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THE IMPACT OF FOREIGN BANK ENTRY ON DOMESTIC BANKS AND ECONOMY OF LAO PDR

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Abstract

This study aims to estimate the effects of foreign bank presence on the performance of domestic banks and the economy in the Lao PDR. The analysis of the effect on domestic bank performance, employing a panel data methodology. The results specifically show that higher foreign bank entry causes the management ability of domestic banks to drop as the operating expenses and total cost of domestic banks have increased while the asset quality, liquidity, and bank growth also declined as the diminution of market share by loan. These all can point to the reduction of earning ability as well as the profitability of domestic banks. The second model is to detect the relationship between foreign bank presence and Lao Economy using the VAR Granger causality model and impulse response function. The result implies that changes in the growth rate of credit to economy in Lao PDR cause foreign bank asset percentage change and mostly foreign banks perform as substitution not for complementary this makes the competition stronger which causes to lower domestic bank's performance and can contribute to the lower economic growth in long run.

Keywords: Lao Banking System, Foreign Bank Entry, Bank Competition, Domestic bank performance, Lao PDR

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ผลกระทบของการเข้ามาของธนาคารต่างประเทศต่อธนาคารภายในประเทศและเศรษฐกิจของ สปป. ลาว

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บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาถึงผลกระทบของธนาคารต่างประเทศต่อผลการดำเนินงานของธนาคารในประเทศและเศรษฐกิจใน สปป.ลาว ในการวิเคราะห์ผลกระทบต่อผลการดำเนินงานของธนาคารในประเทศ โดยใช้สมการถดถอยที่ใช้ข้อมูล Panel data model ผลการวิจัยแสดงให้เห็นว่า หากจำนวนธนาคารต่างประเทศเพิ่มขึ้นทำให้ความสามารถในการบริหารจัดการของธนาคารในประเทศลดลง เนื่องจากค่าใช้จ่ายในการดำเนินงานและต้นทุนรวมของธนาคารในประเทศเพิ่มขึ้น ในขณะที่คุณภาพสินทรัพย์ สภาพคล่อง และการเติบโตของธนาคารก็ลดลงตามการลดลงของส่วนแบ่งการตลาดเงินกู้ ทั้งหมดนี้สามารถชี้ได้ว่า ความสามารถในการหารายได้รวมทั้งความสามารถในการทำกำไรของธนาคารในประเทศลดลงเช่นกัน ส่วนการหาความสัมพันธ์ระหว่างธนาคารต่างประเทศและเศรษฐกิจในลาว ได้ใช้แบบจำลอง VAR Granger Causality และการวิเคราะห์การตอบสนองอย่างฉับพลัน (Impulse Response Function) ผลลัพธ์แสดงให้เห็นว่า การเปลี่ยนแปลงของอัตราการเติบโตทางเศรษฐกิจและปริมาณสินเชื่อในเศรษฐกิจมีส่วนทำให้สัดส่วนธนาคารต่างประเทศที่เข้ามาในประเทศมีการเปลี่ยนแปลง แต่ธนาคารต่างประเทศส่วนใหญ่เข้ามาเป็นคู่แข่งมากกว่าที่จะมาส่งเสริมธนาคารในประเทศ ส่งผลให้ผลการดำเนินงานของธนาคารในประเทศลดลงและสามารถส่งผลให้อัตราการเติบโตของเศรษฐกิจลดลงในระยะยาวได้

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1. Introduction

In any economy, the financial system performs several essential roles. Fundamentally, it performs as the intermediate of mobilizing financial resources, allocating capital to efficient projects, monitoring the operation of the financial resources, facilitating risk management and supplying payment system, etc. Financial institutions and financial system influence the path of economic development and even have an effect on the rapidity of economic growth (Goldsmith, 1969). A study by King and Levine (1993) analyzed a dataset of 80 nations during the time of 1960-1989. They found a strong positive relationship between financial development and economic growth; the level of financial development is a good leading indicator of economic growth.

Further to the key roles of the financial sector, financial development has become one of the most important processes and should never be neglected, it responds positively to economic growth and industrialization. There is even verification that the financial development degree is a great indicator of capital accumulation, technological change, and future economic growth. Moreover, when the financial sector lack of development it critically affects the pattern and speed of economic development and the health of financial system can also ensure the health of economy (Levine, 1996).

Financial liberalization performs as an essential factor of the financial transformation to empower central banks with more expertise in regulating monetary policy, managing, and reorganizing banking system, specifically to promote and develop the character of financial sector in facilitating the economy. Until the 80s and 90s several countries adopted financial reformation and moved towards by less financial restrictions, banking sector came forward in the process of transformation, involving in abolition of the control on credit allocation and interest rates, privatization of state-own commercial banks, stimulating bank competitions and liberalization of capital flows as accepting foreign banks to operate in the country (Beju & Ciupac-Ulici, 2012).

As financial services internationalize has a key role in financial development and banking markets are becoming more and more international because of financial liberalization. The level of financial combination and liberalization has increased considerably. Particularly, the percentage of foreign bank presence in total bank assets in developing countries has risen from 19 percent in 1995 to 42 percent in 2000 (World, 2002). Further this procession, foreign banks got more attention from researchers, economists, and policymakers in examining their

performance and its impacts on local economy. Even many people generally believe that foreign banks can develop financial system. Nevertheless, if we talk about doing research it has commonly two sides of consideration for that concern.

However, most evidence about foreign and domestic banks' correlation was too general since mostly the studies were based on the integration of many countries, we cannot assume the real impact of foreign banks for one specific country by those results especially for the high growth developing countries that is not all the effects of foreign bank entry, financial internationalization, the advantage and disadvantage of emerging in financial services rely on host country and banks' characteristics, various constraints consist of the structure of the domestic financial industry, the supervisory and regulatory background as well as the sequencing of liberalization (Wang, 2004).

The objective of this paper is to analyze the impact of financial liberalization as foreign bank entry on domestic bank performance and the economy in Lao PDR using data from 2004 to 2020, as the banking sector performs the most significant role in the Lao financial system and there is no identified study that has been conducted to determine this concern in Lao PDR. This study will go one step further from previous literature about the banking system in Laos, which will be useful to banking management, researchers, academicians, policymakers, and businessmen. They would also understand the benefits and complications brought by foreign banks in the local market to make appropriate decisions to ensure economic success in trading off between internal and external policy factors as well as the level of banking globalization.

