

Financial intermediation and profitability of commercial banks in Vietnam: does bank size matter?

Journal of
International
Economics and
Management

65

Vinh Hoang Le and Anh Hoang Nguyen
*University of Economics and Law, Ho Chi Minh City, Vietnam and
Vietnam National University Ho Chi Minh City, Ho Chi Minh City, Vietnam, and*
Toan Van Ngo
University of Finance and Marketing, Ho Chi Minh City, Vietnam

Received 23 April 2025
Revised 26 May 2025
15 June 2025
Accepted 7 July 2025

Abstract

Purpose – This study examines the implications of bank size for the impact of financial intermediation function on the profitability of commercial banks in Vietnam.

Design/methodology/approach – We utilized a balanced panel dataset comprising 25 Vietnamese commercial banks from 2009 to 2022. The system-GMM method is used to explore relationships through these data.

Findings – The estimation results show that the interaction between customer deposits and loans has a positive impact on bank profitability. This means that commercial banks can increase their profitability if they harmoniously perform financial intermediation functions. We also found that bank size plays a moderating role in the impact of the loan-to-asset ratio and deposit-to-asset ratio on profitability.

Originality/value – Findings show that commercial banks need to focus on managing their scale in accordance with the two core activities of a banking intermediary, including mobilizing deposits and granting credit to customers. Not only that, these two activities need to be closely coordinated with each other. The study has provided reliable evidence on the moderating role of bank size on the relationship between financial intermediation and bank profitability in emerging markets. Our findings are relevant to the context of the continuous changes in size and financial intermediation process of Vietnamese banks after the 2008 global financial crisis. Hence, it may have practical implications for policymakers.

Keywords Bank size, Commercial banks, Financial intermediation, Profitability

Paper type Research article

1. Introduction

Financial intermediation is a process that entails the mobilization of deposits from entities with surplus funds and the subsequent allocation of these funds as loans and advances to entities with deficits in their spending (Allen and Santomero, 1997). This facilitates the effective allocation of financial resources within the financial system and improves consumers' welfare by allowing them to time purchases better (Akoto and Nabieu, 2014; Mishkin, 2019). Financial institutions, like commercial banks, serve as intermediaries in connecting savers, spenders, lenders and borrowers. Size, maturity, risk and information intermediation are the four types of intermediation functions that a financial intermediary, such as a commercial bank, employs to eliminate mismatches between firms and savers (Kolb and Rodriguez, 1993; Saunders *et al.*, 2022). Financial intermediaries, including commercial banks and other credit institutions, profit from the spread between the borrowing interest rate (or deposit interest rate) and lending interest rate. Financial intermediaries can perform these tasks at a lower cost than individuals due to their utilization of economies of scale. Intermediation services are implemented in a standardized and automated manner on a significant scale, resulting in a

© Vinh Hoang Le, Anh Hoang Nguyen and Toan Van Ngo. Published in *Journal of International Economics and Management*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) license. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this license may be seen at [Link to the terms of the CC BY 4.0 licence](#).



Journal of International Economics and
Management
Vol. 25 No. 1, 2025
pp. 65-79
Emerald Publishing Limited
e-ISSN: 2977-6104
p-ISSN: 2615-9856
DOI 10.1108/JIEM-04-2025-0018

reduction in per-unit transaction costs. Consequently, would it be accurate to assert that as a bank expands its size, it will leverage economies of scale to generate greater profitability? Is it true to state that as the scale of operations increases, banks find it easier to attract deposits while also performing the function of financial intermediation due to broadened operational network coverage? This study aims to analyze the influence of financial intermediation on bank profitability, considering the mediating effect of bank size.

Many studies have found empirical evidence that bank size increases bank performance. [Kovner et al. \(2014\)](#) asserted that costs relative to bank size, such as compensation, information technology and legal services, decline as bank size increases. However, when a business gets larger, it also grows in complexity, resulting in the exhaustion of scale economies. Moreover, large financial firms, especially commercial banks, may cause a problem called “too big to fail” ([Stern and Feldman, 2009](#)). In bank-based financial systems, banks play important roles in efficiently channeling funds and providing payment systems. The banking system must be safe and governments may help to avoid negative externalities and financial instability when banks “fail”. Yet, giant, complex banks might tend to take on excessive risk if they expect future rescues from the government. Previous research has identified bank size as a debatable factor that may affect bank profitability positively ([Almaqtari et al., 2019](#); [Koroleva et al., 2021](#)) or negatively ([Berger and Bouwman, 2009](#); [Dietrich and Wanzenried, 2014](#); [Batten and Vo, 2019](#)). This entails investigating the moderating role of bank size in generating profitability via financial intermediation activities of commercial banks in a developing economy like Vietnam.

The study of Vietnam’s bank intermediation and profitability with size as a moderating variable is intriguing in several ways. First, due to the underdevelopment of the security market, commercial banks in Vietnam play a critical role in distributing financial resources to the entire economy ([Batten and Vo, 2019](#)). Vietnam has a bank-based financial system, with domestic credit to the private sector by banks accounting for 126.4% of GDP in 2022 ([The World Bank, 2023](#)). Along with an average annual GDP increase of 6.2% from 2000 to 2022 ([General Statistics Office of Vietnam, 2023](#)), Vietnam’s financial sector, including the banking industry, is expected to thrive. The expansion of the banking sector raises concerns about Vietnamese bank performance under the moderating role of bank size.

Second, after undergoing a decade-long restructuring process in the wake of the 2008 global financial crisis, Vietnam’s banking industry has grown in size and made notable strides in capitalization. Despite the strong profitability reported by many commercial banks in recent years, Vietnam’s banking sector has experienced a low level of capital accumulation. The average capital adequacy ratio of Basel II-compliant banks in Vietnam is approximately 9.2% for state-owned banks and 11.4% for private-sector banks ([Fitch Ratings, 2022](#)). This is significantly lower than the average for banks in other Southeast Asian countries, which is 19.4% ([Fitch Ratings, 2022](#)). It can be explained by the fact that rapid loan growth consumed most of the increase in retained earnings. As a result, loan loss reserves are increased to cover potential losses from non-performing loans. Therefore, in line with the ongoing progress, banks’ average assets persistently increase due to increased capital accumulation and loan expansion. Profits may increase for commercial banks in Vietnam as a result of economies of scale, but this may be offset by a rise in non-performing loans. This inquiry pertains to the potential negative correlation between bank size and profitability and the possibility that bank size could moderate the effect of financial intermediation on bank profitability.

