Determinants of a bank's profitability with the mediating role of interest rate spread: A case of Vietnam

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ABSTRACT

Considering the fundamental function of commercial banks in the economy, which involves the facilitation of fund transfers from lenders to borrowers, it is imperative for these institutions to carry out this task in a manner that is both efficient and effective. This is crucial to fostering economic growth and enhancing social welfare. A bank's profitability has been a subject of scrutiny by researchers in many countries for decades. This study aims to analyze the impact of interest rate spread (IRS) and its mediating role in the relationship between bank-specific factors and the bank's profitability at the Commercial Bank of Vietnam. The data was collected from 2008 to 2020 for the 25 Commercial Banks using panel regression. The study found the positive effect of cost efficiency (CE), income diversity (ID), and liquidity risk (LIQ) on the IRS; however, bank size (BS), non-performing loan (NPL), provision of bad and doubtful debts (PL), asset structure (AS), non-interest expense (NIE), and economic conditions (ECD) do not impact the IRS statistically significantly. The study also confirms the IRS's mediating role. The study findings provide empirical evidence of the explaining and mediating role of the IRS on bank profitability. This study recommends that policymakers encourage Commercial Banks to diversify their income in order to avoid focusing on traditional activities, which can lead to credit overheating.

Contribution/ Originality: The study contributes to the literature on loanable funds theory. This study is one of very few trying to analyze the impact of the IRS and its mediating role in the relationship between bank-specific factors and bank's profitability in Vietnamese Commercial Banks.

1. INTRODUCTION

The world banking system is currently facing a direct result of the global financial crisis that occurred in 2008: increased competition between domestic and foreign banks and reorganization of the financial system based on the policies of each country's Central Bank are two of the major challenges. These challenges are in line with the goals of financial deregulation, liberalization, and international economic integration. As a result, investors are not only concerned about the financial performance of the banks but also want to know their operations, or more specifically, how the banks may diversify their revenue structure in response to market uncertainties when the credit activities are not steady and may contain a large number of risks. Particularly, the tremendous economic shock that has been felt all across the world as a direct result of the beginning of this epidemic has put an unprecedented amount of pressure on the economies of each and every nation, including Vietnam, especially in the financial market around the

world. Many big banks had a big problem with difficulty and bankruptcy, such as Silicon Valley Bank (SVB), Signature Bank, and Silvergate Bank in the USA.

According to the State Bank of Vietnam, the return on assets (ROA) and return on equity (ROE) growth rate of the banking system increased year by year, as shown in Table 1. After the Covid-19 pandemic, the banking situation gradually improved efficiency through caution in lending and diversifying the bank's income, as evidenced by the fact that the ratio of non-interest income is higher than interest income, which tends to increase over the years. Considering the crisis period from 2008 to 2014, the world economic situation faced many difficulties in general, and in Vietnam in particular. The ROA and ROE ratios have decreased significantly in this period since 2008. ROA reached 1.22% and decreased to 0.59% in 2014, while ROE reached 9.14% and decreased to 6.74%. After the economy recovered, the ROA and ROE ratios increased from 2015 to 2020, as shown in Table 1.

The economic environment in general has a significant impact on the bank's profit, in addition to the fact that ROA and ROE reflect the actual situation of Vietnam's economy over time. Due to the difficulties of profit growth, banks actively increased non-interest income to limit risks from traditional income over the years, increasing from 14% in 2012 to nearly 26% in 2020, with a significant improvement in income diversification.

The banking industry dominates the financial sector as a whole, particularly in terms of the mobilization of savings and the provision of credit facilities to a variety of various economic subsectors (Antwi, Banerjee, & Antwi, 2017). A bank's profitability is formed by two main sources: interest income and non-interest income. According to research by Aboagye, Akoena, Antwi-Asare, and Gockel (2008) and Amidu (2006), the interest rate is one of the primary factors that determines how profitable banks are. According to Antwi et al. (2017) the IRS accounts for around 45% of the profits made by banks. The gap between the interest rates that Commercial Banks lend at and the interest rates that they pay out on deposits is known as the IRS (Kalsoom, Khurshid, & Campus, 2016). Another source of income for the bank is non-interest income, such as transaction fees, insufficient funds fees, annual fees, monthly account service charges, inactivity fees, check and deposit slip fees, and so on.

The financial and banking industry is an essential component of any national economy. It makes a significant contribution to the economic prosperity of any nation. A stable microenvironment is essential to maintaining a stable financial industry. The State Bank of Vietnam is the country's Central Bank, and it oversees all of the Commercial Banks' daily operations. The level of a business's profitability is the single most important determinant of its rate of expansion and growth. Therefore, it is necessary to concentrate on the problems associated with a bank's profitability. Their capacity to efficiently manage their asset and liability portfolios is a critical factor in determining their level of profitability. The function of the bank as an intermediary in the financial market is demonstrated by the fact that it accepts deposits from those with a surplus in exchange for one interest rate and makes loans to those with a deficit in exchange for another interest rate. This is one factor that affects bank profitability. Furthermore, non-interest income also has an impact on a bank's profitability. Interest income always accounts for a large proportion of the total income of banks, not only in Vietnam but also in the general situation of banks in the world. Although the trend is improving, the improvement is not significant, thereby showing that banks are facing many risks from lending activities and relying too much on interest income.

Alternate alternatives for investment on the financial market might also have an effect on the total amount of deposits. When interest rates as well as the income of investors go down, the spread will go up, and this will cause savings to go down. The variation of interest rates has a substantial impact on the profitability of banks operating in the financial industry. This study attempts to bridge the gap by making use of previously collected data in an effort to comprehend the mediating roles of the IRS in the effect of bank-specific variables on ROA and ROE. This paper consists of various sections: introduction, literature review and hypotheses, research methodology, data analysis and research results, discussions and recommendations, conclusion, and finally limitations and future studies.

Table 1. ROA, ROA and percentage of interest, noninterest income from 2008 to 2020.