The commercial banks in Laos are small as compared to the others in the region. The total asset of Lao commercial banks is 118,236.25billion LAK (about 14 billion USD). The banking system is under the administration of Bank of Lao PDR (Central Bank of Laos) and consists of 42 commercial banks. The banking system is dominated by large, state-owned banks. The health of the banking sector is problematic to define because of deficiency of reliable data. However, banks are generally supposed to be poorly regulated and there is extensive concern about bad debts and non-performing loans that have not been completely reconciled yet, by the state-owned banks.

Lao economy still has the problem of long-lasting macroeconomic instability, and financial inefficiency, there is a great volume of non-performing loans in the banking market, especially at state-owned commercial banks. Apprehensions over weak banking regulation, slack promulgation aside the high growth of Lao economy has led foreign direct investment to operate the business in Lao PDR such as construction, commerce, and also financial institutions. Laos' banking sector has gone through several transformations, including:

- The New Economic Mechanism was started in 1988, and the centrally-planned economy has transformed into a market-oriented economy. Banking sector in Lao PDR was liberalized during the years 1988-1989, but this process was not completely open.
- In the period of 1992-1995, internationally opened financial market, and foreign banks began to enter Lao banking market.
- At the end of 1999, the Lao banking system enjoyed a certain degree of openness as the number of domestic and foreign banks had increased rapidly. The simple generally expected role of foreign banks is to make the banking sector more competitive (BOL, 2017).

2. Literature Review

2.1 Impact of foreign bank penetration on domestic bank performance and stability

Dorothea and Oleksandr (2007) collected 160 banks' statistics during 2003Q2–2005Q3, using a dynamic panel data estimator and found that domestic banks' profitability has a positive relationship with market share by assets of foreign banks in Ukraine and accept that foreign banks increase competition, bring positive spillover effects such as helping domestic banks familiarize new services, improve monitoring, decline the percentage of nonperforming loans, and gain from technology know-how brought by parent foreign banks. As a result, the profitability of local banks may increase because of advanced operating efficiency. Goldberg, Dages, and Kinney (2000) analyzed quarterly credit data of commercial banks in Argentina and Mexico in the 1990s and found that foreign lenders were more stable than domestic ones, and their loan growth rates were also greater than domestic banks'. Moreover, banks with multiple ownership seem to benefit on stability of credit in times when the domestic financial system is weak or suffering from a crisis.

The findings are consistent with Clarke, Cull, and Martinez (2001), Weller (2000) and Gormley (2010), who discovered that foreign banks have a positive impact on domestic banking sectors, particularly by increasing credit to the economy and strengthening stability. The observation of

19 banks' data in the period from 2001 to 2009 to find out the effect of foreign banks on Kenya's domestic banking sector, reveals that foreign bank entry negatively impacts the profitability of domestic banks but enhances the efficiency of the domestic banking system in such ways as decreasing lending rates and competition intensifying. Using different measures to capture this curiosity, Ghosh (2016) studies the effects of foreign banks on banking crises by employing the dataset of banks in 138 countries from 1998 to 2013 and found that the probability of banking crisis decreases with great banking sector internationalization. They also emphasize that greater foreign bank existence offers better banking sector stability in the host country by providing more credit, advanced technologies, better supervision proficiency, and building up banking supervision. Martinez Peria (2002) and Peek and Rosengren (1997) also confirm that the penetration of foreign financial institutions in a host country positively affects the stability of the domestic banking sector. This evidence concludes that foreign banks can enhance the operations of the banking industry.

Although foreign bank entry can positively affect financial stability as foreign banks often increase their credit at the time of domestic economic downturns, However, there are some evidences found that foreign banks harm home country economic conditions. Cizikova (2012) estimates empirically the effects of increasing foreign banks on domestic commercial bank performance in the Baltic countries: Latvia, Estonia, and Lithuania, using a dataset of 46 banks during 1997–2007, using a panel data model. The outcomes show that more foreign bank presence negatively effects the incomes, pre-tax profits, and overhead expenses of domestic banks. In the short-term, loan loss provision also rises, which is a consequence of greater competitive pressure. Unite and Sullivan (2002) examine that the notion of liberalization in the banking sector is to support domestic commercial banks to be more efficient and competitive, and it has functioned well in greater Philippine banks. But, the foreign bank entry is directly connected with growth in risk, such as loan loss provisions, this is also in line with the argument of Claessens, Demirguc-Kunt, and Huizinga (2001) that local commercial banks are forced to take on less creditworthy clients because of the higher competition brought by foreign bank entry. Lu (2009) found that foreign banks have also brought some negative impacts, such as raising the short-term operating costs of domestic banks rapidly and increasing the banking sector's vulnerability. These effects disturb the stable operation of the banking system in China. Hermes and Lensink (2001) analyzed the statistics of local banks in least developed countries and generally found that foreign bank presence has a positive relationship with domestic bank performance in most cases, but also found that it was an inverted U-shaped relationship and

recommended that banks in these countries focus on efficiency and competition effects only after the degree of foreign bank presence has reached a minimum level.

2.2 Impacts of foreign bank penetration on domestic economy

2.2.1 Impacts of foreign bank on credit availability

Credit allocation is an important determining factor in the economy. Recently, many economists have extensively estimated the effects of foreign bank presence on credit distribution. There are also two contrasting opinions about the effect of foreign bank penetration on credit accessibility in the domestic banking market. After analyzing domestic and foreign banks' performances in Latin America, Crystal, Dages, and Goldberg (2002) determine that the growth rate of foreign bank loans is higher than the rate of domestic ones. As studied by Claessens et al. (2001), foreign bank presence tends to expand bank credit scale. So, foreign bank entry can be viewed as a positive development in the developing financial system. The foreign bank increases the source of funds and decreases the interest rate of loans as the overhead costs of firms (Beck & Martinez Peria, 2010). Using data from 19 commercial banks during 2001–2009, Ben and Isaiah (2014) find that foreign bank entry negatively affects the profitability of Kenyan commercial banks, but in the overall view, it can enhance domestic banking efficiency by reducing lending rates and improving credit access to all firms. Claeys and Hainz (2007) analyze a dataset of commercial banks in ten Eastern European nations during the years of 1995–2003 to conclude that the entry of foreign banks not only increases credit availability but also improves the efficiency of credit for the economy as a whole.Taboada (2008) discovered that while reducing government ownership in commercial banks has no effect on credit efficiency, increasing foreign ownership can improve capital allocation efficiency by lending to more productive firms and industries that rely more on external financing. Clarke, Cull, and Martínez Pería (2006) Combined the survey of most companies in 35 developing and transition countries and found that greater foreign bank share expands the accessibility of external funds for enterprises, as well as small and medium-sized ones. Giannetti and Ongena (2009) arranged a dataset of around 60,000 unlisted and listed Eastern European companies to evaluate the effects of foreign bank penetration on the financial accessibility of companies. They summarize that companies indirectly gain advantages from foreign banks' presence as it lowers lending costs and increases firm probability. Until then, they can easily start relationships with banks. It improves accessibility to credit for all firms. Although big companies profit more from foreign banks, smaller firms also benefit.