Third, following the COVID-19 pandemic, commercial banks in Vietnam attempted to implement digital transformation procedures. Process automation, improved customer experiences and increased management efficiency all help banks reduce operational costs and increase profits ([Nuhiu and Aliu, 2023](#); [Xie and Wang, 2023](#); [Theiri and Alareeni, 2023](#)). Vietnam commercial banks may benefit from economies of scale due to cost advantages. Overall, the evolution of the banking system, the restructuring of the banking industry in Vietnam since the 2008 global financial crisis and the digital transformation procedures raise concerns about the relationship between bank size and profitability. Furthermore, banks’

digital transformation, combined with changes in consumer behavior following the COVID-19 pandemic, creates prospects to promote financial inclusion. This entails enhancing consumer access to banks' financial intermediation activities via conventional commercial banking services, such as deposit-taking and lending.

In this context, our study is innovative in several aspects. From an emerging market perspective, our research is one of the few studies to examine the moderating effect of bank size on the relationship between financial intermediation and bank profitability. Furthermore, our research contributes by studying a uniquely different context and an updated study period from 2009 to 2022. Following the 2008 global financial crisis, this period saw the restructuring, privatization and digital transformation of Vietnamese banks. During this period, Vietnamese banks' size and financial intermediation process also changed constantly. Hence, our findings in this phase may have policy and practice implications.

The remainder of our paper is organized as follows. [Section 2](#) presents the literature review and expectations. [Section 3](#) describes our data and methodology. The empirical findings are given in [Section 4](#), while [Section 5](#) provides implications from our findings and suggestions for further studies.

2. Literature review and expectations

2.1 Financial intermediation and bank profitability

Financial resources play a crucial role in stimulating economic growth through efficient financial intermediation (Sulaiman and Aluko, 2015). Financial intermediation refers to the mechanism by which individuals with surplus funds entrust them to banks or other financial institutions, which in turn extend credit to individuals in need of funds for personal or business purposes (Akoto and Nabieu, 2014; Mishkin, 2019; Saunders *et al.*, 2022). The effectiveness of financial intermediation is determined by how successfully surplus funds are matched against deficit funds or how well surplus funds are used to compensate for deficit funds (Akoto and Nabieu, 2014). Financial intermediation aids in the reconciliation of lenders' and borrowers' preferences regarding the quantity of funds, risk exposure, maturity and liquidity (Mishkin, 2019; Saunders *et al.*, 2022). In essence, deposit mobilization and lending activities are at the heart of financial intermediation, contributing to the performance of financial intermediaries such as commercial banks (Gwachha, 2019). Several studies generally demonstrated that increased and efficient financial intermediation leads to bank profitability, financial stability and economic development (Bologna, 2011; Obamuyi, 2013; Yakubu *et al.*, 2021).

Regarding the mobilization of deposits, it is evident that the profitability and viability of businesses are heavily reliant on the availability of funds. Deposits serve as the primary means of bank financing, thus establishing a clear connection between effective deposit mobilization and profitability (Bologna, 2011; Saunders *et al.*, 2023). Customers' deposits refer to funds that individuals or entities entrust to banking institutions to safeguard them. Deposits are typically made into various types of deposit accounts, including savings, checking and money market accounts. The deposit is classified as a liability, representing the bank's obligation to repay the depositor. According to Obamuyi (2013), to ensure profitability in the banking sector, it is imperative for banks to effectively mobilize a greater volume of deposits, thereby enabling them to extend a higher number of loans and advances. Gwachha (2019) discovered a positive impact of the customer deposit-to-total-asset ratio on profitability by analyzing data from 51 Nepalese banks listed between 2004 and 2013. Lee and Hsieh (2013) and Saeed (2014) emphasized this relationship by concluding that commercial banks that mobilize more customer deposits may have better prospects of generating more profitability, whereas low deposits may have a negative impact on bank profitability. In addition, this positive relationship continues to be supported by the case of state-owned commercial banks in China because they can create better confidence in mobilizing capital (Koroleva *et al.*, 2021).

In terms of loan granting, which is a critical component of financial intermediation, it is anticipated that enhanced lending capacity will augment bank profitability. This is due to the fact that loans are banks' primary source of income. We use the ratio of loans to total assets as a proxy for lending capacity, representing the ability of banks to meet the demand for loans by using the total assets owned by banks. The higher this ratio, the better the credit performance level because the greater the loan component given in the total structure of the assets. Several studies by [Jumono and Mala \(2019\)](#) and [Trujillo-Ponce \(2013\)](#) reported a direct positive association between the relative percentage of loans in bank assets and profitability. [Berger and Bouwman \(2009\)](#) stated that firms prefer to borrow from a bigger bank to expose the quality of their projects. [Trujillo-Ponce \(2013\)](#) also added that large banks have enough resources to extend their loan volume, enjoy superior diversification benefits and cost savings from large information systems, resulting in higher profit. However, a high loan-to-asset ratio may lead to more defaults and thus to reduced profitability ([Gwachha, 2019](#)). [Vong and Chan \(2009\)](#) assumed that if the bank increased loan volume through lower margins and loosened lending standards to accept more low-quality borrowers, it could be presumed to have a negative effect on profitability. [Prabowo et al. \(2018\)](#) also confirmed that the loan-to-asset ratio has a negative effect on bank profitability when they studied the performance of commercial banks listed on the Indonesia Stock Exchange in the period 2012–2016.

More importantly, commercial banks are intermediary financial institutions, both mobilizing capital from savers/lenders and lending to spenders/borrowers. Accordingly, [Adeyinka et al. \(2018\)](#), [Garr and Awadzie \(2021\)](#) pointed out that customer deposits need to be continuously mobilized by banks to increase their ability to provide credit to customers. [Adeyinka et al. \(2018\)](#) found that customer deposits are an increasing function of customer lending and specifically mobilized deposits explain 96.4% of the variation in customer lending. [Buchory \(2015\)](#) argued that a higher loan-to-deposit ratio indicates a bank can perform its financial intermediation function more optimally and vice versa. Thus, customer deposits and loans at commercial banks have a complementary relationship and have a positive impact on profitability. However, the attention to these relationships in empirical studies is limited ([Garr and Awadzie, 2021](#)). Regarding the case of commercial banks in Vietnam, we expect that the interaction between customer deposits and loans has a positive impact on profitability. Accordingly, the hypotheses regarding the impact of financial intermediation are as follows:

- H1a.* The interaction between customer deposits and loans has a positive impact on bank profitability.
- H1b.* There is a positive relationship between customer deposits and bank profitability.
- H1c.* Customer loans and bank profitability exhibit a positive correlation.