No	Year	Lending rate	Deposit rate	IRS	ROA	ROE	% Interest income	%Noninterest income
1	2020	9.51%	4.62%	4.89%	0.93%	11.17%	74.1%	25.9%
2	2019	9.73%	4.98%	4.75%	0.93%	11.58%	75.0%	25.0%
3	2018	9.23%	4.76%	4.47%	0.84%	10.73%	75.0%	25.0%
4	2017	8.83%	4.46%	4.37%	0.68%	9.29%	77.3%	22.7%
5	2016	8.40%	4.38%	4.02%	0.53%	7.11%	80.1%	19.9%
6	2015	8.49%	4.36%	4.13%	0.48%	6.06%	81.5%	18.5%
7	2014	9.05%	4.77%	4.28%	0.59%	6.74%	78.0%	22.0%
8	2013	10.13%	5.80%	4.33%	0.62%	6.25%	78.9%	21.1%
9	2012	13.70%	8.40%	5.30%	0.89%	7.94%	85.9%	14.1%
10	2011	20.59%	10.47%	10.12%	0.96%	8.60%	86.4%	13.6%
11	2010	13.73%	6.64%	7.09%	1.23%	12.03%	76.6%	23.4%
12	2009	10.82%	5.27%	5.55%	1.27%	11.94%	69.1%	30.9%
13	2008	19.78%	9.06%	10.72%	1.22%	9.14%	79.0%	21.0%

2. LITERATURE REVIEW AND HYPOTHESES

2.1. Loanable Funds Theory

In the theory of loanable funds, the price at which the demand for and supply of loanable funds are brought into equilibrium is the interest rate. When demand and supply of loanable money are in a state of balance, savers and investors experience the greatest amount of contentment. Variations in either the demand for loans or the supply of loans or credit funds that are available for lending can give rise to shifts in the interest rate, which can be either positive or negative. In most modern economies, the rate of interest is not determined by market forces, i.e., by the forces of demand and supply. Instead, institutional forces—that is, the stances and deeds of the government and the central bank—determine it in large part. Their policies exert the most important influence on the rate of interest by determining both the demand for and supply of loanable funds in the country.

2.2. Market Structure and Efficiency Structure Theory

The market power theory and the efficiency structure theory are the two primary schools of thought that attempt to explain the performance and profitability of banks. Therefore, according to the theories, the performance of the banking sector is wholly dependent on the composition of the market. According to Fu and Heffernan (2009) banks can boost anomalous profits by exercising market power over pricing and earnings in markets that are either highly concentrated or in which they have a significant portion of the market and for which they have clearly defined their goods.

- According to the X-efficiency hypothesis, financial institutions that have superior management and practices are able to keep their costs under control while simultaneously increasing their profits. This brings the financial institution closer to the best practice, a lower-bound cost curve. According to the scale-efficiency hypothesis, certain financial institutions are able to attain higher levels of operational size and, as a result, reduce costs. This is because of economies of scale. The banks that are better able to take advantage of economies of scale incur less costs overall, which results in more profits and a greater rate of business growth.

- The structure-conduct-performance hypothesis contends that less competition in more concentrated markets results in higher loan rates and lower deposit rates, while the relative-market power hypothesis contends that only large banks with some "brand identification" are able to influence pricing and raise profits.

The banks constitute the core of the international monetary system. Therefore, banks must guarantee that they continue to maintain favorable profitability and performance ratios. Bank performance may be seen as the primary factor that contributes to the profitability of the activities of the bank. In addition, it serves as the foundation and

primary objective of all banking operations (Ferrouhi, 2018). ROA and ROE are the standard ratios that are utilized all over the world, including in Vietnam, to evaluate the efficiency of financial institutions.

The State Bank of Vietnam controls all the regulations and policies of all Commercial banks, including the interest rate, exchange rate, and so on. That will affect the profits of banks considerably. Currently, as per Table 1, more than 70 percent of the income of Vietnamese banks is mainly from credit activities, non-income credit activities account for less than 30 percent, which shows that Vietnamese banks are too dependent on credit activities, following the structure-conduct-performance hypothesis. The lending activity is very risky, so it is necessary to reform income by diversifying it.

2.3. Dependent Variables: Profitability (ROA and ROE)

There are various internal and external factors that can affect a bank's profitability. Internal variables are those over which bank managers have some degree of control; in addition, internal factors are impacted by the policies and actions taken by a bank's management. As a result, they essentially represent variations relating to the policies and decisions made by the management of a bank with regard to the uses of money, capital, liquidity and cost management, loans, services, and so on. According to Rao and Tekeste (2012) the influence of internal variables on a bank's profitability may be assessed by looking at the balance sheet and income statement of the relevant Commercial Bank. The term "external factor" is used to describe factors in a financial institution's environment that management cannot control, such as inflation (INFL), gross domestic product (GDP), the actions of the government, and so on.

Although banks can make money through a variety of channels, lending remains the institution's primary function. In most cases, banks will borrow money from depositors and then pay those depositors an interest rate in exchange for the loaned money. As a result of the IRS, the banks will lend the money to the borrowers at a higher interest rate in order to make a profit. A greater spread signifies a more efficient financial intermediary and a bigger net income. Therefore, a bigger spread is associated with higher profitability. Additionally, banks generally diversify their business portfolios and create money via different financial services, such as investment banking goods and services. The activities that result in profits for banks may be broken down into the following categories:

- Loan interest rates: the primary responsibility of a Commercial Bank is to obtain funds from depositors in order to distribute them to borrowers at a rate of interest that is significantly higher.
- Commission: banks provide their clients with a wide variety of services, and in exchange, they charge their customers various fees and commissions. On behalf of its customers, a bank will collect monetary items such as checks, rent, dividends, etc.; it will also take bills of exchange; it will issue drafts and letters of credit; and it will collect wages and pensions.
- Interest on investments: banks invest a significant amount of their resources in securities issued by the government as well as other first-rate industry assets.

