	(3.52)	(9.74)	(7.44)
NPL	-0.0996*	-0.0211	0.00204	0.0519
	(-1.77)	(-0.33)	(0.03)	(0.82)
Zscore	0.0338	0.0760***	0.0978***	0.0881***
	(1.62)	(4.91)	(5.22)	(5.71)
GDP	0.00716	0.0162	0.0178	0.0337
	(0.27)	(0.69)	(0.95)	(1.51)
INF	0.0121	-0.0126	0.0505	0.00533
	(0.3)	(-0.58)	(1.22)	(0.09)
_cons	0.00728**	0.00984**	0.00988***	0.0161**
	(2.17)	(2.05)	(2.81)	(2.57)
No				280

The table above shows a significant negative impact of credit growth (CG) on banks' return on assets (ROA) across all quantiles, indicating that higher CG is associated with lower profitability. Notably, the largest effect is observed at q95, suggesting that CG's influence is more pronounced in banks with higher ROA than in those with lower ROA, as the coefficient increases with higher quantiles. This highlights how excessive credit growth can undermine banks' profitability, likely by increasing credit risk and potentially leading to a surge in non-performing loans (NPLs).

The overall regression in Table 13 shows a consistent negative correlation between CG and ROA across four regression methods. This further supports our earlier view that a higher CG is associated with a lower ROA. More specifically, a 1% increase in CG is associated with a 0.0216 percentage point decrease in ROA. The present study finding aligns with established theoretical frameworks, which indicate that expansionary policies, characterised by increased loan supply or credit growth, have a considerable and negative impact on bank profitability, as it is believed that more money injection into the banking sector enhances banks' ability to provide loans, hence elevating their exposure to credit hazards (Friedman & Schwartz, 1963). Therefore, the findings support *Hypothesis 3: The credit channel (bank lending) negatively affects bank profitability.*

Indeed, the Vietnamese banking sector demonstrates this theoretical view from 2009 to 2015. In a newly emerging market characterized by intense competition and inadequate risk management practices, such as Vietnam, local banks opted to enhance profitability by extending loan supply to non-

production sectors, without implementing appropriate regulatory and control measures; so, when the real estate and securities bubble burst, this, in turn, led to high NPLs and elevated provisioning expenses, resulting in plunged overall profitability. Recent studies by Mamatzakis and Bermpei (2016) and Dang (2022) also reveal a similar finding.

Table 13: Regression results for the credit channel (bank lending)

Dependent Variable (ROA)	POLS	REM	FEM	FGLS
CG	-0.0627***	-0.0495***	-0.0323***	-0.0216**
	(-3.96)	(-4.31)	(-2.97)	(-2.57)
CIR	-0.0234***	-0.0183***	-0.0131***	-0.0167***
	(-10.81)	(-8.43)	(-5.99)	(-10.61)
LAR	-0.00527*	-0.00696*	-0.00305	-0.00245
	(-1.66)	(-1.65)	(-0.69)	(-0.76)
LDR	0.0140***	0.0176***	0.0140***	0.00991***
	(6.1)	(7.63)	(6.03)	(4.89)
CAP	0.0673***	0.0433***	-0.0539***	0.0684***
	(7.81)	(3.31)	(-2.83)	(5.64)
NPL	0.0135	0.0083	-0.00303	0.00982
	(1)	(0.75)	(-0.29)	(0.85)
Zscore	0.0783***	-0.0161	-0.205***	0.0233
	(6.85)	(-0.79)	(-6.25)	(1.57)
GDP	0.0174	0.0105	0.00293	0.0187***
	(1.05)	(0.91)	(0.27)	(3.03)
INF	-0.00716	0.0015	0.0179	0.00402
	(-0.24)	(0.07)	(0.93)	(0.37)
_cons	0.00970***	0.0104***	0.0252***	0.00403
	(2.64)	(2.85)	(6.14)	(1.32)
N	280	280	280	280
R-sq	0.682		0.72	

Robustness check

The following table presents a robustness check to determine whether the above findings persist when using an alternative measure of the dependent variable. The study replaces ROA with ROE, rediscount rate (Redis) with refinance rate (Refin), and credit growth (CG) with money supply (MS), and finds that most of the study's main results remain persistent.

Table 14: Robustness check for all three channels

Dependent Variable (ROE)	Interest rate Channel	Exchange rate Channel	Bank Lending Channel
Refin	-1.300***		
	(-3.49)		
Exch		0.260***	
		(3.02)	
MS			-0.200***
			(-2.85)

CIR	-0.211***	-0.223***	-0.215***
	(-10.31)	(-11.28)	(-10.45)
LAR	-0.0478	-0.0773*	-0.0363
	(-1.19)	(-1.87)	(-0.89)
LDR	0.101***	0.102***	0.105***
	(3.96)	(4.07)	(4.06)
CAP	-0.215*	-0.206	-0.196
	(-1.71)	(-1.63)	(-1.53)
NPL	-0.021	0.0227	0.00876
	(-0.15)	(0.16)	(0.06)
Zscore	0.118	0.0389	0.131
	(0.7)	(0.23)	(0.77)
GDP	0.396***	0.239***	0.0577
	(4.1)	(3.2)	(0.63)
INF	0.196	0.14	0.1730
	(1.49)	(1.12)	(1.28)
_cons	0.206***	-2.442***	0.170***
	(5.38)	(-2.84)	(4.77)
N	280	280	280
R-sq			

CONCLUSION AND IMPLICATION

This study examines how bank profitability responds to monetary changes within a multi-instrument context. While this responsiveness has been thoroughly examined in global literature, a comprehensive analysis of diverse financial market prices (interest rates and exchange rates) and quantities (credit growth) within a single context, specifically Vietnam, has been overlooked. Consequently, the paper has offered meaningful insights by utilising a dataset of 28 Vietnamese local banks from 2014 to 2023 via the GLS method.

First, our empirical results indicate that bank profitability responds to monetary policy changes through three channels: interest rates, exchange rates, and bank lending. Specifically, the interest rate and bank lending channels are examined for a negative correlation with bank profitability, whereas the exchange rate channel is expected to have the opposite effect. These findings align with previous studies confirming MPTM's considerable role in driving bank profitability in a bank-based economy. Furthermore, some bank-determinant variables are significantly correlated with bank profitability across all methods and models.

From an implication perspective, the study enhances the existing literature by providing new empirical evidence through 2023 to substantiate its findings and make them highly valuable. Thus, policymakers must exercise caution when implementing monetary measures, as adjusting the interest rate or exchange rate, or injecting money into the supply, to increase loan growth may substantially impact bank profitability. Indeed, the banking sector's considerable role is widely recognised as the primary catalyst for the nation's financial activities and a key factor in fostering sustained economic development. From the standpoint of bank management, the study highlights

internal factors that influence bank profitability, which may help bank directors enhance their financial performance.

Ultimately, we arrive at the study's shortcomings, which present opportunities for further research on this exciting topic. Several prior studies have used various monetary and control variables to examine how bank performance, including profitability and riskiness, responds to monetary changes. This is a shortcoming of our paper, as it addresses only bank profitability. Additionally, to achieve a more comprehensive understanding of MPTM and its impacts on bank performance, further study should not only focus on Vietnam but also on other economies to provide a more insightful picture.

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