2.2 Bank size and its implications for the relationship between financial intermediation and profitability

Bank size reveals net assets, market activities and funds owned and controlled by a bank ([Almaqtari et al., 2019](#)). A bank's size is important because it indicates its managerial ability to gain market share by leveraging average cost reduction per unit. Similarly to other studies, we use the natural logarithm of asset value to measure bank size in our research ([Almaqtari et al., 2019](#); [Dietrich and Wanzenried, 2014](#)).

Bank size appears to be an important component in determining their profitability ([O'Connell, 2023](#)). It is commonly believed that size and profitability are positively correlated. Growing in size can help a bank take advantage of economies of scale in several ways. The increase in operation scale allows banks to allocate fixed costs, such as regular expenses, branding, information and communication technology, over a bigger asset base, which can translate into cost savings and increased profitability ([Almaqtari et al., 2019](#); [Koroleva et al.,](#)

2021). Additionally, growing in size can provide banks with additional strength and capability to diversify more, which helps reduce the level of risk and thus promote profitability (Berger and Bouwman, 2009). A growing body of empirical research worldwide has confirmed the role of bank size in improving bank efficiency. Kovner *et al.* (2014) found evidence of scale efficiency in the US banking industry. Shehzad *et al.* (2013) discovered that large banks in organisation for economic co-operation and development (OECD) countries achieve higher profitability than small banks. Beccalli *et al.* (2015) investigated 103 European banks from 2000 to 2011 and found evidence of economies of scale across different bank sizes. Koroleva *et al.* (2021) agreed that large banks, especially state-owned banks in China, enjoy significant cost advantages and higher profitability than smaller banks. Several recent studies also insist on the positive impact of bank size on bank profitability (Almaskati, 2022; Derbali, 2021).

On the other hand, contrary-view scholars argue that as bank size increases, operational and marketing costs, overheads of bureaucratic processes and agency costs rise, resulting in an adverse correlation between bank profitability and size (Batten and Vo, 2019; Berger and Bouwman, 2009; Dietrich and Wanzenried, 2014). According to Berger and Bouwman (2009), small banks can establish stronger relationships with local businesses and customers than large banks. As a result, small banks can access helpful information in forming loan contract terms, making better lending decisions and obtaining higher profitability than large banks. Dietrich and Wanzenried (2014) explored the determinants of bank profitability across 118 countries from 1998 to 2012 and found no evidence that larger banks are more profitable than small banks in low-, middle- and high-income countries. Batten and Vo (2019) used a data sample of 35 Vietnamese commercial banks from 2006 to 2014 and discovered a negative relation between profitability and bank size, implying that larger banks can face the diseconomies of scale.

Previous research indicates an unclear understanding of the scale effect on bank profitability. In our study, we hypothesize that the profitability of Vietnamese commercial banks is positively correlated with bank size because large banks may benefit from economies of scale, bargaining power due to superior financial position and cost control. The following is the hypothesis concerning the effect of bank size on profitability:

H2a. There exists a positive correlation between the size of Vietnam commercial banks and their profitability.

As previously stated, we anticipate a well-established relationship between financial intermediation and bank profitability, but bank size can change this relationship. There is a link between bank size and profitability, so there might be a complex relationship between financial intermediation, profitability and bank size. Quantitatively, the size or the nature of the relationship between financial intermediation and bank profitability might change as a function of bank size. Statistically, we have financial intermediation as the predictor, bank size as the moderator, the multiplication of financial intermediation and bank size as the interaction and bank profitability as the outcome. Studies affirm the interaction between bank size and financial intermediation. If the interaction is significant, bank size is moderating the relationship between financial intermediation and bank profitability. Bertay *et al.* (2013) argued that banks with a high market share may be able to attract more deposits because their market power makes them safer. Ferrouhi (2017) examined the determinants of bank deposits in Morocco using panel data covering 2003–2014 and found that bank size is one of the factors explaining deposit behavior. Recently, Ünvan and Yakubu (2020) indicated that larger banks with economies of scale and a larger branch network are more efficient in mobilizing deposits than smaller banks. As a result, our study expects that bank size will amplify the impact of the deposit-to-asset ratio on bank profitability.

From the perspective of loan capacity, several empirical studies showed that large banks tend to provide more credit to customers. Amidu and Hinson (2006) revealed that bank size significantly influences banks' ability to extend credit to their customers. Berger *et al.* (2005) found that large banks lend at a greater distance and interact with their borrowers in a more

impersonal manner. [Ongena and Smith \(2001\)](#) even found that large banks have longer relationships with firms, resulting in extending more credit to firms. [Trujillo-Ponce \(2013\)](#) also confirmed the positive relationship between bank size and loan capacity. On the other hand, [Bertay et al. \(2013\)](#) explored that large banks are further shown to hold a relatively small share of their assets in the form of loans rather than, for instance, securities. This, in turn, causes larger banks to obtain a larger share of their income through non-interest income such as trading income and fees. In other words, a large size may not necessarily lead to increased bank loan grants. [Alhalabi et al. \(2023\)](#) concluded that large banks manage risks in lending activities better than other banks. These authors also confirmed that small banks tend to overlend to relatively risky borrowers, which supports the moral hazard hypothesis. [Fang et al. \(2021\)](#) found that Taiwanese small banks have irrational loan herding behavior during the crisis and expansionary periods; thus, it has a significantly negative effect on their performance. In our study, since lending is the conventional operation of Vietnam commercial banks, we expect that bank size will strengthen the positive effect of the loan-to-asset ratio on bank profitability.

In brief, bank size is interesting to study since it reflects the assets, capital and reserves, customer deposits and lending capacity. Therefore, bank size can play a moderating role when we investigate the impact of financial intermediation through deposit-to-asset ratio and loan-to-asset ratio on bank profitability. Given the considerations presented above, two hypotheses are formulated regarding the relationship among financial intermediation, bank size and profitability:

- H2b.* The bank size will magnify the influence of the deposit-to-asset ratio on the bank profitability.
- H2c.* The bank size will reinforce the impact of the loan-to-asset ratio on the bank profitability.

