



Tomas Bata University in Zlín
Faculty of Management and Economics

Doctoral Thesis

**Monetary Policy Transmission Mechanism (MPTM)
and Its Impact on Bank Performance:
Evidence from Vietnam and Taiwan**

**Transmisní mechanismus měnové politiky (MPTM) a jeho dopad na
výkonnost bank:**

Důkazy z Vietnamu a Tchaj-wanu

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ABSTRACT

Monetary policy is central to guiding economies through different phases of the business cycle, and extensive research highlights the significance of its transmission channels. Yet, evidence on how the monetary policy transmission mechanism (MPTM) operates within the banking sector remains inconclusive, largely due to differences in economic structures and levels of financial development. Most existing studies focus on advanced economies or single-country contexts, offering limited comparative insights for emerging or frontier markets such as Vietnam. This dissertation, therefore, examines how key MPTM channels, namely the interest rate, exchange rate, and credit (bank lending) channels, shape bank performance in Vietnam, classified as a frontier market by Morgan Stanley Capital Investment (MSCI), in comparison with Taiwan, which the International Monetary Fund (IMF) categorises as an advanced economy.

Regarding the data and analysis methods, the study utilises a dataset comprising 59 banks from 2014 to 2023, of which 28 are from Vietnam, and 31 are from Taiwan, yielding a total of 590 observations. It then adopts a sequential regression approach to examine correlations among variables in panel data. For each model, the study sequentially applies five regression methods, ultimately selecting the System Generalised Method of Moments (SGMM) because it effectively addresses endogeneity and lagged variables that other methods cannot.

As a result, the findings reveal nuanced impacts of MPTM channels on bank performance. More specifically, the interest rate channel exerts opposing effects across the two countries, whereas the exchange rate and credit channels yield similar effects. These divergences underscore structural and developmental differences between a frontier and an advanced economy, thus offering valuable policy and managerial implications. For bank managers, the study identifies key internal factors, such as sensitivity to interest rate fluctuations and credit channel dynamics, that can be strategically managed to enhance performance and resilience, particularly in frontier markets. For policymakers, the contrasting effects of the interest rate channel underscore the need for tailored monetary policy measures that account for structural differences and levels of financial development. By highlighting these heterogeneities, the research contributes to the more effective design and implementation of monetary policy across diverse economic contexts, ultimately supporting financial stability and sustainable banking-sector growth.

ABSTRAKT

Měnová politika je klíčovým nástrojem při řízení ekonomik v různých fázích hospodářského cyklu a rozsáhlý výzkum zdůrazňuje význam jejích transmisních kanálů. Přesto však důkazy o tom, jak transmisní mechanismus měnové politiky (MPTM) funguje v bankovním sektoru, zůstávají nejednoznačné, a to zejména kvůli rozdílům v ekonomických strukturách a úrovních finančního rozvoje. Většina dosavadních studií se zaměřuje na vyspělé ekonomiky nebo na kontext jedné země, což poskytuje omezené srovnávací poznatky pro rozvíjející se či hraniční trhy, jako je Vietnam. Tato disertační práce proto zkoumá, jak klíčové kanály MPTM – úroková sazba, směnný kurz a úvěrový (bankovní) kanál – ovlivňují výkonnost bank ve Vietnamu, který je podle Morgan Stanley Capital Investment (MSCI) klasifikován jako hraniční trh, v porovnání s Tchaj-wanem, který Mezinárodní měnový fond (IMF) označuje za vyspělou ekonomiku.

Pokud jde o data a analytické metody, studie využívá soubor dat zahrnující 59 bank z období 2014–2023, z nichž 28 pochází z Vietnamu a 31 z Tchaj-wanu, což představuje celkem 590 pozorování. Následně je aplikován sekvenční regresní přístup k analýze korelací mezi proměnnými v panelových datech. Pro každý model studie postupně využívá pět regresních metod, přičemž nakonec volí systémovou metodu generalizovaných momentů (SGMM), protože účinně řeší endogenitu a zpožděné proměnné, které jiné metody nedokážou zohlednit.

Výsledky odhalují jemně diferencované dopady kanálů MPTM na výkonnost bank. Konkrétně úrokový kanál působí v obou zemích protichůdně, zatímco kanály směnného kurzu a úvěrový kanál vykazují podobné účinky. Tyto rozdíly zdůrazňují strukturální a rozvojové odlišnosti mezi hraniční a vyspělou ekonomikou, a tím poskytují cenné politické i manažerské implikace. Pro bankovní manažery studie identifikuje klíčové interní faktory, jako je citlivost na výkyvy úrokových sazeb a dynamika úvěrového kanálu, které lze strategicky řídit s cílem posílit výkonnost a odolnost, zejména na hraničních trzích. Pro tvůrce politik pak kontrastní účinky úrokového kanálu zdůrazňují potřebu přizpůsobených měnových opatření, která zohledňují strukturální rozdíly a úroveň finančního rozvoje. Zdůrazněním těchto heterogenit výzkum přispívá k efektivnějšímu návrhu a implementaci měnové politiky v různých ekonomických kontextech, což v konečném důsledku podporuje finanční stabilitu a udržitelný růst bankovního sektoru.

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LIST OF ABBREVIATIONS USED

BUS	Bank Business Model
CBC	Central Bank of the Republic of China (Taiwan)
CAP	Capital Ratio
CAR	Capital Adequacy Ratio

CBA	Central Bank's Assets
CG	Credit Growth
CIR	Cost to Income Ratio
CPI	Consumer Price Index
Exch	Exchange Rate
FEM	Fixed Effects Model
FGLS	Feasible Generalized Least Square
GDP	Gross Domestic Product
INF	Inflation
LAR	Loan to Asset Ratio
LDR	Loan to Deposit Ratio
MPTM	Monetary Policy Transmission Mechanism
MS	Money Supply
NICS	Non-interest Income Share
NPL	Non-Performing Loan
POLS	Pooled Ordinary Least Square
Redis	Rediscount Rate
REM	Random Effects Model
ROA	Return on Assets
ROE	Return on Equity
SBV	State Bank of Vietnam
SGMM	System Generalized Method of Moments
UIP	Uncovered Interest Rate Parity
VIF	Variance Inflation Factor

1. INTRODUCTION

1.1 Research Background and Motivation

The researcher is particularly interested in the Monetary Policy Transmission Mechanism (MPTM), a framework extensively examined in the literature for its role in explaining how monetary policy affects economic activity through the interest rate, exchange rate, and credit (bank lending) channels.

A major conceptual advancement emerged in the 1990s with **Taylor (1995)**'s influential work, which clarified how central bank actions influence financial and economic variables to maintain price stability and support growth. Taylor argues that financial market prices—such as short-term interest rates, bond yields, and exchange rates—play a more decisive role in transmitting monetary policy than financial quantities, such as money supply (MS), credit growth (CG), or government bond issuance. Since then, a vast body of research on the MPTM has expanded, yet debates persist regarding the true effects of monetary policy on money, credit, interest rates, exchange rates, and the role of commercial banks in the transmission process

Mishkin (1996) presents a widely known framework for how monetary policy affects the economy, beginning with the traditional interest rate channel before examining alternative asset price channels and, ultimately, the credit channel—which he views as potentially more influential than the interest rate channel emphasized by **Taylor (1995)**. Similarly, **Bernanke and Gertler (1995)** challenge purely interest-rate-focused views by arguing that, while interest rates may influence consumption and investment, their impact on the cost of capital remains limited; instead, they highlight the amplifying role of credit frictions.

Another important debate stems from **Krugman et al. (1998)**, who critique the monetarist perspective advanced by **Friedman and Schwartz (1963)**. In *A Monetary History of the United States*, **Friedman and Schwartz (1963)** attribute the Great Depression largely to a contraction in the money supply, arguing that a sufficiently expansionary monetary response by the Federal Reserve could have mitigated the downturn. **Krugman et al. (1998)**, however, points to historical events in the US and UK during the late 1970s, when sustained increases in money supply failed to prevent economic decline, as evidence against monetarism. He also highlights Japan's experience in the 1990s, where monetary expansion did not revive economic activity, further challenging Friedman's theory.

Nonetheless, recent studies have increasingly highlighted the importance of the credit channel in supporting macroeconomic objectives. For instance, **Hendricks and Kempa (2009)** examine the operation of the credit channel during major U.S. economic crises throughout the 20th century. Their results show that this mechanism continues to play a central role, even amid substantial financial liberalisation and deeper financial market development, and that its relevance becomes particularly pronounced during periods of economic stress. In contrast, **Orlowski (2015)**'s study indicates that the credit channel became less effective during the financial crisis from 2008 to 2014, as the sharp increase in the monetary base did not translate into greater loan supply. Instead, U.S. banks allocated the additional liquidity primarily toward excess reserves and securities rather than extending credit.

By examining the broader impacts of the Monetary Policy Transmission Mechanism (MPTM) on financial and economic domains, a growing body of recent research has investigated its linkages with bank risk-taking (**Chen et al., 2017**), bank performance (**Chen et al., 2015; Mamatzakis & Bermpei, 2016**), loan growth (**Yang & Shao, 2016**), firm-bank relationships (**Garg et al., 2024**), and financial interconnectedness (**Ghosh, 2022**) across diverse economies. These studies often yield incongruent conclusions, largely due to differences in economic structures, banking systems, and institutional contexts.

Despite the abundance of empirical work on MPTM, a comprehensive understanding and direct comparison of the relationship between monetary policy and bank performance in Vietnam, a frontier economy, and Taiwan, an advanced economy, remains limited. Most prior studies concentrate on a single transmission channel or a single country, often overlooking multi-channel dynamics or cross-country comparisons. This limits the ability to develop a nuanced, comparative view of MPTM effectiveness across varying levels of economic development and banking environments.

A second key motivation for this study stems from the author's interest in the ongoing transition of banks' business models from traditional interest-based lending to greater emphasis on non-traditional banking services—a shift encouraged by the State Bank of Vietnam (SBV) and still subject to debate. In late 2012, this transformation became particularly evident in Vietnam, as many banks faced surging non-performing loans (NPLs) and elevated loan-loss provisioning. These pressures

arose from rapid pre-crisis credit expansion and heavy reliance on interest income. To mitigate risks and stabilize earnings, banks diversified into bancassurance, investments, securities and currency trading, and various fee-based services to boost non-interest income. However, the effectiveness of this substantial shift remains uncertain, as it requires simultaneous improvements in core technical infrastructure, service competencies, and operational systems. Therefore, this area warrants deeper empirical scrutiny to assess the strategic viability of such business model changes in the banking sectors of both Vietnam and Taiwan.

These motivations, addressing comparative gaps in MPTM-bank performance links and evaluating diversification efficacy, underscore the need for this thesis, which adopts a multi-channel, cross-country approach to provide more robust insights for policymakers in frontier and advanced Asian economies.

1.2 Research Questions and Objectives

This study's key research idea is to examine how MPTM, particularly the interest rate, exchange rate, and credit (bank lending) channels, affect bank performance, using evidence from Vietnam, a frontier economy, and Taiwan, an advanced economy. A comparative picture of the two countries is also provided to highlight differences in the impact of MPTM on the banking sector's performance. The bank's business model, specifically its income diversification, will also be used as a moderator in assessing the aforementioned impact. The research questions and objectives are as follows:

Q1: What is the monetary policy transmission mechanism (MPTM) and its classified channels, which have been developed?

The objectives of this question are (1) to provide a concise conceptual framework of MPTM, particularly how monetary policy changes affect the economy through various transmission channels; (2) to briefly present the theoretical development of MPTM; and (3) to examine how these channels have changed and adapted to different economies worldwide.

Q2: Considering the specific cases of Taiwan and Vietnam, what are their current monetary policy advancements, and how do their banking sectors' macroeconomic landscape and performance change relative to changes in monetary policy?

The objectives of this question are (1) to analyse and compare recent advancements and tools used in the monetary policies of Taiwan and Vietnam; (2)

to evaluate the impact of monetary policy changes on bank performance and the broader macroeconomic environment in each nation; and (3) to derive valuable insights from the monetary policy management practices of both economies.

Q3: How can the effects of MPTM, particularly the interest rate channel, the exchange rate channel, and the credit (bank lending) on bank performance be measured, and how can these be explained?

The objectives of this question are (1) to establish an appropriate econometric model with various regression methods to measure the effects empirically; (2) to determine and compare the coefficients associated with the variables affecting bank performance in two countries; and (3) to explore whether some of the variables are more influential than others.

Q4: How can the business model, as denoted by income diversification (measured by the non-interest income share), moderate the relationship between MPTM and bank performance?

The objectives of this question are (1) to assess the moderating role of banks' business models, and (2) to evaluate banks' strategic shift from traditional lending activities to a fee-based focus.

Q5: How do the differential impacts of MPTM channels on bank performance between Vietnam and Taiwan inform tailored policy recommendations for enhancing banking sector resilience in frontier versus advanced economies?

The objectives of this question are (1) to derive managerial recommendations for bank directors, particularly in frontier markets, such as Vietnam, on leveraging internal factors (e.g., income diversification and sensitivity to monetary policy changes) to mitigate adverse MPTM impacts and improve resilience, and (2) to propose broader contributions to the design of monetary policy frameworks in heterogeneous economic landscapes, aiming to promote financial stability, sustainable bank performance, and overall economic resilience.

1.3 Structure of the Thesis

The thesis consists of 6 chapters, and the remainder of this dissertation will proceed as follows:

Chapter 2 presents a detailed research methodology that adapts the Research Onion, from research philosophy through data collection and techniques employed to achieve the study's objectives.

Chapter 3 reviews the theory and literature, briefly examining the roles of banks and MPTM in the economy before delving into the interest rate, exchange rate, and credit (bank lending) channels, and their interactions with the income diversification model and bank performance. This crucial chapter provides the author with theoretical grounds to formulate the latter hypotheses.

Chapter 4 first provides an overview of the historical development of monetary policy in Taiwan and Vietnam, followed by an analysis of the impacts of monetary policy changes on the banking sector and the economy in both countries. The analysis is divided into three periods: 2005–2010, 2011–2016, and 2017–2023, to provide a comprehensive understanding of the critical role of monetary policy during each period and the economic development of the two countries over the past 19 years.

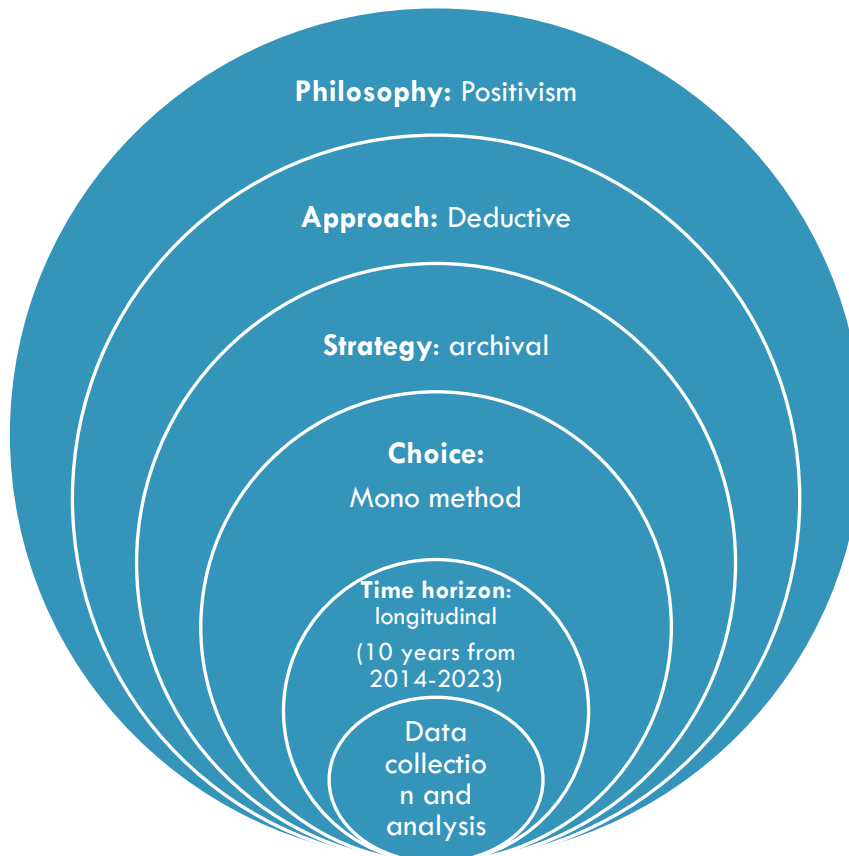
Chapter 5 presents the study's regression results in both countries and discusses the validation of the hypotheses built. This part is crucial as it substantiates the dissertation's findings and clarifies the study objectives.

Finally, **Chapter 6** concludes with implications, limitations, and future research.

2. RESEARCH METHODOLOGY

2.1 Research Onion

Following the research onion, adapted from **Saunders et al. (2016)**, the process of our research methodology will be as follows:



*Figure 1: Research Onion adapted from **Saunders et al. (2016)***

2.2 The Research Philosophy

This dissertation adopts a “positivist” research philosophy and a quantitative approach to examine the phenomena under investigation, aligned with the study's research questions and objectives. As described by **Smith et al. (1996)**, positivism posits that social phenomena can be examined as objective, hard facts, with the relationships between these facts capable of being identified and established as scientific laws.

Moreover, considering the ontological, epistemological, axiological, and methodological characteristics of positivism outlined by Sekaran and Bougie (2016), **Saunders et al. (2016)**, and **Pickard (2013)**, this philosophical approach is well-

suited to the present study. Positivism aligns with an epistemological focus on observable, measurable evidence and supports investigating causal relationships between variables. In this context, the dissertation aims to uncover causal interactions among the monetary policy transmission mechanism (MPTM), bank business models, and bank performance in Taiwan and Vietnam.

2.3 The Research Approach

This study adopts a deductive approach, which progresses from broad theoretical concepts to more specific empirical examination, a process often described as “top-down” (Trochim & Donnelly, 2001). In practice, the research begins by drawing on established theories and prior literature on monetary policy, the MPTM, and their implications for bank performance under the moderating influence of income diversification. From this foundation, a set of hypotheses is formulated regarding the relationships among MPTM, income diversification, and bank performance. The study then moves to the empirical stage, where data are collected from credible sources, and econometric models are estimated to test these hypotheses. This methodological sequence is essential because it directly addresses the dissertation’s research questions and objectives.

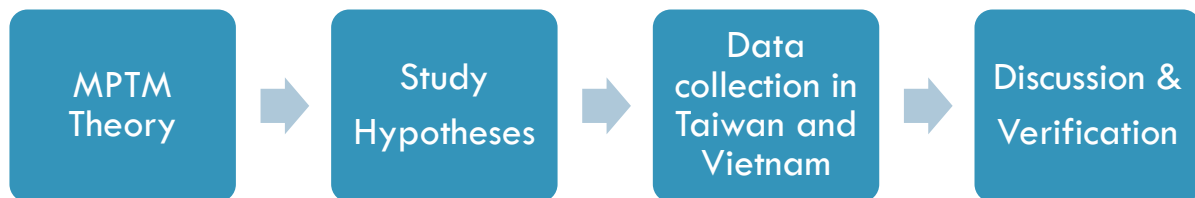


Figure 2: The deductive approach adapted from Trochim & Donnelly (2001)

2.4 The Research Design

The research design is “*a general plan of how to answer the research questions*” (Saunders et al., 2016). It must clearly outline the objectives and the obstacles encountered during data collection, and address any related ethical issues.

Hence, the general plan of this dissertation will be formulated as follows: it begins with a literature review, in which significant theories and arguments related to MPTM’s theoretical foundations and its interaction with income diversification and bank performance are presented. Next, a concise overview of monetary policy and the macroeconomic landscape in Taiwan and Vietnam will be provided, enabling

readers to understand how these two economies have been run over the last 19 years. The upcoming section employs econometric models, which are regarded as offering a more objective and rigorous examination of numerical and statistical data. Additionally, the use of quantitative methods enables the author to statistically address the research's explanatory and evaluative aims (**Saunders et al., 2016**). Specifically, the explanatory aspect is achieved by analysing causal relationships among monetary variables, business model, bank-specific characteristics, and macroeconomic conditions to clarify how, and under what circumstances, changes in monetary indicators influence bank performance in Taiwan and Vietnam. These findings ultimately support the identification of areas for improvement, future development, and strategic planning aligned with the evolving economic and banking environments in both countries.

2.5 The Research Strategy

As defined by **Denzin and Lincoln (2011)**, a research strategy is a plan of action to achieve a goal, serving as a methodological link between philosophy and the subsequent choice of methods for collecting and analysing data. Hence, the archival research strategy will be implemented, given the selection of a positivist research philosophy, a deductive approach, and the research design outlined above. This is one of the typical research strategies classified by **Saunders et al. (2016)** and is understood as “*the use of administrative records and documents as the principal source of data*” (**Saunders et al., 2016, pg 150**). Indeed, it is true that all of the secondary data, including macro-economic, banks’ business model, and determinant variables used in this dissertation, are collected initially from different reliable sources for a variance of purposes; for instance, economic data is the collection and aggregation of data from all industries nationwide, and audited financial statements are the consolidation and accounting of all of a bank’s daily transactions.

Furthermore, an archival strategy can help address questions concerning the past and changes over time for explanatory and evaluative purposes. By collecting historical data on monetary policy, macroeconomics, and bank performance in Taiwan and Vietnam over the past decade and applying it to econometric models, the study can empirically explain and evaluate the nexus among variables over time, thereby validating its hypotheses.

2.6 The Research Choice

In terms of research design, the study adopts a mono-method approach, using a single quantitative data-collection technique paired with a corresponding analytical procedure (**Saunders et al., 2016**). Secondary data serve as the basis for the analysis, including audited bank financial statements and statistical reports from governmental and non-profit organisations. Using these data, the study applies econometric regression techniques to examine relationships among variables and to test the proposed hypotheses. Selecting an appropriate data type is essential, as it links the collected information to the research strategy and forms a critical component of the investigative process (**Collis & Hussey, 2021**).

2.7 Time Horizon

According to **Bouma et al. (1995)**, a fundamental question in longitudinal studies is “Has there been any change over a period of time?” (**Bouma et al., 1995, p. 114**). This dissertation examines changes and developments in the interactions among MPTM, business models, and bank performance over 10 years in Taiwan and Vietnam, and thus constitutes a longitudinal case study that provides a rich data source for testing the study’s hypotheses and validating existing theory.

2.8 Data Collection Technique and pros & cons of Secondary Data

2.8.1 Data collection technique

This study utilises secondary data from official financial sources, including the World Bank, the IMF, SBV, and CBC. For an in-depth analysis of banks’ performance, the researcher primarily relies on their yearly audited financial statements and annual reports. The author consistently computes critical indicators for all banks, including profitability, liquidity, exposure, asset quality, solvency, and efficiency, for the period 2014 to 2023. This helps obtain historical information on changes in banks' financial positions over a decade.

2.8.2 Pros and cons of secondary data

In this dissertation, secondary data analysis is chosen for several reasons. Firstly, the researcher must rely on secondary data from reliable sources, as the objectives and research questions concern statistical data collected over the years to examine correlations between variables. According to **Bell et al. (2022)**, it may be unnecessary or impractical for a researcher to create some methods using primary data when such methods or data already exist. Secondly, on a purely practical level, secondary resources substantially save time, money, and effort. Additionally,

Stewart and Kamins (1993) argue that secondary data may be of higher quality than data obtained by researchers, as it provides information that others have already verified.

Despite the advantages of using secondary data, researchers must be aware of its reliability and validity. Reliability concerns the research findings and is one aspect of the credibility of the results. It refers to the “*extent to which the data collection technique or analysis procedures will yield consistent findings*” (**Saunders et al., 2016, pg 156**). **Bell et al. (2022)** suggest that the higher the reliability, the more similar the results will be. However, given the study's objectives, some threats to the research's reliability may exist. For instance, other researchers may use different monetary instruments, business models, and bank and macroeconomic indicators to represent their explanatory variables, leading to different outcomes. Secondly, the time frame is another issue, as most researchers tend to use the period when they can obtain the most data, either short-term or long-term, which may not provide proper insight into changes in explanatory variables over time. Last but not least, techniques and skills for handling data and regression results in econometric models are the most challenging tasks for researchers, directly affecting the reliability of their study's key findings.

In terms of validity, it is the connection between the study concept and the specific measurement used to assess that concept. According to **Bell et al. (2022)**, the purpose of validity is to ensure that the research measures what it is intended to measure; thus, errors in data, sampling, or measurement can undermine the research's validity. Even in many circumstances, when dealing with official statistics collected from large organisations or government websites, researchers should be aware of the limitations of such data, as statistics may change over time.

2.9 The Theoretical Framework

According to **Sekaran and Bougie (2016)**, the researcher must develop testable hypotheses that can be examined to determine whether the theory is valid. Hence, based on the research questions and objectives, the researcher has developed the following theoretical framework and hypotheses:

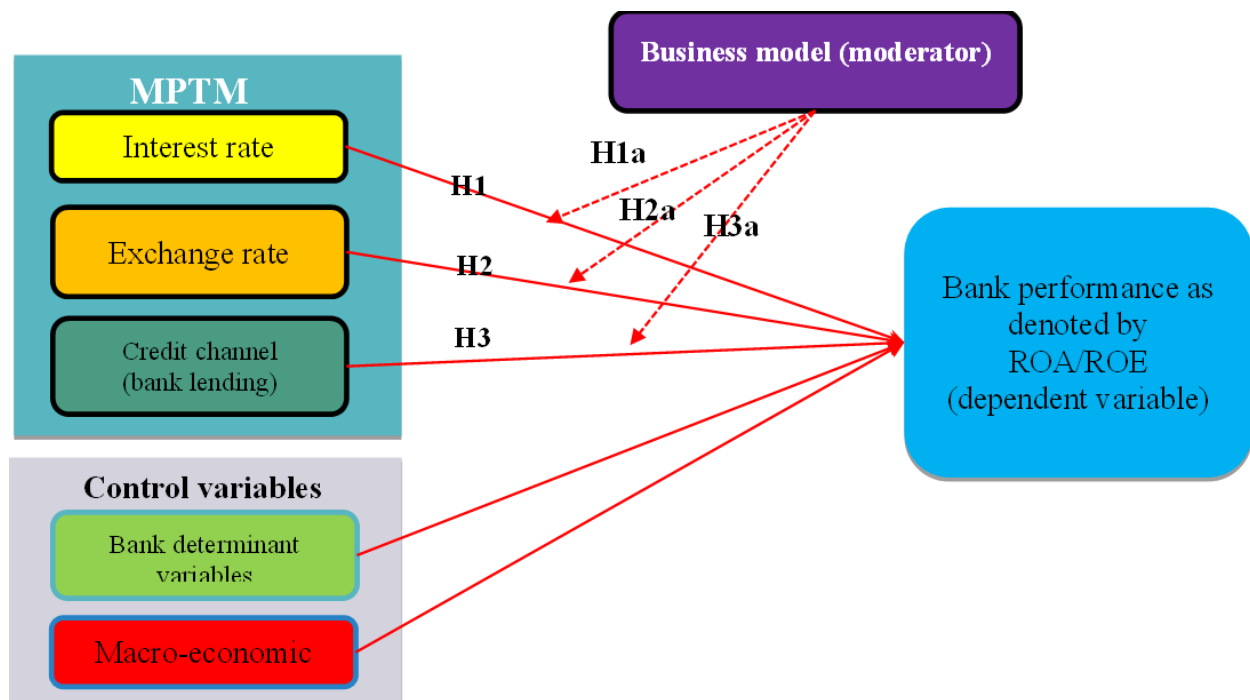


Figure 3: The study's theoretical framework

Hypotheses:

H1: The interest rate channel is positively associated with bank performance in Taiwan and Vietnam.

H1a: The business model, as denoted by income diversification, moderates the correlation between the interest rate channel and bank performance in Taiwan and Vietnam.

H2: The exchange rate channel is positively associated with bank performance in Taiwan and Vietnam.

H2a: The business model, as denoted by income diversification, moderates the correlation between the exchange rate channel and bank performance in Taiwan and Vietnam.

H3: The credit channel (bank lending) is negatively associated with bank performance in Taiwan and Vietnam.

H3a: The business model, as denoted by income diversification, moderates the correlation between the credit channel (bank lending) and bank performance in Taiwan and Vietnam.

2.10 Data Description

2.10.1 Dependent variable

Various measures, including net profit, NIM, ROA, and ROE, are frequently employed to assess bank performance.

Rivard and Thomas (1997) argue that ROA provides a more accurate measure of bank profitability than ROE because it is not influenced by high equity multipliers. Similarly, **Dietrich and Wanzenried (2011)** note that relying on ROE may overlook the heightened risks associated with high leverage, making ROA a more reliable indicator of a bank's ability to generate returns on its total assets. Consequently, many empirical studies, such as **Klein and Weil (2022)**, **Djalilov and Piesse (2016)**, **Athanasoglou et al. (2008)**, and **Dietrich and Wanzenried (2011)** favour ROA over ROE when examining bank profitability. Following this approach, this study adopts ROA as the main dependent variable and uses the average annual asset value, which is reported more accurately than year-end data.