However, the empirical study on 31 Chinese commercial banks from 2002 to 2009 examined the effects of foreign banks on business structure and credit scale in China. The results show that the entry of foreign banks is not correlated with credit growth but significantly improves the structure of Chinese commercial banks (Xiaoyan & Yong, 2011). Claessens and Horen (2014) provide an inclusive dataset on foreign ownership banks for 5,324 commercial banks in 137 nations during the period of 1995–2009 and conclude that the relationship between credit to the economy and the presence of foreign banks significantly depends on the bank and host country's characteristics. Definitely, foreign banks appear to have a negative impact on credit in poor countries where credit information is restricted to a limited availability, particularly when it comes from distant countries. Berger, Klapper, and Udell (2001) study on the 61,295 companies' dataset of 115 Argentinian commercial banks and agree that foreign banks have problems in expanding loans to opaque small firms, particularly when they have long distances to their home countries. Moreover, Detragiache, Tressel, and Gupta (2008) also confirm that the credit scale in low-income countries was decreased by the increase of foreign bank branches. Furthermore, they develop a model employing data from 89 low-income countries and discover that when local banks have less efficient technology than foreign banks, they may lower private credit, resulting in slower credit growth, higher operating costs, and lower welfare in the host country.

The studies on ASEAN banking markets, analyzing individual commercial bank data of five banking markets studied the effect of the entry of foreign banks on lending, which concerned about credit channeled towards SMEs clients and larger companies, Wattanapruttipaisan (2010) concluded that foreign banks mobilize less capital to SMEs customers, due to these reasons although foreign banks are a greater source of capital, they have trouble in contacting soft information of small-medium sized enterprises. In contrast, SMEs lack of information and disclosures that firms can use to ensure the stability of their business and access the credit of foreign banks.

2.2.2 Impacts of foreign bank on economic growth

Even though foreign banks can act as economic and financial development stimulants, their impact on credit availability and financial stability is still being debated. Yet the study of their effect on economic indicators is also to be discussed. Bruno and Hauswald (2014) study the effects of foreign banks on real economic growth in developing and advanced countries with the cross-section method and discover that foreign banks ease financial restrictions without

eliminating economic growth prospects but also increase real growth, particularly in developing countries where firms regularly lack access to alternative sources of capital. Foreign banks stabilize firm performance and stimulate real economic activity during periods of crisis, especially in middle and high-income countries. Theoretically, foreign banks may have positive effects on real output growth both indirectly and directly. Economic growth can be stimulated by providing supplementary capital, actively lending to efficient firms, improving risk management, or even directly increasing capital allocation and accumulation (Levine, 1996). Wu, Jeon, and Luca (2010) analyzed the dataset on 35 emerging countries in the time period of 1996–2003 by using OLS regression and fixed effects methods and concluded that more foreign bank existence has a positive effect on economic growth. The findings of Caves (1996) and De Gregorio (2003) confirmed that foreign direct investment has more effective functions than domestic investment in the way of speeding real GDP growth in Latin American nations and even discovered that foreign direct investment has more effects on the economy of the host country than domestic investment three times.

In contrast to those viewpoints, Berger, Miller, Petersen, Rajan, and Stein (2005) argued against foreign bank entry because foreign lenders have a tendency to “cherry pick” the most profitable customers, neglecting the medium and small. As a result, a greater degree of foreign bank presence may hurt host countries’ economic growth because medium and small sized companies characterize the main group of total enterprises and create a large number of jobs for citizens. Giannetti and Ongena (2011) also found that foreign banks’ branches may concentrate on mobilizing capital for large companies and ignore small firms. Such abandonment, the apprehension that foreign bank penetration may be harmful to the financial performance and growth of small and young enterprises, this may reduce economic growth, particularly in EMs and LICs. Ghosh (2017) studies the effects of banking institutions’ liberalization on GDP growth by using a panel dataset of 138 countries during the years of 1995 to 2013 and finds that a high level of banking sector globalization lowers real economic growth. The result was in line with the studies of Acharya and Subramanian (2009), Dell’ariccia and Marquez (2004), Detragiache, Gupta and Tressel (2008), Gormley (2010), Mian (2006), and Sengupta (2007), They have assumed the apprehensions that foreign institutions may encounter the problem of informational asymmetries in developing and least developed nations, which can obstruct them from lending to small-medium sized enterprises, which are more informationally opaque, and thus lower real GDP growth. Demirguç-Kunt (1998) analyzed the data of 7900 individual banks in over 80 countries in the period of 1988–1995, and found that foreign banks do not exert a

significant impact on economic growth.

2.2.3 Summary of literature review

Through many studies, there is a common conclusion regarding the impacts of foreign banks on domestic banks that foreign banks are more stable than domestic banks, especially in developing countries. Even in the first period, they can reduce the profitability of the domestic banks, but they serve as an effective competitive force, compelling domestic banks to improve their cost efficiency until they have improvements in profitability and bank value, as there is a positive correlation between the profitability of local banks and the market share of foreign banks' assets. However, too much foreign bank entry does not contribute to a more stable banking system and can be negative for local commercial banks.

Furthermore, there is evidence that foreign bank entry can ease financial restrictions without eliminating economic growth prospects and stimulate local economic activity since foreign banks can help to alleviate connected-lending problems and improve capital allocation. This leads to more accessible credit for small and medium-sized enterprises, particularly in developing countries rather than advanced economies. However, some studies found that the high level of banking sector globalization lowers real economic growth in both emerging markets and low-income countries but not in advanced countries because the high presence of foreign banks reduces private credit flows in host nations, which implies foreign banks face informational bottlenecks that hinder them from lending to a large majority of their potential client base in host markets.

3. Research Methodology

3.1 Data and variables

Lao commercial banks are used to be the sample for this study by using both panel datasets and time series. First, the panel data is used in the study of the impact of foreign branches on domestic bank performance, containing annual datasets of 27 out of 44 domestic commercial banks in Lao PDR from the time period of 2012 to 2020. The sample of Lao banks includes the largest state-owned commercial bank, 2 joint state commercial banks, 9 private commercial banks, 4 foreign subsidiary banks, and 14 foreign commercial bank branches. Among them, 9 banks are introduced as domestic banks (DB), and 18 banks as foreign banks (FB). Foreign bank presence is the main independent variable which is estimated by both numbers and assets. They are shown in Table 1.