3. Methodology

3.1 Data

We used secondary data extracted from audited financial statements of sampled banks within the 14-year period from 2009 to 2022. The research scope is from 2009 because it marked many outstanding events in the Vietnamese banking industry following the global economic and financial crisis in 2008. According to [Phong \(2009\)](#), significant developments in the banking sector in 2009 included ongoing improvements in the legal and institutional framework for banking operations, skillful management of monetary policy tools and enhanced collaboration with ministries and branches. These efforts were aimed at ensuring the coherence of macroeconomic policies. The final year is 2022 because this is the closest year to the present. In addition, we selected 25 Vietnamese commercial banks for the research sample. This selection is based on the availability of research data provided by FiinGroup and the establishment of balanced panel data.

3.2 Research model

To closely evaluate the impact of the financial intermediation function on profitability and this impact when moderated by bank size for the case of commercial banks in Vietnam, we used the conceptual framework according to [Figure 1](#).

Based on [Figure 1](#), we develop specific research models as follows:

Firstly, the impact of financial intermediation on bank profitability.

$$ROE_{i,t} \text{ (or } ROA_{i,t}) = c_1 + \sigma_1 \cdot DP_{i,t} + \sigma_2 \cdot LO_{i,t} + \sigma_3 \cdot (DP \cdot LO)_{i,t} + \sigma_j \cdot CONTROL_{j,i,t} + \pi_{i,t} .$$

Secondly, bank size moderates the impact of customer deposits on bank profitability.

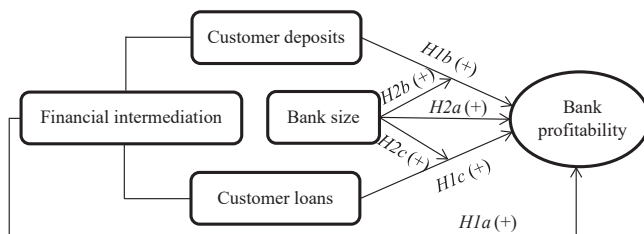


Figure 1. The conceptual framework. **Source(s):** Authors' own work

$$ROE_{i,t} \text{ (or } ROA_{i,t}) = c_2 + \beta_1 \cdot SZ_{i,t} + \beta_2 \cdot DP_{i,t} + \beta_3 \cdot (DP \cdot SZ)_{i,t} + \beta_j \cdot CONTROL_{j,i,t} + \varepsilon_{i,t}$$

Finally, bank size moderates the impact of customer loans on bank profitability.

$$ROE_{i,t} \text{ (or } ROA_{i,t}) = c_3 + \alpha_1 \cdot SZ_{i,t} + \alpha_2 \cdot LO_{i,t} + \alpha_3 \cdot (LO \cdot SZ)_{i,t} + \alpha_j \cdot CONTROL_{j,i,t} + \lambda_{i,t}$$

where i , j and t denote bank, control variable and time in years, respectively; c_1 , c_2 and c_3 are the constant; β , α and σ are the regression coefficient; ε , λ and π are the error term. [Table 1](#) describes the variables in each research model and we summarize the expected sign.

3.3 Estimation method

To address the concern mentioned above, we implemented the quantitative research method. The primary activities of banking intermediaries are deposit mobilization and lending, which fluctuate over time. Besides, the size and profitability of commercial banks also change and previous outcomes might have an impact on the present results. Accordingly, the lag of the dependent variables return on assets (ROA) and return on equity (ROE) by one period ($t-1$) are employed as control variables in our models. Therefore, the two-step system generalized method of moments (GMM) estimation method is used to control endogeneity problems in order to address potential reverse causality between profitability and financial intermediation. [Ünvan and Yakubu \(2020\)](#) provided evidence that profitability has a negative impact on customer deposits, while [Saunders et al. \(2023\)](#) implied that commercial banks make loans to customers based on their ability to control risks and expected profits.

The AR(2) test was used to evaluate the second-order serial correlation problem. P -values from this test reach the lowest level of 0.112 and the highest level of 0.808. They are greater than 0.05, indicating no second-order serial correlation of the differentiated error term in our models. Furthermore, based on the P -values from the AR(1) test, we concluded that there are first-order serial correlations. Finally, we used the Hansen test to examine the endogenous phenomenon. The P -values range from 0.368 to 0.888, implying that the instrument variables are exogenous and suitable for our models. According to the results of these important tests, we believe that using the GMM estimation method is appropriate and reliable for such a quite small sample bias and precision ([Soto, 2009](#)).

4. Findings and discussions

The results of the descriptive statistical analysis of all the variables in our models are presented in [Table 2](#). Considering profitability represented by ROA, this ratio averages 1.1%. It is lower than the ROA of 1.31% of banks in Nepal according to [Gwachha \(2019\)](#), but higher than the case of Chinese banks (1.06%) from the assessment of [Koroleva et al. \(2021\)](#) and Moroccan banks (1.045%) from the research of [Derbali \(2021\)](#). With an average ROE of 11.7% in [Table 2](#), we found that this level is lower than that of commercial banks in Nepal (16.25%), China (16.12%) and Morocco (12.32%).