For the robustness check, the study uses ROE to assess the persistence of the results.

2.10.2 Independent Variables

In this study, monetary variables include the rediscount rate (Redis), which represents the interest rate channel; the nominal exchange rate (Exch), which represents the exchange rate channel; and credit growth (CG), which represents the credit channel (bank lending). Control variables consist of bank determinants and macroeconomic variables.

Monetary variables (explanatory):

Many studies use a single monetary indicator, such as the short-term interest rate, the reserve requirement ratio, or the money aggregates, to assess monetary changes. Unlike these studies, our dissertation employs several monetary tools within an examination context to better gauge the stance (**Varlik & Berument, 2017**). This method allows for a simultaneous and thorough evaluation of how different monetary channels affect bank performance, recognising that central banks generally employ a combination of monetary tools to achieve their goals

More specifically, to represent the interest rate channel, the study uses the rediscount rate (used to discount valuable papers), as the SBV has not adjusted the policy base rate for an extended period. An increase in rediscount rates is observed

to signify monetary contraction and vice versa. Next, for the credit (bank lending) channel, the study uses the yearly credit growth (%) provided by the Central Bank. High credit growth is expansionary, and vice versa. Finally, the study employs the logarithm of the Central Bank's annual average nominal exchange rate against the USD to proxy for the exchange rate channel. The increase in its value means depreciation, and vice versa.

Bank Control Variables:

The Capital Adequacy Ratio (CAR) is a comprehensive indicator that assesses a bank's risk and its ability to manage its resources and obligations. It is widely regarded as a key benchmark for evaluating banks. In practice, CAR is a crucial metric for assessing the value of a bank's capital and reserves, which are retained to safeguard against risky assets and mitigate the risk of bank failure (**Guidara et al., 2013**). Regulators rely on CAR to evaluate whether banks hold adequate capital and to determine their ability to withstand adverse economic shocks. Despite its importance, the literature presents mixed views on whether a higher CAR reduces profitability. The argument is that holding excess capital encourages more conservative risk-taking, which may limit a bank's capacity to generate higher returns (**Berger, 1995**).

The loans-to-deposits ratio (LDR) reflects a bank's liquidity, i.e., its capacity to convert its financial assets into cash quickly and effectively, or the availability of readily available funds to fulfil all of its financial commitments. Indeed, the considerable role of liquidity has been much recognised, as a liquidity shortfall at a bank can cause systemic risk and significantly impact bank performance. However, there is controversy over whether banks holding high liquidity may incur the opportunity cost of other investments that generate higher returns. Indeed, when a bank shifts its loan portfolio from short-term to long-term, its return improves but its liquidity risk increases, and vice versa. Therefore, a low LDR suggests a bank that is less risky and less profitable, thereby creating a dilemma for the management team: balancing liquidity and profitability. From a regulatory perspective, **Thakor (2018)** argues that banks should raise capital requirements to minimise solvency risk.

Regarding banks' asset quality, theoretical views indicate that this factor strongly influences commercial banks' performance. Various indicators can be employed, and a loan is among the significant elements that must be critically addressed. However, as loans involve risk, there is always a possibility that a loan may become non-

performing (**Altunbas et al., 2010**). Generally, higher levels of non-performing loans may prompt banks to exercise greater prudence, potentially leading to stricter lending criteria and reduced lending activity. Furthermore, this decline can exert pressure on banks' profitability and capital, and hinder their willingness and ability to extend credit to the economy (**Naceur et al., 2018**). This is particularly serious for bank-based economies such as Vietnam. Indeed, a bank facing significant credit risk tends to prioritise strengthening risk oversight over expanding loan issuance. Also, **Tracey and Leon (2011)** claim that banks may respond differently depending on the specific NPL threshold. However, **Aysan & Disli (2019)** present an opposing view, arguing that an increase in NPLs does not hinder banks' traditional lending activity in Turkey. The authors believe diversifying funding strategies could help banks withstand the diminished profits from deteriorating assets.

Concerning management efficiency, **Berger & DeYoung (1997)** suggest that the critical key indicator of an adequate system is low-cost efficiency. In practice, several financial indicators can be used to assess this crucial field. This study only applies CIR. Although it may appear evident that increased expenses entail decreased profit and vice versa, the nexus between expenses and profits is not always straightforward. Several observations suggest that higher expenses may indicate a larger scale of banking activities, resulting in higher revenues. In low-competitive markets, where banks dominate, costs are passed on to depositors and borrowers by reducing deposit rates and raising lending rates (**Naceur, 2003**).

The Z-score (insolvency risk index) is computed by dividing the standard deviation of ROA (σROA , representing earnings volatility) by the sum of ROA and the equity-to-assets ratio. This measure evaluates a bank's likelihood of insolvency given the variability of its earnings (**Rivard & Thomas, 1997**). The underlying concept is that insolvency occurs when a bank's losses exceed its equity base.

Macro-economic variables

Inflation (INF) is the economic phenomenon of rising prices over a given period. It is worth noting that banks can adjust their interest rates in response to their ability to forecast the inflation rate (**Perry, 1992**).

GDP growth is a crucial indicator included in the analysis because it reflects economic activity. In downturns, firms face operational challenges and cut back on borrowing, leading to reduced interest revenue for banks and, consequently, lower profitability; the reverse occurs when the economy expands (**Acharya, 2018**).

2.10.3 Moderator variable

When examining banks' business models, many existing studies, such as **Stiroh & Rumble (2006)**, **DeYoung & Rice (2004)**, **Laeven & Levine (2007)**, and **Williams (2016)**, employ measures of income diversification. Generally, the bank's operating income includes interest and non-interest income. Interest income is generated from traditional lending activities, while non-interest income comprises fee-based income, such as commissions, currency and securities trading, and other consultancy services.

In this study, the business model, as denoted by income diversification, will be measured by the ratio of non-interest income to total operating income (NICS); an increase in this ratio may indicate a transition in the bank's business model from conventional lending practices to a fee-based focus.

Table 1: Key variables summary

Variable	Notation	Measure
Dependent variables:	Performance	
Return on assets	ROA	Profit after tax/average total assets (%)
Return on equity	ROE	Profit after tax/average total equity (%)
Independent variables		
<u>Monetary variables</u>		
Credit growth	CG	Yearly credit growth provided by SBV (%)
Rediscounted rates	Redis	Average yearly rediscount rates set by SBV (%)
Nominal exchange rate	Exch	Log of Average yearly exchange rates set by Central Bank
<u>Bank control variables</u>		
Capital adequacy ratio	CAR	(Tier 1 + Tier 2 capital)/Risk-weighted assets (%)
Cost-to-income ratio	CIR	Total operating expenses/total operating income (%)
Zscore	Zscore	Insolvency risk index as $\sigma\text{ROA}/(\text{ROA}+\text{equity}/\text{assets})$
Asset growth	AssetGr	Yearly growth of total assets (%)
Loans to Deposits ratio	LDR	Total loans/total deposits (%)
Non-Performing Loan r	NPL	Total non-performing loans/Total loans (%)
<u>Macro-economic variables</u>		
Gross domestic product	GDP	Yearly GDP growth rate (%)
Headline Inflation	CPI	Yearly percentage change in CPI (%)
<u>Moderator variable</u>		
Non-interest income share	NICS	Non-interest income/total operating income (%)

2.11 Econometric Models for the Regression

In the findings section, the study will present the regression results for two models: one without a moderator and one *with a moderator*. Therefore, the

following econometric models will be applied, following the models from **Mamatzakis & Bermpei (2016), Chen et al. (2017), and Dang (2022):**

Model without a moderator:

$$Perf_{i,t} = \alpha_0 + \alpha_1 MP_t + \alpha_2 BV_{i,t} + \alpha_3 Macro_t + \varepsilon_{i,t} \quad (1)$$

Model with a moderator, NICS:

$$Perf_{i,t} = \alpha_0 + \alpha_1 MP_t + \alpha_2 MP_t \times NICS_{i,t} + \alpha_3 NICS_{i,t} + \alpha_4 BV_{i,t} + \alpha_5 Macro_t + \varepsilon_{i,t} \quad (2)$$

For both models, $Perf_{i,t}$ is the performance of bank i in year t . Bank performance ($Perf_{i,t}$) is measured by ROA and ROE; (MP_t) is referred to monetary policy indicators, including credit growth (%), average rediscounting rates (%), and log of average central bank's nominal exchange rate in year t ; ($NICS_{i,t}$) is a moderator variable representing the bank business model of bank i in year t ; ($BV_{i,t}$) are bank determinant variables of bank i in year t , and ($Macro_t$) displays macroeconomic indicators, including GDP growth (%) and inflation (CPI,%) in year t .

The first model serves as the baseline, examining the direct effects of monetary changes on bank performance without a moderator. The second model builds on the baseline by incorporating a moderator to assess whether the correlation identified in the first model persists and to explore the moderating role of the bank business model in this relationship.

To address unobserved heterogeneity, several fixed effects considerations are evaluated. Industry fixed effects are omitted because our sample consists solely of banks, with no cross-industry variation. Country fixed effects are also not included, as the regressions are estimated separately for Vietnam and Taiwan, thereby controlling for time-invariant country-specific factors such as institutional development and regulatory frameworks. Year fixed effects are excluded because, within each country, all banks are exposed to the same domestic monetary policy and macroeconomic conditions in any given year; moreover, standard time-specific shocks are already accounted for by the country-specific macroeconomic control variables (e.g., GDP growth, inflation, policy interest rates, exchange rates). Including year fixed effects may lead to over-controlling and potential collinearity with these key variables (**Roodman, 2009**).

Before running the regression, the correlation matrix and VIF are computed to assess collinearity and determine the eligibility of variables for each model. Next,

the study examines quantiles, which are informative for understanding how various explanatory, bank-determinant, and macroeconomic variables affect the dependent variable at different quantiles (25%, 50%, 75%, and 95%). This thus offers a nuanced view of bank performance across low, median, high and very high ROA levels.

At the regression stage, for each model, the study sequentially applies five methods to examine variable correlations: POLS, REM, FEM, FGLS, and SGMM.

The POLS is first implemented; however, this method assumes the absence of individual-specific effects, which may bias the results if such effects exist. Hence, FEM and REM are introduced: FEM assumes that these individual-specific effects are fixed, whereas REM treats them as random variables uncorrelated with the explanatory variables. Next, the Hausman test (**Hausman, 1978**) will be conducted to determine whether REM or FEM is the appropriate selection. However, neither FEM nor REM can address heteroskedasticity using the Modified Wald test (**Baum et al., 2003**) or autocorrelation using the Wooldridge test (**Wooldridge, 2002**) in the model; therefore, FGLS is applied. Nevertheless, FGLS ignores endogeneity when it is unidentifiable; therefore, SGMM is used to address potential endogeneity and lagged variables (**Arellano & Bover, 1995; Blundell & Bond, 1998**). We assert that all bank variables are lagged by a specified period, as they require time to respond to changes in monetary policy and macroeconomic conditions. Hence, the endogeneity of monetary policy is recognised, as central banks continually adjust their policies in response to financial system stability.

The GMM estimator, introduced by **Arellano and Bond (1991)**, is believed to address unobserved effects in the regression. Furthermore, the outcomes remain satisfactory despite excluding omitted variables and despite the absence of unmentioned or unmeasured variables in the model. Furthermore, the GMM addresses the issue of reverse causality between variables.

Nonetheless, **Arellano and Bover (1995)** and **Blundell and Bond (1998)** assert that ordinary GMM exhibits bias and reduced accuracy when the dependent variable is persistent, because a significant correlation between current and past values over a short time frame can render the results unreliable. Consequently, **Arellano and Bover (1995)** and **Blundell and Bond (1998)** introduced the SGMM to address these issues. It is noted that although the SGMM is suitable for a limited number of periods (t) and a large number of cross-sections (i), too many instruments may overfit the instrument variables, leading to biased results. Therefore, the number of

instruments must be smaller than the number of cross-sections in each regression (**Roodman, 2009**). Some recent studies have run the SGMM to examine the impact of monetary indicators on bank performance (**Yang & Shao, 2016; Khan et al., 2016; Guidara et al., 2013**). Finally, in the robustness check, the study replaces the dependent variable, ROA, with ROE.

3. LITERATURE REVIEW

3.1 Role of Banks in Economies

Monetary policy operates primarily through financial markets, and its effectiveness depends critically on the structure and development of the financial system. Accordingly, the transmission of monetary policy instruments—such as interest rates, exchange rates, and reserve requirements—and the magnitude of their impact on economic activity are shaped by the financial system's institutional and structural characteristics (**Agénor & Montiel, 2015**). The financial system broadly comprises financial institutions (banks and non-bank intermediaries), financial markets (money and capital markets), and regulatory bodies (such as central banks and supervisory authorities) that collectively facilitate the allocation of resources and the smooth functioning of economic activity.

Understanding the structure of a country's financial system is therefore essential for analyzing the monetary policy transmission mechanism (MPTM). In particular, the relative importance of bank-based versus market-based financial systems determines the dominant transmission channels (**Allen & Gale, 2000**). In bank-based systems, financial intermediation is primarily conducted by banks, whereas in market-based systems, capital markets play a larger role in allocating funds.

Banks perform several critical functions within the financial system. As highlighted by **Warjiyo and Juhro (2019)**, banks: (i) act as intermediaries by transforming short-term household deposits into long-term loans for firms; (ii) monitor borrowers and manage risks associated with lending; and (iii) provide payment and transaction services that facilitate economic exchanges. These functions are particularly important in the presence of information asymmetry, where banks serve as specialized institutions capable of screening and monitoring borrowers more efficiently than financial markets (**Diamond, 1984**).

In developing and emerging economies, banks typically dominate the financial system. Household savings constitute the primary source of deposits, while bank loans represent the main source of external finance for firms, especially for working capital and investment. Vietnam provides a clear example of a bank-based financial system, where firms rely heavily on bank credit due to the underdevelopment of capital markets. As a result, monetary policy actions that influence bank lending significantly impact economic activity. Similar patterns are observed in other emerging economies, where limited financial market depth constrains firms' access to alternative financing sources. Even in some advanced economies, banks continue to play a dominant role. For example, in Taiwan, although non-bank financial institutions exist, they account for only a small share of total financial intermediation. Data from the Central Bank of the Republic of China (Taiwan) (**CBC, 2023**) indicate that more than 90% of total loans are provided by banks. Furthermore, indicators such as the credit-to-GDP ratio and total banking assets relative to GDP highlight the significant role of the banking sector. As of 2022, the credit-to-GDP ratios in Taiwan and Vietnam were approximately 160.7% and 125.9%, respectively, while total banking assets reached 283.9% and 168% of GDP (**CBC, 2023; SBV, 2023**). These figures underscore the centrality of banks in both economies' financial systems.

Despite the importance of the banking sector, excessive reliance on bank credit raises several concerns for policymakers. One major issue is the maturity mismatch inherent in banking activities, where short-term deposits are used to finance medium- to long-term loans. This exposes banks to liquidity risks, particularly during periods of financial stress. Additionally, there is growing evidence that excessive financial deepening may have diminishing or even negative effects on economic growth. **Arcand et al. (2015)** find that beyond a certain threshold, typically when private-sector credit reaches approximately 80–120% of GDP, the marginal contribution of financial development to growth becomes negative. Several explanations have been proposed for this phenomenon. First, as economies develop, market-based financing mechanisms, such as bond and equity markets, become more efficient and cost-effective compared to bank-based lending. Second, excessive credit expansion may lead to misallocation of resources, particularly when funds are directed toward unproductive sectors, thereby increasing the risk of financial instability and economic volatility (**Rajan, 2010**). Third, an oversized financial sector may distort labor allocation by attracting a disproportionate share of skilled

workers, potentially crowding out productive sectors of the real economy (**Arcand et al., 2015**).

In contrast, advanced economies with well-developed capital markets tend to exhibit more diversified financial structures. In Taiwan, for example, the presence of efficient bond and equity markets, as well as institutional investors, enables highly rated firms to raise medium- to long-term funds at lower cost, thereby reducing their reliance on bank credit. This diversification enhances financial stability by mitigating concentration risk in the banking sector. Indeed, central banks and international organizations widely advocate for the development of capital markets to complement bank-based financing (**Brandao-Marques et al., 2020**). Moreover, financial diversification also benefits banks themselves. As firms increasingly access capital markets, banks can shift toward fee-based activities, such as underwriting, advisory services, and asset management. This transition contributes to a more stable revenue structure and reduces dependence on traditional interest income. Evidence from Taiwan indicates that non-interest income accounts for more than 40% of total operating income in the banking sector, reflecting a gradual transformation toward a more diversified financial model.

In summary, the structure of the financial system plays a decisive role in shaping the effectiveness of monetary policy transmission. While bank-based systems, such as Vietnam, amplify the importance of credit channels, they also expose the economy to concentration risks and structural inefficiencies. Conversely, more diversified financial systems, such as Taiwan, enhance resilience and improve the overall efficiency of resource allocation, thereby strengthening the transmission of monetary policy through multiple channels.

3.2 Grounded theory of Monetary Policy Transmission Mechanism (MPTM)

The theoretical underpinnings of the MPTM have evolved substantially over time, driven by advances in macroeconomic theory and an increasingly sophisticated understanding of financial frictions. While classical economics laid the groundwork for examining the considerable importance of money, significant contributions from the Keynesian, monetarist, and New Keynesian schools have ultimately shaped our current understanding of how monetary policy affects real economic activity and the financial system.

Classical economics conceptualizes money primarily as a medium of exchange, with limited influence on real economic variables. This view is formalized in the Quantity Theory of Money (**Friedman, 1987; Humphrey, 1974**), expressed as:

$$MV=PY$$

where M denotes the money supply, V the velocity of money, P the price level, and Y the real output. Under the classical assumption of flexible prices and wages, changes in the money supply affect only nominal variables (such as the price level) without altering real output or employment. This principle, the neutrality of money, implies that monetary policy has no real effects on output in the long run (**Friedman, 1987**). However, classical theory offers limited insight into short-run fluctuations, as it assumes immediate market adjustment, whereas in reality, some market factors, such as prices or wages, cannot adjust immediately. Moreover, the inability of classical models to explain persistent unemployment and output volatility opened the way for further theoretical developments.

Therefore, Keynesian theory shifted focus to short-run demand-side effects by emphasizing nominal rigidities, such as sticky prices and wages, which prevent instantaneous market adjustment. These rigidities imply that monetary policy can influence real factors in the short run by altering interest rates, investment, and aggregate demand. Hence, the IS–LM framework formalized this mechanism. A monetary expansion shifts the LM curve by lowering interest rates and stimulating investment through reduced borrowing costs, thereby boosting consumption and aggregate demand when prices are sticky (**Keynes, 1936**). This highlights the policy's ability to address demand deficiencies. Therefore, Keynesian theory offers the first coherent and systematic explanation for why monetary policy shocks exert real effects on the economy. Because prices and wages adjust only gradually, policy changes in interest rates are not immediately offset by proportional movements in nominal market factors. Instead, these shocks propagate through borrowing costs, investment decisions, consumption behaviour, and credit conditions before nominal adjustments occur. For instance, during 2011–2012, in Vietnam, when the SBV tightened monetary policy by raising policy rates and restricting credit growth to combat inflation, lending rates surged immediately, but wages and output prices remained rigid. Firms face higher financing costs while revenues remain unchanged in the short run, resulting in a decline in investment and production. This, thus, led

to a sharp decrease in banks' credit growth and business activity, demonstrating the Keynesian mechanism in practice.

However, monetarists, led by Milton Friedman, critiqued the Keynesian emphasis on interest rates and fiscal tools; instead, they re-emphasized the central role of money supply dynamics in determining nominal income and inflation, arguing that policy affects nominal income primarily through changes in the money supply, with long and variable lags (**Friedman & Schwartz, 1963**). Indeed, in Vietnam, periods of rapid growth in the money supply (M2) during 2005-2007 (Table 4) were followed by high inflation, consistent with the monetarist view of a long-run link between money and prices. Additionally, monetarists introduced the concept of adaptive expectations, highlighting that people adjust their behaviour in response to past inflation, thereby influencing wage setting, price adjustments, and credit decisions. Although they acknowledged short-run non-neutrality due to information lags and adjustment costs, monetarists argued that systematic monetary policy cannot permanently influence real output, which is determined by structural factors, such as technology and labour supply, in the long run. Therefore, monetarists' key contributions lie in emphasising the importance of expectations, policy credibility, and the transmission of monetary shocks through money supply and credit conditions. These insights laid the groundwork for more modern models that incorporate expectations and micro-foundations.

Modern monetary theory is anchored in the New Keynesian framework (**Clarida et al., 1999**), which integrates rational expectations with nominal rigidities (prices and wages adjust slowly). In this view, monetary policy influences real economic activity through the intertemporal substitution mechanism: when the policy rate changes, households and firms adjust the timing of their consumption and investment, and revise their expectations about future economic conditions. A key contribution of the New Keynesian is the explicit incorporation of financial frictions. By recognizing that credit markets are imperfect—due to asymmetric information, collateral constraints, and weaknesses in borrowers' balance sheets—the framework shows how monetary shocks can be amplified rather than simply transmitted. The financial accelerator model (**Bernanke et al., 1999**) illustrates this dynamic by demonstrating how monetary policy affects borrowers' net worth, the external finance premium, and ultimately investment behavior. These frictions imply that monetary policy operates through more than just the interest rate channel; the strength and speed of transmission depend on the financial system's structure, and

banks play a central role in either magnifying or dampening policy effects. This theoretical evolution underpins the emergence of multiple transmission channels, such as the interest rate, exchange rate, and bank lending channels, that form the basis of contemporary analyses of the monetary policy transmission mechanism.

3.3 MPTM and Its Classification

One way to understand the MPTM is to raise a fundamental question: How do minor changes in monetary indicators lead to substantial shifts in deposits, loans, bonds, and other financial assets, ultimately influencing overall economic output and investment levels (**Cecchetti, 1995**)? This question highlights the complexity of the transmission process and underscores the importance of identifying the channels through which monetary policy influences the real economy.

Building on theoretical foundations provided by **Cecchetti (1995)**, **Taylor (1995)**, **Mishkin (1996 & 2007)**, **Borio and Zhu (2008)**, **Agénor and Montiel (2015)**, **Walsh (2017)**, and **Warjiyo and Juhro (2019)**, the MPTM can be understood as a multi-stage process. It begins with the implementation of monetary policy by the central bank through various instruments, including policy interest rates, reserve requirements, exchange rate interventions, open market operations, and, more recently, unconventional tools such as quantitative easing. These policy actions are then transmitted through financial markets and institutions to the real economy via several key channels: the interest rate channel, the exchange rate channel, the wealth (asset price) channel, the credit channel, and the risk-taking channel. Due to the complexity and interdependence of these channels, **Bernanke and Gertler (1995)** famously describe the MPTM as a “black box.”

The interest rate channel remains the traditional and most widely recognized mechanism. Under nominal rigidities, particularly price stickiness, an increase in nominal interest rates raises real interest rates, increasing the cost of capital for firms and households. As a result, investment and consumption are deferred, leading to a decline in aggregate demand and output (**Mishkin, 1996; Woodford, 2003**). Empirical evidence suggests that this channel is especially effective in economies with well-developed financial markets and credible monetary policy frameworks (**Brandao-Marques et al., 2020**).

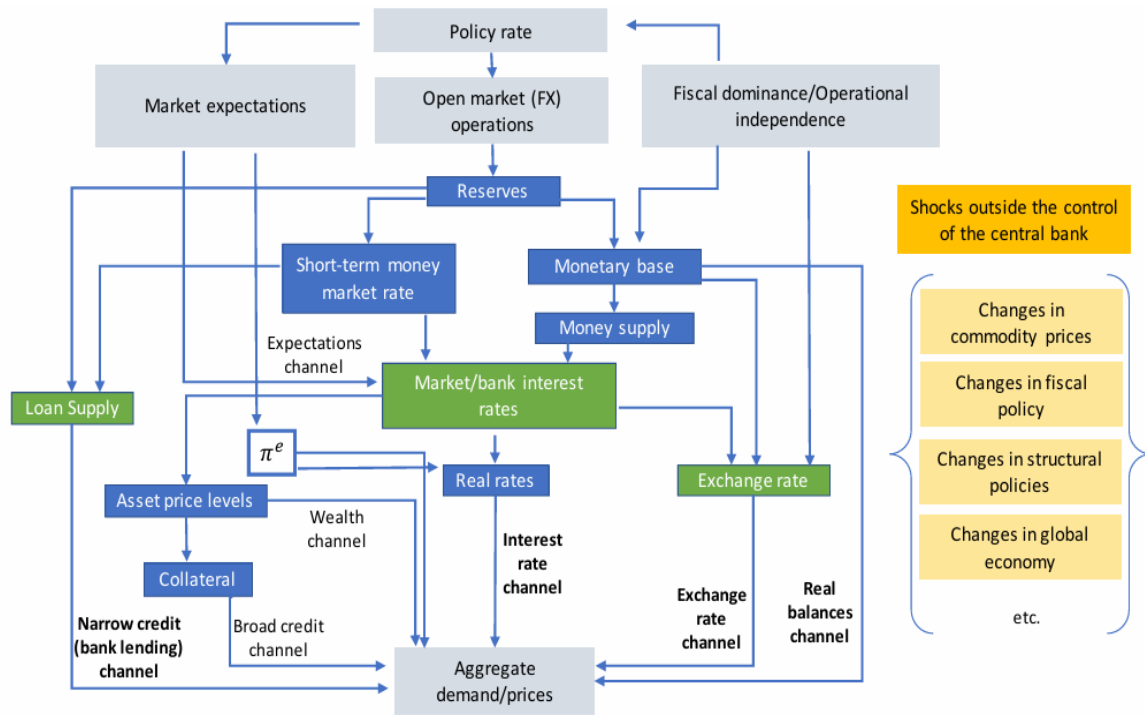


Figure 4: Channels of Monetary Transmission (Brandao-Marques et al., 2020).

In highly open economies, the exchange rate channel plays a crucial complementary role. An increase in domestic interest rates tends to appreciate the domestic currency (*ceteris paribus*), making imports cheaper while reducing export competitiveness. This leads to a decline in net exports and aggregate demand, particularly in export-oriented economies. However, this relationship is not always straightforward. In the presence of currency mismatches, where firms or banks hold liabilities denominated in foreign currency, an appreciation of the domestic currency can improve balance sheets by reducing the domestic value of foreign debt. This, in turn, enhances borrowing capacity and may stimulate investment, potentially offsetting the contractionary effects on net exports (Avdjiev et al., 2019)

Another important mechanism is the wealth (asset price) channel, which is grounded in Franco Modigliani's life-cycle hypothesis (1971). This theory posits that consumption decisions depend on households' lifetime wealth, including financial assets (stocks, bonds) and real assets (housing, gold). Monetary policy influences these asset prices through changes in interest rates and liquidity conditions. For instance, an expansionary monetary policy lowers interest rates, increasing the attractiveness of equities and real estate, thereby raising asset prices

and household wealth. This, in turn, stimulates consumption and aggregate demand (**Boivin et al., 2010**).

From a different perspective, the credit channel, or “credit view”, extends the traditional interest rate mechanism by emphasizing the role of financial frictions and asymmetric information. As proposed by **Bernanke and Gertler (1995)**, this channel comprises two components: the balance-sheet channel and the bank-lending channel. The balance sheet channel operates through borrowers’ financial positions. A contractionary monetary policy raises interest rates, reduces asset prices, and weakens firms’ balance sheets, increasing the risks of adverse selection and moral hazard. As a result, external finance becomes more costly, leading to a decline in investment and output. This mechanism is particularly relevant in economies where firms rely heavily on collateralized borrowing. The bank lending channel, on the other hand, focuses on the supply of credit. Tight monetary policy reduces bank reserves and deposits, limiting banks’ ability to extend loans. If banks cannot easily substitute lost deposits with alternative funding sources, they are forced to contract lending, thereby constraining firms’ access to credit and reducing investment (**Bernanke & Gertler, 1995; Diamond, 1984**). This channel is especially important in bank-based economies such as Vietnam, where small and medium-sized enterprises rely heavily on bank loans to finance working capital. Prolonged periods of high interest rates may further exacerbate financial distress, increasing the likelihood of loan defaults and weakening financial stability.

Finally, the risk-taking channel highlights how monetary policy influences the risk appetite of financial intermediaries. According to **Borio and Zhu (2008)**, low interest rates encourage banks and investors to take on greater risk in search of higher returns. While this behavior can stimulate economic growth in the short term, it may also lead to excessive leverage, asset price bubbles, and financial instability if not properly regulated. The global financial crisis of 2008 illustrates the risks associated with prolonged accommodative monetary policy.

In summary, the MPTM is inherently complex, as multiple channels operate simultaneously and interact with one another. The relative importance of each channel depends on country-specific factors, including the level of financial development, degree of openness, exchange rate regime, and institutional quality. In bank-based economies, such as Vietnam, the interest rate and credit channels tend to dominate because banks play a central role in financial intermediation. As

financial markets deepen and diversify, the wealth channel becomes increasingly important. Meanwhile, in highly open economies with flexible exchange rate regimes and high capital mobility, the exchange rate channel plays a more prominent and rapid role in transmitting monetary policy shocks. Furthermore, the strength and speed of transmission vary across the business cycle and are influenced by macroeconomic conditions, including capital flows, inflation expectations, and financial stability.