2.3.1. Return on Assets (ROA)

The financial performance of an organization, often known as profitability, is a measurement of how profitable the company is and how it will be used as a standard by investors when deciding how to invest their money. The majority of the research that has been done on bank performance has focused on the most important indicators of profitability, such as the net interest margin (NIM), ROA, and ROE (Ben-Naceur & Omran, 2011; Flamini, McDonald, & Schumacher, 2009). The profitability ratios are used as a stand-in for financial performance. In the vast majority of studies that have been conducted regarding the profitability of Commercial Banks all around the world, the proxy for the profitability of Commercial Banks is often ROE (Goddard, Molyneux, & Wilson, 2004) and ROA (Athanasoglou, Delis, & Staikouras, 2006).

So in this study, the definition of ROA, which is an expression that stands for return on total assets, is the ratio that is utilized to investigate the profitability of banks (Goddard et al., 2004; Pasiouras & Kosmidou, 2007). According

to Hassan and Bashir (2003) ROA reflected not just the outcome of investments made in assets but also, and perhaps more importantly, the ability of senior executives to make profitable use of the company's financial resources. ROA is different for each bank.

2.3.2. Return on Equity (ROE)

The definition of ROE is a financial metric that measures a company's capacity to create profits while also providing more value to its owners. The ROE is widely regarded as one of the most complete metrics that can be used to assess the profitability of Commercial Banks. ROA is calculated by taking the net profit and expressing it as a percentage of the total assets. The literature on a bank's profitability argues that the ROA is an acceptable indicator of a bank's ability to create returns on its asset portfolio (Pasiouras & Kosmidou, 2007) whereas the ROE represents how well bank management is utilizing its equity capital.

Furthermore, if the IRS increases, then the profitability of the banking sector will increase. However, the majority of the increase in earnings may be attributed to the increased yields that the banks can achieve. Banks are able to generate a profit by first soliciting cash deposits from their clients in exchange for interest payments and then investing those funds in other ventures. The return that the bank receives from its investments is subtracted from the interest that the bank pays its depositors, resulting in a profit for the bank. The yield on their investments increases when interest rates are higher. The perceived level of market risk, the structure of the market, and other expenses, such as those attributable to inter-bank borrowing, excess reserves, BS, and so on, all have an impact on bank interest spreads. It means that the IRS is influenced by bank characteristics. For all the above reasons, we find that the important mediators of the IRS are the bank's profitability and the bank's characteristics.

2.4. Mediator Variable: Interest Rate Spread (IRS)

IRS refers to the difference between two interest rates: (i) the interest rate on deposits and (ii) the interest rate on loans, as suggested by Robinson (2002). In existing literature, Ho and Saunders (1981) introduce two types of IRS: pure IRS and genuine IRS. The actual IRS is the difference between the average bank lending rate and the average bank depositing rate. It can also be shown as: (interest obtained from loans/total loans) minus (interest paid to deposits/total deposits).

Antwi et al. (2017) examined the impact of the IRS on bank's profitability in Ghana using 28 Commercial Banks data from 1992-2015 (average yearly). The empirical results demonstrate that the relationship between ROA and IRS is positive and statistically significant. In addition, INFL, operating costs (OPC), and net interest income (NII) show a negative relationship with the IRS. Tarus and Manyala (2018) explored the IRS determinants in the 20 Sub-Saharan African economies during 2003-2012. Costs of operations as well as the degree to which banks are organised have a direct and significant influence on the IRS. The study reveals that the growth rate of GDP, money supply, BS, and Treasury bill rate are negatively related to IRS in low-per-capita economies. In contrast, upper-middle-income economies found contradictory results, as GDP growth is insignificant while BS reveals a negative influence and is slightly significant.

Hussain, Rehman, and Rehman (2019) using the ten Commercial Banks data sets for the period 2010-2017, scrutinized the determinants of the IRS in the case of Pakistan. The empirical estimates show that INFL, exchange rate, and Non-Performing Loans (NPL) ratio are positively associated and statistically significant, while the exchange rate and NPL ratio have an insignificant impact. Further, the ratio of demand deposits to total deposits and capital adequacy ratio (CAR) show a negative effect on the IRS. Kalsoom et al. (2016) aimed to review the literature on the association between IRS and profitability. After a comprehensive review, it was concluded that the IRS is a core determinant of profitability. Additional determinants include microeconomic parameters like GDP, INFL rate, and bank-related characteristics, namely size, loans, and deposits, among others, while competition also contributes to the IRS.

However, there are a number of factors that have an impact on the IRS, including the macroeconomic environment, high administrative costs, and a high NPL ratio, among others. However, the IRS is a significant contributor to bank profitability, indicating that changes in interest rates will have an impact on profitability. Musah, Anokye, and Gakpetor (2018) probed the link between the IRS and the profitability of Ghanaian Commercial Banks. The findings reveal that the IRS is positively associated with a bank's profitability and statistically significant. In addition, the inclusion of control variables like CAR and BS is positively associated with bank profitability, and credit risk has a negative impact on bank profitability.

Jui, Sakib, and Rafsan (2020) utilizing the Bangladesh 30 Commercial banks data from 2014-2018, studied the influence of the IRS on profitability. The research used three measures of profitability, such as ROA, ROE, and NIM. The study indicates that the association between the IRS and profitability is positive and statistically significant.

2.5. Independent Variables: Bank Characteristics

2.5.1. Cost Efficiency (CE)

The formula for calculating CE is to divide the entire net operating income by operating expenses. The CE of the bank has the same impact on ID as the size of the bank does. Cost is one of the main factors that affects the profit of banks. The study by Boateng (2018) investigates the elements that contribute to the profitability of banks in Ghana and India. According to the findings, factors like credit risk, CAR, and INFL all have a key role in determining profitability in Ghana and India, respectively. On the other hand, factors such as CE and BS have a negligible impact on the profitability of banks in India, but the same factors have a large impact on the profitability of banks in Ghana. Furthermore, Kumar and Bird (2022) conducted an investigation into the elements that influence bank's profitability in India and China. They found that BS, cost management, and credit quality are the most important factors driving profitability.