Table 1: Foreign bank presence in Lao banking system

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total number of banks	31	32	37	41	41	42	43	44	44
Number of foreign banks	18	18	22	26	27	27	28	29	29
Foreign bank asset to total bank asset (%)	17.08	17.84	21.13	25.59	27.66	28.32	28.86	28.69	28.69

Source: Annual economic report (Bank of the Lao P.D.R.)

Among these 27 Lao banks, we have full information on all commercial banks. The panel dataset is balanced as all sample banks were selected by the establishment date from 2012 onward.

Secondly, the time series dataset is used in the empirical tests on the effects of foreign bank penetration on Lao economy. The dataset includes annual data from 2004 to 2020, gathered from the Bank of Lao PDR and World Bank databases

The bank data we need to collect includes ROA, TCOST, NPM, ... (dependent variables) in order to comply with the central bank's supervision of the Lao banking system based on the CAMEL principle, as well as other bank characteristics as independent variables such as SIZE, DER, CASH, EXPA, MKS, and so on. We also require information on other variables that can influence the dependent variables, such as foreign bank presence, macroeconomic environment, and financial development. Obviously, the data used in the empirical model are gathered from bank annual reports and financial statistics of the Lao banking system to complete the sample. The variable definitions are shown in Table 2.

Table 2: Variables and data sources

1. Dependent Variables	Definition of variable	2. Independent Variables	Definition of variable
1.1. Bank performance		**2.1. Foreign Bank Presence**	
1.1.1. Capital Strength		FBA	Total foreign bank penetration asset to total bank asset
ROE	Return on equity	FBN	Foreign bank number to total bank number
1.1.2. Asset quality		**2.2. Bank Characteristics**	
ATR	Asset turnover ratio	SIZE	Logarithm total asset
LTA	Ratio of loan to assets	DER	Debt to equity ratio
1.1.3. Management ability		CASH	Cash to debt ratio
EXR	Operating expenses as a percentage of total revenue	EXPA	Operating expenses as a percentage of total assets
TCOST	Total cost to total asset	MKS	Market share by asset
1.1.4. Earning and Profitability		**2.3. Financial Development**	
NPM	Net profit margin	BANK	Growth rate of total bank asset
ROA	Return on assets	**2.4. Macroeconomic Variables**	
1.1.5. Liquidity		INF	Inflation rate
ICR	Interest coverage ratio	INR	Real short-term interest rate
LTD	Loan to deposit ratio	GDP	Growth rate of GDP per capita
1.1.6. Bank growth		**3. Dummy Variable**	
LOAN	Market share by loan	FB	FB is 1 when the bank is foreign bank, and 0 when is the bank is domestic bank without foreign ownership.
1.2. Financial system factor			
CREDIT	Growth rate of credit to economy		
GDP	Growth rate of GDP per capita		

3.2 Methodology

3.2.1 Impact of foreign banks penetration on domestic banks

The first question that whether foreign bank entry through penetration had some significant effects on domestic bank performance, such as profitability, cost, stability, and efficiency. To address the question, this study uses panel OLS regression and is based on Kocabay (2009), Kim and Lee (2004), Manlagñit (2011) as follows:

$$Y_{i,t} = \alpha_0 + \alpha_1 Foreign\ bank\ presence_{t-1} + \alpha_2 Bank\ Characteristics_{i,t-1} + \alpha_3 Macro_{t-1} + \alpha_4 FB_i + \varepsilon_{i,t} \quad (1)$$

Whereas,

$Y_{i,t}$ *is a vector of dependent variables to measure the performance of a bank i in time t, including of ROE, ATR, LTA, EXR, TCOST, NPM, ROA, ICR, LTD, and LOAN to indicate the capital strength, asset quality, management ability, earning efficiency, liquidity, and growth of the bank, respectively.*

$Foreign\ bank\ presence_{t-1}$ *is a vector of the main independent variable consisting of FBA (foreign bank asset to total bank asset) and FBN (foreign bank number to total bank number) to examine how the relationship between foreign bank presence and domestic bank performances are.*

$Bank\ Characteristics_{i,t-1}$ *is dataset of banks i at time t-1, including SIZE, DER, CASH, EXPA, and MKS. These variables can obviously affect the bank's performance.*

$Macro_{t-1}$ *are macroeconomic environmental variables because they may have an influence on bank performance. They are INR (real short-term interest rate), INF (inflation rate) and GDP (growth rate of GDP per capita).*

FB_i *is a dummy variable, to compare the impact on two different types of banks FB is 1 when the bank is a foreign bank, and 0 when the bank is a domestic bank without foreign ownership.*

$\varepsilon_{i,t}$ *is the random error term.*
α_0, α_1, α_2, α_3 *and* α_4 *are parameters*

3.2.2 Impact of foreign bank on Lao economy

In order to check the effect of foreign branch presence on Lao economy, this study employed the VAR based the Granger causality test, which is built based on Kirikkaleli (2016) and impulse response function, to examine the relationship between foreign bank presence by asset (FBA) and determinants of Lao economy, namely CREDIT and GDP whereas the development of banking sector variable (BANK) was used as a controlled variable. We employ the Granger causality to find (i) whether X variable Granger causes the Y variable and (ii) whether Y variable Granger causes the X variable. If the Y variable does not cause X, the parameters of X on the lagged Y are jointly zeros (Granger, 1969). The general equations of the VAR based Granger causality test for this model are shown below:

$$Foreign\ Bank\ presence_t = \alpha_i + \sum_{t=1}^{n} \beta_i Foreign\ Bank\ presence_{t-1} + \sum_{t=1}^{n} \gamma_i Lao\ economy_{t-1} + \sum_{t=1}^{n} \delta_i Financial\ Development_{t-1} + \varepsilon_t \quad (2a)$$

$$Lao\ economy_t = \alpha_i + \sum_{t=1}^{n} \beta_i Foreign\ Bank\ presence_{t-1} + \sum_{t=1}^{n} \gamma_i Lao\ economy_{t-1} + \sum_{t=1}^{n} \delta_i Financial\ Development_{t-1} + \varepsilon_t \quad (2b)$$