In this study, we focus on three key channels: the interest rate channel, the exchange rate channel, and the bank lending channel, which are discussed in detail in the following subsections.

3.3.1 The interest rate channel

The interest rate channel of the monetary policy transmission mechanism (MPTM), rooted in the Keynesian IS–LM framework, remains one of the most widely recognized and foundational mechanisms through which monetary policy affects the real economy. The basic transmission process can be summarized as follows:

$$\mathbf{M} \uparrow \rightarrow \mathbf{Int} \downarrow \rightarrow \mathbf{I} \uparrow \rightarrow \mathbf{Y} \uparrow \text{ (Mishkin, 1996 \& 2007; Walsh, 2017)}$$

According to this framework, an expansionary monetary policy increases the money supply ($\mathbf{M} \uparrow$), leading to a decline in nominal and, under price stickiness, real interest rates ($\mathbf{Int} \downarrow$). Lower real interest rates reduce the cost of borrowing and the user cost of capital, thereby stimulating investment and consumption ($\mathbf{I} \uparrow$). This increase in aggregate demand ultimately raises output and income ($\mathbf{Y} \uparrow$). Conversely, a contractionary monetary policy raises interest rates, discourages investment and consumption, and reduces economic activity.

Despite its central role, the effectiveness of the interest rate channel has been debated. **Taylor (1995)** emphasizes that interest rates remain the primary conduit through which monetary policy influences firms' cost of capital and households' consumption decisions. In contrast, **Bernanke and Gertler (1995)** argue that the traditional interest rate channel alone is insufficient to explain the full impact of monetary policy, highlighting the role of financial frictions and credit channels in amplifying monetary shocks instead. This divergence reflects broader theoretical developments from simple IS–LM models toward more comprehensive frameworks incorporating imperfect information and financial intermediation.

Empirical evidence on the relative importance of the interest rate channel is mixed and varies across countries and time periods. For example, **Claus (2011)** finds that in New Zealand, the interest rate channel plays a dominant role in transmitting monetary policy shocks, significantly affecting both consumption and investment decisions. Similarly, **Brandao-Marques et al. (2020)** document that in many advanced economies, well-developed financial markets facilitate rapid transmission from policy rates to market interest rates, reinforcing the effectiveness of this channel. However, other studies suggest that the importance of the interest rate channel has declined in certain contexts. **Poon and Wong (2011)** argue that, in China, particularly after the global financial crisis, the wealth (asset price) channel became more prominent than the interest rate channel, reflecting structural changes in the financial system. Likewise, **Charoenseang and Manakit (2007)** find that in Thailand, the interest rate channel has weakened due to incomplete interest rate pass-through, while the credit channel continues to play a significant role. These findings highlight the evolving nature of monetary transmission mechanisms as financial systems develop and diversify.

The effectiveness of the interest rate channel depends critically on the structure and efficiency of financial markets. In advanced economies with deep, liquid, and competitive financial systems, changes in policy rates are quickly transmitted to interbank rates, lending rates, and broader financial conditions. This rapid pass-through enhances the responsiveness of consumption and investment to monetary policy (**Agénor & Montiel, 2015**). In contrast, developing and emerging economies often experience weaker and slower transmission due to structural imperfections, including information asymmetries, high transaction costs, limited financial market depth, and restricted access to credit. These factors reduce the sensitivity of market interest rates to policy rate changes and weaken the overall effectiveness of the interest rate channel. Empirical studies provide strong support for this view. For instance, **Disyatat and Vongsinsirikul (2003)** document significant lags in Thailand's monetary transmission process, while **Archer (2006)** reports similar delays in New Zealand. Earlier cross-country evidence by **Cottarelli and Kourelis (1994)** and **Hofmann and Mizen (2004)** demonstrates that interest rate pass-through is generally slower and less complete in countries with less developed financial systems.

Moreover, recent literature highlights that the strength of the interest rate channel is also influenced by institutional factors such as central bank credibility, inflation

expectations, and monetary policy frameworks. In inflation-targeting regimes with transparent communication and strong policy credibility, changes in policy rates can more effectively shape expectations and amplify transmission effects (**Woodford, 2003**). Conversely, in economies with weak institutional frameworks, policy signals may not be fully transmitted to market participants, further weakening the channel.

In summary, while the interest rate channel remains a cornerstone of the MPTM and the central mechanism in the IS–LM framework, its effectiveness varies significantly across countries depending on financial development, market structure, and institutional quality. Although alternative channels, such as credit and wealth effects, have gained importance in recent decades, particularly in emerging and transitioning economies, the interest rate channel continues to play a fundamental role in shaping macroeconomic outcomes

3.3.2 The exchange rate channel

With the rise of global economic interconnectedness, the exchange rate channel has taken on a much more prominent role in the MPTM. It remains an essential tool for promoting economic stability across numerous nations. This channel operates primarily through the Uncovered Interest Rate Parity (UIP) condition, which posits that interest rate differentials between countries are offset by expected exchange rate changes (**Kuttner & Mosser, 2002**). More particularly, when applying contractionary monetary policy ($M \downarrow$), domestic interest rates rise ($Int \uparrow$) compared to foreign rates, and the local currency tends to appreciate ($E \uparrow$). This currency appreciation raises the price of exports while making imports more affordable, reducing net exports ($NX \downarrow$) and, in turn, leading to a decline in aggregate demand ($Y \downarrow$). Conversely, an expansionary monetary policy reverses these macroeconomic effects (**Mishkin, 1996 & 2007; Boivin et al., 2010**)

Empirical evidence strongly supports the relevance of the exchange rate channel in advanced and financially integrated economies. Studies such as **Golinelli and Rovelli (2005)** for Central and Eastern Europe, **Karasoy et al. (2005)** for Turkey, and **Bjørnland and Halvorsen (2014)** for the Eurozone document a significant and statistically robust response of exchange rates to monetary policy shocks. Moreover, cross-country analyses highlight that exchange rate movements serve as a key amplifier of monetary policy effects, particularly in inflation-targeting regimes and economies with high capital mobility (**Clarida et al., 2002**).

However, the effectiveness of the exchange rate channel varies substantially across countries and is often weaker in emerging and developing economies. A key explanation lies in structural and institutional characteristics. According to **Mishra and Montiel (2013)**, monetary transmission in low-income and developing countries is generally weaker and less predictable compared to advanced economies, reflecting structural constraints and policy distortions. In particular, **Mishra and Montiel (2013)** argue that limited financial development, shallow capital markets, and weak integration into global financial systems significantly reduce the responsiveness of exchange rates to interest rate changes. This weak transmission is not merely a methodological issue but reflects “real constraints” in the economic structure of developing countries.

Another critical factor is the phenomenon of “**fear of floating**”, where central banks actively intervene in foreign exchange markets to stabilize exchange rates rather than allowing them to adjust freely (**Calvo & Reinhart, 2002; Sánchez-Fung, 2023**). Such interventions dampen exchange rate volatility but simultaneously weaken the exchange rate channel of monetary policy. Empirical evidence suggests that frequent interventions, capital controls, and managed exchange rate regimes reduce the sensitivity of exchange rates to monetary policy shocks, thereby limiting the effectiveness of the MPTM (**Chen et al., 2017**). Furthermore, structural features such as dollarization, banking sector dominance, and underdeveloped financial markets further constrain the transmission process (**Berg et al., 2013; Mishra et al., 2012**). Equally, **Davoodi et al. (2013)** highlight that shallow financial systems and weak institutional frameworks can significantly hinder the pass-through from policy rates to market variables, including exchange rates.

The contrast between advanced and developing economies is therefore pronounced. In advanced economies, deep and liquid financial markets, high capital mobility, and credible monetary policy frameworks enhance the responsiveness of exchange rates and strengthen the transmission mechanism. In contrast, developing economies often experience weaker and less reliable transmission due to structural rigidities and policy interventions. As a result, the exchange rate channel tends to have a more significant impact on output in advanced economies than in developing ones (**Mishra & Montiel, 2013**).

Empirical evidence from Vietnam further supports this conclusion. Studies such as **Vo and Nguyen (2017)** and earlier work by **Vinh (2013)** find that the exchange

rate channel is either weak or statistically insignificant. In particular, strict exchange rate management by the State Bank of Vietnam (SBV) reduces exchange rate flexibility and limits its responsiveness to monetary policy shocks. Additionally, underdeveloped debt and capital markets, along with limited financial openness, further constrain the effectiveness of this transmission channel.

3.3.3 The credit (bank lending) channel

Given the presence of asymmetric information in financial markets, the monetary policy transmission mechanism (MPTM) operates not only through traditional interest rate channels but also via credit channels, which play a crucial role in amplifying policy effects. The theoretical foundation of the credit view is established by **Bernanke and Blinder (1988)** and further developed by **Bernanke and Gertler (1995)**. These studies argue that, due to information asymmetries between borrowers and lenders, financial markets are imperfect and that banks play a central role in allocating credit. Within this framework, two main channels emerge: the bank lending channel and the balance sheet channel. This study concentrates solely on the bank lending channel, which is particularly relevant in bank-based financial systems. Its transmission process is outlined below.

$M \uparrow \Rightarrow \text{Bank deposits} \uparrow \Rightarrow \text{Bank loans} \uparrow \Rightarrow I \uparrow \Rightarrow Y \uparrow$ (Mishkin, 1996)

Under an expansionary monetary policy, increases in reserves and deposits enhance banks' ability to extend loans. As banks expand credit supply, firms—especially those reliant on external finance—are able to increase investment, leading to higher aggregate output (**Mishkin, 1996; Walsh, 2017**). Conversely, a contractionary monetary policy reduces bank reserves and deposits, tightening credit conditions, restricting loan supply, and ultimately dampening investment and economic activity.

The importance of this channel stems from financial frictions, particularly adverse selection and moral hazard, which limit firms' direct access to capital markets. Banks mitigate these frictions through screening and monitoring, making them indispensable intermediaries (Rajan, 1992). As a result, the bank lending channel is especially significant for small and medium-sized enterprises (SMEs), which typically lack access to bond and equity markets and rely heavily on bank financing (**Boivin et al., 2010**).

Empirical evidence suggests that the strength of the bank lending channel varies across countries depending on the structure of the financial system. In bank-based

economies, where financial intermediation is dominated by banks, this channel tends to be more powerful. For instance, in Vietnam, a frontier economy characterized by limited capital market development, firms, particularly SMEs, rely predominantly on bank credit. Consequently, monetary policy actions that affect bank lending substantially impact firms' financing conditions and overall economic performance. Studies such as **Dang (2022)** confirm that the bank lending channel has played a critical role in Vietnam's economic growth. However, recent policy shifts by the State Bank of Vietnam (SBV) toward diversifying financial intermediation and promoting capital market development have gradually reduced the relative importance of this channel. In contrast, in more advanced and market-based financial systems, such as Taiwan, the bank lending channel is generally less dominant. Firms, particularly large corporations, have access to alternative financing sources, including bond and equity markets, which reduces their dependence on bank loans. This weakens the sensitivity of investment to bank credit supply and, consequently, dampens the effectiveness of the lending channel (**Woodford, 2003**).

A similar pattern can be observed in China, where the credit channel remains dominant despite ongoing financial reforms. **Li (2021)** analyzes four transmission channels: interest rate, credit, exchange rate, and asset prices, and finds that the credit channel accounts for approximately 42% of monetary policy effects, followed by the interest rate channel (31%), asset prices (20%), and the exchange rate channel (7%). This dominance is largely attributed to structural characteristics, including strict exchange rate controls, segmented financial markets, and the significant role of state-owned enterprises, which collectively reinforce the importance of bank-based financing.

Despite extensive empirical support, the credit view—and particularly the bank lending channel—has also faced criticism. Some studies argue that financial development and banking sector consolidation may weaken this channel over time. For example, **Olivero et al. (2011)** find that in Asian and Latin American economies, increased bank concentration reduces the responsiveness of loan supply to monetary policy changes. Larger banks, with better access to alternative funding sources, are less constrained by reserve fluctuations, thereby weakening the traditional lending channel. Similarly, **Mushtaq (2016)** provides evidence from Pakistan suggesting that bank lending does not significantly influence economic growth in either the short or long run. Instead, the study finds reverse causality, where economic growth drives credit expansion rather than the other way around. This challenges the

conventional view of the lending channel and highlights the importance of country-specific structural factors.

Overall, the effectiveness of the bank lending channel depends critically on the degree of financial development, banking sector structure, and firms' access to alternative sources of finance. While it remains a key transmission mechanism in bank-based and developing economies such as Vietnam, its role tends to diminish in more advanced financial systems like Taiwan characterized by diversified funding sources and deep capital markets.

3.4 The Interaction Between MPTM, Income Diversification, and Bank Performance

3.4.1 Income diversification and bank performance

From a theoretical perspective, income diversification has been widely discussed as a strategic approach for banks to enhance performance and manage risk. **Klein and Saldenberg (2000)** argue that diversifying income streams allows banks to improve both operational efficiency and risk management. By expanding into non-traditional financial services, such as bancassurance, securities trading, underwriting, investment banking, and payment services, banks can generate additional fee-based income and exploit economies of scale and scope. This perspective is consistent with modern financial intermediation theory, which suggests that diversification enables banks to smooth income fluctuations and reduce dependence on interest margins. From a risk management standpoint, shifting from interest-based to non-interest income is often viewed as a strategy to stabilize earnings. Traditional lending activities are inherently cyclical and sensitive to interest rate fluctuations and economic conditions, whereas fee-based services may offer more stable, predictable revenue streams. This view is supported by **Baale et al. (2007)**, who examine 255 banks across 17 European countries over the period 1989–2004. Their findings indicate that income diversification improves risk-adjusted returns and enhances future profitability, as the benefits of diversification outweigh the costs associated with increased operational complexity and agency problems. Similarly, **Chiorazzo et al. (2008)** find that diversification contributes positively to bank performance, particularly through economies of scale and scope. They argue that investments in technology, such as e-banking and digital financial services, enable banks to cross-sell products and expand their customer base, thereby generating multiple income streams. Hence, the benefits of income diversification should offset the drawbacks of higher fixed and variable costs associated with

information and communication technology. These findings align with portfolio theory, which suggests that diversification reduces overall risk by combining income sources with imperfect correlations.

Nevertheless, the benefits of income diversification are not universally supported. An alternative strand of literature argues that diversification may increase risk and reduce profitability due to higher operational complexity and agency costs. For instance, **DeYoung and Roland (2001)**, analyzing 472 U.S. banks from 1988 to 1995, find that greater reliance on non-interest income is associated with higher earnings volatility. They attribute this to several factors: (i) lower switching costs for fee-based services compared to traditional lending relationships; (ii) higher fixed costs related to investments in technology and human capital, leading to increased operating leverage; and (iii) weaker regulatory capital requirements for non-interest activities, which may encourage excessive risk-taking. This argument is further reinforced by **Stiroh and Rumble (2006)**, who demonstrate that non-interest income is more volatile than traditional interest income, particularly for large U.S. bank holding companies. Similarly, **Laeven and Levine (2007)** argue that diversification across financial activities can increase exposure to systemic risk, thereby offsetting potential efficiency gains. These findings suggest that diversification may not always lead to improved performance, particularly when banks lack the necessary expertise or governance structures to manage complex operations.

In the context of Vietnam, empirical evidence on income diversification remains relatively limited but provides important insights. **Luu et al. (2020)**, analyzing 39 Vietnamese banks over the period 2007–2017, find that diversification improves the performance of state-owned and foreign-owned banks but negatively affects privately owned banks. This divergence is attributed to differences in governance quality, access to capital, and technological capabilities. Similarly, **Nguyen (2021)** reports that increased reliance on non-interest income reduces profitability in Vietnamese banks, primarily due to the high costs associated with investments in core banking systems and digital infrastructure. These findings suggest that while diversification offers potential benefits, its success depends on banks' operational efficiency, technological readiness, and strategic management.

Overall, the literature presents a nuanced view of income diversification. While theoretical and empirical studies highlight its potential to enhance profitability and reduce risk through economies of scale and diversified revenue streams, other

research emphasizes the associated costs, increased volatility, and managerial challenges. Therefore, the net effect of diversification on bank performance is ambiguous and highly dependent on country-specific factors, including financial development, regulatory frameworks, and institutional quality.

3.4.2 The interest rate channel, income diversification, and bank performance

The interest rate channel serves as a core mechanism in the monetary policy transmission process. Expansionary monetary policy lowers nominal (and thus real) interest rates, reducing the user cost of capital for firms and households, thereby stimulating investment and consumption, boosting aggregate demand and overall economic output. Contractionary policy is executed in the reverse direction. Empirical and theoretical foundations for this channel remain robust across frameworks (**Mishkin, 2007; Walsh, 2017; Warjiyo & Juhro, 2019**). However, its implications for bank performance are more nuanced and context-dependent due to dissimilar economic structures, varying financial system development, or differing capital availability.

Traditional views hold that higher interest rates widen net interest margins (NIM-interest income minus interest expenses) and enhance bank profitability. Banks can reprice assets (loans) upward more readily than liabilities (deposits), because lower interest rates lead to diminished net interest margin. Banks are often hesitant to reduce deposit rates due to the fear of depositors' withdrawal of savings for better financial instruments. Studies supporting this perspective include **Demirgüç-Kunt and Huizinga (1999), Alessandri and Nelson (2015), Borio (2017), and De Menna (2021)**.

Conversely, a low-interest-rate environment compresses NIMs, as declines in lending rates often outpace reductions in deposit costs, particularly when rates approach the zero lower bound or turn negative. Banks may hesitate to pass negative rates to retail depositors, exacerbating margin pressure. Nevertheless, contrary evidence suggests that low rates do not always significantly erode overall profitability. Declines in interest expenses can outpace revenue losses, while improved macroeconomic conditions, such as lower loan-loss provisions from decreased borrower debt burdens, higher asset valuations, and expanded lending volumes, can offset or even outweigh the margin compression (**Scheiber et al., 2016; Madaschi & Pablos Nuevo, 2017; Altavilla et al., 2018**).

Income diversification, often proxied by the share of non-interest income (e.g., fees, commissions, trading, or other operating income) in total revenue, has gained attention as a potential buffer or amplifier in the interest rate–profitability nexus. Traditional interest-dependent models expose banks heavily to rate fluctuations, whereas diversified revenue streams can provide stability when NIMs compress.

Evidence on the standalone effect of diversification is mixed. Some studies link higher non-interest income shares to improved profitability and risk-adjusted returns, particularly in competitive or emerging markets, by reducing reliance on spread-based income (**Meslier et al., 2014**). Others highlight risks: greater diversification (especially into volatile trading or non-fee activities) can increase earnings volatility without necessarily boosting risk-adjusted profits, due to higher operational costs or stronger correlations with traditional interest income (**DeYoung & Roland, 2001; Stiroh, 2004**).

Crucially, income diversification interacts with the interest rate channel. Expansionary policy (falling rates) can strengthen the positive association between diversification and profitability. Lower rates stimulate economic activity, potentially boosting fee-based services, such as advisory, wealth management, or transaction volumes, while adverse margin effects are partially offset by non-interest income. Contractionary policy (rising interest rates) may weaken this linkage, as interest income rebounds while diversified activities face difficulties amid slower economic or market conditions (**Chen et al., 2015**).

Banks that expand non-interest activities may experience performance slowdowns during crises but benefit disproportionately from accommodative policy environments (**Gambacorta & Marqués-Ibáñez, 2011**). Non-interest income can also mitigate the negative effects of negative interest rates on performance, acting as a hedge when traditional margins narrow (**Dang, 2022**).

Therefore, the interaction among the interest rate channel, income diversification, and bank performance is multifaceted. Direct rate effects primarily operate through NIM compression or expansion, but the secondary channel, especially the non-interest income, moderates outcomes. Diversification does not uniformly enhance performance; its value as a moderator appears conditional on movements in interest rates: under expansionary conditions (low-rate), it can cushion or even amplify profitability by diversifying away from squeezed margins and capitalizing on activity-driven fee growth, while under contractionary conditions (high-rate),

benefits may diminish as interest income recovers, though diversification still provides resilience against volatility. This contingency helps explain contrasting empirical results across studies, regions, and time periods.

In contexts such as Taiwan and Vietnam, which feature distinct financial structures, such as varying degrees of state influence, market depth, and exposure to regional monetary policies, testing these interactions is particularly relevant; therefore, this study seeks to test the following hypothesis.

Hypothesis 1: *The interest rate channel is positively associated with bank performance in Taiwan and Vietnam*

Hypothesis 1a: *The business model, as denoted by income diversification, moderates the relationship between the interest rate channel and bank performance in Taiwan and Vietnam*

3.4.3 The exchange rate channel, income diversification, and bank performance

The exchange rate channel plays a critical role in shaping bank performance, yet empirical findings remain mixed across different economies. Divergent results may stem from variations in trade openness, financial market sophistication, and banking sector structures. For instance, **Almaqtari et al. (2019)** document a negative relationship between exchange rate movements and bank profitability in India, suggesting that currency depreciation may increase import costs, raise inflationary pressures, and ultimately erode banks' margins. Conversely, studies of export-driven economies highlight a positive association: depreciation enhances export competitiveness, stimulates production, and increases demand for credit, thereby strengthening banks' loan portfolios and interest income.

From a financial stability perspective, **Bruno and Shin (2020)** show that firms in emerging markets with significant foreign-currency liabilities face distress when the local currency depreciates, which can translate into higher credit risk for banks. Similarly, **Fisera et al. (2021)** find that depreciation often increases external debt burdens in emerging economies, undermining debt sustainability and indirectly affecting bank performance. Taken together, these findings suggest that the impact of exchange rate movements is context-dependent, shaped by the structure of trade, the extent of foreign-currency borrowing, and the development of financial markets.

Recent macroeconomic work by **Brandao-Marques et al. (2023)** confirms this asymmetry: in advanced economies, depreciation tends to boost output via the trade

channel, whereas in emerging markets it can be contractionary due to balance-sheet mismatches and dominant-currency pricing. This underscores the dual nature of exchange rate shocks in economies like Taiwan and Vietnam, where export competitiveness is high but exposure to foreign-currency borrowing remains significant.

Beyond direct lending effects, banks are also financial intermediaries with expertise in risk management. They can capitalize on exchange rate fluctuations through trading, hedging, and fee-based services, further reinforcing profitability. Yet, the extent to which banks benefit depends on their business models. Institutions heavily reliant on interest income may be more vulnerable to exchange rate volatility, while those with diversified revenue streams, such as fees, commissions, and non-interest activities, may be better positioned to absorb shocks. Prior research (**Demirgüç-Kunt & Huizinga, 2010; Sanya & Wolfe, 2011**) suggests that income diversification stabilizes earnings, reduces exposure to cyclical lending risks, and enhances resilience against external shocks, including currency fluctuations.

Despite these insights, relatively few studies have explicitly examined how income diversification moderates the relationship between exchange rates and bank performance. This gap is particularly relevant in Asian economies such as Taiwan and Vietnam, where trade dependence is high, and exchange rate movements directly influence credit demand. In these contexts, depreciation of the local currency can significantly boost export-oriented firms, leading to higher borrowing needs and increased bank lending. At the same time, diversified banks may leverage exchange rate volatility not only through lending but also through foreign exchange services, trade finance, and investment products. This dual channel suggests that the interaction between exchange rate exposure and diversification could be a critical determinant of bank performance. Thus, this study proposes:

Hypothesis 2: *The exchange rate channel is positively associated with bank performance in Taiwan and Vietnam.*

Hypothesis 2a: *The business model, as denoted by income diversification, moderates the relationship between the exchange rate channel and bank performance in Taiwan and Vietnam.*

3.4.4 The credit channel (bank lending), income diversification, and bank performance

A substantial body of literature documents the presence and significant impact of the credit channel, particularly the bank lending channel, on bank performance. Monetary policy influences banks' balance sheets by altering reserves, deposits, and funding conditions, thereby affecting their ability to extend credit. Since interest income from lending constitutes the largest share of banks' operating income, changes in loan supply directly affect profitability (**Mishkin, 1996**).

Empirical studies provide mixed evidence regarding the direction of this relationship. For instance, **Mamatzakis and Bermpei (2016)** employ a central bank asset (CBA) approach to measure the stance of monetary policy and find a negative relationship between expansionary policy and bank profitability. Specifically, an increase in central bank assets, reflecting accommodative monetary policy, expands credit supply but compresses interest margins. This occurs because expansionary policy tends to reduce long-term interest rates and flatten the yield curve, thereby narrowing the spread between lending and funding rates (**Neely & Fawley, 2013**). As a result, despite increased lending volumes, banks may experience declining net interest income and profitability. From a broader macro-financial perspective, **Friedman and Schwartz (1963)** argue that monetary expansions increase liquidity in the banking system, enabling banks to extend more credit. However, excessive credit growth may lead to risk accumulation and misallocation of resources, increasing the likelihood of loan defaults and provisioning costs, particularly during economic downturns. This highlights the dual nature of the credit channel: while it can stimulate lending and support short-term profitability, it may also amplify financial fragility and reduce long-term performance (**Rajan, 2010**).

Across countries, the impact of the credit channel on bank performance is highly heterogeneous. **Kashyap and Stein (2000)** show that smaller banks in the United States are more sensitive to monetary policy shocks because they rely more heavily on deposits and have limited access to alternative funding sources. Similarly, Altunbas et al. (2009) demonstrate that in European banking systems, bank-specific characteristics, such as capital adequacy and liquidity, significantly influence the strength of the lending channel. Poorly capitalized or less liquid banks tend to contract lending more sharply in response to monetary tightening, thereby experiencing stronger impacts on profitability. These findings are consistent with the bank lending channel theory, which emphasizes the role of balance sheet

constraints in shaping banks' responses to policy changes (**Diamond & Rajan, 2001**)

Regarding the moderating role of income diversification, the literature suggests that diversification can either mitigate or amplify the effects of the credit channel on bank performance. **Gambacorta and Marques-Ibanez (2011)** find that banks in the United States and Europe with more diversified income structures were not necessarily more resilient during financial crises, as exposure to non-traditional activities, particularly trading, introduced additional risks. Similarly, **Lepetit et al. (2008)** show that diversification into trading income increases risk, whereas fee-based income contributes to greater earnings stability. These findings suggest that the composition of non-interest income plays a crucial role in determining whether diversification enhances or weakens bank performance.

In the context of emerging economies, where financial markets are less developed and banks remain the dominant financial intermediaries, the interaction between diversification and the credit channel becomes even more important. Evidence remains limited, but **Dang (2022)** provides valuable insights. His study finds that both non-interest income and the degree of income diversification significantly moderate the negative impact of the credit channel, proxied by central bank claims, on bank performance in Vietnam. Specifically, diversified banks are better able to offset margin compression and increased credit risk by generating alternative revenue streams, such as fees from payment services, foreign exchange operations, and trade finance.

Despite these contributions, there is a notable lack of research examining this moderating effect in export-oriented and bank-dominated economies such as Taiwan and Vietnam. Both economies are characterized by high trade openness, strong reliance on bank financing, and increasing financial integration. In such contexts, expansionary monetary policy may compress interest margins and increase credit risk, but banks with diversified income structures may partially offset these adverse effects through non-interest income activities. This suggests that the relationship between the credit channel and bank performance is not only direct but also conditional on banks' business models.

Therefore, this study proposes the following hypotheses:

Hypothesis 3: *The credit channel (bank lending) is negatively associated with bank performance in Taiwan and Vietnam*

Hypothesis 3a: *The business model, as denoted by income diversification, moderates the relationship between the credit channel (bank lending) and bank performance in Taiwan and Vietnam*

4. MONETARY POLICY AND MACROECONOMIC LANDSCAPE IN TAIWAN AND VIETNAM

4.1 Vietnam

4.1.1 A brief overview of the historical development of the banking sector and monetary management

Following the “Doi Moi” economic reforms, Vietnam underwent substantial economic restructuring, transitioning from a centrally controlled economy to one driven by market principles. Greater global integration further accelerated the shift from an agrarian base to an economy dominated by industry and services. Monetary policy, led by the State Bank of Vietnam (SBV), has played a crucial role in guiding this transformation and supporting macroeconomic management. A key turning point came in 1988, when Vietnam replaced its mono-bank structure with a dual-tier system comprising the SBV and four state-owned commercial banks (**Camen, 2006**). The second milestone occurred in 1998, with the implementation of the Law on the SBV in Vietnam, which was designed to align national monetary policy with international standards (**Nguyen et al., 2019**). Although the law undertook minor revisions in 2010, its core principles remained unchanged. More specifically, in accordance with the SBV Law 2010 (**Law on the SBV, 2010**), the two primary objectives of Vietnam’s monetary policy are currency stability and inflation control. SBV’s mission has been adjusted after decades of carrying out a broad mandate not only to stabilise the value of the currency and the system, but also to facilitate socio-economic development, as stipulated in the SBV Law (**Law on SBV, 1997**). Also, under the SBV Law 2010 (**Law on SBV, 2010**), annual targets for broad money (M2) growth and total credits are set to guide annual growth in the banking sector. Such quantitative indicators are commonly selected by countries in the initial stages of developing their financial markets (**Laurens, 2005**).