2.5.2. The Capital Adequacy Ratio (CAR)

The regulators are the ones that often determine what constitutes an appropriate amount of capital for a bank to hold as a proportion of its risk-weighted assets. The CAR is the statistic that is utilized most frequently for determining capital adequacy. The CAR is a metric that determines how robust a bank is in relation to its risk assets by comparing the amount of capital the bank possesses to the risk-weighted assets it possesses. According to the findings of several empirical studies (Albulescu, 2015; Islam & Nishiyama, 2016; Malik, Baig, Abbas, & Zia ur Rehman, 2015) the CAR has a favorable influence on ROA. According to the findings of research conducted by Dao (2020) over the period of 2010–2017 at 16 Commercial Banks in Vietnam, the CAR had a good influence on ROA, but it had a negative impact on ROE.

2.5.3. Bank Size (BS)

BS is defined as the entire value of a bank's assets. The fact that large banks, as opposed to smaller banks, are in a better position to take advantage of the economies of scale that may be achieved through transactional activity and thus increase their profit margins. According to the findings of several studies, the BS has a substantial impact on its profitability. Lee and Isa (2017), Ahamed (2017) and Al-Homaidi, Tabash, Farhan, and Almaqtari (2018) are the most recent studies on this topic. Al-Harbi (2019) came to the conclusion that there is no correlation between the size of a bank and its level of profitability among the banks that are a part of the Organization of Islamic Cooperation (OIC). Karadžić and Đalović (2021) found that the BS was a key determinant in the profitability of large European banks. Using bank-level data spanning the years 2008-2017, Bunyaminu, Yakubu, and Bashiru (2021) explore the influence of financial leverage on the profitability of recapitalized banks in Ghana. Their study focuses on the country's banking industry.

The research demonstrates, via the use of both random effects and fixed effects methodologies, that leverage has a considerable and negative influence on the profitability of banks. The data also show that there is a positive and substantial relationship between the size of a bank and its profitability.

2.5.4. Income Diversity (ID)

ID is defined as the ratio of net non-interest income to total operating income. According to studies by Lin, Shi, and Zheng (2021) and Li, Feng, Zhao, and Carter (2021) there is a favorable association between ID and financial performance. Moreover, Meslier, Tacneng, and Tarazi (2014) research on the Commercial Banks of the Philippines over the years 1999 to 2005 shows that income diversification has a beneficial effect on the profitability of banks.

2.5.5. Liquidity Risk (LIQ)

The ratio of total liquid assets to total assets is how the LIQ is calculated. When the liquidity risk ratio is high, this results in a reduction in the interest income that the liquid assets generate, as well as a loss of opportunity costs. According to Akter and Mahmud (2014) research, the profitability of banks and their liquidity are linked. Supiyadi, Arief, and Nugraha (2019) analyze the internal and external factors that impact the profitability of Indonesian Sharia banks from 2010 to 2017, using the fixed effects approach. This research covers the period from 2010 to 2017. The research concludes that aspects of a bank's operations, such as asset size, credit risk, and capital sufficiency, all have a substantial and detrimental impact on profitability. On the other hand, liquidity has a constructive and substantial influence on the profit that banks make.

2.5.6. Non-Performing Loan (NPL)

A loan is deemed to be an NPL or a non-performing asset due to the fact that it is highly improbable that the borrower will repay the loan as a financial obligation. According to Catur and Dewi (2020) the purpose of this study is to investigate the impact of NPL on the profitability of financial institutions. In this study, conventional banks from Indonesia that were listed on the Indonesian Stock Exchange between the years 2009 and 2017 were used. The findings of this research indicate that the variable of NPL has a considerable impact, both positively and negatively, on the profitability of banks. According to Rejaul, Mustaqim, Farjana, and Mahmud (2023) the purpose of this study is to evaluate the relationship between NPL and the profitability of banks in Bangladesh. In order to accomplish the goal of this research, the data from twenty-five different listed banks' websites for the twelve years ranging from 2010 to 2021 has been studied. The study's findings indicate that the NPL ratio has a significant and detrimental impact on the ROA's measure of profitability.

2.5.7. Non-Interest Expense (NIE): Non-Interest Expense/ Asset

Ozili (2021) investigates the factors that affect bank's profitability in South Africa, Nigeria, and the United States. Specifically, the study focuses on Nigeria. According to the findings of the study, the ratio of a bank's overhead expenses to its total assets, the amount of its NPL, and its CE all play key roles in determining the profitability of the bank. The study finds that the cost-efficiency ratio of South African banks, the ratio of overhead costs to total assets, and the amount of NPL are major elements that influence bank profitability. In a similar vein, the CAR of United States banks and the total amount of loans that are considered to be non-performing are key elements that influence bank's profitability.

2.5.8. Provision for Bad and Doubtful Debts (PL)

PL: The term "provision for bad debts" refers to the total amount of doubtful debts that need to be written off for the upcoming accounting period. A bank's reliability may be inferred from its PL, which acts as a safety net against the possibility of incurring losses. To protect themselves against the credit risk that arises when a NPL becomes a

default loan, Commercial banks are required to take into consideration the possibility of loan defaults as well as the associated expenses. Not only is the amount of provision a measure of the financial health of the banking sector, but also of the financial health of the economy as a whole in the country. It has been demonstrated via empirical research (Lu & Yuming, 2013; Noman, Pervin, Chowdhury, & Banna, 2015) that the loan loss provision ratio and profitability may have either a positive or negative correlation with one another.