Table 1. Measurement of variables and sign expectation

Variable	Description	Measurement	Empirical evidence	Expected sign
<i>Dependent variable</i>				
ROE	Return on equity	$\frac{\text{Earnings after taxes}}{\text{Average equity capital}}$	Koroleva <i>et al.</i> (2021), Derbali (2021), Gwachha (2019), Jumono and Mala (2019), Saeed (2014), Shehzad <i>et al.</i> (2013)	
ROA	Return on assets	$\frac{\text{Earnings after taxes}}{\text{Average total assets}}$	Koroleva <i>et al.</i> (2021), Derbali (2021), Gwachha (2019), Prabowo <i>et al.</i> (2018), Buchory (2015), Saeed (2014), Shehzad <i>et al.</i> (2013)	
<i>Explanatory variables</i>				
<i>(1) Financial intermediation</i>				
DP	Customer deposits	$\frac{\text{Customer deposits}}{\text{Total assets}}$	Koroleva <i>et al.</i> (2021), Gwachha (2019), Saeed (2014)	+
LO	Customer loans	$\frac{\text{Customer loans}}{\text{Total assets}}$	Jumono and Mala (2019), Gwachha (2019), Prabowo <i>et al.</i> (2018), Saeed (2014), Trujillo-Ponce (2013)	+
DP.LO	Interaction between customer deposits and loans	The multiplication of DP and LO	Authors' suggestion	+
<i>(2) Bank size and its moderation</i>				
SZ	Bank size	Natural logarithms of total assets	Derbali (2021), Gwachha (2019), Saeed (2014), Shehzad <i>et al.</i> (2013)	+
DP.SZ	Interaction between bank size and customer deposits	The multiplication of DP and SZ	Authors' suggestion	+
LO.SZ	Interaction between bank size and customer loans	The multiplication of LO and SZ	Authors' suggestion	+
<i>(3) Control variables</i>				
CR	Credit risk	$\frac{\text{Non-performing loans}}{\text{Total loans to customers}}$	Koroleva <i>et al.</i> (2021), Buchory (2015)	-
CA	Bank capital	$\frac{\text{Equity capital}}{\text{Total assets}}$	Derbali (2021), Gwachha (2019), Jumono and Mala (2019), Prabowo <i>et al.</i> (2018), Saeed (2014), Shehzad <i>et al.</i> (2013)	+
LI	Bank liquidity	$\frac{\text{Liquid assets}}{\text{Customer deposits and borrower funds}}$	Shehzad <i>et al.</i> (2013)	+
CI	Cost management efficiency	$\frac{\text{Operating costs}}{\text{Operating income}}$	Derbali (2021), Buchory (2015), Shehzad <i>et al.</i> (2013)	-
Source(s): Authors' own work				

For the financial intermediation function of the banks represented by customer deposits and loans, the DP and LO variables averaged 63.3 and 56.4%, respectively. Accordingly, compared with the empirical evidence provided by Gwachha (2019), Vietnam exhibits a bank deposit-to-asset ratio of 12.7% lower than that observed in Nepal. In contrast, Vietnam exhibits a bank loan-to-asset ratio surpassing Nepal's by 1.1%. The SZ variable varied from 15.021 to 21.387, while this range is from 9.548 to 12.927 for Moroccan banks (Derbali, 2021) and from

Table 2. Descriptive statistical analysis

Variables	Observations	Mean	Minimum	Maximum	Std. dev.
ROA	350	0.011	-0.060	0.056	0.009
ROE	350	0.117	-0.563	0.303	0.084
DP	350	0.633	0.267	0.886	0.122
LO	350	0.564	0.194	0.826	0.127
SZ	350	18.474	15.021	21.387	1.256
CA	350	0.097	0.041	0.324	0.044
CR	350	0.021	0.000	0.110	0.012
LI	350	0.236	0.050	0.756	0.117
CI	350	0.745	0.225	86.302	4.588

Source(s): Authors' own work

6.515 to 11.656 for Nepalese banks (Gwachha, 2019). These statistics show that the scale of Vietnamese commercial banks is superior to that of Morocco and Nepal.

Table 3 provides information on the correlation coefficient between profitability and bank size, customer deposits, lending to customers and other factors. They show that ROA and ROE fluctuations are positively correlated with changes in the loan-to-asset ratio and bank size, but negatively correlated with changes in the deposit-to-asset ratio. However, the correlation coefficient between ROE and DP does not ensure statistical significance. The correlation coefficient between explanatory variables ranges from -0.638 to -0.008 and from 0.008 to 0.598. In addition, the highest variance inflation factor is 2.243, indicating that multicollinearity is not severe according to the rule of thumb proposed by Hair *et al.* (2019) and Gujarati (2021) and this result is similar to the conclusions of Koroleva *et al.* (2021) and Gwachha (2019).

Our empirical results based on the system-GMM regression method are presented in Table 4. Regarding the first model, the findings in Table 4 show that both variables DP and LO have a negative impact on ROA and ROE at the statistical significance level of 1%, which is consistent with the estimated results of Models (2) and (3). In addition, the interaction of these two factors is positively related to ROA and ROE. This interactive relationship supports our expectation that a harmonious combination of customer deposits mobilization and customer lending will increase bank profitability. It supports the hypothesis H1a. Our result contributes to affirming the nature of commercial banks' financial intermediation function associated with their goals from a financial management perspective. These findings are similar to the arguments of Akoto and Nabieu (2014) and Gwachha (2019) about the core activities of a financial intermediary – typically a commercial bank; they are also empirical evidence supporting the complementary relationship between deposits and loans according to Buchory (2015), Adeyinka *et al.* (2018), Garr and Awadzie (2021).

Regarding the SZ variable representing bank size, the initial model exhibits a positive regression coefficient, whereas the second and third models demonstrate contrasting outcomes. These findings indicate that the size of a bank has an adverse effect on its profitability, independent of its financial intermediation activities. However, when there is a positive interaction between deposit mobilization and customer lending, this relationship transforms into a positive one; thus, we accept hypothesis H2a. It supports the economies of scale theory and is similar to the empirical evidence confirmed by Almaqtari *et al.* (2019), Koroleva *et al.* (2021), Derbali (2021), Beccalli *et al.* (2015), Kovner *et al.* (2014) and Shehzad *et al.* (2013).

Considering the findings for the second model, with a confidence level of 99%, the DP variable has a negative effect on ROA and ROE. Specifically, the negative regression coefficients of the DP variable in Models (1) and (2) imply that commercial banks with fewer

Table 3. Correlation coefficient matrix and variance inflation factors

	ROA	ROE	DP	LO	SZ	CA	CR	LI	CI
ROA	1.000								
ROE	0.814***	1.000							
DP	-0.225***	-0.047	1.000						
LO	0.108**	0.194***	0.598***	1.000					
SZ	0.112**	0.456***	0.364***	0.329***	1.000				
CA	0.314***	-0.201***	-0.362***	-0.092*	-0.638***	1.000			
CR	-0.196***	-0.292***	0.056	-0.083	-0.181***	0.133**	1.000		
LI	0.070	0.030	-0.622***	-0.604***	-0.259***	0.152***	-0.008	1.000	
CI	-0.459***	-0.452***	-0.140***	-0.161***	-0.075	0.008	-0.034	0.099*	1.000
<i>Variance inflation factors</i>			2.243	2.050	1.954	1.960	1.078	1.894	1.035

Note(s): *, **, *** indicate statistical significance at 10, 5 and 1%, respectively