Regarding monetary tools, the SBV can employ various measures, including the reserve requirement, the base rate and policy rates (refinance and rediscount rates), to control market interest rates and use open market operations (OMO) to manage market liquidity. The base rate assists the SBV in setting the lending rates of local banks, but this tool has not been utilized since 2010. Instead, the SBV has regularly

used the refinance rate to charge local banks for short-term loans (less than 1 year) and the rediscount rate to discount banks' eligible papers. These policy rates are frequently revised throughout the year to keep pace with the market movement. Moreover, during periods of interest rate volatility, the SBV enforces administrative measures by imposing a ceiling on deposit rates to restrict the fund-mobilisation race among commercial banks and a floor on lending rates.

In addition, the SBV aggressively uses OMO to inject liquidity by purchasing government bonds under repurchase agreements (at a given “repo” rate) and selling its bills at a “bill” rate. This is a key monetary instrument for the SBV to pursue its annual targets (M2 and credit growth), as it helps the SBV adjust system liquidity and influence interbank interest rates, which serve as key references for commercial banks.

The SBV also operates in the FX market, announcing daily reference rates for major currencies and setting the trading range. If market rates are volatile against it, the SBV could intervene to stabilise the exchange rate.

Nevertheless, alongside some achievements of monetary policy, it is also noted that, given the nature of a young, frontier economy, numerous issues persist in integrating its economic policies with the pace of global markets. Indeed, this has been repeatedly demonstrated in Vietnam's historical economic development, with the inflation rate rising to two-digit levels, a sign of severe macroeconomic instability. This resulted from years of persistent accommodative monetary policy and measures aimed at promoting economic growth despite high inflation.

4.1.2 The banking structure

As of the end of 2023, the Vietnamese banking sector comprised four state-owned commercial banks (State ownership exceeds 50%), 28 privately owned commercial banks, nine foreign banks, and other institutions. As shown in the table below, the banking system did not undergo major changes in terms of number, except for the case of three domestic banks – Construction Bank, Dong A Bank, and Ocean Bank – which were forced to be acquired by the state-owned banks due to their increased bad debts and liquidity problems.

Table 2: Number of banks in Vietnam from 2016 to 2023

Number of banks	2016	2017	2018	2019	2020	2021	2022	2023
State-owned banks	4	4	4	4	4	4	4	4
Privately owned banks	28	28	28	28	28	28	28	28
Weak domestic banks under the Central Bank's control	3	3	3	3	3	3	3	3
Foreign-owned banks	6	9	9	9	9	9	9	9
Others	1251	1256	1267	1266	1266	1266	1266	1263
Total	1292	1300	1311	1310	1310	1310	1310	1307

Note: State-owned banks are Vietinbank, Vietcombank, BIDV, and Agribank; other credit institutions include foreign branches, joint ventures, finance leasing companies, small local funds, etc., source: SBV

We also observe substantial expansion and shifts in both total assets and market share across the banking sector over the years. Since 2020, the collective market share of the 28 privately owned banks has exceeded that of the four state-owned banks. As of 2023, the four state-owned banks held a combined 41.5% share, while the privately owned commercial banks accounted for 44.8%. Meanwhile, the market share of other credit institutions, including foreign bank branches, small credit funds, leasing companies, etc., remained relatively unchanged, consistently representing less than 10% of the market.

Table 3: Banks' total assets from 2017 to 2023

Total assets	2017	2018	2019	2020	2021	2022	2023
State-owned banks	4,570,097	4,863,380	5,439,691	5,791,840	6,451,454	7,679,166	8,326,260
Privately owned banks	4,028,497	4,554,803	5,212,516	6,053,176	7,152,246	8,000,502	8,986,950
Joint venture and foreign-owned	954,165	1,136,618	1,345,869	1,522,674	1,629,487	1,770,764	1,865,830
Other	449,031	509,332	580,736	651,863	727,593	824,661	894,241
Total	10,001,790	11,064,132	12,578,812	14,019,553	15,960,780	18,275,093	20,073,281

Source: SBV; State-owned banks are Vietinbank, Vietcombank, BIDV, and Agribank

Banks' market share as of 2023

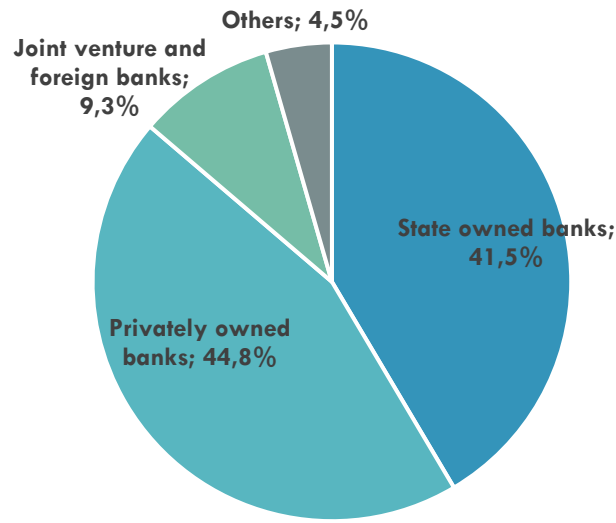


Figure 5: Total assets' market share as of 2023; Source: SBV & Own processing

4.1.3 Macroeconomic landscape and the evolution of the banking sector

The following analysis is divided into three periods: 2005-2010, 2011-2016, and 2017-2023, to examine how the banking sector responds to monetary policy changes.

a) Period 2005-2010:

This period was characterised by rapid credit and overall M2 growth, resulting in a two-digit inflation rate and a volatile macroeconomic environment. Vietnam's average credit and M2 growth rates during 2005-2010 were 34.3% and 32%, respectively, which were double those of other Asian nations at the same time.

Table 4: Macroeconomic indicators from 2005-2010

	2005	2006	2007	2008	2009	2010
GDP growth	7.55%	6.98%	7.13%	5.66%	5.40%	6.42%
Bank credit to the private (% of GDP)	60%	65%	86%	83%	103%	90%
Bank assets to GDP (%)	-	-	-	-	-	-
Bank credit to total GDP	59%	63%	83%	79%	97%	115%
Credit growth	31.0%	25.4%	53.9%	23.4%	39.6%	32.4%
Overall payment growth (M2)	29.7%	33.6%	46.1%	20.3%	29.0%	33.3%
Headline inflation (average CPI)	8.3%	7.5%	8.3%	23%	6.9%	9.2%
Average yearly exchange rate (against USD)	-	-	16,126	16,302	17,063	18,630
Average yearly rediscount rate	3.8%	4.5%	4.5%	6.5%	5.7%	6.2%

Average yearly refinance rate	5.8%	6.5%	6.5%	12.9%	10.1%	8.2%
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Source: Bankscope, GSO, SBV, and calculated by the author

It is undoubtedly true that the lax monetary policy implemented during 2005-2010, along with the early years of Vietnam's WTO accession, created an abundance of FDI (foreign direct investment) in Vietnam. Nevertheless, limited absorption capacity and macro-management capabilities led to the most severe macroeconomic instability, as evidenced by persistent inflationary pressures and VND devaluation at the time. Another concern regarding the credit-to-GDP ratio was raised, as this economic indicator increased from 59% in 2005 to 115% in 2010. On the one hand, this implies the growing role of credit in driving economic growth; on the other, it indicates the inefficiency of lending activities. The data showed that most of this credit went to non-production categories, such as real estate and securities, which were a root cause of the subsequent asset bubble and years of banking crises, as evidenced by high non-performing loans (NPLs), strained liquidity, and plunging profits.

Table 5: Banking indicators from 2005-2010

	2005	2006	2007	2008	2009	2010
ROE (before tax)	15.7%	19.3%	17.7%	11.7%	15.7%	14.3%
ROA (before tax)	0.96%	1.07%	1.51%	1.21%	0.99%	1.20%
NIM	2.4%	3.58%	3.1%	2.5%	3.4%	3.1%
NPL ratio	-	-	2%	3.5%	2.2%	2.6%
Banks' NICS	21.7%	25.4%	32.6%	32.5%	31%	27.3%
Banks' CIR	35.5%	36.2%	32.6%	39.7%	41%	41.4%
Z-score (insolvency index)	13.3%	16.5%	17.7%	21.5%	18.4%	17.8%
Banks' CAR	-	-	-	-	-	-

Source: Bankscope, SBV and GSO

During a period of rapid credit growth, most banks benefited from higher interest income, resulting in higher ROE, ROA, and NIM than their Asian peers. However, the focus on interest income led banks to suffer when the credit bubble burst, resulting in high NPLs and, in turn, higher expenses for loan loss provisioning. Some banks even faced bankruptcy and were acquired due to excessively high provisioning (a topic that will be examined in more detail later).

b) Period 2011-2016

Learning from the experiences of previous years, marked by loose monetary policy and characterized by macroeconomic instability resulting from excessive

growth in credit and the money supply (M2), policymakers during this period shifted to a more stringent strategy.

More particularly, inflationary pressures and the Dong devaluation, banks' deteriorating asset quality, stressed liquidity, and rising M&A activity among banks were typical problems that the entire economy had to contend with at all costs in early 2011. On that thought, a consecutive strong implementation of tightened monetary tools, including a cap on credit growth, controlled M2, increased refinancing and rediscount, combined with a range of administrative measures, was strictly taken in 2011. Above all, the banking system's restructuring plan 2011-2015 (**Government of Vietnam, 2012**) was released in 2012, focusing on restoring its financial health and operational capacity. Consequently, from 2011 to 2016, average credit and M2 growth declined to 14.3% and 16.7%, respectively, significantly lower than the rates observed from 2005 to 2010 (approximately 34.3% for credit growth and 32% for the money supply).

Table 6: Macroeconomic indicators from 2011-2016

	2011	2012	2013	2014	2015	2016
GDP growth	6.24%	5.25%	5.42%	5.98%	6.99%	6.69%
Bank credit to the private (% of GDP)	80%	76%	78%	90.4%	98.86%	104%
Bank assets to GDP (%)	-	-	-	115.7%	128.0%	142.1%
Bank credit to total GDP	102%	95%	97%	101%	111%	122%
Credit growth	14.7%	8.9%	12.5%	14.2%	17.3%	18.3%
Overall payment growth (M2)	12.1%	18.5%	18.9%	17.7%	16.2%	18.4%
Headline inflation (average CPI)	18.6%	9.2%	6.6%	4.1%	0.6%	2.7%
Average yearly exchange rate (against USD)	20,510	20,828	20,933	21,159	21,677	22,182
Average yearly rediscount rate	11.8%	9.6%	5.5%	4.58%	4.5%	4.5%
Average yearly refinance rate	13.0%	11.6%	7.5%	6.58%	6.5%	6.5%

Source: Bankscope, GSO, SBV, and calculated by the author

Another bright spot during this period was the achievement of substantial economic growth over six years, while the headline inflation rate declined from its peak of 18.6% to 2.7% in 2016. This was due to the sustained decline in both rediscount and refinance rates since late 2012, which supported economic activity following the strong tightening measures in early 2011. This thus illustrated the recovery of economic stability. Additionally, the credit-to-GDP ratio has been stable, with a slight annual increase, suggesting that credit flows are increasingly directed towards the production sector.

Turning to the banking sector, as noted earlier, this period was the most challenging for the banking system, given its earlier rapid growth and poor risk

management practices. All key performance indicators dropped significantly due to high credit provisioning for loan losses. Although the NPL ratio was reported by the SBV as only 3-4% annually, it was much higher.¹ Consequently, in 2013, the SBV issued Circular 02 (**SBV, 2013**), followed by Circular 09 (**SBV, 2014**), to improve loan classification and provisioning, enhance transparency of NPLs, and restore investor confidence. These two circulars requested that banks adopt their credit rating system in accordance with international best practices for classifying NPLs.

Table 7: Banking indicators from 2011-2016

	2011	2012	2013	2014	2015	2016
ROE (before tax)	14.6%	11.0%	7.7%	8.0%	3.6%	4.9%
ROA (before tax)	1.4%	1.0%	0.7%	0.7%	0.3%	0.6%
NIM	4.0%	4.3%	3.1%	2.7%	3.6%	3.0%
NPL ratio	3.1%	4.1%	3.6%	3.3%	2.6%	10.1% (*)
Banks' NICS	16.8%	15%	19.2%	17.6%	21.6%	22.3%
Banks' CIR	42.1%	51.2%	54.4%	51.3%	52.2%	51.7%
Z-score (insolvency index)	16.8%	15.6%	15.3%	14.7%	13.9%	12.8%
Banks' CAR	-	13.8%	13.3%	11.83%	12.8%	12.6%

Source: Bankscope and SBV; () include all on-balance sheet NPLs, unsettled bad debts sold to VAMC, and highly risky loans exposed to NPLs*

More importantly, to fully resolve the root cause of the problem, the establishment of the VAMC (Vietnam Asset Management Company) under the SBV in July 2013 was essential to help banks address non-performing loans. The early years of VAMC were less resourceful than expected due to insufficient capital, inadequate human resources stemming from limited practical experience, poor legal counsel, and limited authority and power. Hence, the most significant benefit of VAMC since its inception has been to help banks remove part of their bad debts from the balance sheet and extend the provisioning period for those sold.

c) Period 2017- Present

This period continued to see progress in the banking system's restructuring and the strengthening role of VAMC. Other stringent policies, such as Circular 41 (**SBV, 2016**) and Circular 22 (**SBV, 2019**), were introduced to further enhance banks' risk management practices. Average credit and overall payment growth were 14.3% and 13.5%, respectively, lower than during the 2011-2016 period. In fact, before the COVID-19 pandemic in 2020, Vietnam's macroeconomy appeared highly

¹ According to the estimation of Fitch, an international credit rating agency, the Vietnam banks' NPL would be 3-4 times higher if applying the International Accounting Standard.

optimistic, as evidenced by high GDP growth, controlled inflation, and credit and overall payment growth within acceptable levels. Even during the unprecedented COVID-19 pandemic, Vietnam was among the few countries worldwide that achieved positive economic growth. This indicates a significant improvement in policymakers' ability to navigate the economy through turbulent periods.

Table 8: Macroeconomic indicators from 2017 to 2023

	2017	2018	2019	2020	2021	2022	2023
GDP growth	6.81%	7.08%	7.02%	2.91%	2.58%	8.12%	5.05%
Exports as % of GDP	81.76%	84.42%	85.16%	84.38%	93.85%	93.42%	86.5%
Bank credit to the private (% of GDP)	104%	105%	108%	115.5%	124%	125.9%	-
Bank assets to GDP	148%	149%	152%	163%	136%	168%	-
Bank credit to GDP	130%	130%	136%	146%	124%	133%	-
Credit growth	18.3%	13.9%	13.7%	12.2%	13.6%	14.2%	13.8%
Overall payment growth (M2)	15%	12.4%	14.8%	14.5%	10.7%	6.2%	12.5%
Headline inflation (average CPI)	3.5%	3.5%	2.8%	3.2%	1.8%	3.2%	3.3%
Average yearly exchange rate (against USD)	22,370	22,602	23,050	23,208	23,160	23,272	23,794
Average yearly rediscount rate	4.38%	4.25%	4.17%	3.13%	2.5%	3.08%	3.38%
Average yearly refinance rate	6.38%	6.25%	6.17%	4.71%	4.0%	4.58%	5.0%

Source: Bankscope, SBV, GSO, and calculated by the author

The banks' performance indicators have returned to track, thanks to a significant decrease in NPL and the successful settlement of bad loans. This helps reduce loan loss provisioning and increases additional income from provision reversal. Due to more efficient operations in handling VAMC's bad debts, banks' profitability has improved since 2017, as evidenced by higher ROE and ROA.

Table 9: Banking indicators from 2017-2023

	2017	2018	2019	2020	2021	2022	2023
ROE (before tax)	7.3%	9.2%	12.8%	11.0%	14.7%	15.8%	14.2%
ROA (before tax)	0.7%	0.9%	1.0%	1.0%	1.2%	1.4%	1.3%
NIM	2.8%	2.9%	3.1%	3.0%	3.4%	-	-
NPL ratio (*)	7.4%	5.9%	4.4%	5.1%	7.3%	-	-
Banks' NICS	24.1%	26.8%	26.6%	25.9%	29.1%	-	-
Banks' CIR	48.3%	46.5%	43.6%	42.4%	34.7%	-	-
Z-score (insolvency index)	12.6%	13.3%	13.0%	13.6%	14.7%	-	-
Banks' CAR	12.1%	11.9%	11.8%	11.4%	11.5%	11.7%	11.8%

Source: Bankscope and SBV

This period also saw a strategic shift among most of Vietnam's local banks toward non-interest income, following the SBV's call to reduce reliance on interest income and to concentrate more on fee-based services. Many Vietnamese commercial banks have strategically diversified their operations to expand customer services, including

card payments, internet and SMS banking, and partnerships with other financial services such as insurance, securities investments, and trading, to enable cross-selling. Indeed, this strategic transition was well reflected in the increase in NICS from 16.8% in 2011 to 29.1% in 2021. Another ratio to note is the CIR. The strategic shift of most Vietnamese commercial banks has led to rapid growth in digital banking with high-tech products and services, contributing to a significant decline in the CIR from its peak of 54.4% in 2013 to 34.7% in 2021.

4.2 Taiwan

4.2.1 A brief overview of the historical development of the banking sector and monetary management

Over the past 75 years, the Taiwanese economy has shifted from a manufacturing-based economy to a global leader in high-technology sectors, especially semiconductors and electronics. The era, from 1950 to 1995, commonly known as the "Taiwan Miracle," was characterised by dynamic economic growth (6-8% annually), rapid technological advancement, and enhanced integration into the global economy, as reflected by export-led industrialisation. Such a significant transformation of the Taiwanese economy has been attributable to the CBC's innovative monetary policy. Indeed, Taiwan's monetary policy has undergone substantial changes, shifting from a fixed exchange-rate system to a more flexible approach, followed by a focus on monetary targeting and, later, inflation targeting. In recent years, its primary objective has been to ensure price stability while fostering economic growth. More specifically, the first turning point was in 1995, when the CBC adopted a managed float exchange rate from a long-standing fixed exchange rate regime, alongside OMO and reserve requirements to manage the money supply. The second turning point occurred in 2003, when the CBC adopted monetary targeting by setting an annual target for money supply growth (M2) to achieve price stability (i.e., a target annual inflation rate below 2%). This regime appeared to be effective during stable periods, but less responsive to economic or financial shocks, for instance, the global financial crisis of 2008, which required more support in the form of interest rate cuts and high liquidity injection (exceeding the M2 target) from the CBC. Therefore, in response to the COVID-19 pandemic in 2020, the CBC shifted from a monetary targeting approach to an inflation-targeting framework, emphasising the primary objective of keeping inflation within a specified range of approximately 2%. Unlike monetary targeting, this framework

can set a reference range for money supply growth, in combination with interest rates and other tools, to prioritise controlling inflation at around 2%.

Similar to the SBV, the CBC also applies various monetary tools, including policy rates (primarily the discount rate), OMO, reserve requirements, FX intervention, and especially a range of macroprudential measures, such as the loan-to-value ratio, debt-to-income ratio, etc., for borrowers and capital and liquidity requirements for banks, concentrating on credit control, enhancing banks' buffer, and asset bubbles.

4.2.2 The banking structure

As of the end of 2023, the Taiwanese banking sector comprised nine state-owned commercial banks (fully and partially owned by the State), 30 privately owned commercial banks, 31 foreign banks, and other credit institutions. As shown in the table below, there has not been much change in the number of banks from 2016 to 2023.

Table 10: Number of banks in Taiwan from 2016 to 2023

Number of banks	2016	2017	2018	2019	2020	2021	2022	2023
State-owned banks	9	9	9	9	9	9	9	9
Privately owned banks	31	30	28	29	29	30	31	30
Foreign-owned banks	29	29	29	29	29	30	31	31
Others	335	335	335	335	335	335	335	335
Total	404	403	401	402	402	404	406	405

Note: State-owned banks are Bank of Taiwan, Land Bank of Taiwan, Taiwan Cooperative Bank, First Commercial Bank, Hua Nan Commercial Bank, Chang Hwa Commercial Bank, Mega International Commercial Bank, Taiwan Business Bank, and Export-Import Bank of ROC; Source: CBC

Regarding the market share of loans, we also observe that domestic banks, including state-owned and privately owned banks, largely dominate the market, with over 91.59% as of 2023. Of which, state-owned banks account for 43.9%, and privately owned banks occupy the remaining 47.7%.

Table 11: Loans' market share from 2017 to 2023

Loans' market share	2017	2018	2019	2020	2021	2022	2023
Domestic banks	89.91%	89.57%	89.44%	90.21%	90.53%	90.78%	91.59%
Foreign-owned	4.27%	4.58%	4.80%	4.15%	3.99%	3.95%	3.09%
Others	5.82%	5.85%	5.76%	5.64%	5.48%	5.27%	5.32%
Total	100%	100%	100%	100%	100%	100%	100%

Note: Domestic banks include state-owned and privately owned banks; Source: CBC

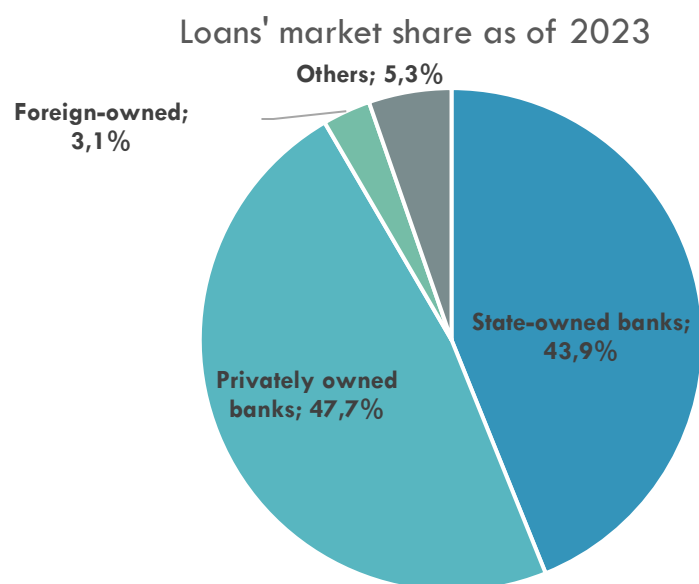


Figure 6: Loans' market share as of 2023; Source: CBC & Own processing

Regarding the market share of deposits, we also find that domestic banks are eating into market share and, similar to the loan market, largely dominate the market, accounting for over 80.68%. Of which, state-owned banks account for 36.5%, and privately owned banks occupy the remaining 44.2%.

Table 12: Deposits' market share from 2017 to 2023

Deposits' market share	2017	2018	2019	2020	2021	2022	2023
Domestic banks	77.92%	78.25%	78.56%	79.37%	80.55%	80.28%	80.68%
Foreign-owned	1.71%	1.56%	1.66%	1.92%	1.29%	1.99%	1.97%
Others	20.37%	20.19%	19.78%	18.71%	18.16%	17.73%	17.35%
Total	100%	100%	100%	100%	100%	100%	100%

Note: Domestic banks include state-owned and privately owned banks; Source: CBC

Deposits' market share as of 2023

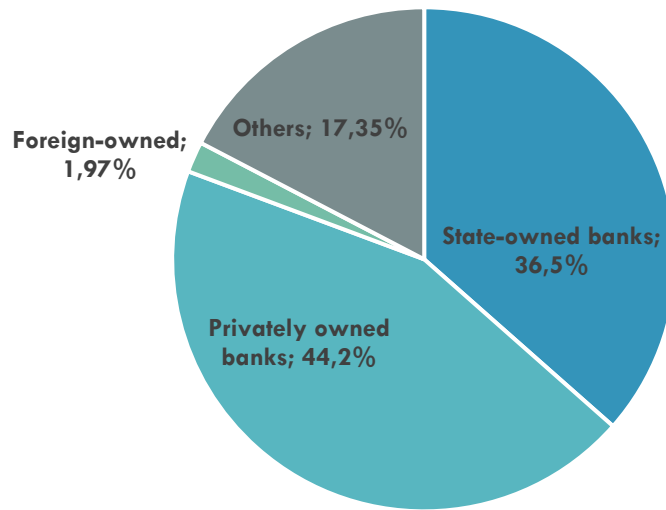


Figure 7: Deposits' market share as of 2023; Source: CBC & Own processing

4.2.3 Macroeconomic landscape and the evolution of the banking sector

The following section also segments macroeconomic and banking data into three periods: 2005-2010, 2011-2016, and 2017-2023, to examine how the Taiwanese banking sector responds to monetary policy changes.

a) Period 2005-2010:

During this period, the most notable economic event was the widespread financial crisis in the U.S., which severely damaged Taiwan's economy over two consecutive years, 2008 and 2009. More specifically, after achieving a growth rate of 6.5% in 2007, Taiwan's economy declined significantly to 0.7% in 2008 and further to -1.6% in 2009. This significant drop in Taiwan's economic growth can be attributed to its high economic openness and heavy reliance on exporting markets, which were severely impacted. Hence, to promptly address the economic downturn, the CBC immediately implemented expansionary monetary policies by continuously lowering key interest rates, specifically the discount rate and refinancing rate, from an average of 3.28% and 3.68% in 2008 to 1.27% and 1.65% in 2009, respectively, aiming to stimulate domestic investment, business activities, and consumption. As a result of these timely measures, Taiwan's economy rebounded, with growth surging to 10.6%. The economic recovery was also reflected in a rise in credit growth, from

0.7% in 2009 to 6.2% in 2010, which significantly contributed to the expansion of business activity.

Table 13: Macroeconomic indicators from 2005-2010

	2005	2006	2007	2008	2009	2010
GDP growth	5.4%	5.6%	6.5%	0.7%	-1.6%	10.6%
Bank credit to the private (% of GDP)	-	-	-	-	-	-
Bank assets to GDP (%)	231.0%	234.9%	224.5%	223.2%	251.5%	242.6%
Credit growth	7.8%	4.1%	2.4%	3.4%	0.7%	6.2%
Overall payment growth (M2)	6.2%	6.2%	4.2%	2.7%	7.5%	4.5%
Headline inflation (average CPI)	2.3%	0.6%	1.8%	3.5%	-0.9%	1.0%
Average yearly exchange rate (against USD)	32.22	32.52	32.79	31.51	33.01	31.61
Average yearly rediscount rate	1.97%	2.48%	3.05%	3.28%	1.27%	1.37%
Average yearly refinance rate	2.34%	2.85%	3.43%	3.68%	1.65%	1.73%

Source: Bankscope, Central Bank, and calculated by the author

Regarding banking indicators, it is noteworthy that the two indicators, ROE and ROA, recorded negative values of -0.9% and -0.1% in 2006 due to a decline in interest income and a surge in NPLs resulting from credit card issues. The NPL ratio peaked at 2.2% during this period. However, in 2007, these two important indicators recovered to 4.3% and 0.3%, respectively, before declining again in 2008. However, in 2010, thanks to an economic boom reflected in GDP and credit growth, the ROE and ROA reached their highest levels during this period, at 9.1% and 0.6%, respectively. The NPL ratio was also downward, from 2.2% to 0.6% in 2010, reflecting banks' efforts to write off and sell bad loans.

Table 14: Banking indicators from 2005-2010

	2005	2006	2007	2008	2009	2010
ROE (before tax)	4.7%	-0.9%	4.3%	1.9%	4.5%	9.1%
ROA (before tax)	0.3%	-0.1%	0.3%	0.1%	0.3%	0.6%
NIM	-	-	-	-	-	-
NPL ratio	2.2%	2.2%	1.8%	1.5%	1.2%	0.6%
Banks' NICS	33.9%	31.7%	33.6%	21.5%	40.5%	40.5%
Banks' CIR	-	-	-	-	-	-
Z-score (insolvency index)	-	-	-	-	-	-
Banks' CAR	11.2%	10.9%	10.8%	11.0%	11.8%	12.0%

Source: Bankscope, Central Bank, and calculated by the author

b) Period 2011-2016:

This period did not witness any significant shocks, except for 2015, when a sharp decline in global oil and energy prices weakened export markets, especially in China, Taiwan's largest export market. This, hence, pulled Taiwan's economic growth

down to only 1.5%, the lowest during this period. Again, to support the economy, the Central Bank of Taiwan continued to cut the discount and refinance rates, from an average of 1.82% and 2.2% in 2015 to 1.46% and 1.75%, respectively, in 2016. This period also saw the TWD depreciate by 9.63% to support export activities and bolster economic growth.