2.5.9. Asset Structure (AS)

The quality of loans will contribute to the bank's earnings and its credit risk. Hence, assets and related factors are important components of a bank's business stability (Žunić, Kozarić, & Dželihodžić, 2021). Therefore, this measure helps to explore the nature of a bank's loan portfolio. Several studies have used the loans-to-total-assets ratio as a proxy for a bank's asset quality (Al-Harbi, 2019; Al-Homaidi et al., 2018). The study on OIC countries by Al-Harbi (2019) found a weak and negative effect of asset quality on profitability, while the study on US banks by Al-Homaidi et al. (2018) reported a positive relationship between asset quality and profitability in Indian Commercial banks. Khan (2022) conducts research on the elements that affect the level of profitability that banks in Gulf Cooperation Council member nations experience. According to the findings of the study, ROA has a connection that is both substantial and favorable to GDP growth as well as BS. Although BS and asset management have a significant and positive impact on ROE, capital adequacy, financial risk, operating efficiency, and asset quality also significantly negatively affect ROE.

2.5.10. Ownership Structure (OWS)

Shareholders have varied interests; OWS of Commercial banks should be taken into consideration in research on the factors that determine the IRS because different shareholders will have different effects on bank behavior in order to get the advantages. According to research done by Nguyen and Nguyen (2015) domestically owned banks have a stronger influence on profitability than foreign-owned banks do. This study also discovered that private ownership has a positive impact on the profitability of banks. This finding suggests that increased bank privatization can facilitate profitability and that transparency and disclosure of information will be more closely controlled and monitored as a result of an increase in the number of shareholders involved. As a result, this will put pressure on banks to operate in a way that is both healthier and more effective. According to Moez, Marouan, and Tahar (2015) the influence of private ownership on ROA and ROE has a favorable and significant impact on both metrics. Both Nguyen (2018) and Miah and Uddin (2017) conclude that banks that are owned by the government bolster the influence that diversification has on efficiency.

2.5.11. Economic Conditions (ECD)
2.5.11.1. The Period 2008 – 2014: Crisis Period

The world economic crisis in 2007 – 2008 was the most "expensive," with a cost of 10 trillion USD being washed away, 30 million people losing their jobs, and 50 million people returning to the poverty line. This affected the economies of all countries around the world, including Vietnam. So, the Vietnamese government has implemented monetary policy combined with fiscal policy. On average, in the period 2008 – 2014, the ratio of M2/GDP has reached 113%, about 2.3 times higher; while the ratio of state budget expenditure to GDP is about 32%, approximately 1.3 times higher than that of the 1996 – 2006 period.

2.5.11.2. The Period 2015 – 2020: Recover Period

In the period 2015 – 2020, the State Bank of Vietnam has made a lot of efforts to implement policies to reduce lending interest rates to support and recover the economy.

Based on the above empirical evidence, we developed hypotheses based on the framework of this research as follows:

H₁: the condition of the independent variable having a significant effect on ROA and ROE.

H₂: the condition of the independent variable having a significant effect on the mediator variable.

H₃: the condition of a mediator variable significantly predicting ROA and ROE

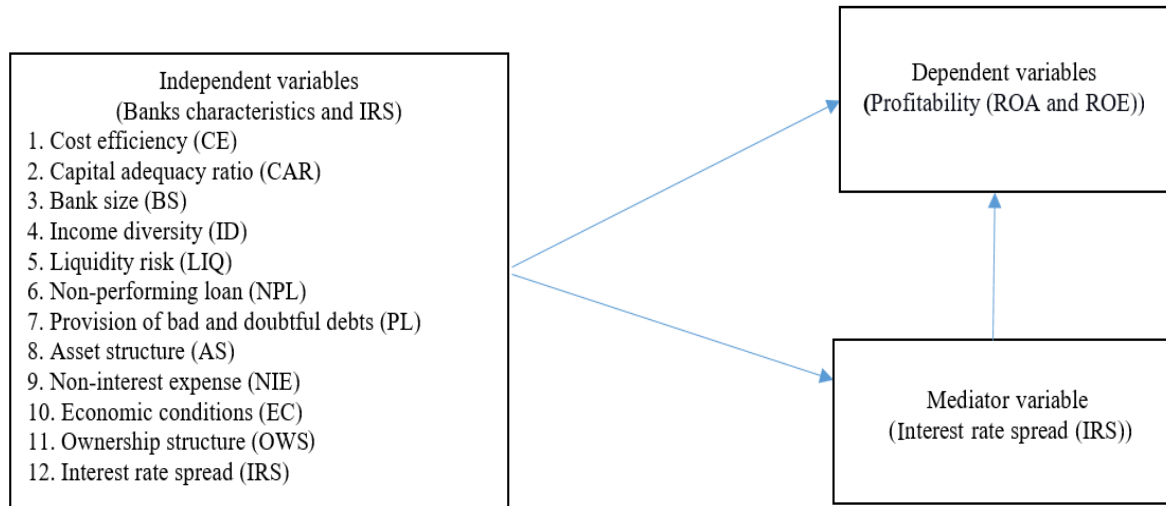*H₄: the identification of whether or not the mediating variable was a partial or full mediator*

Figure 1. Research model.

2.6. Model Specification and Variable Calculations

To test the research hypotheses, the panel regression analysis model was used. To gain effective regression coefficients, the weaknesses of the panel data were diagnosed and fixed with the appropriate econometric model. The specific model used in this research is shown in Figure 1 as follows:

The framework of this research can be designed as follows:

In the present study, the model was tested (the condition of a mediator variable significantly predicting dependent variables and independent variables), and the identification of whether or not the mediating variable was a partial or full mediator was made. The specific model used in this research is shown as follows:

$$IRS_{it} = \alpha_0 + \beta_1 CE_{it} + \beta_2 CAR_{it} + \beta_3 BS_{it} + \beta_4 ID_{it} + \beta_5 LIQ_{it} + \beta_6 NPL_{it} + \beta_7 PL_{it} + \beta_8 AS_{it} + \beta_9 NIE_{it} + \beta_{10} ECD_{it} + \beta_{11} OWS_{it} + \varepsilon_{it} \qquad (1)$$

$$ROA_{it} = \alpha_0 + \beta_1 IRS_{it} + \varepsilon_{it} \qquad (2)$$

$$ROE_{it} = \alpha_0 + \beta_1 IRS_{it} + \varepsilon_{it} \qquad (3)$$

$$ROA_{it} = \alpha_0 + \beta_1 CE_{it} + \beta_2 CAR_{it} + \beta_3 BS_{it} + \beta_4 ID_{it} + \beta_5 LIQ_{it} + \beta_6 NPL_{it} + \beta_7 PL_{it} + \beta_8 AS_{it} + \beta_9 NIE_{it} + \beta_{10} ECD_{it} + \beta_{11} OWS_{it} + \varepsilon_{it} \qquad (4)$$

$$ROE_{it} = \alpha_0 + \beta_1 CE_{it} + \beta_2 CAR_{it} + \beta_3 BS_{it} + \beta_4 ID_{it} + \beta_5 LIQ_{it} + \beta_6 NPL_{it} + \beta_7 PL_{it} + \beta_8 AS_{it} + \beta_9 NIE_{it} + \beta_{10} ECD_{it} + \beta_{11} OWS_{it} + \varepsilon_{it} \qquad (5)$$

Where the subscript i denotes bank i while t denotes year t; α, β, ε are the intercept, the regression coefficient, and the error term, respectively. All variables are explained in Table 2.

Table 2. Variable definitions.

No.	Variables	Symbol	Calculation
Mediator variable			
1	Interest rate spread	IRS	Interest gained from loans /total loans minus interest paid to deposits /total deposits
Dependent variable			
2	Return on assets	ROA	Net profit/total asset
3	Return on equity	ROE	Net profit/ shareholders' equity
Independent variable (Bank-specific characteristics)			
4	Cost efficiency	CE	Total net operating income/operating expenditure
	Capital adequacy ratio	CAR	Equity/risk weighted asset
5	Bank size	BS	Log of a bank's total assets
6	Income diversity	ID	Net non-interest income/total operating income
7	Liquidity risk	LIQ	Deposits/ liabilities
8	Non-performing loan	NPL	Total NPL amount/total loans past due receivables, overdue and doubtful to total loans.
9	Provision of bad and doubtful debts	PL	Total loan loss provision/total loans
10	Asset structure	AS	Loans/total assets
11	Non-interest expense	NIE	Non-interest expense/ asset
12	Economic conditions	ECD	1: From 2008 to 2014, crisis period; 0 : From 2015 to 2020, recover period
13	Ownership structure	OWS	1: State owned banks 0: Private-owned banks

2.7. Methodology

In the current investigation, an analytical approach based on structural equation modeling (SEM) is utilized. A model is developed to test the impact of the IRS and its mediating role in the relationship between bank-specific factors and bank profitability. SEM is a statistical technique utilized to concurrently solve systems of linear equations and examine the optimal connections among variables, as depicted in Figure 1. In addition to various methodologies such as regression analysis, path analysis, and factor analysis, SEM is also employed to assess the appropriateness of the hypothesized model (Hox & Bechger, 2014; Stein, Morris, & Nock, 2012) and the capacity of this approach to quantify both direct and indirect associations among variables (Civelek, 2018). SEM is a statistical technique utilized to analyze the appropriateness of a hypothesized model in order to determine its potential to accurately represent observed data.

3. DATA COLLECTIONS AND ANALYSIS

Data was collected and synthesized from the websites of 25 Commercial Banks listed in Appendix 1, the website of the State Bank of Vietnam (SBV), the General Statistics Office (GSO), and Vietstock.vn.

3.1. Statistical Description

Table 3 presents the descriptive statistics for all variables in the research model with bank-specific data collected from 25 Vietnamese Commercial Banks for 13 years from 2008 to 2020. The statistics indicate that the average IRS of 25 Vietnamese Commercial Banks is about 5.593 percent, with a standard deviation of 3.778 percent.

Table 3. Descriptive statistics of variables.

No	Variables	Mean	Min.	Max.	Std. dev.
1	IRS	5.592	-2.779	27.517	3.778
2	CE	0.553	-1.060	2.938	0.438
3	CAR	14.774	2.000	286	16.604
4	BS	32.081	28.514	34.955	1.317
5	ID	32.081	-0.585	11.650	0.651
6	NPL	3.828	0	300.642	20.631
7	PL	0.013	0	0.039	0.0050
8	AS	0.575	0.113	0.829	0.121

No	Variables	Mean	Min.	Max.	Std. dev.
9	LIQ	0.189	0.0149	0.994	0.117
10	NIE	0.0092	-0.0016	1.002	0.055
11	ROA	0.0085	-0.055	0.0595	0.007
12	ROE	0.091	-0.820	0.285	0.082
13	OWS	0.120	0	1	0.325
14	ECD	0.582	0	1	0.494

3.2. Correlation Analysis

The correlation analysis shows that all the independent variables are correlated with the dependent variable at the 1% significance level, except for CAR, NPL, NIE, ROE, and ECD variables. Almost all independent variables have a negative relationship with the IRS, except for CE, CAR, ID, LIQ, ROA, and ROE (Table 4). There is no correlation coefficient higher than 0.7.

Table 4. Correlation matrix.

Variables	IRS	CE	CAR	BS	ID	NPL	PL
IRS	1.000						
CE	0.273***						
CAR	0.044	0.052	1.000				
BS	-0.260***	0.004	-0.355***	1.000			
ID	0.164***	-0.160***	-0.053	-0.011	1.000		
NPL	-0.065	-0.047	-0.032	-0.088	-0.032	1.000	
PL	-0.132***	-0.011	-0.133***	0.348***	0.068	-0.038	1.000
AS	-0.352***	-0.194***	-0.243***	0.365***	-0.182***	0.055	0.112***
LIQ	0.345***	0.366***	0.466***	-0.455***	0.062	-0.056	-0.196***
NIE	-0.001	-0.027	-0.015	0.043	-0.001	-0.006	0.060
ROA	0.203***	0.842***	0.108	0.004	-0.416***	-0.042	-0.023
ROE	0.030	0.655***	-0.103	0.381***	-0.576***	-0.060	0.103
OWS	-0.230***	0.083	-0.104	0.556***	-0.002	-0.037	0.383***
ECD	-0.011	0.042	0.022	-0.002	-0.068	-0.074	-0.024

Note: *** $p<0.01$.