Source(s): Authors' own work

Table 4. Regression results

Variables	Model 1		Model 2		Model 3	
	ROA	ROE	ROA	ROE	ROA	ROE
DP	-0.093*** [0.020]	-0.579*** [0.136]	-0.354*** [0.105]	-6.903*** [1.717]	-0.007 [0.004]	0.039 [0.043]
LO	-0.081*** [0.024]	-0.468*** [0.127]	0.003 [0.007]	-0.019 [0.060]	-0.308*** [0.068]	-6.937*** [0.524]
SZ	0.002*** [0.000]	0.011* [0.006]	-0.006* [0.003]	-0.198*** [0.050]	-0.006** [0.003]	-0.226*** [0.017]
DP.LO	0.144*** [0.038]	0.871*** [0.221]				
DP.SZ			0.019*** [0.006]	0.374*** [0.092]		
LO.SZ					0.017*** [0.004]	0.382*** [0.029]
CA	0.059*** [0.007]	-0.126** [0.051]	0.096*** [0.015]	0.403* [0.216]	0.100*** [0.015]	-0.192 [0.153]
CR	-0.028 [0.020]	-0.206 [0.234]	-0.030 [0.019]	-0.362 [0.235]	-0.060*** [0.021]	-0.065 [0.214]
LI	-0.004 [0.004]	0.011 [0.048]	0.000 [0.004]	0.068 [0.062]	-0.000 [0.004]	0.046 [0.040]
CI	-0.001*** [0.000]	-0.009*** [0.000]	-0.001*** [0.000]	-0.009*** [0.000]	-0.001*** [0.000]	-0.010*** [0.000]
ROA (-1)	0.377*** [0.036]		0.405*** [0.126]		0.326*** [0.043]	
ROE (-1)		0.596*** [0.120]		0.419*** [0.072]		0.778*** [0.075]
Constant	0.010 [0.014]	0.165 [0.118]	0.121** [0.057]	3.668*** [0.919]	0.106** [0.046]	4.107*** [0.311]
F-test	0.000	0.000	0.000	0.000	0.000	0.000
AR (1) test	0.047	0.007	0.087	0.045	0.053	0.005
AR (2) test	0.669	0.112	0.499	0.124	0.808	0.160
Hansen test	0.709	0.790	0.888	0.625	0.970	0.368
Observations	325	325	325	325	325	325

Note(s): Standard errors are presented in square brackets. *, **, *** indicate statistical significance at 10, 5 and 1%, respectively

Source(s): Authors' own work

customer deposits could expect to achieve higher profits and vice versa. This relationship contradicts our *H1b* hypothesis and empirical evidence provided by [Lee and Hsieh \(2013\)](#), [Saeed \(2014\)](#), [Gwachha \(2019\)](#) and [Koroleva et al. \(2021\)](#), but it can be explained by reducing the cost of holding high-interest deposits ([O'Connell, 2023](#)). Besides, the interaction variable between DP and SZ positively influences ROA and ROE at the statistical significance level of 1%. It implies that commercial banks with a larger scale can more effectively exploit the level of deposits from customers by not saving interest costs and promoting the use of capital for profitable operations. Therefore, the impact of customer deposits on bank profitability is amplified thanks to bank size, which is consistent with our expectation in the hypothesis *H2b* and supports the implication of the findings of [Bertay et al. \(2013\)](#), [Ünvan and Yakubu \(2020\)](#).

For the final model's estimation results, we used a statistical significance level of 1% and accepted the negative impact of the LO factor on ROA and ROE. This finding aligns with the conclusions of [Gwachha \(2019\)](#), [Prabowo et al. \(2018\)](#), [Vong and Chan \(2009\)](#), but it contradicts our *H1c* hypothesis as well as empirical evidence provided by [Trujillo-Ponce \(2013\)](#), [Saeed \(2014\)](#), [Jumono and Mala \(2019\)](#). This impact signals that commercial banks lack good control over loan portfolio size and asset quality, so they negatively influence return

on assets (Gwachha, 2019). More notably, the interaction between LO and SZ has a positive effect on ROA and ROE at a confidence level of 99%, supporting our expectation in the hypothesis H2c that bank size plays a moderating role in increasing the impact of customer lending on profitability. This moderating trend shows that larger banks are more likely to accept loan expansion with the expectation of amplifying changes in profitability; not only that, an increase in bank size can create overconfidence among managers, which increases the negative impact of lending on banks' profits.

5. Conclusions and suggestions

Mobilizing customer deposits and lending to customers are core activities of banks' financial intermediation function. However, differences in scale can make a difference in market power, customer trust or the ability to control costs and risks. Accordingly, we evaluate the importance of bank size in performing the financial intermediary role of commercial banks in Vietnam to maximize their profitability. From data analysis of 25 banks in the period 2009–2022, we found positive impacts of customer deposits and loans on profitability and these impacts become stronger with the moderating role of bank size. Besides, the complementary combination of deposit mobilization and credit provision to customers is necessary to increase profitability for commercial banks. Based on these findings, we recommend (1) focusing on evaluating and selecting a scale appropriate to the ability to perform financial intermediation functions; (2) adjusting the level of deposits that need to be mobilized from customers to be compatible with customer lending opportunities. However, future studies can evaluate the relationship between financial intermediation and profitability according to different quantiles of bank size or examine the explanatory significance of related aspects of bank size, such as market power, customer trust and others, to increase scientific and practical value.

About the authors

Vinh Hoang Le is working as lecturer at Faculty of Finance and Banking, University of Economics and Law, Vietnam National University – Ho Chi Minh City, Vietnam. His research area involves Financial Analysis, Financial Management, Derivatives Finance, Risk Management, Tax Policy Analysis and Behavioral Finance.

Anh Hoang Nguyen is working as lecturer at Faculty of Finance and Banking, University of Economics and Law, National University – Ho Chi Minh City, Vietnam. Her research area involves Financial Market and Institutions, Behavioral Finance, Personal Finance, Corporate Finance.

Toan Van Ngo is working as lecturer at Faculty of Finance and Banking, University of Finance and Marketing, Vietnam. His research area involves Corporate Finance, Financial Market and Institutions, Valuation, Mergers and Acquisitions.