These are the specific equations:

$$FBA_t = \alpha_1 + \sum_{t=1}^{n} \beta_1 FBA_{t-1} + \sum_{t=1}^{n} \gamma_1 GDP_{t-1} + \sum_{t=1}^{n} \delta_1 BANK_{t-1} + \varepsilon_t \quad (2a\text{-}1)$$

$$GDP_t = \alpha_2 + \sum_{t=1}^{n} \beta_2 FBA_{t-1} + \sum_{t=1}^{n} \delta_2 GDP_{t-1} + \sum_{t=1}^{n} \gamma_2 BANK_{t-1} + \varepsilon_t \quad (2b\text{-}1)$$

$$FBA_t = \alpha_3 + \sum_{t=1}^{n} \beta_3 FBA_{t-1} + \sum_{t=1}^{n} \gamma_3 CREDIT_{t-1} + \sum_{t=1}^{n} \delta_3 BANK_{t-1} + \varepsilon_t \quad (2a\text{-}2)$$

$$CREDIT_t = \alpha_4 + \sum_{t=1}^{n} \beta_4 FBA_{t-1} + \sum_{t=1}^{n} \gamma_4 CREDIT_{t-1} + \sum_{t=1}^{n} \delta_4 BANK_{t-1} + \varepsilon_t \quad (2b\text{-}2)$$

4. Results

Impact of foreign banks penetration on domestic banks

This study used empirical models to estimate the impact of foreign bank entry on the performance of Lao domestic banks. There are six performance indicators to indicate – five parts are CAMEL: Capital Strength (ROE), Asset quality (ATR and LTA), Management ability (EXR and TCOST), Earning and Profitability (NPM and ROA), Liquidity (ICR and LTD), and the last one is bank growth (LOAN) are examined. The main variable is FBN and the dummy variable (FB) to figure out the differences between banks with and without foreign ownership.

Panel data is defined as the combination of time series and cross-section data. Unit root test (ADF-Fischer Chi-square) was performed prior to running the model to determine whether the data are stationary or not. Hereby, the Random effect model is more appropriate than other models based on the Hausman specification test, especially for the model with a dummy variable, which is not effective for the fixed effect model. After detect the multicollinearity, we have done the Wooldridge test for autocorrelation in panel data and the Breusch-Pagan Lagrange Multiplier Panel Heteroscedasticity Test. And the results show that almost every equation has autocorrelation and heteroscedasticity problems. The way of eliminating the autocorrelation and heteroscedasticity problems in our model is by running GLS Random-

effects models with robust standard errors clustered. We have run four specific models as 1) The model after multicollinearity detection, as removing FBA and LGDP, 2) The model after adding LGDP as a dependent variable, as GDP has a crucial role in indicating the economy, 3) The model using a dataset of banks with foreign ownership, and 4) The model using a dataset of banks without foreign ownership. The results are presented in Table 3, 4, 5, and 6 respectively.

With all the models, we interpreted the results as follows:

1. Capital strength

From the first equation to determine the effect of FBN on domestic banks' ROE, the empirical shows that FBN has a negative relation to ROE but is insignificant. From the significance of FB with the positive relationship to ROE, it can be seen that if the increasing number of foreign banks in Laos has a negative impact on foreign banks (which came into the market before 2013), it was smaller than the domestic banks. This evidence appears to be consistent with the findings of Demirguc Kunt-Huizinga (1998), which indicate that there is some evidence that the income of domestic banks is negatively affected by foreign bank entry.

2. Asset quality

To determine the effect of foreign bank entry on the asset quality of domestic banks, we have estimated two variables: ATR- Asset turnover ratio and LTA-Ratio of loan to assets. The empirical results show that FBA has a positive relationship to ATR, which is significant at 10% level. Meaning that if the number of foreign banks arises the asset turnover ratio of domestic also increases. But, the FBN has a negative impact on LTA means that ratio of loan to assets of domestic bank decrease with greater foreign bank entry.

When we separately run the model by bank types (bank with and without foreign ownership), the results show that the impact on ATR is smaller for the bank without foreign ownership, and the impact on LTA seems to be stronger for the bank without foreign ownership. This means that Lao bank will get into a worse situation even if the impact is negative or positive.

3. Management ability

The effect of foreign bank entry on the management ability of domestic banks was negative since the empirical test showed that the FBN effect positively on EXR and the FBA effect

positively on the TCOST. We can conclude that foreign bank entry, regardless of the number or asset, has a positive impact on domestic banks' operating expenses and total costs.
When we separately run the model, the impact on banks with foreign ownership is stronger than on the Lao commercial banks. This might due to domestic commercial banks' advantage in informational accessibility.

4. Earning and profitability

NPM-Net profit margin and ROA-Return on assets were used to determine the effect of foreign bank entry on the earning and profitability of domestic banks. The results show that FBN negatively impacts on NPM and FBA effects negatively on ROA as the increase in foreign bank entry affects negatively NPM and ROA of commercial banks in the host country. Especially if the banks are banks with foreign ownership, the impact will be stronger.

5. Liquidity

The foreign bank number has a negative impact on domestic bank liquidity as ICR-Interest coverage ratio and LTD-Loan to deposit ratio which is consistent with the common results, is significant at 10% level for LTD, but not significant for ICR. The separate models show that the impact on banks with foreign ownership is stronger than on Lao commercial banks.

6. Bank growth

The variable we use to indicate the bank growth is LOAN-market share by loan, the empirical result shows that the FBN has a negative relationship to LOAN especially to the banks with foreign ownership. The result is not significant, but it is still consistent with the previous evidence, which shows that the increase in foreign bank numbers will decrease the market share by loan of the commercial banks in host country.

The general conclusion of this model is that foreign bank penetration through the opening of branches in the domestic banking sector did contribute to reduced domestic bank performance through CAMEL and also lower bank growth. The results specifically show that the management ability has dropped as the operating expenses and total cost of domestic banks have increased, while the asset quality, liquidity, and bank growth also declined as the diminution of loan to asset, loan to deposit, and the market share by loan. These all point to the reduction of earning ability as well as the profitability of domestic banks as ROE, ROA, and NPM. The empirical results are consistent with the previous evidence. Cizikova (2012)

discovered that the entry of larger foreign banks has a negative impact on domestic banks' net interest income, non-interest income, and pre-tax profits. Nevertheless, the FB variable that we have run in both the model with and without the GDP variable and even run the model separately by two bank types, has shown the indeterminate answer that if the domestic banks with or without foreign ownership have been impacted more by foreign bank entry, this might happen because of the insufficient data

Table 3: The effect of foreign bank entry through the opening of branches on the performance of domestic banks (2012–2020) (The model after multicollinearity detection, as removing FBA and LGDP)