Table 4. Continue correlation matrix.

Variables	AS	LIQ	NIE	ROA	ROE	OWS	ECD
AS	1.000						
LIQ	-0.627***	1.000					
NIE	0.026	-0.033	1.000				
ROA	0.004	0.198***	-0.000	1.000			
ROE	0.165***	-0.014	0.039	0.774***	1.000		
OWS	0.334***	-0.111***	0.143***	0.014	0.231***	1.000	
ECD	0.010	0.047	0.056	0.037	0.015	0.006	1.000

Note: *** $p<0.01$.

Table 5. Results of the role of mediator IRS, bank-specific and ROA, ROE.

Variables	Coef.	OIM std. err.	P>|z|	95% conf.	Interval
IRS ←					
CE	2.009	0.469	0.000	1.089	2.929
CAR	-0.028	0.012	0.027	-0.053	-0.053
BS	-0.291	0.197	0.139	-0.678	0.095
ID	0.934	0.293	0.001	0.358	1.510
NPL	-0.009	0.008	0.264	-0.027	0.007
PL	-20.946	40.672	0.607	-100.662	58.769
AS	-3.335	2.121	0.116	-7.492	0.822
LIQ	5.681	2.579	0.028	0.625	10.737
NIE	2.716	3.301	0.411	-3.753	9.186
OWS	-1.722	0.771	0.026	-3.235	-0.210
ECD	-0.186	0.372	0.616	-0.915	0.542
_cons	15.491	6.712	0.021	2.335	28.647

Variables	Coef.	OIM std. err.	P>|z|	95% conf.	Interval
ROA ←					
IRS	0.000	0.000	0.007	0.000	0.000
CE	0.014	0.000	0.000	0.014	0.015
CAR	0.000	0.000	0.000	0.000	0.000
BS	0.000	0.000	0.604	-0.000	0.000
ID	-0.003	0.000	0.000	-0.003	-0.002
NPL	-6.750	8.790	0.442	-0.000	0.000
PL	0.048	0.039	0.223	-0.029	0.127
AS	0.010	0.002	0.000	0.006	0.014
LIQ	-0.004	0.002	0.066	-0.009	0.000
NIE	0.004	0.003	0.157	-0.001	0.010
OWS	-0.002	0.000	0.000	-0.004	-0.001
ECD	-0.000	0.000	0.426	-0.001	0.000
_cons	-0.008	0.006	0.178	-0.021	0.004
ROE ←					
IRS	0.001	0.000	0.018	0.000	0.002
CE	0.108	0.005	0.000	0.097	0.118
CAR	-0.000	0.000	0.582	-0.000	0.000
BS	0.023	0.002	0.000	0.019	0.028
ID	-0.060	0.003	0.000	-0.066	-0.054
NPL	-0.000	0.000	0.429	-0.000	0.000
PL	0.531	0.446	0.233	-0.342	1.406
AS	0.073	0.023	0.002	0.028	0.119
LIQ	0.021	0.028	0.450	-0.034	0.077
NIE	0.067	0.036	0.061	-0.003	0.138
OWS	-0.017	0.008	0.041	-0.034	-0.000
ECD	-0.007	0.004	0.067	-0.015	0.000
_cons	-0.772	0.074	0.000	-0.918	-0.627
Var(e.IRS)	10.684	0.839		9.159	12.463
Var(e.ROA)	0.000	8.100		8.840	0.000
Var(e.ROE)	0.001	0.000		0.001	0.001
No. of obs.	324				
Log likelihood	-481.808				

4. RESULTS OF STUDY

The findings of the study related to the mediating roles of the variable of IRS effect on CE, CAR, BS, ID, NPL, PL, LIQ, OWS, NIE, AS, and ECD variables on ROA and ROE are presented in Table 5.

The result shows that the effect of the CE, ID, and LIQ variables on the mediator variable of IRS is found to be positive and statistically significant with a sig. value < 0.05 and the effect of CAR, OWS variables on the mediator variable of IRS is found to be negative and statistically significant with a sig. value < 0.05.

Other variables, such as BS, NPL, PL, AS, NIE, and ECD variables, are not found to be statistically significant with a sig. value > 0.05.

4.1. Results of the Role of Mediator IRS on Bank-Specific and ROA

The effect of the mediator variable of IRS on ROA is also found to be positive and significant, with a sig. value =0.018 < 0.05. This finding is consistent with Antwi et al. (2017) and Musah et al. (2018).

The result shows that the effect of CE, CAR, and AS on the ROA is found to be positive and statistically significant with sig. value < 0.05, ID and OWS variables are negatively related to the ROA and statistically significant with a sig. value < 0.05. The findings in CE, ID, AS, and OWS are inconsistent with Boateng (2018), Lin et al. (2021), Li et al. (2021), Al-Homaidi et al. (2018), Nguyen (2018) and Miah and Uddin (2017). The finding of CAR is inconsistent with Dao (2020).

While other variables, such as BS, NPL, PL, LIQ, NIE, and ECD, have an impact on the ROA, they are not found to be statistically significant with a sig. value > 0.05. The findings of BS, NIE, NPL, and PL are inconsistent with Boateng (2018); Ozili (2021) and Supiyadi et al. (2019).

As per the above-mentioned results, the study finds that the role of the mediator variable in IRS affects CE, CAR, ID, OWS, and ROA. In this case, the criteria of the mediation model were secured.

4.2. Results of the Role of Mediator IRS, Bank Specific and ROE

The effect of the mediator variable of IRS on ROE is also found to be positive and significant, with a sig. value =0.007 < 0.05. This finding is consistent with the Jui et al. (2020).