References

- Adeyinka, A.J., Odi, N., Ebenehi, O.E., Ademola, O.G. and James, S.O. (2018), "Implications of financial intermediation on the performance of microfinance banks in Nigeria: 2000–2016", *Financial Markets, Institutions and Risks*, Vol. 2 No. 4, pp. 68–81, doi: [10.21272/fmir.2\(4\).68-81.2018](https://doi.org/10.21272/fmir.2(4).68-81.2018).
- Akoto, R.K. and Nabieu, G.A. (2014), "Analysis of financial intermediation and profitability: a case study of the Ghanaian banking industry", *International Journal of Economics and Finance*, Vol. 6 No. 5, pp. 220–232, doi: [10.5539/ijef.v6n5p220](https://doi.org/10.5539/ijef.v6n5p220).
- Alhalabi, T., Castro, V. and Wood, J. (2023), "The relationship between excessive lending, risk premium and risk-taking: evidence from European banks", *International Journal of Finance and Economics*, Vol. 28 No. 1, pp. 448–471, doi: [10.1002/ijfe.2430](https://doi.org/10.1002/ijfe.2430).
- Allen, F. and Santomero, A.M. (1997), "The theory of financial intermediation", *Journal of Banking and Finance*, Vol. 21 Nos 11–12, pp. 1461–1485, doi: [10.1016/S0378-4266\(97\)00032-0](https://doi.org/10.1016/S0378-4266(97)00032-0).

- Almaqtari, F.A., Al-Homaidi, E.A., Tabash, M.I. and Farhan, N.H. (2019), "The determinants of profitability of Indian commercial banks: a panel data approach", *International Journal of Finance and Economics*, Vol. 24 No. 1, pp. 168-185, doi: [10.1002/ijfe.1655](https://doi.org/10.1002/ijfe.1655).
- Almaskati, N. (2022), "The determinants of bank profitability and risk: a random forest approach", *Cogent Economics and Finance*, Vol. 10 No. 1, 2021479, doi: [10.1080/23322039.2021.2021479](https://doi.org/10.1080/23322039.2021.2021479).
- Amidu, M. and Hinson, R. (2006), "Credit risk, capital structure and lending decisions of banks in Ghana", *Banks and Banking Systems*, Vol. 1 No. 1, pp. 89-97.
- Batten, J. and Vo, X.V. (2019), "Determinants of bank profitability – evidence from Vietnam", *Emerging Markets Finance and Trade*, Vol. 55 No. 6, pp. 1417-1428, doi: [10.1080/1540496X.2018.1524326](https://doi.org/10.1080/1540496X.2018.1524326).
- Beccalli, E., Anolli, M. and Borello, G. (2015), "Are European banks too big? Evidence on economies of scale", *Journal of Banking and Finance*, Vol. 58, pp. 232-246, doi: [10.1016/j.jbankfin.2015.04.014](https://doi.org/10.1016/j.jbankfin.2015.04.014).
- Berger, A. and Udell, P. (2009), *Bank Capital, Survival, and Performance Around Financial Crises*, Financial Institutions Center at the Wharton School, Philadelphia.
- Berger, A.N., Udell, P., Frame, W.S. and Miller, N.H. (2005), "Debt maturity, risk, and asymmetric information", *The Journal of Finance*, Vol. 60 No. 6, pp. 2895-2923, doi: [10.1111/j.1540-6261.2005.00820.x](https://doi.org/10.1111/j.1540-6261.2005.00820.x).
- Bertay, A.C., Demirgüç-Kunt, A. and Huizinga, H. (2013), "Do we need big banks? Evidence on performance, strategy and market discipline", *Journal of Financial Intermediation*, Vol. 22 No. 4, pp. 532-558, doi: [10.1016/j.jfi.2013.02.002](https://doi.org/10.1016/j.jfi.2013.02.002).
- Bologna, P. (2011), *Is There a Role for Funding in Explaining Recent US Bank Failures?*, Bank of Italy Occasional Papers, Rome.
- Buchory, H.A. (2015), "Banking intermediation, operational efficiency and credit risk in the banking profitability", *Kuala Lumpur International Business, Economics and Law Conference 7*, Malaysia, Vol. 2, pp. 141-152.
- Derbali, A. (2021), "Determinants of the performance of Moroccan banks", *Journal of Business and Socio-Economic Development*, Vol. 1 No. 1, pp. 102-117, doi: [10.1108/JBSED-01-2021-0003](https://doi.org/10.1108/JBSED-01-2021-0003).
- Dietrich, A. and Wanzenried, G. (2014), "The determinants of commercial banking profitability in low-middle-and high-income countries", *The Quarterly Review of Economics and Finance*, Vol. 54 No. 3, pp. 337-354, doi: [10.1016/j.qref.2014.03.001](https://doi.org/10.1016/j.qref.2014.03.001).
- Fang, H., Lu, Y.C., Shieh, J.C. and Lee, Y.H. (2021), "The existence and motivations of irrational loan herding and its impact on bank performance when considering different market periods", *International Review of Economics and Finance*, Vol. 73, pp. 420-443, doi: [10.1016/j.iref.2021.01.015](https://doi.org/10.1016/j.iref.2021.01.015).
- Ferrouhi, E.M. (2017), "Determinants of bank performance in a developing country: evidence from Morocco", *Organizations and Markets in Emerging Economies*, Vol. 8 No. 15, pp. 118-129, doi: [10.15388/omee.2017.8.1.14201](https://doi.org/10.15388/omee.2017.8.1.14201).
- Fitch Ratings (2022), "Special report: Vietnam banks' capital needs", available at: <https://www.fitchratings.com/research/banks/vietnam-banks-capital-needs-17-03-2022> (accessed 15 April 2023).
- Garr, D.K. and Awadzie, D.M. (2021), "The impact of financial intermediation on bank performance", *International Journal of Economics, Business and Management Research (IJEEMR)*, Vol. 5 No. 5, pp. 96-110.
- General Statistics Office of Vietnam (2023), *Statistical Yearbook of Vietnam 2022*, Statistical Publishing House, Hanoi.
- Gujarati, D.N. (2021), *Essentials of Econometrics*, Sage Publications, New York.
- Gwachha, K.P. (2019), "Bank specific and macroeconomic determinants of banking profitability in Nepal", *Sebon Journal*, Vol. 7 No. 1, pp. 120-129.
- Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2019), *Multivariate Data Analysis*, Cengage Learning, Hampshire.