Equation	1	2	3	4	5	6	7	8	9	10
Bank performance	Capital Strength	Asset quality		Management ability		Earning Ability		Liquidity		Bank growth
Dependent variables	ROE	ATR	LTA	EXR	TCOST	NPM	ROA	ICR	LTD	LOAN
FBN	-0.6667	0.087**	-0.8705	1.2996	0.0762*	-0.7401	-0.0478	-20.4552	-45.2586*	-0.1365
	[0.4217]	[0.0395]	[0.6517]	[0.9167]	[0.0459]	[0.721]	[0.0559]	[21.0631]	[27.2659]	[0.1508]
LSIZE	0.0412***	0.0023	-	-	0.0016	-0.0495*	0.0025	-	-	-
	[0.0109]	[0.0027]	-	-	[0.0019]	[0.0257]	[0.0036]	-	-	-
DER	0.003***	0.00003***	0.00003	-0.0001	0.0001***	-0.0006*	-0.00003	-0.0207*	-0.0069	-0.00004
	[0.0001]	[0.00001]	[0.0004]	[0.0005]	[0.00001]	[0.0003]	[0.00002]	[0.0123]	[0.0079]	[0.00005]
CASH	0.000003	-0.0001***	-0.0005***	0.0005***	-0.00004	-0.0001	-0.00001	-0.0067	0.0032	0.00002
	[0.0001]	[0.00002]	[0.0002]	[0.0001]	[0.00003]	[0.0001]	[0.00002]	[0.0048]	[0.0031]	[0.00002]
EXPA	-0.5484*	0.8773***	0.8043	1.5745***	1.1006***	-1.8082***	-0.1105*	-18.5174	6.1511	0.05968
	[0.3203]	[0.0769]	[0.7355]	[0.4833]	[0.1116]	[0.3456]	[0.0594]	[14.1284]	[5.9321]	[0.0452]
MKS	-	-	0.4584	0.0922	-	-	-0.0331	-11.7105*	40.947	1.0822***
	-	-	[0.5459]	[0.0761]	-	-	[0.0466]	[6.8925]	[45.3937]	[0.173]
INF	0.3122	-	-0.7169	-0.9867	-0.1767*	-0.7065	0.0837	-0.0484	-8.3449	-0.0432
	[0.45]	-	[0.9092]	[0.6197]	[0.0972]	[0.5334]	[0.0531]	[26.0621]	[11.1491]	[0.1083]
INR2	0.1636	-	0.2983	-0.1689	-	0.184	-0.0432	6.0447	17.8926	0.0501
	[0.2444]	-	[0.3521]	[0.6247]	-	[0.3463]	[0.0532]	[10.3035]	[12.8495]	[0.0372]
FB	0.072***	-0.0083	-0.1193*	-0.0062	-0.0177***	0.0082	0.0091***	0.357	2.0303	-0.006
	[0.0223]	[0.0077]	[0.0704]	[0.0169]	[0.0056]	[0.0757]	[0.0026]	[1.9569]	[2.5894]	[0.0122]
C	-0.1483	-0.0333	1.1278***	-0.8566	-0.0248	1.6678***	0.0014	16.7577	28.2103*	0.0906
	[0.2847]	[0.0426]	[0.4244]	[0.5824]	[0.0378]	[0.4491]	[0.0412]	[14.1671]	[15.8269]	[0.1018]
No. of observation	189	243	189	189	243	189	189	189	189	189
Adj-R2	0.4739	0.5497	0.1205	0.0937	0.7245	0.2297	0.0651	0.0903	0.0269	0.856

Note: standard errors are in square brackets. The results are estimated via GLS Random-effects models with robust standard errors clustered. The dependent variables are domestic bank performances, while the main independent variable is FBN (foreign bank number to total bank number). For definition of variables, please see Table 2. * Denote significance at 0.1 level. ** Denote significance at 0.05 level. *** Denote significance at 0.01 level

Table 4: The effect of foreign bank entry through the opening of branches on the performance of the domestic banks (2012-2020) (after adding LGDP as a dependent variable, as GDP has a crucial role in indicating the economy)

Equation	1	2	3	4	5	6	7	8	9	10
Bank performance	Capital Strength	Asset quality		Management ability		Earning Ability		Liquidity		Bank growth
Dependent variables	ROE	ATR	LTA	EXR	TCOST	NPM	ROA	ICR	LTD	LOAN
FBA	-	0.1591*	-	-	0.2293**	-	-0.0796*	-	-	-
	-	[0.0953]	-	-	[0.0955]	-	[0.0459]	-	-	-
FBN	-0.2328	-	-1.5511***	2.0361*	-	-2.1041**	-	-173.3141	-31.0438*	-0.0658
	[0.7408]	-	[0.5489]	[1.1700]	-	[1.0336]	-	[159.7322]	[17.7655]	[0.0708]
LSIZE	-	0.0006	0.0438	-0.0059	0.0039	-0.0278	0.0036	-	-	-
	-	[0.0024]	[0.0393]	[0.0084]	[0.0035]	[0.0468]	[0.0037]	-	-	-
DER	0.0032***	-0.0001	-0.0001**	0.0001	0.0000	-0.0002**	-0.0001**	-0.0042	-0.0025	0.0000
	[0.0003]	[0.0001]	[0.0001]	[0.0003]	[0.0000]	[0.0001]	[0.0000]	[0.0057]	[0.0017]	[0.0000]
CASH	-0.0001	0.0000	-0.0012***	0.0003***	0.0000	-0.0004***	0.0000	-0.0311	0.0006	0.0000
	[0.0001]	[0.0000]	[0.0003]	[0.0001]	[0.0000]	[0.0001]	[0.0000]	[0.0447]	[0.0030]	[0.0000]
EXPA	-0.4879	0.8376***	1.0243	1.4862***	1.0730***	-1.1731	-0.1000	-11.5291	6.3203	0.0301
	[0.3505]	[0.0829]	[0.7318]	[0.4480]	[0.1180]	[0.7597]	[0.0624]	[34.8600]	[6.5933]	[0.0385]
MKS	0.6090*	-	-0.3104	-	-0.1002**	-	-0.0479	-8.3395	44.7272	1.0371***
	[0.3276]	-	[0.7156]	-	[0.0497]	-	[0.0493]	[10.8629]	[46.7345]	[0.1706]
INF	-	-	-0.8500	-	-	-1.1219*	-	-90.9796	-21.7677*	-0.0522
	-	-	[0.9271]	-	-	[0.6529]	-	[84.2182]	[13.0946]	[0.1074]
INR2	0.1494	-0.0385	-	-0.2959	0.0052	-	-0.0234	-	-	-
	[0.2550]	[0.0359]	-	[0.6447]	[0.0436]	-	[0.0515]	-	-	-
LGDP	-0.0448	-0.0260	0.1164	-0.1151	-0.0295	0.2758	-0.0020	38.5893	1.6900	-0.0007
	[0.1040]	[0.0245]	[0.1336]	[0.1263]	[0.0224]	[0.1947]	[0.0161]	[35.5541]	[1.2236]	[0.0052]
FB	0.0449**	-0.0098	-0.0638	-0.0148	-0.0183***	0.0301	0.0097***	-1.6482	2.3647	-0.0045
	[0.0199]	[0.0084]	[0.0704]	[0.0229]	[0.0055]	[0.0897]	[0.0025]	[2.3475]	[2.6951]	[0.0110]
C	1.2129	0.6182	-1.8041	1.4445	0.6236	-4.2722	0.0265	-789.6607	-20.8244	0.0622
	[2.0858]	[0.5598]	[2.5417]	[2.6506]	[0.5182]	[4.4301]	[0.3438]	[731.8796]	[20.8809]	[0.1564]
No. of observation	189	189	243	189	189	243	189	243	243	243
Adjusted-R2	0.4141	0.5648	0.1886	0.0897	0.7143	0.1053	0.0628	0.0264	0.0257	0.8682