Table 15: Macroeconomic indicators from 2011-2016

	2011	2012	2013	2014	2015	2016
GDP growth	3.8%	2.1%	2.2%	4.7%	1.5%	2.2%
Bank credit to the private (% of GDP)	-	-	-	-	-	140.7%
Bank assets to GDP (%)	246.7%	253.5%	267%	264.6%	260%	260.6%
Credit growth	6.0%	5.7%	4.6%	5.2%	4.6%	3.9%
Overall payment growth (M2)	5.8%	4.2%	4.8%	5.7%	6.3%	4.5%
Headline inflation (average CPI)	1.4%	1.9%	0.8%	1.20%	-0.3%	1.4%
Average yearly exchange rate (against USD)	29.48	29.53	29.82	30.43	31.90	32.32
Average yearly rediscount rate	1.78%	1.88%	1.88%	1.88%	1.82%	1.46%
Average yearly refinance rate	2.16%	2.25%	2.25%	2.25%	2.20%	1.75%

Source: Bankscope, Central Bank, and calculated by the author

Following the global financial crisis, banking indicators, including profitability, NPLs, and the CAR, remained stable. Specifically, ROE and ROA consistently maintain above 9% and 0.6%, respectively. Although these two indicators were only at average levels, they reflected the progress of the recovery following the 2008 financial crisis. The NPL ratio remained well controlled, staying below 0.5%, while the CAR was consistently maintained above the minimum required level.

Table 16: Banking indicators from 2011-2016

	2011	2012	2013	2014	2015	2016
ROE (before tax)	9.3%	10.4%	10.3%	11.6%	10.7%	9.2%
ROA (before tax)	0.6%	0.7%	0.7%	0.8%	0.7%	0.7%
NIM	-	-	-	1.2%	1.3%	1.1%
NPL ratio	0.43%	0.41%	0.39%	0.25%	0.24%	0.27%
Banks' NICS	37.4%	37.7%	39.0%	40.7%	39.2%	40.0%
Banks' CIR	-	-	-	50.4%	61.3%	60.7%
Z-score (insolvency index)	-	-	-	17.9%	17.9%	18.5%
Banks' CAR	12.1%	12.5%	11.8%	12.4%	12.9%	13.3%

Source: Bankscope, Central Bank, and calculated by the author

c) Period 2017-2023:

During this period, despite the COVID-19 outbreak in 2020, Taiwan's economy demonstrated remarkable resilience, as evidenced by a positive GDP growth rate of 3.4% in 2020, surging to 6.6% in 2021 following the reopening of international

markets after the lockdown. Nevertheless, Taiwan's economy exhibited signs of deceleration, falling to 1.31% in 2023, primarily due to the effects of stringent monetary policies in both local and global export markets, stemming from a period of continuous support through various stimulus packages and measures during the post-COVID-19 period. Indeed, this monetary change could be observed by adjusting rediscount and refinance rates before and after 2021. Before 2021, rediscount and refinance rates remained low, supporting local businesses to overcome COVID-19. However, after 2021, contractionary policy was implemented, as evidenced by increases in these two key interest rates, which led to a deceleration in economic growth.

Table 17: Macroeconomic indicators from 2017-2023

	2017	2018	2019	2020	2021	2022	2023
GDP growth	3.3%	2.8%	3.1%	3.4%	6.6%	2.6%	1.31%
Bank credit to the private (% of GDP)	146.3%	150.9%	155%	159.2%	159.9%	160.7%	166.1%
Bank assets to GDP	265%	271%	275.3%	283.2%	278.0%	283.9%	289%
Credit growth	4.82%	5.39%	4.96%	6.79%	8.39%	6.38%	6.58%
Overall payment growth (M2)	3.8%	3.5%	3.5%	5.8%	8.7%	7.5%	6.3%
Headline inflation (average CPI)	0.6%	1.4%	0.6%	-0.2%	2.0%	3.0%	2.5%
Average yearly exchange rate (against USD)	30.44	30.16	30.93	29.58	28.02	29.78	31.15
Average yearly rediscount rate	1.38%	1.38%	1.38%	1.12%	1.13%	1.46%	1.85%
Average yearly refinance rate	1.75%	1.75%	1.75%	1.54%	1.50%	1.83%	2.23%

Source: Bankscope, Central Bank, and calculated by the author

During this period, key banking-sector indicators remained stable, indicating consistent performance relative to the previous period. Despite the impact of COVID-19 in 2020, the ROE declined slightly from 9.4% in 2019 to 7.8% in 2020, before rebounding in subsequent years, while ROA remained flat. NPLs and CARs remained well-maintained, owing to the CBC's strict regulatory measures and supervision.

Table 18: Banking indicators from 2017-2023

	2017	2018	2019	2020	2021	2022	2023
Banks' ROE (before tax)	9.2%	9.4%	9.4%	7.8%	8.1%	9.30%	10.30%
Banks' ROA (before tax)	0.7%	0.7%	0.7%	0.6%	0.6%	0.60%	0.70%
Bank's NIM	1.2%	1.1%	1.1%	1.0%	1.0%	-	-
Bank's NPL ratio	0.28%	0.24%	0.22%	0.22%	0.17%	0.15%	0.14%
Banks' NICS	40.0%	40.7%	43.4%	40.1%	37.9%	33.9%	44.1%
Banks' CIR	62.2%	59.5%	59.8%	62.0%	61.7%	-	-
Z-score (insolvency index)	18.8%	19.0%	19.5%	18.5%	17.8%	-	-
Banks' CAR	14.2%	14.0%	14.1%	14.8%	14.8%	14.68%	15.33%

Source: Bankscope, Central Bank, and calculated by the author

Table 19: Comparative summary between Taiwan and Vietnam from 2005 to 2023

		TAIWAN	VIETNAM
Period 2005-2010	Macroeconomic landscape	Average GDP growth: 4.5% Average CPI: 1.4% Average credit growth: 4.1% Average money supply: 5.2% Average rediscount rate: 2.2% Average refinance rate: 2.6% Average appreciation 1.9%	Average GDP growth: 6.5% Average CPI: 10.5% Average credit growth: 34.3 % Average money supply: 32.0% Average rediscount rate: 5.2% Average refinance rate: 8.3% Average depreciation: 15.5%
		Analysis: Although Vietnam experienced higher economic growth than Taiwan, its inflation surged to double-digit levels, exceeding Taiwan's modest 1.4%. This was a sign of macroeconomic instability in Vietnam, an inevitable consequence of exceptionally high average growth rates of credit and the money supply, at 34.3% and 32%, respectively, significantly higher than in Taiwan during this period. Despite the SBV's efforts to continuously raise the rediscount and refinancing rates, these measures were insufficient to cool down the economy. This period also saw the VND depreciate by 15.5% due to a large trade deficit, which led to a shortage of foreign currency in the local market and a decline in foreign exchange reserves.	
	The Banking Sector	Average ROA: 0.25 % Average ROE: 3.93 % Average NIM: N/A Average NPL: 1.58 % Average CIR: N/A Average NICS: N/A	Average ROA: 1.4% Average ROE: 15.7% Average NIM: 2.9% Average NPL: 2.6% Average CIR: 40.7% Average NICS: N/A
		Analysis: Thanks to the high credit growth rate, as analyzed above, the ROE and ROA of Vietnamese banks were significantly higher than those of Taiwan's banks. Additionally, this period witnessed a significant increase in non-performing loans among Taiwan's banks, primarily from credit card accounts, resulting in a decline in their profits. Moreover, although	

		the NPL ratio of Vietnamese banks remained below the SBV's 3% limit, there were growing signs of a bad-loan crisis at some banks, attributable to a prolonged period of aggressive credit expansion and inadequate risk-management practices.	
Period 2011-2016	<i>Macroeconomic landscape</i>	TAIWAN	VIETNAM
		Average GDP growth: 2.75 % Average CPI: 1.06% Average credit growth: 5.0 % Average money supply: 5.2 % Average rediscount rate: 1.78 % Average refinance rate: 2.14 % Average depreciation: 9.63 %	Average GDP growth: 6.1% Average CPI: 6.96 % Average credit growth: 14.3 % Average money supply: 16.9 % Average rediscount rate: 6.7 % Average refinance rate: 8.66 % Average depreciation: 8.15 %
		<u>Analysis:</u> This period witnessed an improvement in Vietnam's macroeconomic landscape, with an average economic growth rate of 6.1%, while inflation has been reduced to a single digit. In addition, two key indicators—credit growth and money supply—have been managed at reasonable levels, indicating that credit flows were efficiently directed toward productive channels, thereby bolstering economic growth, rather than non-productive sectors such as real estate and securities. This period also saw an expansionary monetary policy in two countries, in which the discount and refinancing rates were continuously adjusted downward to support domestic businesses. At the same time, both the TWD and VND were devalued by an average of 9.63% and 8.15%, respectively, to support exporting activities.	
	<i>The Banking Sector</i>	Average ROA: 0.7% Average ROE: 10.25% Average NIM: 1.2% Average NPL: 0.3% Average CIR: 57.4% Average NICS: 47.77%	Average ROA: 0.8% Average ROE: 14.3% Average NIM: 3.2% Average NPL: 4.5% Average CIR: 50.5% Average NICS: 20.53%
		<u>Analysis:</u> Although Taiwan's banking sector has recovered from the surge in bad debt associated with credit card loans, profitability indicators, such as ROA and ROE, remain	

		lower than those in Vietnam. This can be explained by two main reasons: 1) Taiwan's NIM, the profit margin from lending activities, are only 1.2%, much lower than Vietnam's 3.2%; 2) The CIR in Taiwan is very high compared to Vietnam, leading to lower pre-tax profits. This period also witnessed a surge in NPLs at Vietnamese banks, with an average NPL ratio of 4.5%. Another noteworthy point is that the NICS of banks in Taiwan is very high, reaching nearly 48%, while in Vietnam, it is only 20.5%, indicating that Taiwanese banks have aggressively focused on developing fee-based services.	
Period 2017-2023	<i>Macroeconomic landscape</i>	Average GDP growth: 3.3% Average CPI: 1.39 % Average credit growth: 6.2 % Average money supply: 5.57% Average rediscount rate: 1.4% Average refinance rate: 1.8% Average appreciation/depreciation: depreciated: 2.33%	Average GDP growth: 5.65 % Average CPI: 3.04% Average credit growth: 14.2% Average money supply: 12.3% Average rediscount rate: 3.6% Average refinance rate: 5.3 % Average appreciation/depreciation: depreciated: 6.4 %
		<u>Analysis:</u> Although COVID-19 marked a significant shock to this period, both economies demonstrated positive growth and well-controlled inflation. Both countries maintained expansionary monetary policy, as reflected in low discount and refinancing rates, to support local business activity, particularly in overcoming the difficulties caused by COVID-19. Exchange rates continued to depreciate, but to a lesser extent in both countries, to further support local businesses and export activities.	
	<i>The Banking Sector</i>	Average ROA: 0.7% Average ROE: 9.1% Average NIM: 1.1% Average NPL: 0.2% Average CIR: 61% Average NICS: 50.9%	Average ROA: 1% Average ROE: 12.1% Average NIM: 2.9% Average NPL: 6% Average CIR: 43.1% Average NICS: 24.3%
		<u>Analysis:</u> Profitability indicators, such as ROA, ROE, and NIM, in both countries decreased slightly compared to the previous period, partly due to the impact of the COVID-19	

		pandemic. The NPL ratio in Vietnam continued to rise, whereas in Taiwan it remained well controlled. A positive sign for Vietnam's banking sector is that the CIR ratio has decreased to around 40%, whereas it remains very high in Taiwan, at over 60%. Additionally, although the NICS in Vietnam remains significantly lower than in Taiwan, this indicator has shown improvement following the SBV's call to focus on developing fee-based services.
<u>Concluding remark:</u> - Overall, the comparison underscores the trade-offs between growth and stability in different stages of financial development. Taiwan represents a mature banking system characterised by low risk, diversified income, and operational conservatism, albeit with narrower margins and higher costs. Vietnam, as a frontier market, had leveraged rapid credit expansion to drive higher bank profitability and economic growth, but at the expense of periodic instability and asset-quality challenges. These insights highlight the importance of context-specific monetary policy transmission and the need for continued structural reforms in Vietnam to enhance resilience as it progresses toward emerging-economy status. - Regarding the banking structure of the two economies, a key similarity lies in the dominant role of domestic banks and the closely balanced market positions between state-owned and privately owned commercial banks as of 2023. However, in both markets, privately owned banks have surpassed state-owned banks in market share, reflecting a gradual shift toward the private sector. This evolution suggests the maturation of financial sectors, in which private players are increasingly capable of competing with traditionally dominant state-owned entities.		

5. REGRESSION RESULTS AND DISCUSSION

5.1 General approach to the data interpretation

To provide clear insight into the results supporting the study hypothesis, this 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 the quantiles (25%, 50%, 75%, and 95%) to assess the spread of the data. This part, on the one hand, is essential for providing 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.

After the quantile examination, the study employs a sequential empirical approach, conducting regression analyses on panel data to evaluate the results. The study begins with a pooled OLS model as a baseline to provide initial estimates, then applies random-effects (REM) and fixed-effects (FEM) models to account for unobserved individual heterogeneity. During this stage, the paper performs several diagnostic tests, including the Hausman test (**Hausman, 1978**) to determine the appropriateness of the fixed-effects versus random-effects model, as well as the Modified Wald test (**Baum et al., 2003**) and the Wooldridge test (**Wooldridge, 2002**) to assess heteroskedasticity and autocorrelation, respectively. If evidence of autocorrelation and heteroskedasticity is detected, feasible generalised least squares (FGLS) is employed to address these issues. Next, we conducted the Wu-Hausman test (**Wu, 1973; Hausman, 1978**) to assess whether any variables in the models were endogenous. If endogeneity is detected, we proceed by applying the System Generalised Method of Moments (SGMM), which addresses potential endogeneity and lagged variables (**Arellano & Bover, 1995; Blundell & Bond, 1998**). Moreover, the validity of the SGMM has to be supported by several diagnostic tests: first, the Hansen J-test of overidentifying restrictions fails to reject the null hypothesis of instrument exogeneity (p-value > 0.05), second, the Arellano-Bond AR(2) test indicates no evidence of second-order serial correlation (p-value > 0.05), while AR(1) is present as expected (p-value < 0.05), third, the number of instruments is kept below the number of groups to mitigate instrument proliferation concerns (**Roodman, 2009**).

Lastly, to further confirm the findings, this section ends with a robustness check in which the dependent variable, ROA, is replaced with ROE, to verify the results' consistency across alternative measures.

5.2 Data description

Table 20: Data Description for both countries, Taiwan and Vietnam

Taiwan						Vietnam					
Variable	Obs	Mean	Std. dev.	Min	Max	Variable	Obs	Mean	Std. dev.	Min	Max
ROA	310	0.00621	0.003565	0.00011	0.02635	ROA	280	0.00941	0.00751	-0.00720	0.03653
ROE	310	0.07955	0.031154	0.00372	0.20531	ROE	280	0.11421	0.07975	-0.12332	0.30332
CG	310	0.05701	0.012588	0.0389	0.08390	CG	280	0.1494	0.02070	0.122	0.183
Redis	310	0.01489	0.002594	0.01125	0.01875	Redis	280	0.03846	0.0071	0.025	0.045833
LogExch	310	10.3235	0.038544	10.2408	10.3834	LogExch	280	10.0271	0.03405	9.95980	10.0755
CAR	310	0.14120	0.027359	0.0939	0.523	CAR	280	0.11987	0.03138	0.08	0.2453
NPL	310	0.00250	0.001891	0.00	0.0098	NPL	280	0.02094	0.02199	0.0034	0.29757
LDR	310	0.70980	0.108685	0.19472	0.92403	LDR	280	0.90866	0.15745	0.37187	1.46909
Assgrow	310	0.06525	0.146285	-0.38368	2.22984	Assgrow	280	0.15578	0.11020	-0.22499	0.60426
Zscore	310	0.01837	0.011247	0.00507	0.05214	Zscore	280	0.05401	0.02376	0.01632	0.13145
CIR	310	0.52998	0.121020	0.19117	0.90603	CIR	280	0.50487	0.15729	0.22706	1.72248
NICS	310	0.39618	0.181905	-0.34705	2.20182	NICS	280	0.20476	0.10624	-0.25940	0.50667
GDP	310	0.02751	0.015042	0.0075	0.0645	GDP	280	0.06002	0.01832	0.0255	0.0812
CPI	310	0.01198	0.010231	-0.0031	0.0295	CPI	280	0.0286	0.00949	0.006	0.041

Source: own processing

The table above comprehensively summarises all variables used in the regression model. It comprises a dataset of 59 banks from 2014 to 2023, yielding 590 observations from Taiwan and Vietnam.

Comparing the profitability indicators, ROA and ROE, between the two countries, it is evident that banks in Vietnam exhibit higher ROE and ROA, with a maximum and minimum of 30.3% and 3.7%, respectively, whereas these ratios at banks in Taiwan are 20.5% and 2.6%, respectively. Nonetheless, the standard deviations of ROA and ROE in Vietnam are significantly higher than those in Taiwan, indicating a substantial disparity in profitability across banks. This also highlights the uncertainties and high risk associated with profitability in a small yet rapidly expanding market, such as Vietnam, in contrast to an adequate banking system characterised by stringent management and best practices in Taiwan.

Another ratio worth noting is the NPL ratio, which reflects how effectively banks in Taiwan and Vietnam manage asset quality, particularly their lending portfolios. The dataset reveals significant differences in credit risk management between the two banking systems. The mean and maximum NPL ratios in Taiwan are

approximately 0.1% and 1%, respectively, whereas in Vietnam they are 2.2% and 30%, respectively. This indicates the poor credit risk management in Vietnam. Additionally, we must be aware that this NPL ratio in Vietnam is just the tip of the iceberg, as many Vietnamese banks' NPLs have been restructured, written off the balance sheet, or sold to the VAMC for debt settlement. Hence, if accurately computed, Vietnam's non-performing loan (NPL) ratio may be 2-3 times the current level.

The LDR reflects the bank's overall liquidity, indicating the extent to which it utilises its deposit base for lending. In Taiwan, this ratio across all banks is adequately controlled at below 100%, whereas in some Vietnamese banks it approaches 150%, reflecting significant liquidity risk. This is a concerning sign for the Vietnamese banking system, as liquidity issues at several banks may trigger a deposit race among banks and exert upward pressure on interest rates. This phenomenon occurred in early 2011, when banks repeatedly raised their deposit rates to remain competitive and deter withdrawals from other weak or insolvent banks.

The CIR is the only ratio among Vietnamese banks that exceeds Taiwan's. Although the maximum CIR of Vietnamese banks is 172%, the mean is only 50.5%, lower than Taiwan's 53%. Over the last decade, following the SBV's call, the digitalisation of banking services and products has significantly reduced this crucial ratio in many Vietnamese banks, as they have shifted their business models from traditional lending to non-interest-based services. However, the mean NICS of Vietnam's banks remains only half that of Taiwan's, implying a long-term concentration on fee-based services by Taiwan's banks.

Regarding monetary indicators, credit growth (CG) in Taiwan's banks is substantially lower than in Vietnam's, with a mean growth rate of only 5.7% versus nearly 15% in Vietnam. This reflects the vital role of credit in Vietnam, a bank-based economy in which bank credit significantly finances most local businesses, investment, and consumption.

ROA, ROE, and NICS Histogram for Taiwan and Vietnam

Figure 8: Taiwan's ROA distribution

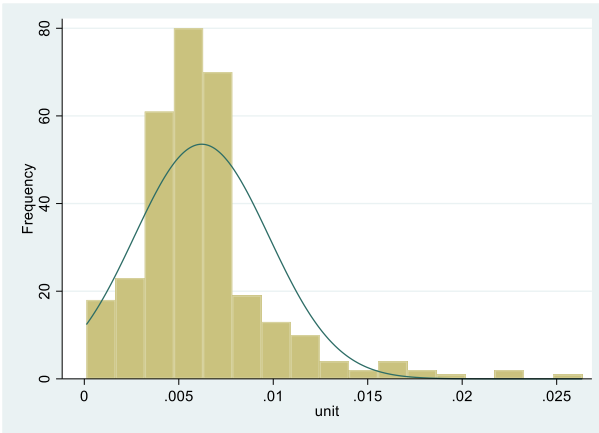


Figure 9: Vietnam's ROA distribution

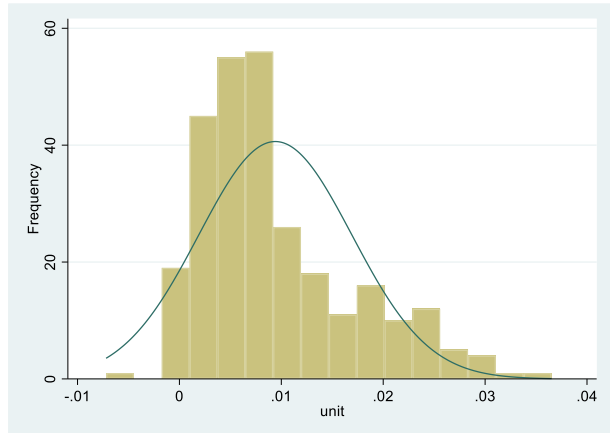


Figure 10: Taiwan's ROE distribution

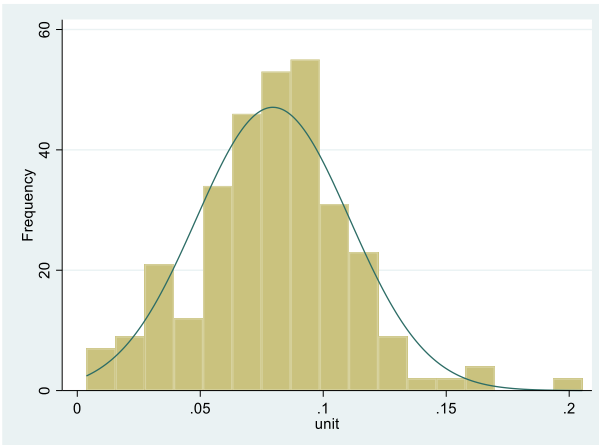


Figure 11: Vietnam's ROE distribution

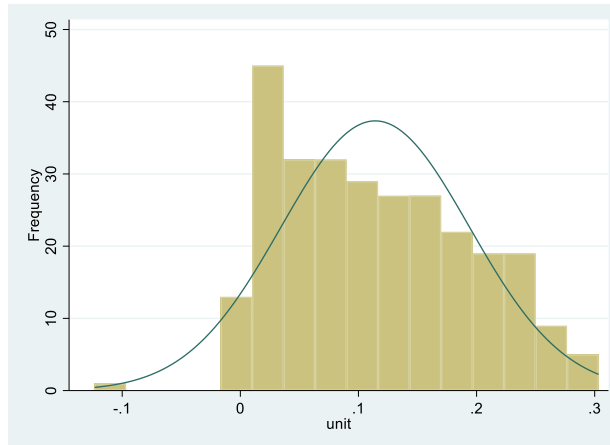


Figure 12: Taiwan's NICS distribution

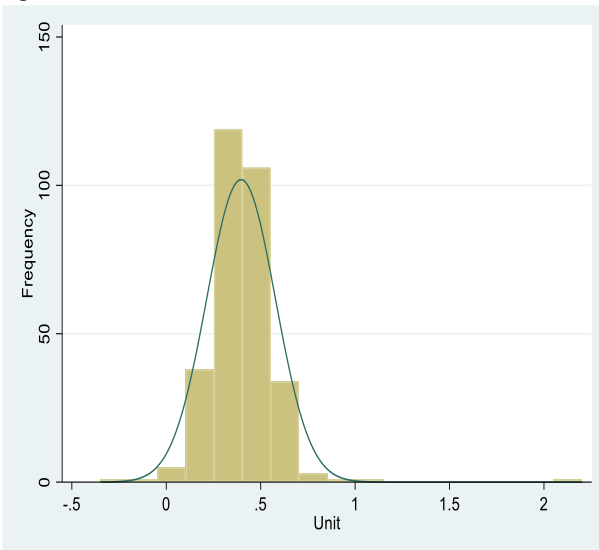
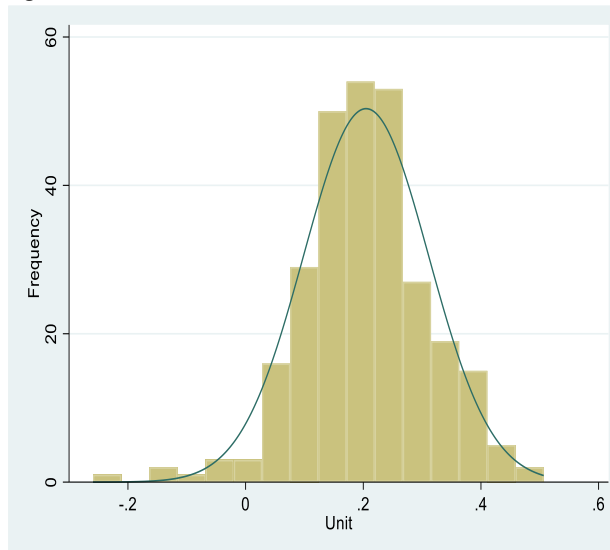


Figure 13: Vietnam's NICS distribution



5.3 Models without a moderator

5.3.1 The interest rate channel

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

Table 21: Correlation, collinearity, heteroskedasticity, and autocorrelation test in Taiwan

Taiwan	Redis	CAR	NPL	LDR	Assgro	Zscore	CIR	GDP	CPI	VIF
Redis	1									1.61
CAR	-0.1091	1								1.34
NPL	0.0421	-0.2325	1							1.19
LDR	0.0675	-0.3761	-0.0662	1						1.24
Assgrow	0.0777	-0.1329	-0.0263	0.0471	1					1.04
Zscore	0.0104	0.0523	0.0841	-0.1671	0.0522	1				1.05
CIR	-0.0691	-0.104	0.2606	-0.1161	0.0342	0.1439	1			1.12
GDP	-0.5708	0.0469	-0.0687	-0.0288	-0.0338	0.0034	0.0349	1		1.61
CPI	0.0802	0.1931	-0.1882	-0.0588	-0.0602	0.0157	-0.0286	0.1722	1	1.17
Mean VIF										1.26

The correlation between variables is >-0.8 and <0.8 , indicating no multicollinearity in the model (Gujarati, 2009)

VIF of all variables are less than 10, indicating no severe multicollinearity in the model (O'brien, 2007)

Modified test for heteroskedasticity: P-value=0.0000 <0.05 , indicating the existence of heteroskedasticity in model

Wooldridge test for autocorrelation, P-value = 0.0020 <0.05 , indicating the existence of autocorrelation in the model

Wu-Hausman test (Wu, 1973; Hausman, 1978) for endogenous variables: Assetgrowth (p-value = 0.0000)

Source: own processing

Table 22: Correlation, collinearity, heteroskedasticity, and autocorrelation test in Vietnam

Vietnam	Redis	CAR	NPL	LDR	Assgro	Zscore	CIR	GDP	CPI	VIF
Redis	1									2.44
CAR	0.1961	1								1.16
NPL	-0.0563	-0.0469	1							1.39
LDR	-0.3614	0.0009	-0.1049	1						1.52
Assgrow	0.0525	-0.2185	-0.0424	0.1243	1					1.16
Zscore	0.1509	0.1228	-0.0187	-0.0494	0.1702	1				1.08
CIR	0.3466	0.0765	0.4546	-0.4828	-0.0873	-0.0182	1			1.85
GDP	0.64	0.118	-0.0158	-0.0677	-0.0423	0.0508	0.1479	1		1.84
CPI	0.1017	-0.0914	0.0692	0.0481	0.0353	0.0086	-0.0005	0.1112	1	1.05
Mean VIF										1.50

The correlation between variables is >-0.8 and <0.8 , indicating no multicollinearity in the model (Gujarati, 2009)

VIF of all variables are less than 10, indicating no severe multicollinearity in the model (O'brien, 2007)

Modified test for heteroskedasticity: P-value = 0.0000 <0.05 , indicating the existence of heteroskedasticity in model

Wooldridge test for autocorrelation, P-value = 0.0091 <0.05 , indicating the existence of autocorrelation in the model

Wu-Hausman test (Wu, 1973; Hausman, 1978) for endogenous variables: NPL (p-value = 0.0000)

Table 23: Quantile regression results for the interest rate channel in both countries

Dependent (ROA)	Taiwan				Dependent (ROA)	Vietnam			
	Q25	Q50	Q75	Q95		Q25	Q50	Q75	Q95
Redis	0.226** (2.35)	0.214*** (2.66)	0.283*** (3.97)	0.582** (2.46)	Redis	-0.152*** (-2.73)	-0.241*** (-2.98)	-0.315** (-2.15)	-0.267** (-2.20)
CAR	0.0596*** (4.64)	0.0436*** (4.79)	0.0562*** (3.78)	0.0830*** (2.69)	CAR	0.0226** (2.31)	0.0330*** (3.01)	0.0228 (1.6)	0.0412 (0.92)
NPL	-0.236** (-2.15)	-0.11 (-1.33)	0.0296 (0.21)	0.283 (1.4)	NPL	-0.0749* (-1.78)	-0.0182 (-0.45)	0.00625 (0.11)	0.0778 (1.39)
LDR	0.00714** (2.43)	0.0000564 (0.02)	-0.00183 (-0.60)	0.00185 (0.43)	LDR	0.00779*** (2.62)	0.00962*** (2.82)	0.00892** (2.46)	0.00891 (1.57)
Assetgro~h	0.00204 (1.42)	0.0013 (0.77)	0.00067 (0.26)	-0.00234 (-0.51)	Assetgro~h	0.00908*** (3.63)	0.0135*** (6.72)	0.0104** (2.11)	0.0255*** (3.1)
Zscore	0.0595*** (3.21)	0.0485*** (4.15)	0.0745*** (3.17)	0.195*** (7.25)	Zscore	0.0326** (2.01)	0.0480** (2.36)	0.0781*** (3.04)	0.0486 (1.05)
CIR	-0.0101*** (-3.70)	-0.0151*** (-6.19)	-0.0187*** (-9.09)	-0.0198*** (-8.85)	CIR	-0.0150*** (-4.39)	-0.0218*** (-6.77)	-0.0304*** (-7.87)	-0.0340*** (-6.35)
GDP	0.0087 (0.53)	0.00468 (0.4)	0.0209 (1.4)	0.0154 (0.49)	GDP	0.00978 (0.4)	0.0344 (1.13)	0.085 (1.65)	0.0917 (1.64)
CPI	-0.0445*** (-2.92)	-0.0419*** (-3.64)	-0.0553*** (-3.49)	-0.013 (-0.35)	CPI	0.028 (1.02)	0.0316 (1.25)	0.0800* (1.77)	0.0831** (2.14)
N				310	N				280

Source: Own processing. The table presents statistical significance at the 10%, 5%, and 1% one-, two-, and three-star levels, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

A quantile regression is performed to estimate the relationship between study variables. While the 25th and 50th quantiles indicate a lower level, the 75th and 95th quantiles represent medium and high levels, respectively. The estimated results in Table 23 indicate the correlation between ROA and relevant variables across different quantile levels. In other words, this table provides the first insight into the diverse effects of the interest rate channel, as denoted by Redis, and the bank determinant variables and macroeconomic variables on ROA at various quantile levels in Taiwan and Vietnam.