The result shows that the effect of CE, BS, and AS on the ROE is found to be positive and statistically significant with a sig. value < 0.05, and ID and OWS on the ROE is found to be negative and statistically significant with a sig. value < 0.05. The findings for CE and BS are consistent with Boateng (2018) and Kumar and Bird (2022) respectively.

While other variables such as CAR, NPL, PL, LIQ, NIE, and ECD on the ROE are not found to be statistically significant with a sig. value > 0.05. The findings of NIE, NPL, and PL are inconsistent with Boateng (2018), Ozili (2021) and Supiyadi et al. (2019).

As per the above-mentioned results, the study finds that the role of the mediator variable in the IRS affects CE, ID, OWS, and *ROE*. In this case, the criteria of the mediation model were secured.

5. FINDING DISCUSSION

Improving a bank's efficiency, which is determined by the optimal usage of a bank's assets and liabilities, which have a tight link with a bank's IRS, should be the fundamental objective of every Commercial Bank. One of the primary responsibilities of the bank is to ensure that there is effective coordination and a healthy balance between its investment and finance tasks. This is done in order to achieve improved risk management, which in turn leads to increased efficiency and further leads to a rise in market value metrics such as ROA and ROE. The research objectives were explored by using the data of 25 Commercial Banks in Vietnam from 2008 to 2020. This was done to verify that the results are accurate and current and that they could be captured precisely. In the present study, whether or not the IRS variable had a mediating role in the effect of bank specifics and ROA and ROE in the Vietnamese Commercial Banks was investigated.

The causal mediation effect was utilized in testing the mediation model constructed. The result confirmed that the role of the mediator variable of the IRS affects CE, CAR, ID, OWS, and ROA, and the role of the mediator variable of the IRS affects CE, ID, OWS, and ROE. Research results show that the CE and ID are inversely proportional in the model. This is the main problem for banker owners. Saving costs and diversifying income play a decisive role in determining competitive interest rates in the market. Any bank that manages CE and ID well will be highly competitive in the new trend of Vietnam, an emerging country.

5.1. Theoretical Implications

The findings contribute to the current literature. This is consistent with loanable funds: banks that want to increase profits in general only need to optimize output and input interest rates to achieve maximum profits. This situation is consistent with the current situation of Vietnamese Commercial Banks in the current period. According to the data analyzed in Table 1, the majority of bank profits are from the IRS. This implies bankers must diversify their income to avoid being too dependent on the IRS and to avoid too much risk in lending activities, which may increase bad debt in the future period.

5.2. Practical Implications

For policymakers, they should have certain encouragements to raise the Commercial banks' diversifying their business lines in order to avoid focusing on conventional activities, which can lead to credit overheated development and can 'boom at any time, and credit activities are sensitive to unforeseen occurrences. Additionally, they should reduce operation costs as well as diversify the OWS of the bank. The State Bank of Vietnam encourages Commercial

banks to promote equitization and increase their charter capital to get high competitiveness and lower interest rates to develop the economy. This should especially take place during the period in which the market is recovering. This is absolutely required in light of the devastating effects that COVID-19 has had on the global financial system, as seen by the rise in the number of delinquent obligations. The high IRS might be beneficial for Commercial banks. A bank could provide high loan rates in order to pay its interest expenditures, NIE, and compensate its liquidity risk as part of its strategy to achieve greater IRS. A high IRS may help a bank increase its interest revenue, but it also indicates that the bank is operating in an inefficient manner. Borrowers and depositors both stand to gain from an IRS that is low. Because businesses have to rely on bank loans to finance their operations, the effective corporate tax rate is often rather high in nations that have inadequately developed banking systems. Borrowers will profit from a reduction in IRS, which may be accomplished by providing lower loan rates and cutting expenditures other than interest, which will in turn stimulate economic growth.

6. LIMITATIONS AND FUTURE STUDIES

Although this study provided empirical evidence of the role of the mediator variable of IRS in banking characteristics and ROA and ROE, the sample size was too small to generalize the results. In this study, macro environment is not considered in relation to the IRS, ROA, or ROE. Therefore, further research should modify the research model with the role of macro environment and increase the sample size.

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Appendix 1. List of banks use in this study.

No.	Bank name	Abbreviation
1	An Binh Commercial Joint Stock Bank	ABB
2	Asia Commercial Joint Stock Bank	ACB
3	BAC A Commercial Joint Stock Bank	BAB
4	Bao Viet Joint Stock Commercial Bank	BaoVietBank
5	Joint Stock Commercial Bank for Investment and Development of Vietnam	BIDV
6	Bao Viet Joint Stock Commercial Bank	BVB
7	Vietnam Joint Stock Commercial Bank of Industry and Trade	CTG

No.	Bank name	Abbreviation
8	Vietnam Export Import Commercial Joint Stock	EIB
9	Ho Chi Minh City Development Joint Stock Commercial Bank	HDB
10	Kien Long Commercial Joint Stock Bank	KLB
11	LienViet Commercial Joint Stock Bank	LPB
12	Military Commercial Joint Stock Bank	MBB
13	Nam A Commercial Joint Stock Bank	NAB
14	National Citizen Bank	NVB
15	Petrolimex Group Commercial Joint Stock Bank	PGB
16	Sai Gon Commercial Joint Stock Bank	SCB
17	Saigon Bank for Industry & Trade	SGB
18	Saigon-Hanoi Commercial Joint Stock Bank	SHB
19	Saigon Thuong Tin Commercial Joint Stock Bank	STB
20	Vietnam Technological and Commercial Joint Stock Bank	TCB
21	TienPhong Commercial Joint Stock Bank	TPB
22	Viet A Commercial Joint Stock Bank	VAB
23	Joint Stock Commercial Bank for Foreign Trade of Vietnam	VCB
24	Vietnam International Commercial Joint Stock Bank	VIB
25	Vietnam Commercial Joint Stock Bank for Private Enterprise	VPB