Note: standard errors are in square brackets. The results are estimated via GLS Random-effects models with robust standard errors clustered. The dependent variables are domestic bank performances, while the main independent variables are FBA (foreign bank asset to total bank asset) and FBN (Foreign bank number to total bank number). For definition of variables, please see Table 2. * Denote significance at 0.1 level. ** Denote significance at 0.05 level. *** Denote significance at 0.01 level.

Table 5: Impact of foreign bank entry on domestic banks with foreign ownership

Equation	1	2	3	4	5	6	7	8	9	10
Bank performance	Capital Strength	Asset quality		Management ability		Earning Ability		Liquidity		Bank growth
Dependent variables	ROE	ATR	LTA	EXR	TCOST	NPM	ROA	ICR	LTD	LOAN
FBA	-	0.1411	-	-	0.2430*	-	-0.1101*	-	-	-
	-	[0.1396]	-	-	[0.1416]	-	[0.0623]	-	-	-
FBN	0.4854	-	-1.4524**	3.0993*	-	-2.3442	-	-265.3973	-37.6101*	-0.0977
	[0.3846]	-	[0.6591]	[1.7296]	-	[1.4773]	-	[241.3800]	[20.0054]	[0.0912]
LSIZE	-	0.0064	0.0513	-0.0016	0.0063	-0.0045	0.0026	-	-	-
	-	[0.0042]	[0.0379]	[0.0113]	[0.0039]	[0.0618]	[0.0048]	-	-	-
DER	0.0030	-0.0013***	-0.0032	-0.0015	-0.0006	-0.0012	-0.0003	0.2311	-0.1771*	0.0004
	[0.0043]	[0.0003]	[0.0071]	[0.0037]	[0.0005]	[0.0048]	[0.0003]	[0.2926]	[0.1054]	[0.0014]
CASH	-0.0001	-0.0001*	-0.0011***	0.0003**	0.0000	-0.0006***	0.0000	-0.0450	-0.0007	0.0000
	[0.0001]	[0.0000]	[0.0002]	[0.0001]	[0.0000]	[0.0002]	[0.0000]	[0.0523]	[0.0030]	[0.0000]
EXPA	-0.4700	0.8647***	1.0237	1.3329***	1.1191***	-0.9863	-0.0976	3.8183	7.9542	0.0431*
	[0.3456]	[0.0801]	[0.7071]	[0.5070]	[0.1377]	[0.8865]	[0.0601]	[43.7799]	[5.6769]	[0.0232]
MKS	1.4579***	-	-0.1518	-	-0.0888	-	-0.0188	-40.5250	120.3148	0.8673
	[0.5076]	-	[1.6724]	-	[0.1435]	-	[0.1148]	[35.9138]	[100.9515]	[0.6151]
INF	-	-	0.2964	-	-	-1.0700	-	-117.1447	-20.1933*	0.0061
	-	-	[0.8855]	-	-	[0.8757]	-	[121.5943]	[11.6986]	[0.0707]
INR2	-0.1260	-0.0108		-0.7723	0.0655	-	-0.0516	-	-	-
	[0.3038]	[0.0493]		[0.9174]	[0.0574]	-	[0.0774]	-	-	-
LGDP	-0.0693	-0.0245	0.0386	-0.2410	-0.0412	0.3181	0.0137	59.5939	1.8884	-0.0068
	[0.1077]	[0.0371]	[0.1629]	[0.1854]	[0.0310]	[0.3232]	[0.0190]	[53.6167]	[1.8095]	[0.0050]
C	1.3548	0.5053	-0.2326	3.6588	0.8467	-5.3997	-0.3107	-1225.7960	-19.67862	0.2191
	[2.3135]	[0.8321]	[3.1923]	[3.8279]	[0.7132]	[7.0928]	[0.4079]	[1104.7400]	[35.2685]	[0.1446]
No. of observation	126	126	162	126	126	162	126	162	162	162
Adjusted-R2	0.5231	0.6100	0.2139	0.0990	0.7369	0.0362	0.0211	0.0414	0.1302	0.6529

Note: standard errors are in square brackets. The results are estimated via GLS Random-effects models with robust standard errors clustered. The dependent variables are domestic bank performances, while the main independent variables are FBA (foreign bank asset to total bank asset) and FBN (Foreign bank number to total bank number). For definition of variables, please see Table 2. * Denote significance at 0.1 level. ** Denote significance at 0.05 level. *** Denote significance at 0.01 level.

Table 6: Impact of foreign bank entry on domestic banks without foreign ownership.