First, a contrasting picture of the effect of Redis on ROA has emerged in Taiwan and Vietnam. In Taiwan, Redis is significantly and positively correlated with ROA across all quantiles (25th, 50th, 75th, and 90th), indicating that higher Redis is associated with higher ROA. 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., 0.582** at q95 versus 0.283*** at q75). This may provide insight into how more profitable banks can better leverage higher interest rates by efficiently managing their interest rate-related assets and liabilities. Meanwhile, the picture of Redis's impact on ROA in Vietnam is the opposite of that in Taiwan. As the table illustrates, Redis is significantly and negatively associated with ROA across all quantile levels in Vietnam, with a more substantial effect at the upper median. This implies that higher Redis reduces banks' ROA, as higher Redis may increase borrowing costs, thereby discouraging loan demand from local businesses. This reflects the reality of Vietnamese banks, in which their primary source of operating income is lending.

The CAR, a vital measure of a bank's financial strength, exhibits a clear positive correlation with ROA across all quantiles in Taiwan but not in Vietnam. Indeed, in a well-established, structured, and regulated market such as Taiwan, the positive nexus between CAR and ROA, with the most substantial effect at q95, may indicate that well-capitalised banks can leverage their financial health for improved profitability. In other words, CAR is a critical driver for bank performance in Taiwan.

Another crucial ratio is the CIR, for which both Taiwan's and Vietnam's banks show similar results. Indeed, CIR has a negative and significant impact on banks' ROA across all quantiles, with larger effects at higher quantiles in both Taiwan and Vietnam. This implies that a higher CIR will lessen banks' overall return and profitability. This is understandable, as a higher CIR entails higher operating expenses and lower operating income, resulting in lower net profit and, ultimately, a lower ROA.

The following table presents the regression results of model (1) through the application of five regression methods in both countries:

Table 24: Regression results for the interest rate channel in both countries

Dependent (ROA)	Taiwan					Dependent (ROA)	Vietnam				
	POLS	REM	FEM	FGLS	SGMM		POLS	REM	FEM	FGLS	SGMM
Redis	0.305*** (5.01)	0.267*** (5.84)	0.276*** (7.1)	0.183*** (5.57)	0.229*** (3.29)	Redis	-0.256*** (-4.18)	-0.192*** (-4.22)	-0.204*** (-5.12)	-0.175*** (-3.78)	-0.122** (-2.04)
CAR	0.0575*** (10.95)	0.0311*** (6.47)	0.00139 (0.28)	0.0240*** (4.82)	0.0474*** (8.4)	CAR	0.0359*** (3.72)	-0.00972 (-0.98)	-0.0406*** (-4.31)	0.0192** (2.14)	0.0149 (1.61)
NPL	-0.171** (-2.39)	-0.1 (-1.29)	-0.136* (-1.88)	-0.152** (-2.52)	-0.133* (-1.74)	NPL	0.00954 (0.63)	-0.00369 (-0.32)	-0.011 (-1.08)	0.00592 (0.45)	0.0217* (1.79)
LDR	0.00488*** (3.83)	0.0019 (1.05)	-0.00256 (-1.28)	-0.000978 (-0.73)	0.00191 (0.66)	LDR	0.0118*** (5.37)	0.0122*** (6.46)	0.00801*** (4.64)	0.00903*** (4.78)	0.000729 (0.33)
Assetgro~h	0.00142 (1.65)	0.00122* (1.8)	0.000352 (0.6)	0.000229 (0.33)	-0.00046 (-0.17)	Assetgro~h	0.0121*** (4.42)	0.00626*** (3.32)	0.00515*** (3.17)	0.00365** (2.47)	0.00312* (1.73)
Zscore	0.0965*** (8.52)	0.0395* (1.81)	-0.398*** (-8.25)	0.0470*** (3.66)	0.0376 (1.3)	Zscore	0.0509*** (4.14)	-0.0857*** (-5.67)	-0.170*** (-10.94)	0.00895 (0.66)	0.0260** (2.18)
CIR	-0.0160*** (-14.71)	-0.0163*** (-11.52)	-0.0121*** (-7.99)	-0.0164*** (-14.82)	-0.00832* (-1.84)	CIR	-0.0234*** (-9.63)	-0.0147*** (-6.26)	-0.00960*** (-4.43)	-0.0170*** (-8.94)	-0.0102*** (-3.70)
GDP	0.0207** (1.98)	0.0175** (2.25)	0.0170*** (2.61)	0.0100** (2.32)	0.0153* (1.87)	GDP	0.0413** (1.99)	0.0314** (2.3)	0.0372*** (3.18)	0.0331*** (3.39)	0.0314* (1.85)
CPI	-0.0567*** (-4.33)	-0.0402*** (-4.04)	-0.0207** (-2.40)	-0.0186*** (-3.00)	-0.0212 (-1.33)	CPI	0.0510* (1.69)	0.0416** (2.13)	0.0389** (2.32)	0.0336** (2.54)	0.00178 (0.11)
L.ROA					0.510*** (2.67)	L.ROA					0.809*** (7.17)
N	310	310	310	310	279	N	280	280	280	280	252
R-sq	0.637		0.569			R-sq	0.624		0.761		
Arellano-Bond test for AR(1): Pr>z = 0.02 Arellano-Bond test for AR(2): Pr>z = 0.29 > 0.05 → not suffered from autocorrelation Hansen test: Prob>chi2 = 0.06 > 0.05 → the instruments are valid, confirming the model validity Number of instruments: 15; number of groups: 31						Arellano-Bond test for AR(1): Pr>z = 0.01 Arellano-Bond test for AR(2): Pr>z = 0.55 > 0.05 → not suffered from autocorrelation Hansen test: Prob>chi2 = 0.21 > 0.05 → The instruments are valid, confirming the model validity Number of instruments: 15; number of groups: 28					

Source: Own processing. The table presents statistical significance at the 10%, 5%, and 1% one-, two-, and three-star levels, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The regression first uses POLS, then FEM and REM. However, these three methods cannot address model issues related to heteroskedasticity and autocorrelation, as indicated by the Modified and Wooldridge tests. Hence, FGLS is applied to address the problems; however, endogeneity remains a concern when using the Wu-Hausman test. Therefore, the SGMM is finally applied to address endogeneity and the presence of lagged variables in the model.

The empirical results reveal a clear divergence in how Redis influences bank performance in Taiwan and Vietnam, consistent with the heterogeneity observed in the quantile regression analysis. In Taiwan, a 1% increase in Redis is associated with a 0.229-percentage-point rise in ROA at the 1% significance level, indicating that higher policy rates strengthen bank profitability. This result reflects Taiwanese banks' ability to pass higher lending rates to borrowers more effectively, thereby widening net interest margins and enhancing overall returns. Such findings align with the interest rate channel of the monetary policy transmission mechanism (MPTM), which posits that an increase in policy rates raises lending rates more than deposit rates in financially developed and competitive banking systems, ultimately improving banks' spreads. Prior studies, including **Demirgüç-Kunt and Huizinga (1999)**, **Alessandri and Nelson (2015)**, **Borio (2017)**, and **De Menna (2021)**, similarly imply that higher interest rates tend to boost banks' net interest margins and profitability in advanced financial systems.

In contrast, the Vietnamese banking sector exhibits the opposite pattern: a 1% rise in Redis leads to a 0.122-percentage-point decline in ROA at the 5% significance level. This negative effect reflects the structural characteristics of Vietnam's bank-dominated, less-developed financial system. Higher policy rates suppress credit demand while simultaneously increasing banks' funding costs, as deposit rates adjust upward more quickly than lending rates due to competition for deposits and limited financial instruments for savers. This compresses net interest margins and reduces profitability. Moreover, consistent with the credit channel and the financial accelerator mechanism (**Bernanke & Gertler, 1995; Bernanke et al., 1999**), higher interest rates weaken borrowers' balance sheets, raise external finance premiums, and increase the likelihood of loan defaults. These dynamics contribute to rising non-performing loans (NPLs), further eroding bank earnings. Indeed, this theory was empirically supported in Vietnam in early 2008, when lending rates soared to 21% per year, thereby imposing significant financial strain on many local firms and leading to an eventual upsurge in NPLs in subsequent years. Our results align with those of **Dang (2022)**, who found a negative correlation between Redis and banks' performance in Vietnam.

Therefore, the results provide mixed support for Hypothesis 1, as the interest rate channel's impact on bank performance appears context-dependent rather than universally positive. The supportive evidence from Taiwan reinforces the channel's

role in advanced Asian banking systems, whereas the opposing finding in Vietnam underscores challenges in emerging economies. Moreover, the contrasting results between Taiwan and Vietnam underscore the central role of financial structure and bank behavior in shaping the MPTM. In financially mature systems like Taiwan, the interest rate channel dominates, enabling banks to benefit from higher policy rates. In emerging markets such as Vietnam, financial frictions, particularly asymmetric information, collateral constraints, and balance-sheet vulnerabilities, intensify the adverse effects of monetary tightening, thereby weakening bank performance. These findings highlight the importance of incorporating MPTM theory when interpreting cross-country differences in monetary policy impacts on banking outcomes.

Concerning the CIR, the results here further reinforce the preceding view that CIR negatively and significantly affect banks' ROA in both countries across all methods. Our findings align with those of **Demirgüç-Kunt and Huizinga (1999)**, **Rashid and Jabeen (2016)**, and **Alfadli and Rjoub (2020)**, all of whom reached a comparable empirical conclusion: A reduced operating expense ratio is indicative of enhanced management efficiency and profitability.

Regarding macro variables, the results indicate that GDP growth significantly affects banks' performance in both countries. More specifically, the effect size in Vietnam tends to be larger: a 1% increase in GDP growth is associated with a 0.031 percentage-point increase in ROA, compared with 0.015 percentage points in Taiwan. Our findings align with those of **Ozili and Arun (2022)**, who assessed the nexus between economic policy uncertainty and bank performance across 22 advanced countries.

5.3.2 The exchange rate channel:

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

Table 25: Correlation, collinearity, heteroskedasticity, and autocorrelation test in Taiwan

Taiwan	Exch	CAR	NPL	LDR	Assgro	Zscore	CIR	GDP	CPI	VIF
Exch	1									5.43
CAR	-0.1526	1								1.36
NPL	0.1512	-0.2325	1							1.21
LDR	0.0688	-0.3761	-0.0662	1						1.24
Assgrow	0.0021	-0.1329	-0.0263	0.0471	1					1.04
Zscore	-0.0079	0.0523	0.0841	-0.1671	0.0522	1				1.05
CIR	-0.0467	-0.104	0.2606	-0.1161	0.0342	0.1439	1			1.12
GDP	-0.8884	0.0469	-0.0687	-0.0288	-0.0338	0.0034	0.0349	1		5.10
CPI	-0.2579	0.1931	-0.1882	-0.0588	-0.0602	0.0157	-0.0286	0.1722	1	1.13
Mean										2.08
VIF										2.08
The correlation between variables is >-0.8 and <0.8, indicating no multicollinearity in the model (Gujarati, 2009)										
VIF of all variables are less than 10, indicating no severe multicollinearity in the model (O'brien, 2007)										
Heteroskedasticity testing: P-value = 0.0000 <0.05, indicating the existence of heteroskedasticity in the model										
Wooldridge test for autocorrelation, P-value=0.0000 <0.05, indicating the existence of autocorrelation in the model										
Wu-Hausman test (Wu, 1973; Hausman, 1978) for endogenous variables: LDR (p-value = 0.02); Assetgrowth (p-value =0.00)										

Source: own processing

Table 26: Correlation, collinearity, heteroskedasticity, and autocorrelation test in Vietnam

Vietnam	Exch	CAR	NPL	LDR	Assgro	Zscore	CIR	GDP	CPI	VIF
Exch	1									1.61
CAR	-0.2298	1								1.19
NPL	0.0734	-0.0469	1							1.37
LDR	0.4512	0.0009	-0.1049	1						1.61
Assgrow	-0.0642	-0.2185	-0.0424	0.1243	1					1.17
Zscore	-0.1185	0.1228	-0.0187	-0.0494	0.1702	1				1.07
CIR	-0.3157	0.0765	0.4546	-0.4828	-0.0873	-0.0182	1			1.78
GDP	-0.303	0.118	-0.0158	-0.0677	-0.0423	0.0508	0.1479	1		1.15
CPI	0.0585	-0.0914	0.0692	0.0481	0.0353	0.0086	-0.0005	0.1112	1	1.04
Mean VIF										1.33
The correlation between variables is >-0.8 and <0.8, indicating no multicollinearity in the model (Gujarati, 2009)										
VIF of all variables are less than 10, indicating no severe multicollinearity in the model (O'brien, 2007)										
Modified test for heteroskedasticity: P-value = 0.00 <0.05, indicating the existence of heteroskedasticity in model										
Wooldridge test for autocorrelation, P-value = 0.01 <0.05, indicating the existence of autocorrelation in the model										
Wu-Hausman test (Wu, 1973; Hausman, 1978) for endogenous variables: NPL (p-value = 0.00)										

Table 27: Quantile regression results for the exchange rate channel in both countries

Dependent (ROA)	Taiwan				Dependent (ROA)	Vietnam			
	Q25	Q50	Q75	Q95		Q25	Q50	Q75	Q95
Exch	0.0266*** (3.89)	0.0195** (2.58)	0.0285*** (4.55)	0.0331** (2.01)	Exch	0.0149 (1.41)	0.0289*** (4.82)	0.0218 (1.13)	0.0745*** (3.59)
CAR	0.0610*** (4.51)	0.0462*** (4.08)	0.0449*** (2.86)	0.0561** (2.38)	CAR	0.0201* (1.92)	0.0296*** (3.23)	0.0204 (1.28)	0.0914** (2.16)
NPL	-0.291** (-2.21)	-0.0929 (-1.08)	0.0075 (0.08)	0.109 (0.47)	NPL	-0.0652* (-1.67)	-0.00441 (-0.20)	0.0272 (0.8)	0.0661 (1.36)
LDR	0.00710** (2.12)	0.000702 (0.18)	-0.00436 (-1.63)	0.0024 (0.38)	LDR	0.00805** (2.56)	0.0101*** (4.32)	0.0123*** (4.52)	0.00287 (0.7)
Assetgro~h	0.00234 (1.23)	0.00161 (1.22)	0.00141 (0.55)	0.0126** (1.99)	Assetgro~h	0.00835** (2.57)	0.0122*** (8.92)	0.00954** (2.16)	0.0278*** (3.58)
Zscore	0.0609*** (3.41)	0.0513*** (2.69)	0.0774*** (3.3)	0.222*** (4.85)	Zscore	0.0314*** (2.65)	0.0451*** (5.44)	0.0775*** (2.93)	0.00579 (0.25)
CIR	-0.00905*** (-3.45)	-0.0149*** (-6.66)	-0.0200*** (-18.40)	-0.0184*** (-6.71)	CIR	-0.0157*** (-6.68)	-0.0233*** (-10.22)	-0.0311*** (-11.20)	-0.0344*** (-11.51)
GDP	0.0405*** (2.9)	0.0272 (1.54)	0.0504*** (2.89)	0.0633** (2.17)	GDP	-0.0207 (-0.96)	-0.00273 (-0.18)	0.012 (0.41)	0.0409 (1.24)
CPI	-0.0139 (-0.72)	-0.0183** (-2.06)	-0.0335*** (-3.42)	-0.0325 (-1.11)	CPI	0.024 (1.01)	0.0283 (1)	0.0501 (1.12)	0.0987 (1.39)
N				310	N				280

Source: Own processing. The table presents statistical significance at the 10%, 5%, and 1% one-, two-, and three-star levels, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

A quantile regression is performed to estimate the relationship between study variables. While the 25th and 50th quantiles indicate low levels, the 75th and 95th quantiles represent medium and high levels, respectively. The estimated results in Table 27 present correlations between ROA and the relevant variables across quantiles. In other words, this table provides the first insight into the diverse effects of the exchange rate channel, as denoted by the log of the exchange rate, the bank-determinant variables, and the macroeconomic variables on ROA across quantiles in Taiwan and Vietnam.

Unlike the interest rate channel, the exchange rate's impact on banks' performance across two countries is consistently positive, implying that a higher Exch (i.e., a local currency depreciation against the USD) is associated with higher ROA. However, a significant correlation between Exch and ROA is consistently observed only in Taiwan, with the strongest effect at q95, whereas this nexus is not clearly examined in Vietnam across all quantiles. More importantly, in Taiwan, the impact degree of Exch on banks with high ROA will be larger than that on banks with lower ROA, as indicated by the coefficient increasing as the quantile level moves toward the upper end (0.0195** at q50, 0.0285** at q75, and 0.0331** at q95). This may provide insight into how more profitable banks can optimize the devaluation of local currency to increase their overall return. Indeed, since Taiwan has long been considered an export-led economy (with a proportion of exports to total GDP exceeding 50%), the devaluation of TWD greatly assists local businesses to enhance their exporting goods and services, thereby increasing capital demand for scaling, and in turn, raising banks' credit activities and interest income. In the meantime, the picture of Exch's impact on ROA across quantiles in Vietnam is not straightforward. The table shows that Exch is significantly and positively associated with ROA at q50 and q95, with the strongest effect at q95. Like Taiwan, Vietnam is considered an export-driven economy, with exports accounting for more than 87% of GDP in 2023 (World Bank); thus, it is understandable that the VND devaluation has a positive effect on local banks.

The regression results in Table 28 indicate a consistent and statistically significant positive relationship between the exchange rate (Exch) and bank profitability (ROA) in both Taiwan and Vietnam across all estimation techniques. Hence, these results support Hypothesis 2, implying that a depreciation of the domestic currency against the USD is associated with higher bank returns. However, the magnitude of this effect differs substantially: in Vietnam, a 1% increase in Exch raises ROA by 0.0427 percentage points, whereas in Taiwan the effect is more modest at 0.0163 percentage points.

This cross-country divergence can be interpreted through the exchange rate channel of the Monetary Policy Transmission Mechanism (MPTM). According to the New Keynesian framework, exchange rate movements influence real activity and financial conditions through their impact on export competitiveness, firm revenues,

and borrower balance sheets (**Clarida et al., 1999**). Currency depreciation improves the cash flows of export-oriented firms, strengthens their repayment capacity, and reduces credit risk, thereby enhancing bank profitability. This mechanism is particularly relevant in economies with strong export sectors, such as Taiwan's electronics and semiconductor industries, where depreciation can improve corporate earnings and, in turn, indirectly support bank performance.

Meanwhile, the stronger effect observed in Vietnam reflects the structure of its economy, where exporters, especially in manufacturing, agriculture, and textiles, are heavily dependent on bank credit. When the VND depreciates, export revenues increase in local-currency terms, improving liquidity and reducing default risk. This aligns with the balance-sheet channel and credit channel of the MPTM, which emphasize that improved borrower net worth enhances loan performance and reduces provisioning needs (**Bernanke & Gertler, 1995; Bernanke et al., 1999**). As a result, depreciation has a more pronounced positive effect on ROA in Vietnam.

However, this finding stands in contrast to several studies that argue the exchange rate channel is typically weak or muted in emerging markets due to heavy government intervention and underdeveloped financial markets (**Mishra & Montiel, 2013; Vo & Nguyen, 2017; Li et al., 2021**). The positive and significant effect observed in Vietnam suggests that even when macro-level exchange rate pass-through is limited, bank-level transmission can remain strong through borrower cash-flow improvements and export-driven credit demand.

In Taiwan, the smaller coefficient reflects a more diversified financial system and a more stable exchange-rate regime. Taiwanese firms often hedge currency risk through well-developed financial markets, reducing the sensitivity of bank profitability to exchange rate fluctuations. Consequently, while the exchange rate channel remains effective, its impact is more moderate compared to Vietnam.

Overall, the results confirm that the exchange rate channel of the MPTM operates in both countries, but its strength depends on financial structure, export dependence, and the degree of market intervention. Depreciation improves borrowers' cash flows, reduces credit risk, and enhances bank profitability, effects that are amplified in Vietnam's bank-dependent, export-oriented economy.

Table 28: Regression results for the exchange rate channel in both countries

Dependent (ROA)	Taiwan					Dependent (ROA)	Vietnam				
	POLS	REM	FEM	FGLS	SGMM		POLS	REM	FEM	FGLS	SGMM
Exch	0.0325*** (4.29)	0.0240*** (4.03)	0.0145*** (2.74)	0.0120*** (3.72)	0.0163* (1.71)	Exch	0.0321*** (3.03)	0.0198** (2.5)	0.0244*** (3.49)	0.0197** (2.53)	0.0427* (1.66)
CAR	0.0584*** (10.91)	0.0327*** (6.55)	0.00246 (0.45)	0.0258*** (5.12)	0.0636*** (4.34)	CAR	0.0355*** (3.59)	-0.0119 (-1.16)	-0.0435*** (-4.47)	0.0192** (2.07)	0.0144 (1.54)
NPL	-0.201*** (-2.75)	-0.147* (-1.81)	-0.155* (-1.94)	-0.183*** (-2.92)	-0.0177 (-0.14)	NPL	0.015 (0.99)	0.00469 (0.4)	-0.00332 (-0.32)	0.0105 (0.84)	-0.0609 (-0.55)
LDR	0.00491*** (3.82)	0.00253 (1.38)	-0.000881 (-0.41)	-0.000175 (-0.12)	0.00962 (0.94)	LDR	0.0120*** (5.23)	0.0128*** (6.29)	0.00808*** (4.29)	0.00889*** (4.54)	0.00418 (1.44)
Assetgro~h	0.00208** (2.38)	0.00186*** (2.64)	0.000988 (1.57)	0.000878 (1.2)	0.00580 (1.21)	Assetgro~h	0.0116*** (4.16)	0.00574*** (2.96)	0.00470*** (2.82)	0.00287** (1.97)	0.00238 (0.79)
Zscore	0.0974*** (8.52)	0.0554*** (2.6)	-0.357*** (-6.80)	0.0562*** (4.17)	0.0462* (1.94)	Zscore	0.0469*** (3.78)	-0.0878*** (-5.70)	-0.176*** (-10.99)	0.00714 (0.52)	0.0356** (2.36)
CIR	-0.0159*** (-14.51)	-0.0166*** (-11.59)	-0.0135*** (-8.39)	-0.0172*** (-15.32)	-0.0125*** (-3.48)	CIR	-0.0248*** (-10.26)	-0.0172*** (-7.45)	-0.0119*** (-5.58)	-0.0184*** (-10.24)	-0.00733 (-1.08)
GDP	0.0615*** (3.27)	0.0433*** (2.96)	0.0215* (1.66)	0.0203*** (2.87)	0.0256 (1.25)	GDP	-0.00133 (-0.08)	-0.00029 (-0.03)	0.00491 (0.53)	0.0127* (1.7)	0.018 (1.4)
CPI	-0.0301** (-2.31)	-0.0199** (-1.98)	-0.00292 (-0.32)	-0.0154** (-2.50)	-0.0112 (-0.87)	CPI	0.033 (1.08)	0.0274 (1.38)	0.0232 (1.37)	0.0270** (2.13)	-0.00047 (-0.01)
L.ROA					0.302* (1.73)	L.ROA					0.609*** (4.4)
N	310	310	310	310	279	N	280	280	280	280	252
R-sq	0.629		0.502			R-sq	0.613		0.748		
<i>Arellano-Bond test for AR(1): Pr>z = 0.03</i> <i>Arellano-Bond test for AR(2): Pr>z = 0.29>0.05 → not suffered from autocorrelation</i> <i>Hansen test: Prob>chi2 =0.053>0.05 → the instruments are valid, confirming the model validity</i> <i>Number of instruments: 26 ; number of groups: 31</i>						<i>Arellano-Bond test for AR(1): Pr>z = 0.05</i> <i>Arellano-Bond test for AR(2): Pr>z = 0.10 > 0.05 → not suffered from autocorrelation</i> <i>Hansen test: Prob>chi2 =0.13>0.05 → the instruments are valid, confirming the model validity</i> <i>Number of instruments: 22; number of groups: 28</i>					

Source: Own processing. The table presents statistical significance at the 10%, 5%, and 1% one-, two-, and three-star levels, respectively. ***p<0.01, **p<0.05, *p<0.1.

The regression first uses POLS, then FEM and REM, but these three methods cannot address model issues related to heteroskedasticity and autocorrelation, as indicated by the Modified and Wooldridge tests. Hence, FGLS is applied to address the problems; however, endogeneity is detected by using the Wu-Hausman test. Therefore, the SGMM is finally applied to address endogeneity and the presence of lagged variables in the model.