- Jumono, S. and Mala, C.M. (2019), "Determinants of profitability in banking industry: a case study of Indonesia", *Asian Economic and Financial Review*, Vol. 9 No. 1, pp. 91-108, doi: [10.18488/ajefr.2019.9.1.91.108](https://doi.org/10.18488/ajefr.2019.9.1.91.108).
- Kolb, R.W. and Rodriguez, J.R. (1993), *Financial Institutions and Markets*, Kolb Publishing Company, Miami, Florida.
- Koroleva, E., Jigeer, S., Miao, A. and Skhvediani, A. (2021), "Determinants affecting profitability of state-owned commercial banks: case study of China", *Risks*, Vol. 9 No. 8, pp. 150-169, doi: [10.3390/risks9080150](https://doi.org/10.3390/risks9080150).
- Kovner, A., Vickery, J.I. and Zhou, L. (2014), "Do big banks have lower operating costs?", *Economic Policy Review*, Vol. 20 No. 2, pp. 1-27.
- Lee, C.C. and Hsieh, M.F. (2013), "The impact of bank capital on profitability and risk in Asian banking", *Journal of International Money and Finance*, Vol. 32, pp. 251-281, doi: [10.1016/j.jimonfin.2012.04.013](https://doi.org/10.1016/j.jimonfin.2012.04.013).
- Mishkin, F.S. (2019), *The Economics of Money, Banking, and Financial Markets*, Pearson Education, Harlow.
- Nuhiu, A. and Aliu, F. (2023), "The benefits of combining AI and blockchain in enhancing decision-making in banking industry", in *Integrating Blockchain and Artificial Intelligence for Industry 4.0 Innovations*, Springer International Publishing, Cham, pp. 305-326.
- Obamuyi, T.M. (2013), "An analysis of the deposits and lending behaviours of banks in Nigeria", *International Journal of Engineering and Management Sciences*, Vol. 4 No. 1, pp. 46-54.
- Ongena, S. and Smith, D.C. (2001), "The duration of bank relationships", *Journal of Financial Economics*, Vol. 61 No. 3, pp. 449-475, doi: [10.1016/S0304-405X\(01\)00069-1](https://doi.org/10.1016/S0304-405X(01)00069-1).
- O'Connell, M. (2023), "Bank-specific, industry-specific and macroeconomic determinants of bank profitability: evidence from the UK", *Studies in Economics and Finance*, Vol. 40 No. 1, pp. 155-174, doi: [10.1108/SEF-10-2021-0413](https://doi.org/10.1108/SEF-10-2021-0413).
- Phong, N.M. (2009), "Vietnam banking industry in 2009: three highlights", available at: <https://baochinhphu.vn/nganh-ngan-hang-viet-nam-nam-2009-ba-diem-noi-bat-10230048.htm> (accessed 6 October 2023).
- Prabowo, F.P., Sarita, B., Syaifuddin, D.T., Saleh, S., Hamid, W. and Budi, N. (2018), "Effect of equity to assets ratio (EAR), size, and loan to assets ratio (LAR) on bank performance", *IOSR Journal of Economics and Finance*, Vol. 9 No. 4, pp. 1-6, doi: [10.9790/487X-2006070xxx](https://doi.org/10.9790/487X-2006070xxx).
- Saeed, M.S. (2014), "Bank-related, industry-related and macroeconomic factors affecting bank profitability: a case of the United Kingdom", *Research Journal of Finance and Accounting*, Vol. 5 No. 2, pp. 42-50.
- Saunders, A., Cornett, M.M. and Erhemjams, O. (2022), *Financial Markets and Institutions*, McGraw-Hill, New York.
- Saunders, A., Cornett, M.M. and Erhemjams, O. (2023), *Financial Institutions Management: a Risk Management Approach*, McGraw-Hill.
- Shehzad, C.T., De Haan, J. and Scholtens, B. (2013), "The relationship between size, growth and profitability of commercial banks", *Applied Economics*, Vol. 45 No. 13, pp. 1751-1765, doi: [10.1080/00036846.2011.637896](https://doi.org/10.1080/00036846.2011.637896).
- Soto, M. (2009), "System GMM estimation with a small sample", Barcelona Economics Working Paper Series, Barcelona Graduate School of Economics (Spain), pp. 1-26.
- Stern, G.H. and Feldman, R.J. (2009), *Too Big to Fail: the Hazards of Bank Bailouts*, Brookings Institution Press, Washington, DC.
- Sulaiman, L.A. and Aluko, O.A. (2015), "Financial intermediation and economic growth: a test for causality in Nigeria", *Banks and Bank System*, Vol. 10 No. 4, pp. 69-74.
- The World Bank (2023), "World development indicators: domestic credit to private sector (% of GDP) – Vietnam", available at: <https://data.worldbank.org/indicator/FS.AST.PRVT.GD.ZS?locations=VN> (accessed 6 October 2023).

- Theiri, S. and Alareeni, B. (2023), "Perception of the digital transformation as a strategic advantage through the Covid 19 crisis? Case of Tunisian banks", *Journal of Sustainable Finance and Investment*, Vol. 13 No. 1, pp. 477-498, doi: [10.1080/20430795.2021.1964809](https://doi.org/10.1080/20430795.2021.1964809).
- Trujillo-Ponce, A. (2013), "What determines the profitability of banks? Evidence from Spain", *Accounting and Finance*, Vol. 53 No. 2, pp. 561-586, doi: [10.1111/j.1467-629X.2011.00466.x](https://doi.org/10.1111/j.1467-629X.2011.00466.x).
- Ünvan, Y.A. and Yakubu, I.N. (2020), "Do bank-specific factors drive bank deposits in Ghana?", *Journal of Computational and Applied Mathematics*, Vol. 376, 112827, doi: [10.1016/j.cam.2020.112827](https://doi.org/10.1016/j.cam.2020.112827).
- Vong, P.I. and Chan, H.S. (2009), "Determinants of bank profitability in Macao", *Macau Monetary Research Bulletin*, Vol. 12 No. 6, pp. 93-113.
- Xie, X. and Wang, S. (2023), "Digital transformation of commercial banks in China: measurement, progress and impact", *China Economic Quarterly International*, Vol. 3 No. 1, pp. 35-45, doi: [10.1016/j.ceqi.2023.03.002](https://doi.org/10.1016/j.ceqi.2023.03.002).
- Yakubu, I.N., Abokor, A.H. and Gedik Balay, I. (2021), "Re-examining the impact of financial intermediation on economic growth: evidence from Turkey", *Journal of Economics and Development*, Vol. 23 No. 2, pp. 116-127, doi: [10.1108/JED-09-2020-0139](https://doi.org/10.1108/JED-09-2020-0139).

Corresponding author

Vinh Hoang Le can be contacted at: vinhhlh@uel.edu.vn