5.3.3 The credit channel (bank lending):

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

Table 29: Correlation, collinearity, heteroskedasticity, and autocorrelation test in Taiwan

Taiwan	CG	CAR	NPL	LDR	Assgro	Zscore	CIR	GDP	CPI	VIF
CG	1									2.48
CAR	0.2754	1								1.40
NPL	-0.2394	-0.2325	1							1.23
LDR	-0.1194	-0.3761	-0.0662	1						1.24
Assgrow	0.0117	-0.1329	-0.0263	0.0471	1					1.04
Zscore	0.003	0.0523	0.0841	-0.1671	0.0522	1				1.05
CIR	0.0307	-0.104	0.2606	-0.1161	0.0342	0.1439	1			1.12
GDP	0.6778	0.0469	-0.0687	-0.0288	-0.0338	0.0034	0.0349	1		1.99
CPI	0.3934	0.1931	-0.1882	-0.0588	-0.0602	0.0157	-0.0286	0.1722	1	1.23
Mean VIF										1.42

The correlation between variables is >-0.8 and <0.8, indicating no multicollinearity in the model (**Gujarati, 2009**)
VIF of all variables are less than 10, indicating no severe multicollinearity in the model (**O'brien, 2007**)
Modified test for heteroskedasticity: P-value=0.00 <0.05, indicating the existence of heteroskedasticity in model
Wooldridge test for autocorrelation, P-value =0.00 <0.05, indicating the existence of autocorrelation in the model
Wu-Hausman test (**Wu, 1973; Hausman, 1978**) for endogenous variables: LDR (p-value =0.01); Assetgrowth (p-value =0.00)

Source: own processing

Table 30: Correlation, collinearity, heteroskedasticity, and autocorrelation test in Vietnam

Vietnam	CG	CAR	NPL	LDR	Assgro	Zscore	CIR	GDP	CPI	VIF
CG	1									1.76
CAR	0.2123	1								1.17
NPL	-0.0581	-0.0469	1							1.33
LDR	-0.2227	0.0009	-0.1049	1						1.41
Assgrow	0.1349	-0.2185	-0.0424	0.1243	1					1.20
Zscore	0.1362	0.1228	-0.0187	-0.0494	0.1702	1				1.08
CIR	0.2212	0.0765	0.4546	-0.4828	-0.0873	-0.0182	1			1.76
GDP	0.461	0.118	-0.0158	-0.0677	-0.0423	0.0508	0.1479	1		1.42
CPI	-0.2779	-0.0914	0.0692	0.0481	0.0353	0.0086	-0.0005	0.1112	1	1.20
Mean VIF										1.37

The correlation between variables is >-0.8 and <0.8, indicating no multicollinearity in the model (**Gujarati, 2009**)
VIF of all variables are less than 10, indicating no severe multicollinearity in the model (**O'brien, 2007**)
Modified test for heteroskedasticity: P-value=0.00<0.05, indicating the existence of heteroskedasticity in the model
Wooldridge test for autocorrelation, P-value = 0.01 <0.05, indicating the existence of autocorrelation in the model
Wu-Hausman test (**Wu, 1973; Hausman, 1978**) for endogenous variables: CPI (p-value = 0.00)

Source: own processing

Table 31: Quantile regression results for the credit channel in both countries

Dependent (ROA)	Taiwan				Dependent (ROA)	Vietnam			
	Q25	Q50	Q75	Q95		Q25	Q50	Q75	Q95
CG	-0.0777*** (-4.66)	-0.0578*** (-3.57)	-0.0734*** (-3.48)	-0.0852* (-1.93)	CG	-0.0605*** (-4.54)	-0.0755*** (-3.54)	-0.0798*** (-2.73)	-0.0801** (-2.27)
CAR	0.0607*** (5.93)	0.0469*** (5.93)	0.0396*** (3.03)	0.0705*** (3.1)	CAR	0.0235*** (2.88)	0.0284** (2.58)	0.0298* (1.72)	0.0700* (1.86)
NPL	-0.315*** (-2.97)	-0.135 (-1.37)	-0.0238 (-0.20)	-0.00682 (-0.04)	NPL	-0.0551 (-1.39)	0.00155 (0.03)	0.0161 (0.22)	0.0791 (1.24)
LDR	0.00627** (2.09)	0.000325 (0.1)	-0.00603** (-2.57)	0.00235 (0.59)	LDR	0.00929*** (4.3)	0.0128*** (4.29)	0.0123*** (4.4)	0.0116* (1.84)
Assetgro~h	0.00243 (1.55)	0.00162 (1.29)	0.00305 (1.37)	0.00525 (0.8)	Assetgro~h	0.0111*** (4.11)	0.0115*** (4.45)	0.0167*** (2.72)	0.0218*** (2.74)
Zscore	0.0567*** (3.81)	0.0592*** (3.32)	0.0824*** (4.07)	0.207*** (4.72)	Zscore	0.0282** (2.22)	0.0510*** (3.09)	0.0560** (2.29)	0.053 (1.21)
CIR	-0.0106*** (-4.88)	-0.0152*** (-6.46)	-0.0202*** (-14.81)	-0.0170*** (-8.42)	CIR	-0.0154*** (-6.74)	-0.0240*** (-6.45)	-0.0294*** (-8.98)	-0.0337*** (-5.16)
GDP	0.0204* (1.84)	0.0162 (1.39)	0.0285* (1.78)	0.0315 (1.42)	GDP	0.00875 (0.46)	0.022 (1.24)	0.0385 (1.18)	0.0743* (1.83)
CPI	0.00267 (0.16)	-0.00926 (-0.72)	-0.0211** (-2.31)	-0.00624 (-0.21)	CPI	-0.0223 (-0.80)	-0.0245 (-0.62)	-0.00904 (-0.16)	0.0101 (0.11)
N				310	N				280

Source: Own processing. The table presents statistical significance at the 10%, 5%, and 1% one-, two-, and three-star levels, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

A quantile regression is performed to estimate the relationship between study variables. While the 25th and 50th quantiles indicate low levels, the 75th and 95th quantiles represent medium and high levels, respectively. The estimated results in Table 31 present correlations between ROA and the relevant variables across quantiles. In other words, this table provides the first insight into the diverse effects of the credit channel (bank lending), as denoted by credit growth, the bank-determinant variables, and the macroeconomic variables, on ROA across quantiles in Taiwan and Vietnam.

Firstly, the quantile regression table shows consistent negative and significant effects of CG on banks' ROA across all quantiles in both countries, indicating that higher CG is associated with lower ROA. More specifically, the most substantial effect is observed at q95, indicating that the impact of CG on banks with high ROA is greater than on those with low ROA, as the coefficient increases as quantile levels rise in both countries. This provides insight into how rapid credit growth can erode banks' profitability, possibly due to higher credit risk and greater losses from non-performing loans.

The regression results in Table 32 show a consistent, statistically significant negative relationship between credit growth (CG) and bank profitability (ROA) across all five estimation methods in both Taiwan and Vietnam. This confirms that higher CG is associated with lower ROA, reinforcing the earlier interpretation that rapid credit expansion tends to weaken bank performance. The magnitude of the effect is similar across the two countries: in Taiwan, a 1% increase in CG reduces ROA by 0.0378 percentage points, while in Vietnam, the reduction is 0.0309 percentage points under the SGMM estimator.

This pattern aligns with the credit channel (**Bernanke & Gertler, 1995**) and risk-taking channel (**Borio & Zhu, 2008**) of the Monetary Policy Transmission Mechanism (MPTM). According to **Bernanke and Blinder (1988)** and **Bernanke and Gertler (1995)**, rapid credit expansion, often stimulated by accommodative monetary conditions, can weaken banks' screening capabilities, increase exposure to marginal borrowers, and deteriorate asset quality. When banks expand lending aggressively, especially in environments with imperfect information and weak risk management, the probability of future non-performing loans (NPLs) rises, ultimately reducing profitability. This mechanism is consistent with the financial accelerator framework (**Bernanke et al., 1999**), which shows that credit booms amplify financial vulnerabilities and lead to sharper declines in bank performance when borrower balance sheets weaken.

The negative CG–ROA relationship is also consistent with historical evidence. **Friedman and Schwartz (1963)** argue that expansionary credit conditions can generate excessive risk-taking, misallocation of credit, and subsequent financial instability. This theoretical insight is particularly relevant to Vietnam's experience between 2005 and 2015, when rapid credit expansion—often directed toward

speculative sectors such as real estate and securities—occurred without adequate regulatory oversight. When asset bubbles burst, banks faced a surge in NPLs and provisioning costs, leading to a sharp decline in profitability. Empirical studies such as **Mamatzakis and Bermpei (2016)** and **Dang (2022)** similarly find that expansionary monetary conditions, reflected in rising central bank claims or rapid credit growth, are negatively associated with bank performance in emerging markets.

In Taiwan, although the financial system is more mature and regulatory oversight is stronger, the negative effect of CG on ROA remains significant. This suggests that even in developed banking systems, rapid credit expansion may compress lending standards, increase credit risk, and reduce profitability. The consistent negative coefficients across POLS, REM, FEM, FGLS, and SGMM indicate that the relationship is robust to different model specifications and not driven by estimation bias.

Overall, the results support Hypothesis 3, demonstrating that the credit channel of the MPTM plays a central role in shaping bank profitability in both countries. Rapid credit expansion increases banks' exposure to credit risk, weakens asset quality, and raises future provisioning needs, thereby reducing ROA. The similarity in effect magnitude across Taiwan and Vietnam suggests that the underlying mechanism, credit risk accumulation during lending booms, operates similarly across different banking systems. However, the adverse outcomes of this mechanism tend to be more pronounced in emerging economies, where risk-management practices and supervisory frameworks are generally less robust

Other key bank-determinant variables, such as CAR, CIR, and Z-score, are also significantly correlated with ROA in this model.

Table 32: Regression results for the credit channel (bank lending) in both countries

Dependent (ROA)	Taiwan					Dependent (ROA)	Vietnam				
	POLS	REM	FEM	FGLS	SGMM		POLS	REM	FEM	FGLS	SGMM
CG	-0.0768*** (-4.94)	-0.0553*** (-4.42)	-0.0366*** (-3.23)	-0.0430*** (-5.30)	-0.0378** (-2.44)	CG	-0.0850*** (-4.78)	-0.0496*** (-4.07)	-0.0348*** (-3.23)	-0.0402*** (-3.75)	-0.0309** (-2.38)
CAR	0.0606*** (11.29)	0.0341*** (6.79)	0.00343 (0.63)	0.0287*** (5.94)	0.0521*** (3.8)	CAR	0.0370*** (3.87)	-0.00752 (-0.75)	-0.0422*** (-4.24)	0.0184** (2.04)	0.00636 (0.65)
NPL	-0.222*** (-3.05)	-0.181** (-2.19)	-0.188** (-2.31)	-0.224*** (-3.57)	-0.167 (-1.43)	NPL	0.0163 (1.12)	0.00663 (0.6)	0.00344 (0.35)	0.0118 (0.93)	0.00893 (0.89)
LDR	0.00476*** (3.73)	0.00193 (1.06)	-0.00167 (-0.77)	-0.000745 (-0.53)	-0.000211 (-0.03)	LDR	0.0131*** (6.24)	0.0145*** (8.14)	0.0110*** (6.61)	0.0112*** (6.21)	0.00582** (2.44)
Assetgro~h	0.00217** (2.51)	0.00188*** (2.69)	0.000994 (1.59)	0.000996 (1.43)	0.00298 (0.71)	Assetgro~h	0.0134*** (4.83)	0.00703*** (3.61)	0.00521*** (3.04)	0.00394*** (2.65)	0.00173 (0.69)
Zscore	0.0964*** (8.5)	0.0535** (2.52)	-0.357*** (-6.86)	0.0537*** (3.96)	0.0338* (1.73)	Zscore	0.0494*** (4.07)	-0.0744*** (-4.86)	-0.158*** (-9.68)	0.0144 (1.05)	0.0394*** (2.71)
CIR	-0.0159*** (-14.59)	-0.0166*** (-11.63)	-0.0134*** (-8.39)	-0.0173*** (-15.62)	-0.00924** (-2.02)	CIR	-0.0245*** (-10.43)	-0.0176*** (-8.12)	-0.0137*** (-6.83)	-0.0185*** (-10.22)	-0.0114*** (-3.49)
GDP	0.0293** (2.51)	0.0186** (2.06)	0.00798 (1)	0.0163*** (3.39)	0.0087 (1.08)	GDP	0.0282 (1.56)	0.0162 (1.38)	0.0133 (1.3)	0.0202** (2.52)	0.0356*** (3.22)
CPI	-0.0183 (-1.36)	-0.0125 (-1.20)	0.00194 (0.21)	-0.0147** (-2.54)	-0.0066 (-0.63)	CPI	-0.0195 (-0.61)	-0.00323 (-0.15)	0.00174 (0.1)	-0.00011 (-0.01)	-0.108*** (-3.70)
L.ROA					0.352*** (2.65)	L.ROA					0.640*** (5.27)
N	310	310	310	310	279	N	280	280	280	280	252
R-sq	0.636		0.507			R-sq	0.631		0.746		
Arellano-Bond test for AR(1): Pr>z = 0.03 Arellano-Bond test for AR(2): Pr>z = 0.29 > 0.05 → not suffered from autocorrelation Hansen test: Prob>chi2 = 0.40 > 0.05 → the instruments are valid, confirming the model validity Number of instruments: 17; number of groups: 31						Arellano-Bond test for AR(1): Pr>z = 0.05 Arellano-Bond test for AR(2): Pr>z = 0.40 > 0.05 → not suffered from autocorrelation Hansen test: Prob>chi2 = 0.19 > 0.05 → the instruments are valid, confirming the model validity Number of instruments: 15; number of groups: 28					

Source: Own processing. The table presents statistical significance at the 10%, 5%, and 1% one-, two-, and three-star levels, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The regression first uses POLS, then FEM and REM. However, these three methods cannot address model issues related to heteroskedasticity and autocorrelation, as indicated by the Modified and Wooldridge tests. Hence, FGLS is applied to address the problems; however, endogeneity is detected by the Wu-Hausman test. Therefore, the SGMM is finally applied to address endogeneity and the presence of lagged variables in the model.

Table 33: Summary of three channels without a moderator using SGMM in both countries

Dependent (ROA)	Taiwan			Dependent (ROA)	Vietnam		
	Interest rate channel	Exchange rate Channel	Credit channel		Interest rate channel	Exchange rate channel	Credit channel
Redis	0.229*** (3.29)			Redis	-0.122** (-2.04)		
Exch		0.0163* (1.71)		Exch		0.0427* (1.66)	
CG			-0.0378** (-2.44)	CG			-0.0309** (-2.38)
CAR	0.0474*** (8.4)	0.0636*** (4.34)	0.0521*** (3.8)	CAR	0.0149 (1.61)	0.0144 (1.54)	0.00636 (0.65)
NPL	-0.133* (-1.74)	-0.0177 (-0.14)	-0.167 (-1.43)	NPL	0.0217* (1.79)	-0.0609 (-0.55)	0.00893 (0.89)
LDR	0.00191 (0.66)	0.00962 (0.94)	-0.000211 (-0.03)	LDR	0.000729 (0.33)	0.00418 (1.44)	0.00582** (2.44)
Assetgro~h	-0.00046 (-0.17)	0.00580 (1.21)	0.00298 (0.71)	Assetgro~h	0.00312* (1.73)	0.00238 (0.79)	0.00173 (0.69)
Zscore	0.0376 (1.3)	0.0462* (1.94)	0.0338* (1.73)	Zscore	0.0260** (2.18)	0.0356** (2.36)	0.0394*** (2.71)
CIR	-0.00832* (-1.84)	-0.0125*** (-3.48)	-0.00924** (-2.02)	CIR	-0.0102*** (-3.70)	-0.00733 (-1.08)	-0.0114*** (-3.49)
GDP	0.0153* (1.87)	0.0256 (1.25)	0.0087 (1.08)	GDP	0.0314* (1.85)	0.018 (1.4)	0.0356*** (3.22)
CPI	-0.0212 (-1.33)	-0.0112 (-0.87)	-0.0066 (-0.63)	CPI	0.00178 (0.11)	-0.00047 (-0.01)	-0.108*** (-3.70)
L.ROA	0.510*** (2.67)	0.302* (1.73)	0.352*** (2.65)	L.ROA	0.809*** (7.17)	0.609*** (4.4)	0.640*** (5.27)
No of observations	279	279	279	No of observations	252	252	252
AR1	0.016	0.034	0.032	AR1	0.006	0.05	0.04
AR2	0.285	0.287	0.289	AR2	0.553	0.103	0.239
Hansen test	0.062	0.053	0.402	Hansen test	0.213	0.125	0.102
Number of instruments	15	26	17	Number of instruments	15	22	15
Number of groups	31	31	31	Number of groups	28	28	28

Source: Own processing. The table presents statistical significance at the 10%, 5%, and 1% one-, two-, and three-star levels, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In brief, Table 33 provides a concise, comparative overview of the impact of interest rates, exchange rates, and the credit (bank lending) channel on bank performance, as measured by ROA, across both countries. Overall, all three channels have a significant impact on banks' ROA, with varying magnitudes and signs across the five regression methods. This confirms the validity and consistency of the study's empirical results. More specifically, the interest channel is examined to have contrasting effects: positive in Taiwan and negative in Vietnam. Meanwhile, the exchange rate channel is positively associated with ROA at the 10% significance level in both countries, whereas the credit channel is negatively associated with ROA at the 5% significance level.

Regarding the banks' determinants, the study finds mixed effects of these variables on ROA, attributable to banks' dissimilar characteristics and growth trajectories, as well as to the banking-sector development context in the two countries. Nevertheless, the results are similar: CIR negatively and significantly affects ROA, whereas Z-score positively affects banks' performance. Indeed, a higher Z-score indicates a lower probability of insolvency, as evidenced by banks' sound financial condition and robust profitability. Lastly, the results confirm a positive, significant lagged ROA in both countries, indicating strong profitability persistence over the years. This means that banks with high profitability in previous years are likely to maintain higher profitability in subsequent years, and vice versa.

Taking each country individually, the CAR, a vital measure of a bank's financial strength highly regulated by Basel in risk management practices, exhibits a clear positive correlation with ROA across all methods and models in Taiwan. This strongly suggests that well-capitalised banks in advanced economies, such as Taiwan, can leverage their financial soundness to achieve higher profitability. This aligns with **Berger (1995)**, who suggests that banks with a high CAR are expected to have lower bankruptcy probabilities due to reduced risk and funding costs, resulting in higher profit margins. Nevertheless, the situation is different for Vietnamese banks, as some large and highly efficient local banks face difficulties raising capital to meet the CAR ratio required by Basel. Hence, increasing the CAR ratio has remained challenging for these Vietnamese banks to date.

5.4 Models with a moderator, non-interest income share (NICS)

$$ROA_{i,t} = \alpha_0 + \alpha_1 MP_t + \alpha_2 MP_t NICS_{i,t} + \alpha_3 NICS_{i,t} + \alpha_4 CAR_{i,t} + \alpha_5 NPL_{i,t} + \alpha_6 LDR_{i,t} + \alpha_7 Assetgrowth_{i,t} + \alpha_8 Zscore_{i,t} + \alpha_9 CIR_{i,t} + \alpha_{10} GDP_t + \alpha_{11} CPI_t + \varepsilon_{i,t}$$

Table 34: Summary of three channels with a moderator using SGMM in both countries

Dependent (ROA)	Taiwan			Dependent (ROA)	Vietnam		
	Interest rate channel	Exchange rate Channel	Credit channel		Interest rate channel	Exchange rate Channel	Credit channel
Redis	0.117* (1.8)			Redis	-0.133** (-2.13)		
Redis*NICS	-0.802 (-1.46)			Redis*NICS	-1.723*** (-2.94)		
Exch		0.0149* (1.79)		Exch		0.0204*** (2.59)	
Exch*NICS		0.0076 (0.25)		Exch*NICS		0.0355 (0.67)	
CG			-0.0355*** (-2.99)	CG			-0.0258** (-2.20)
CG*NICS			-0.123* (-1.77)	CG*NICS			-0.257** (-2.06)
NICS	0.00500** (2.56)	0.00373** (2.57)	0.00310*** (2.71)	NICS	0.00867*** (2.86)	0.00118 (0.53)	0.00794** (2.04)
CAR	0.0590*** (4.43)	0.0524*** (5.41)	0.0489*** (10.34)	CAR	-0.0105 (-0.56)	0.0193** (2.09)	0.0103 (1.11)
NPL	0.0375 (0.28)	-0.0199 (-0.21)	-0.0421 (-0.43)	NPL	-0.00616 (-0.50)	0.01 (0.79)	-0.0864 (-1.15)
LDR	0.0164* (1.66)	0.00441 (1.28)	0.00239 (0.78)	LDR	0.00353 (1.6)	0.00887*** (4.52)	0.0032 (1.18)
Assetgro~h	0.00235 (0.86)	0.00716 (1.41)	0.00119* (1.77)	Assetgro~h	0.0029 (1.05)	0.00324** (2.17)	0.00468* (1.83)

Zscore	0.0306 (1.45)	0.0412** (2.15)	0.0256 (1.31)	Zscore	0.0313 (1.35)	0.0107 (0.79)	0.0235* (1.65)
CIR	-0.0119*** (-4.11)	-0.0146*** (-3.85)	-0.0116*** (-3.39)	CIR	-0.0108*** (-3.83)	-0.0185*** (-10.27)	-0.00453 (-0.71)
GDP	0.00843 (0.93)	0.0216 (1.36)	0.0054 (0.91)	GDP	0.0466** (2.46)	0.0139* (1.81)	0.0241* (1.81)
CPI	-0.00702 (-0.61)	-0.00808 (-0.57)	-0.00226 (-0.17)	CPI	0.00734 (0.35)	0.0271** (2.06)	0.0181 (0.92)
L.ROA	0.361** (2.03)	0.289* (1.91)	0.387** (2.07)	L.ROA	0.631*** (6.72)	N/A	0.742*** (6.45)
N	279	279	279	N	252		252
AR1	0.042	0.012	0.022	AR1	0.01	As we found no endogeneity in this model, we only run FGLS estimation.	0.025
AR2	0.296	0.249	0.26	AR2	0.487		0.056
Hansen Test	0.106	0.063	0.129	Hansen Test	0.315		0.318
Number of instruments	25	31	25	Number of instruments	21		23
Number of groups	31	31	31	Number of groups	28		28

Source: Own processing. The table presents statistical significance at the 10%, 5%, and 1% one-, two-, and three-star levels, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The idea of adding a moderator, NICS, to the model is to assess how it moderates the correlation between MPTM and banks' performance, given the rapid growth of fee-based services in the banking sector. The aim is to examine whether the effect of each MPTM's channel persists, and whether NICS strengthens or weakens that effect on bank performance.

Regarding the interest rate channel, we find results in Table 34 similar to those explored in the model without a moderator (Table 33). Taiwan benefits from rate hikes (positive effect), reflecting the resilience of its developed system, while Vietnam suffers a negative effect, underscoring emerging-market vulnerabilities. Turning to the moderating role of NICS, the finding offers partial support for the moderating Hypothesis 1a, in which the moderator (NICS) plays a more pronounced role in Vietnam, amplifying negatives, whereas it's not significant in Taiwan. This is likely due to Taiwan's sophisticated banking sector better integrating diversification with traditional lending, versus Vietnam's, where NICS might expose banks to additional risks during the contractionary phase. To clarify, Taiwan's banking system is more mature, with banks having decades of experience in integrating non-interest income sources (e.g., fees, commissions, trading, and wealth management) alongside traditional lending. Therefore, Taiwan's diversification is often well-managed through advanced risk hedging tools, diversified portfolios, and strong internal controls. In contrast, Vietnam's banking sector is still transitioning from a state-dominated, lending-focused model. The burst of the credit bubble and the surge in NPL in the early 2010s pushed Vietnamese banks to diversify into non-lending segments to counter declining interest margins and credit inefficiencies. However, this diversification is relatively recent and often lacks the depth of risk management seen in Taiwan. Non-interest activities (e.g., service fees, securities trading) can introduce greater volatility due to underdeveloped markets, limited hedging instruments, and less-experienced staff.

Regarding the exchange rate channel, the results in Table 34 are also consistent with those observed in the model estimated without the moderator (Table 33). Both countries exhibit positive effects of exchange rate changes (Exch) on bank ROA, meaning that fluctuations, particularly depreciations of the local currency (TWD in Taiwan, VND in Vietnam), tend to boost ROA overall. This aligns with export-oriented Asian economies where currency weakening can enhance competitiveness,

increase export revenues, improve trade balances, and support borrower performance in export sectors, thereby reducing loan defaults and enhancing bank interest and fee income. Given that NICS moderation is insignificant in both countries, this offers weak evidence for Hypothesis 2a that NICS moderate the correlation between the exchange rate channel and bank performance. Additionally, this reinforces the view that the exchange rate channel operates largely independently of banks' diversification into non-interest income sources (e.g., fees, trading, wealth management). Exchange rate impacts are driven by macro-level trade, balance-sheet, and sectoral effects (e.g., export competitiveness, import costs, inflation pass-through) rather than by banks' internal income mix. Non-interest activities may respond indirectly to economic activity influenced by FX changes, but they do not systematically buffer or amplify the exchange rate channel in a statistically meaningful way—unlike the interest rate channel.

Lastly, with respect to the credit (bank lending) channel, the findings in Table 34 are consistent with those observed in the models without a moderator (Table 33). Specifically, the main effect of credit growth on bank performance (ROA) remains negative in both Taiwan and Vietnam (Taiwan: -0.0355***; Vietnam: -0.0258*-see Table 34). This indicates that rapid expansion of credit (loans) tends to harm ROA overall, as aggressive lending can lead to higher risks, increased provisioning for potential bad loans, operational strains, or squeezed margins from competitive lending pressures. The interaction with the non-interest income share (NICS) is also negative and significant in both cases (Taiwan: -0.123*; Vietnam: -0.257**), thereby supporting Hypothesis 3a. The negative interaction means that higher NICS worsens (amplifies) the negative impact of credit growth on ROA. In other words, diversification into non-interest activities does not act as a buffer against credit-related risks; instead, intensifies them, suggesting that non-interest income fails to effectively offset or hedge lending vulnerability. Moreover, we also notice that the larger magnitude of the negative CG*NICS interaction in Vietnam (-0.257 vs. Taiwan's -0.123) reflects weaker risk management and structural differences. To clarify, Vietnamese banks, often transitioning from directed lending, may pursue diversification (higher NICS) as a response to declining lending margins in combination with policy encouragement from the SBV. However, this can lead to over-diversification, and banks extend credit aggressively while entering unfamiliar non-interest areas (e.g., fee-based services, trading, or securities) without adequate

expertise, controls, or hedging. This combination amplifies risks: credit growth raises default probabilities, while volatile or inefficient non-interest activities add income instability. Additionally, Vietnam's banking sector operates amid higher macroeconomic volatility, fewer developed hedging instruments, and more pronounced regulatory gaps than Taiwan's. Taiwan's more advanced and predominantly private banking system benefits from stronger supervisory oversight (for example, the Financial Supervisory Commission), more robust internal controls, and greater experience integrating non-interest activities, such as wealth management and trading, into traditional lending operations. As a result, income diversification in Taiwan is more balanced; thus, the moderating effect of NICS remains negative but is less pronounced; banks are less exposed to overexpansion; and regulatory oversight helps restrain excessive risk-taking during credit booms.

The following section presents a robustness check to determine whether the above findings persist when using an alternative measure of the dependent variable.

5.5 Robustness check

For the robustness check, the study replaces the dependent variable, ROA, with ROE to examine the persistence of MPTM effects on bank performance across alternative measures

5.5.1 Model without moderator

$$ROE_{i,t} = \alpha_0 + \alpha_1 MP_t + \alpha_2 CAR_{i,t} + \alpha_3 NPL_{i,t} + \alpha_4 LDR_{i,t} + \alpha_5 Assetgrowth_{i,t} + \alpha_6 Zscore_{i,t} + \alpha_7 CIR_{i,t} + \alpha_8 GDP_t + \alpha_9 CPI_t + \varepsilon_{i,t}$$

Table 35: Summary of three channels without a moderator using SGMM in both countries (robustness)

Dependent (ROE)	Taiwan			Dependent (ROE)	Vietnam		
	Interest rate channel	Exchange rate channel	Credit channel		Interest rate channel	Exchange rate channel	Credit channel
Redis	1.657** (1.98)			Redis	-1.527** (-2.43)		
Exch		0.212* (1.82)		Exch		0.216*** (2.64)	
CG			-0.223** (-2.30)	CG			-0.285** (-2.40)
CAR	0.368** (2.25)	0.371** (2.25)	0.225*** (5.71)	CAR	-0.0561 (-0.63)	-0.194** (-1.96)	-0.222** (-2.24)
NPL	-0.608 (-0.27)	-1.619 (-0.94)	-1.421 (-1.18)	NPL	-0.0249 (-0.16)	0.0363 (0.26)	0.047 (0.34)
LDR	0.171* (1.67)	0.130** (2.13)	0.00121 (0.05)	LDR	0.0189 (0.6)	0.0858*** (3.97)	0.108*** (5.25)
Assetgro~h	0.00808 (1.36)	0.131 (1.21)	0.00870*** (3.53)	Assetgro~h	0.0482* (1.71)	0.0302* (1.76)	0.0385** (2.14)
Zscore	0.166 (0.4)	0.208 (0.53)	0.0422 (0.2)	Zscore	0.504*** (4.74)	0.316** (2.25)	0.331** (2.27)
CIR	-0.0764*** (-3.16)	-0.116*** (-3.56)	-0.105*** (-5.60)	CIR	-0.131*** (-4.10)	-0.232*** (-11.67)	-0.226*** (-11.20)
GDP	0.119 (0.87)	0.291 (1.12)	-0.0269 (-0.34)	GDP	0.467*** (2.63)	0.237*** (2.95)	0.285*** (3.26)
CPI	0.128 (0.69)	0.189 (1.35)	0.199* (1.7)	CPI	0.0144 (0.06)	0.0964 (0.71)	-0.117 (-0.77)
L.ROE	0.506*** (2.95)	0.187 (1.44)	0.434*** (4.68)	L.ROE	0.631*** (5.61)		

N	279	279	279	N	252	280	280
AR1	0.005	0.004	0.001	AR1	0.005		
AR2	0.419	0.571	0.386	AR2	0.108		
Hansen Test	0.091	0.06	0.083	Hansen Test	0.102	As we found no endogeneity in these two models, we only run FGLS estimation for the regression	
No of instruments	23	26	23	No of instruments	21		
No of groups	31	31	31	No of groups	28		

Source: own processing. The table presents statistical significance at the 10% one-star, 5% two-star, 1% three-star levels, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

5.5.2 Model with a moderator

$$ROE_{i,t} = \alpha_0 + \alpha_1 MP_t + \alpha_2 MP_t NICS_{i,t} + \alpha_3 NICS_{i,t} + \alpha_4 CAR_{i,t} + \alpha_5 NPL_{i,t} + \alpha_6 LDR_{i,t} + \alpha_7 Assetgrowth_{i,t} + \alpha_8 Zscore_{i,t} + \alpha_9 CIR_{i,t} + \alpha_{10} GDP_t + \alpha_{11} CPI_t + \varepsilon_{i,t}$$

Table 36: Summary of three channels with a moderator using SGMM in both countries (robustness)

Dependent (ROE)	Taiwan			Dependent (ROE)	Vietnam		
	Interest rate channel	Exchange rate channel	Credit channel		Interest rate channel	Exchange rate channel	Credit channel
Redis	1.782*** (3.75)			Redis	-2.091*** (-3.09)		
Redis*NICS	7.075 (1.35)			Redis*NICS	1.558 (0.35)		
Exch		0.101** (2.16)		Exch		0.208** (2.49)	
Exch*NICS		-0.302 (-1.54)		Exch*NICS		0.0421 (0.07)	
CG			-0.212* (-1.68)	CG			-0.283** (-2.29)
CG*NICS			-1.653** (-2.13)	CG*NICS			-0.157 (-0.18)
NICS	0.0300* (1.71)	0.0243*** (3.78)	0.0330*** (3.3)	NICS	0.0736* (1.94)	0.018 (0.74)	0.0144 (0.59)
CAR	-0.107 (-0.55)	0.317*** (3.22)	0.197*** (3.79)	CAR	-0.553** (-2.32)	-0.199** (-2.02)	-0.228** (-2.28)
NPL	-2.620**	-1.375	-2.026**	NPL	-1.152	0.0229	0.0306

LDR	(-2.53) 0.115 (1.48)	(-0.97) 0.0445** (2.23)	(-1.97) -0.0017 (-0.07)	LDR	(-1.23) 0.0317 (1.1)	(0.16) 0.0861*** (3.98)	(0.22) 0.108*** (5.25)
Assetgro~h	0.00812 (0.69)	0.0152*** (3.87)	0.0118*** (3.36)	Assetgro~h	0.0453** (2.13)	0.0316* (1.83)	0.0393** (2.16)
Zscore	0.0641 (0.19)	0.108 (0.54)	-0.0185 (-0.08)	Zscore	0.530*** (2.82)	0.305** (2.17)	0.324** (2.21)
CIR	-0.126*** (-5.28)	-0.110*** (-6.71)	-0.118*** (-4.86)	CIR	-0.0482 (-0.65)	-0.230*** (-11.51)	-0.225*** (-10.98)
GDP	0.121* (1.69)	0.133 (1.24)	-0.0704 (-0.83)	GDP	0.606*** (3)	0.249*** (3.06)	0.294*** (3.3)
CPI	0.0178 (0.19)	0.137 (0.97)	0.0944 (0.79)	CPI	-0.0942 (-0.40)	0.0826 (0.6)	-0.118 (-0.76)
L.ROE	0.339*** (5.04)	0.347*** (3.18)	0.314** (2.19)	L.ROE	0.535*** (3.89)		
N	279	279	279	N	252	280	280
AR1	0.012	0.003	0.013	AR1	0.027		
AR2	0.295	0.215	0.211	AR2	0.084		
Hansen Test	0.232	0.089	0.059	Hansen Test	0.394	As we found no endogeneity in these two models, we only run FGLS estimation for the regression	
No of instruments	29	24	28	No of instruments	22		
Number of groups	31	31	31	Number of groups	28		

Source: own processing. The table presents statistical significance at the 10% one-star, 5% two-star, 1% three-star levels, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 37: Research result aggregation

Effect of Monetary Policy Transmission Mechanism on Bank Performance			Effect on ROA		Effect on ROE (robustness)	
			Taiwan	Vietnam	Taiwan	Vietnam
RO1	Interest rate Channel	The effect of the interest rate channel on bank performance.	Significantly positive	Significantly negative	Significantly positive	Significantly negative
		The business model, as denoted by the income diversification, moderates the relationship between the interest rate channel and bank performance.	Negative, but insignificant	Significantly negative	Positive, but insignificant	Positive, but insignificant
RO2	Exchange rate Channel	The effect of the exchange rate channel on bank performance.	Significantly positive	Significantly positive	Significantly positive	Significantly positive
		The business model, as denoted by the income diversification, moderates the relationship between the exchange rate channel and bank performance.	Positive, but insignificant	Positive, but insignificant	Negative, but insignificant	Positive, but insignificant
RO3	Credit (bank lending) channel	The effect of the credit (bank lending) on bank performance.	Significantly Negative	Significantly Negative	Significantly Negative	Significantly Negative
		The business model, as denoted by income diversification, moderates the relationship between the credit channel and bank performance.	Significantly Negative	Significantly Negative	Significantly Negative	Negative, but insignificant

Interest Rate Channel: Opposite directions—positive in Taiwan (mature market efficiency) vs. negative in Vietnam (emerging vulnerabilities). **Exchange Rate Channel:** Consistently positive and robust across ROA/ROE. **Credit Channel:** Consistently negative and robust across ROA/ROE. Robustness (ROA vs. ROE). Patterns are largely consistent, validating the findings and indicating that results aren't sensitive to the asset vs equity focus.

6. CONCLUSION, RESEARCH CONTRIBUTION, FUTURE STUDY

This section concludes the study by presenting its main results and contributions from both theoretical and practical perspectives. In addition to these key findings, the study outlines its limitations and provides directions for future research.

6.1 Conclusion

Over decades, monetary policy has proven to be of considerable importance in guiding a nation through various phases of the economic cycle. Indeed, classical arguments from **Friedman and Schwartz (1963)**, **Taylor (1995)**, **Bernanke and Gertler (1995)**, **Mishkin (1996)**, and **Krugman (1998)** have broadly validated the prominent role of monetary policy and its transmission mechanism in the economy. To that extent, the effects of MPTM on bank performance have been comprehensively researched across regions and countries, yielding divergent results due to distinct economic characteristics and varying levels of banking development. Nonetheless, most studies focus on developed markets or single-country contexts, paying little attention to cross-country comparisons, particularly for small and emerging markets such as Vietnam. Hence, this study analyses MPTM, with particular focus on the interest rate, the exchange rate, and the credit (bank lending) channel, and their substantial impacts on bank performance in both Vietnam, a frontier economy, and Taiwan, an advanced economy. Notably, motivated by the Central Bank's continuous calls to focus on fee-based services, the study also incorporates a growing variable, the non-interest income share, into the empirical models to assess the extent to which it moderates the aforementioned effects of MPTM. In brief, this comparative study aims to provide researchers and policymakers with a comprehensive understanding of MPTM and its impact on bank performance.

6.1.1 Effect of interest rate channel on bank performance and the moderating role of non-interest income

Overall, the effect of the interest rate channel on bank performance has yielded contrasting findings in Taiwan and Vietnam. It has been found to have a significant positive effect on bank performance in Taiwan, whereas it has a negative impact in Vietnam. To elaborate, the positive effects in Taiwan can be explained by rising

interest rates, which enable Taiwan's banks to pass them on to customers and earn higher interest income, thereby increasing their overall returns. This clarification is supported by the literature from **Demirgüç-Kunt and Huizinga (1999)**, **Alessandri and Nelson (2015)**, **Borio (2017)**, and **De Menna (2021)**. In contrast, an increase in interest rates in Vietnam may deter loan demand while increasing banks' funding costs from depositors, reducing their net interest margin and, eventually, net profit. Moreover, higher interest rates pressure borrowers, which may lead to loan defaults and higher provisioning expenses, ultimately reducing profits (**Bernanke & Gertler, 1995**).

Regarding the moderating role of NICS, it is evident in Vietnam, where it intensifies the negative relationship, but it is not significant in Taiwan. This contrast likely reflects differences in banking maturity: Taiwan's more advanced financial system can integrate non-interest income with traditional lending more effectively, whereas in Vietnam, NICS may heighten banks' vulnerability during contractionary periods.

6.1.2 Effect of exchange rate channel on bank performance and the moderating role of non-interest income

Unlike the interest rate channel, the exchange rate channel has a positive overall effect on banks' performance in both countries, indicating that a higher Exch (i.e., a local currency depreciation against the USD) is associated with better bank performance. This provides insight into how banks in Taiwan and Vietnam can optimise local-currency devaluation to increase their overall returns. Indeed, since both countries have long been considered an export-led economy (with a proportion of exports to total GDP exceeding 50% in Taiwan and 80% in Vietnam), the devaluation of their currency greatly assists local businesses to enhance their exporting goods and services, thereby increasing capital demand for scaling, and in turn, raising banks' credit activities and interest income. Not to mention that the currency devaluation is also beneficial to banks' currency trading activities, as banks are perceived as hubs for financial specialists who can exploit the difference between the pre- and post-devaluation periods to generate profits.

Since the moderating effect of NICS is insignificant in both countries, this suggests that NICS do not meaningfully influence the relationship between the exchange rate channel and bank performance. The result also supports the view that exchange rate transmission operates largely independently of banks' diversification

of non-interest income (such as fees, trading, or wealth management). Exchange rate effects are primarily shaped by macroeconomic trade dynamics, balance-sheet exposures, and sector-level adjustments, such as export competitiveness, import costs, and inflation pass-through, rather than by banks' internal revenue composition.

6.1.3 Effect of credit channel (bank lending) on bank performance and the moderating role of non-interest income

The credit channel (bank lending) has a significant negative impact on bank performance in both countries, indicating that higher credit growth is associated with lower profitability. This finding corresponds with established theoretical views, which indicate that expansionary policies, marked by increased loan supply or credit growth, significantly and negatively affect bank performance, as it is believed that more money injection into the banking sector enhances banks' ability to extend loans, hence increasing their exposure to credit hazards (**Friedman & Schwartz, 1963**). Also, grounded in the credit channel theory of **Bernanke and Gertler (1995)**, rapid credit growth often encouraged by accommodative monetary policy can undermine banks' screening effectiveness, increase lending to marginal borrowers, and ultimately weaken asset quality. When banks expand credit too aggressively, particularly in environments with asymmetric information and inadequate risk controls, the likelihood of future non-performing loans rises, which in turn erodes profitability.

Regarding the moderating role of NICS, it appears that NICS amplifies the negative impact of credit growth on bank performance. In other words, diversification into non-interest activities does not act as a buffer against credit-related risks; instead, intensifies them, suggesting that non-interest income fails to effectively offset or hedge lending vulnerability. Moreover, the stronger negative CG*NICS interaction in Vietnam compared with Taiwan further highlights structural and risk-management differences. Vietnamese banks, shifting away from directed lending, tend to boost NICS when lending margins fall, as encouraged by the SBV, but this can result in over-diversification. Banks may expand credit aggressively while moving into unfamiliar non-interest areas without adequate expertise or controls, increasing both default risk and income volatility. These vulnerabilities are further exacerbated by Vietnam's more volatile macro environment, fewer hedging tools, and wider regulatory gaps compared with Taiwan.

6.2 Research contribution and implications

This thesis addresses critical gaps in the existing research on monetary policy transmission mechanisms (MPTM) and their effects on bank performance, with particular emphasis on frontier and advanced Asian economies. By examining Taiwan and Vietnam from 2014 to 2023, a period marked by significant global disruptions, including the post-2014 oil price shock, escalating U.S.–China trade tensions from 2018, and the onset of the COVID-19 pandemic in 2020, the study offers timely empirical evidence on how MPTM channels adapt under economic turbulence. Its contributions are wide-ranging, encompassing theoretical insights, methodological approaches, and practical implications, as outlined below:

- *Pioneering empirical examination of multiple MPTM Channels in Taiwan and Vietnam*: this is the first empirical study to simultaneously investigate the impacts of three key MPTM channels—the interest rate channel, exchange rate channel, and credit (bank lending) channel—on bank performance in Taiwan and Vietnam within a unified framework. By analysing data through 2023, the study captures recent dynamics, such as Taiwan's resilient banking sector and Vietnam's ample credit expansion pre- and post-COVID-19. For instance, the findings reveal that increases in the rediscount rate raised Taiwanese banks' ROA by an average of 0.229%, whereas in Vietnam, it led to a 0.122% decline in ROA due to deteriorating loan demand and heightened default risk among local companies. This analysis substantiates the divergent effects across channels, offering a benchmark for future studies on frontier versus advanced markets.

- *Cross-country comparative analysis*: While much of the existing literature focuses either on major developed economies (such as the U.S. or the Eurozone) or on single-country analyses, this study offers a novel contribution by directly comparing Vietnam, a frontier market characterized by 5–8% annual GDP growth (except the COVID-19's period) and strong dependence on its banking sector, with Taiwan, an advanced economy supported by a technology-driven export structure and well-capitalized private banks. This comparative study reveals important structural contrasts. For instance, the exchange rate channel exerts a more substantial positive influence in Vietnam, where exports exceed 86% of GDP (Table 8), resulting in a 0.043% increase in ROA (Table 28) during periods of currency depreciation. In Taiwan, the corresponding effect is more modest, at roughly 0.016%

(Table 28). These findings demonstrate how differing stages of economic development shape the effectiveness of MPTM channels, addressing a notable gap in cross-economy research and offering a framework for future comparative studies among Asian economies.

- *Integrated model with a moderator and a set of control variables*: Unlike other studies that isolate individual MPTM channels, this research integrates all three into econometric models, along with eight control variables (six bank-specific and two macroeconomic). Crucially, it introduces the non-interest income share (NICS) as a moderating variable, reflecting the shift toward fee-based services amid bank digital transformation. According to the SBV, most Vietnamese banks have formulated digital transformation strategies, with 39% having progressed to the second stage, in which digitalisation is embedded in core business activities (MIC, 2021). Nevertheless, the finding is that NICS generally does not serve as an effective buffer or stabiliser against monetary policy transmission risks for banks in these two countries. Instead, it tends to worsen vulnerabilities, particularly through the interest rate and credit channels, with stronger adverse moderating effects observed in Vietnam's less mature banking system than in Taiwan. The exchange rate channel remains largely unaffected by NICS in both markets.

- *Policy-relevant insights for macroeconomic management*: From a practical standpoint, the findings urge policymakers to exercise monetary tools with care. In Taiwan, where interest rate channels positively correlate with bank performance (positive coefficients- see Table 24), the study suggests that over-reliance on frequent or aggressive rate hikes as a policy tool carries broader risks for the economy, particularly in a tech-dominant landscape like Taiwan. These interconnected risks include higher borrowing costs and reduced investment due to more expensive loans, an increased risk of default and financial strain, and, ultimately, a slowdown in economic growth leading to stagnation. Meanwhile, in Vietnam, the adverse interest rate effects (negative coefficients- see Table 24) emphasize the need for targeted interventions to shield SMEs due to their vulnerability. Vietnam's economy is bank-dominated (credit-to-private as a percentage of GDP ratio >126%- see Table 8, a very high ratio), with limited alternative financing like capital markets, so SMEs are especially vulnerable because they lack access to low-cost funding sources available to large/state-owned enterprises, and during tightening periods (e.g., 2022 rate hikes to combat inflation post-COVID- see Table 8), SME loan demand slumped, possibly contributing to

sluggish credit growth and rising non-performing loans (NPLs) in the SME segment. This, in turn, will inevitably hinder economic growth. Therefore, if the central bank adopts a tightening monetary policy, it should be implemented selectively, targeting non-production sectors such as real estate and securities, without adversely affecting production- and export-oriented sectors, which are key drivers of economic growth.

- *Guidance for bank management in a competitive landscape:* The study offers practical guidance for bank management operating in an increasingly competitive environment. It highlights several controllable factors that influence performance, including strengthening capital adequacy, which has been shown to enhance bank performance, and improving the cost-to-income ratio, which is negatively associated with performance when poorly managed. The findings also underscore the importance of shifting from a lending-focused model (traditional) toward more diversified income streams. It is noticed that, rather than mitigating monetary policy transmission risks, NICS tends to amplify them for banks in both countries. This is especially evident in the interest rate and credit channels, where its moderating influence becomes increasingly detrimental.

- *Empirical validation amid technological shifts:* by connecting MPTM to bank performance during the U.S.–China trade tensions and the global AI boom, this study offers concrete evidence of how transmission channels, particularly the exchange rate channel, operate effectively in export-led economies such as Taiwan and Vietnam. The results show that currency depreciation can enhance resilience even amid major external disruptions. This is especially relevant in the context of the post-2020 surge in global AI demand, which has significantly increased the need for semiconductors (Taiwan’s primary export) and for high-tech manufacturing and electronics (key growth sectors in Vietnam). Moreover, this finding also adds depth to the literature on the dual edges of currency devaluation. To explain, on the positive side, this boosts exports and economic activities due to cheaper and more competitive exported goods, and benefits banks owing to stimulated export-related lending and an increase in FX trading; however, on the downside, this results in imported inflation due to more expensive imported goods, decreased consumers’ real income, eroded purchasing power, increased foreign-denominated debts due to weak currency, capital flight due to investor’s eroded confidence, and foreign trade retaliation as evidenced by trade war between the US and China recently. This eventually distorts the macroeconomic stability.

- *Strictly supervise loan growth to mitigate credit risk:* The adverse effect of credit growth on bank performance in both countries underscores the credit risk posed by loan expansion. Hence, policymakers must enforce strict controls on banks' credit growth, such as stricter lending standards, enhanced borrower screening through due diligence, a robust credit-scoring/rating system, and diversified lending portfolios, specifically in high-risk sectors (e.g., real estate in Vietnam, where price volatility has driven bad debts). Banks should also maintain a substantial reserve base to cover unexpected defaults and implement forward-looking stress testing to assess loan quality under adverse scenarios, including interest rate hikes or economic slowdowns. Additionally, regulators should strictly monitor LDR as a liquidity brake and supervise the NPL ratio and the short-term-deposit-to-long-term-loan ratio to mitigate excessive, uncontrolled loan supply. Moreover, given AI's rapid growth, banks should invest further in data analytics and AI-driven credit scoring to identify high-risk borrowers and enhance the quality of their lending portfolios.

- *Enhance Regulatory Oversight on Diversification Strategies:* In Vietnam, where NICS intensifies vulnerabilities through interest rate and credit channels, regulators (e.g., the State Bank of Vietnam - SBV) should implement stricter guidelines to prevent over-diversification into unfamiliar non-interest areas. This could involve requiring banks to demonstrate adequate risk management expertise and controls before expanding NICS activities. For instance, in Vietnam, SBV should implement risk-based capital add-ons or higher provisioning requirements for banks with high NICS shares, particularly when these banks are tied to volatile sectors (e.g., securities trading or real estate-linked fees), and conduct regular assessments of how NICS affect banks' sensitivity to monetary policy shocks. Moreover, banks in Vietnam should prioritize building internal expertise in non-interest activities (e.g., fees, trading, wealth management) before aggressive expansion. In Taiwan, with its more advanced system, policies could focus on promoting best practices for integrating NICS with traditional lending (cross-selling services, wealth management, digital integration, etc.) to maintain the observed resilience, in which diversified income streams often act as buffers during economic downturns or monetary-tightening phases.

- *Utilize the sensitivity of interest rates:* Banks in Taiwan should leverage rising interest rates by effectively passing on rate hikes to borrowers while still controlling funding costs. For example, with ample liquidity and deposit-funded operations, banks can widen net interest margins (NIMs) through active asset-liability

management, such as repricing floating-rate loans quickly, optimizing deposit mixes toward lower-cost sources, and hedging interest rate risks via derivatives. This approach would boost interest income and net profits without significantly eroding borrower demand in a resilient economy. In the meantime, in Vietnam, where funding pressures persist, with deposit rates trending higher (6.5–7% for 12-month terms in early 2026) due to credit-deposit mismatches and the SBV's cautious 15% credit growth target, banks should prioritize rigorous cost management to alleviate the strain of elevated funding costs during periods of rate pressure or tightening liquidity. Key actions include diversifying funding sources by issuing bonds, attracting stable long-term deposits, and improving operational efficiency through digitalization. Moreover, they must exercise caution and implement appropriate measures to safeguard against loan defaults caused by rising borrowing costs such as enhanced credit monitoring, early-warning systems for vulnerable borrowers, such as in real estate or SMEs, stricter debt-service coverage ratios, restructuring options for at-risk loans, and building higher provisions/buffers.

- *Increase export-related services, including currency trading and lending activities:* given the positive effects of currency depreciation on bank performance, banks in both countries should intensify their currency trading, such as spot/forward FX transactions, options, and hedging services, to further optimise profits from exchange rate movements. This includes building dedicated FX desks, offering competitive pricing to corporate clients, and integrating FX services with broader treasury solutions. Concurrently, banks should cultivate export-led enterprises by actively providing tailored lending support to facilitate their expansion. This involves offering export-oriented credit products, such as pre-shipment finance, post-shipment financing, trade finance facilities (letters of credit, export bills discounting), and foreign-currency-denominated loans, to help firms scale international operations. Moreover, to leverage these firms' foreign-currency earnings effectively, banks can structure loans in USD or other export currencies to reduce currency mismatch risks for borrowers while generating fee income and potentially hedging gains.

- *Lastly, Leverage technology to sharpen competitive edges:* the explosive growth of technological advancements in the banking sector is evident. Thus, banks have been racing to rapidly implement the latest technologies, such as blockchain, AI, and cloud computing, to optimise operational efficiency, enhance customer experiences, and remain competitive in an increasingly digital world. Not to mention that banks

also need to invest in cybersecurity, which is vital for mitigating technological risks associated with digital transformation, thereby assuring customers' confidence in fee-based services.

6.3 Limitations and Future Study

Since the topic of monetary policy and its impact on the economy and the banking sector is vast and encompasses many interesting areas, this study is just the beginning of an exploration. The researcher aims to provide an in-depth understanding of MPTM and its significant role in driving bank performance in Taiwan and Vietnam, as evidenced by recent empirical results. However, the study has limitations, as it addresses only a few aspects of MPTM, leaving numerous questions unanswered. Therefore, it is suggested that further study should focus on a more profound level in the following areas:

- ✓ It is acknowledged that several prior studies employed a variety of monetary and control variables to explore how bank performance, including profitability and riskiness (proxied by NPL or risk-adjusted return on assets and equity), responds to monetary changes. However, this study addresses only bank profitability, which is a shortcoming given the high degree of riskiness and the equally considerable role of risk management in the banking sector. Therefore, future studies can incorporate riskiness into assessments of bank performance to determine whether monetary policy changes affect this crucial indicator.
- ✓ Many studies employ the SVAR (structural vector autoregression) to examine the effect of structural shocks, in this case, the increase/decrease in interest rates, exchange rates, and credit growth, on bank performance and estimate impulse response functions (IRFs). However, this study employs only the SGMM, which, unlike SVAR, cannot trace the dynamic responses of bank performance to monetary shocks. Therefore, future research may apply an SVAR with a 15-year quarterly horizon from 2009, covering the period before and after the global financial crisis and COVID-19, to obtain a more comprehensive assessment of this study's objectives.

- ✓ Concerning the regression model, some previous studies used policy rates, the central bank's total currency reserves, and the money supply to represent the interest rate, the exchange rate, and the credit channel, respectively, and concurrently added non-financial indicators, such as technology advancement, corporate governance, and green finance, to the bank financial variables. Hence, this is also a shortcoming of our dissertation, which thus promises another study to include these crucial variables.
- ✓ Last but not least, all theoretical reviews and standpoints in this dissertation so far relate to the theory of Keynesian economics, which emphasises the role of aggregate demand driven by the central bank's monetary intervention, and the effects of monetary changes on bank performance in the short run only, whereas the supply-side factors, including the labour force, technology, capital investment, and especially climate change, in the long run, are not provided. Therefore, this limitation should be addressed in a subsequent study that examines the impact of long-run key variables, including the labour force, technology, capital investment, and climate change, on bank performance.

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LIST OF AUTHOR’S PUBLICATIONS

- 1) Huy, T. L. Ngo, Quynh, M. Vu & Juraj Sipko (2026). The monetary policy transmission mechanism and its impact on banks’ profitability: Evidence from Vietnam. *Advances in Business-Related Scientific Research Journal*
- 2) Huy, T. L. Ngo (2023). The Application of The Camel Model to The Assessment of Bank Performance and Its Correlation with Bank Profitability:

Evidence from Vietnam. The 6th International Conference on Finance, Accounting and Auditing, ICFAA 2023. NEU, Hanoi. ISBN: 978-604-330-957-7

- 3) Huy, T. L. Ngo & Ha, T.L. Ngo (2023). Monetary Policy, credit channel, and bank performance: Evidence from Vietnam. International Conference on Financial Management and Economics 2023. TDTU. HCM
- 4) Huy, T. L. Ngo (2024). The significance of start-ups in driving economic growth: a comparative analysis of economies with evidence from Japan and Singapore. ACBSP Region 10 Conference 2024. FPTU. HCM

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Date of birth: 16/06/1985

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CAREER SUMMARY

Aug 2022- Present: *Ph.D. at TOMAS BATA UNIVERSITY, ZLIN, CZECH REPUBLIC*

Responsibilities:

- I have taken part in a Ph.D. program specialising in Finance since Aug 2022, in which I have to finish the course in 4 years on the condition of fulfilling qualified articles as well as successfully defending the final thesis, which is about the monetary transmission mechanism and its impact on bank performance in Taiwan and Vietnam. So far, I have already completed the Internal Defence and await approval of the published papers to join the Final Defence in either June or Oct 2026, depending on the Defence Committee's availability.

- During the study, along with passing all courses required by the program, I have published 02 Scopus and 03 conference papers and participated in a 12-month project held by my University. These are mandatory conditions for joining the final round of the Thesis Defense.

Jan 2023 – Present: *Senior Lecturer of the Entrepreneurship and Finance Course at FPT UNIVERSITY, HCM City, VIETNAM (Full-time/Hybrid)*

Responsibilities:

- Generally, in charge of 8-12 classes (50% English conducted) of the Entrepreneurship (Start-up) and Finance course.
- In terms of entrepreneurship, provide students with a basic knowledge of entrepreneurship and ways of executing a start-up idea. More particularly, students will be guided to turn their learned theories, such as business planning, IT, marketing, teamwork, etc., into practical projects.
- Regarding the finance course, provide students with a basic knowledge of financial markets and institutions, a comprehensive introduction to the structure, function, and institutions of modern financial markets — from money markets and capital markets to derivative securities and global financial integration.

Apr 2020- Present: *Associate Lecturer of the Business Technology Finance (BTF) Course, and the Entrepreneurship Course at UEH, RMIT, and TDTU, HCM, VIETNAM (Part-time/Hybrid)*

Responsibilities:

- At UEH and TDTU, generally, in charge of 03-05 classes (100% English conducted) of the module BTF (Business, Technology, and Finance) under the University's Accounting Department. This is a compulsory course for students who desire to get the ICAEW Certificate in Finance, Accounting, and Business, a first step towards becoming a qualified International Chartered Accountant. ICAEW is the Institute of Chartered Accountants in England and Wales. In particular, provide students with a general understanding of the variance of business aspects and their real-world applications. Strategic planning, risk management practices, economic policies, etc. are crucial course topics.
- At RMIT University, generally, in charge of 2-3 classes (100% English conducted) of the Entrepreneurship course. The course provides students with a basic knowledge of identifying business ideas using the value proposition canvas, BMC model, and surveys for hypothesis testing. They must also provide the product's MVP (mock-up) and formulate a business plan to estimate the break-even point and pay-back period.

August 2016- 2020: *General Manager of IVO DELI (F&B Industry)*

Responsibilities:

- Build up the ideas, plans and roadmap of opening IVO DELI restaurant chain expanding from Da Nang to Hoi An and Ho Chi Minh city with key products focusing on: Burger, Pizza and Gelato.
- Personally look for locations and mainly responsible for the restaurant build-up (from business licensing to construction, decoration and installation of machines, furniture, HR recruitment, etc).
- Set up a centralised gelato factory in Da Nang and Ho Chi Minh City, then organise its manufacturing process from ingredient purchasing to final product manufacturing/invention.
- Develop the gelato distribution network and franchising from the factory to IVO DELI's branches and other restaurants. Specifically, develop the wholesale team in terms of human resources, sales brochure design packages, sales commission, and monthly/quarterly/yearly revenue targets.

Jul 2009 – August 2016: *Manager of Strategic Planning & Project Management Department, ABBANK Joint Stock Commercial Bank (Banking Industry)*

Responsibilities

- Managed a department consisting of 6 persons
- Conducted research on the Vietnamese macro-economy and the banking industry, especially ABBANK's standing compared to key rivals regarding financial capabilities, development strategy, market share, etc.
- Worked with the Board of Management (BOM) and Division Directors to develop the bank's vision and missions, followed by their sub-strategic initiatives, key tasks, plans, and roadmaps passed down to Divisions and Departments for bank-wide execution. The Strategic Planning Department must present the final agreement before the Board of Directors (BOD) for final discussion and approval.
- Monitored and timely evaluated the progress of implementing ABBANK's strategic objectives/initiatives to report to the BOM and BOD for immediate actions and adjustments (if any). Specifically, priority is given to closely monitoring the bank's retail-oriented results, including fee income, SME and individual loans, etc.
- Annually formulated a bank-wide business plan aligned with the approved strategic plan, which must be feasible and realisable to ABBANK's organic strengths.

EDUCATION

- 2000-2002: Le Quy Don Gifted School, Da Nang city, Viet Nam
- 2002-2004: St Francis Methodist School, Singapore - Ausmat Pre-University Program
- 2004-2007: University of Central Lancashire, the UK – Bachelor of Accounting and Financial Studies

- 2007-2009: University of Central Lancashire, the UK – Master of Science (MSc) in Financial Management

QUALIFICATIONS

- Certificate in Finance, Accounting and Business awarded by ICAEW (completed in Nov 2020)
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- Bachelor's Degree of Accounting and Financial Studies (completed in Jun 2007)

Huy Tan Lam Ngo

**Monetary Policy Transmission Mechanism (MPTM) and Its Impact
on Bank Performance:
Evidence from Vietnam and Taiwan**

Transmisní mechanismus měnové politiky (MPTM) a jeho dopad na výkonnost
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Důkazy z Vietnamu a Tchaj-wanu

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