Equation	1	2	3	4	5	6	7	8	9	10
Bank performance	Capital Strength	Asset quality		Management ability		Earning Ability		Liquidity		Bank growth
Dependent variables	ROE	ATR	LTA	EXR	TCOST	NPM	ROA	ICR	LTD	LOAN
FBA	-	0.1552**	-	-	0.0898	-	0.0353	-	-	-
	-	[0.0790]	-	-	[0.1024]	-	[0.0796]	-	-	-
FBN	-1.7991	-	-1.2961	-0.0322	-	-1.3749*	-	4.0753	-7.3910	-0.0019
	[2.1125]	-	[1.2518]	[0.4027]	-	[0.7573]	-	[6.9971]	[5.8708]	[0.1713]
LSIZE	-	0.0028	-0.0026	-0.0009	0.0007	-0.0789**	0.0110***	-	-	-
	-	[0.0047]	[0.0370]	[0.0112]	[0.0058]	[0.0392]	[0.0038]	-	-	-
DER	0.0029***	-0.0001	0.0001	0.0002	0.0001*	-0.0001*	-0.0001***	0.0003	-0.0001	0.0000
	[0.0002]	[0.0000]	[0.0001]	[0.0002]	[0.0000]	[0.0001]	[0.0000]	[0.0010]	[0.0003]	[0.0000]
CASH	-0.0108***	-0.0013	-0.0333***	-0.0078	-0.0070***	0.0146***	0.0040***	2.1645***	0.7082***	-0.0005
	[0.0040]	[0.0011]	[0.006]	[0.0056]	[0.0013]	[0.0044]	[0.0015]	[0.1514]	[0.0489]	[0.0006]
EXPA	-0.4559	0.5571***	0.6673	2.0034**	0.6651***	-2.3515***	0.0114	-52.6667	-14.6944	-0.0263
	[0.5973]	[0.2212]	[2.0024]	[0.8363]	[0.2044]	[0.7917]	[0.1045]	[47.0604]	[17.5502]	[0.1693]
MKS	0.1512***	-	-0.0188	-	-0.0779	-	-0.1014***	-6.7393	-3.0128***	1.0481
	[0.0544]	-	[0.5098]	-	[0.0621]	-	[0.0346]	[7.2303]	[2.6999]	[0.0170]
INF	-	-	-2.9819	-	-	-0.8006	-	-30.3574	-15.8194	-0.1723
	-	-	[2.1743]	-	-	[0.7756]	-	[32.6335]	[13.2386]	[0.3149]
INR2	0.7290*	-0.0592	-	0.7188	-0.0789	-	0.0235	-	-	-
	[0.4375]	[0.0566]	-	[0.5504]	[0.0689]	-	[0.0268]	-	-	-
LGDP	0.0262	-0.0459	0.2251*	0.0752	-0.0020	0.2374*	-0.0474**	1.8866**	2.1933	0.0104
	[0.1980]	[0.0287]	[0.1251]	[0.0788]	[0.0334]	[0.1318]	[0.0243]	[0.9065]	[1.7181]	[0.0124]
C	0.5849	1.0622*	-3.7403	-1.7881	0.0759	-3.0641	0.9488*	-43.5941**	-44.94889	-0.2340
	[3.472]	[0.6280]	[2.5230]	[1.5929]	[0.7320]	[2.7946]	[0.5065]	[21.0073]	[35.5557]	[0.3297]
No. of observation	63	63	81	63	63	81	63	81	81	81
Adjusted-R2	0.5085	0.3532	0.2689	0.1648	0.5	0.5247	0.3719	0.5419	0.5461	0.9579

Note: standard errors are in square brackets. The results are estimated via GLS Random-effects models with robust standard errors clustered. The dependent variables are domestic bank performances, while the main independent variables are FBA (foreign bank asset to total bank asset) and FBN (Foreign bank number to total bank number). For definition of variables, please see Table 2. * Denote significance at 0.1 level. ** Denote significance at 0.05 level. *** Denote significance at 0.01 level.

Table 7: The comparison of the results between the models with and without LGDP as an independent variable.

Equation No.	Dependent Variables	The model without LGDP as an independent variable		The model with LGDP as an independent variable			The results after adding LGDP into the model compares to the model without LGDP
		Independent Variable	Dummy Variable	Independent Variable		Dummy Variable	
		FBN	FB	FBA	FBN	FB	
1	ROE	-0.6667	0.0720***		-0.2328	0.0449**	the same (negative)
2	ATR	0.0869**	-0.0082	0.1591*		-0.0098	the same (Positive and significant)
3	LTA	-0.8704	-0.1192*		-1.5511***	-0.0638	the same (negative) but become significant
4	DEXR	1.2996	-0.0061		2.0361*	-0.0148	the same (Positive) but become significant
5	TCOST	0.0761*	-0.0176***	0.2293**		-0.0183***	the same (Positive and significant)
6	NPM	-0.7401	0.0082		-2.1041**	0.0301	the same (negative) but become significant
7	ROA	-0.0477	0.0090***	-0.0796*		0.0097***	the same (negative) but become significant
8	ICR	-20.4551	0.3569		-173.3141	-1.6482	the same (negative)
9	LTD	-45.2586*	2.0302		-31.0438*	2.3647	the same (Negative and significant)
10	LOAN	-0.1365	-0.0059		-0.0658	-0.0045	the same (negative)

Note: After adding LGDP, the effects of foreign banks on domestic banks are still the same. Additionally, there are more significant equations than when running the model without LGDP. As we run the model without LGDP, the FBN has a significant effect on ATR, TCOST, and LTD (only 3 out of 10 equations). But running the model with LGDP, FBA/FBN significantly affects ATR, LTA, DEXP, TCOST, NPM, ROA, and LTD (7 out of 10 equations).

Table 8: The comparison of the impact of foreign banks on domestic banks with and without foreign ownership through the model by a dataset of all banks with FB as a dummy variable and separate datasets of two bank types (banks with and without foreign ownership)

Dependent Variables	The model with dataset of all bank			The model with dataset of banks with foreign ownership		The model with dataset of banks without foreign ownership		Results	The comparison of the impact of foreign banks on domestic banks with and without foreign ownership (summarized based on the significant equation)
	Independent Variable		Dummy	Independent Variable		Independent Variable			
	FBA	FBN	FB	FBA	FBN	FBA	FBN		
1. Capital Strength									
ROE		-0.2328	0.0449**		0.4854		-1.7991	FBN negative to ROE	Impact on Lao bank is stronger (FBN is insignificant)
2. Asset quality									
ATR	0.1591*		-0.0098	0.1411		0.1552**		FBA positive to ATR	Impact on Lao bank is smaller
LTA		-1.5511***	-0.0638		-1.4524**		-1.2961	FBN negative to LTA	Impact on Lao bank is stronger
3. Management ability									
DEXP		2.0361*	-0.0148		3.0993*		-0.0322	FBN positive to DEXP	Impact on Lao bank is smaller
TCOST	0.2293**		-0.0183***	0.2430*		0.0898		FBA positive to TCOST	No conclusion*
4. Earning and Profitability									
NPM		-2.1041**	0.0301		-2.3442		-1.3749*	FBN negative to NPM	Impact on Lao bank is smaller
ROA	-0.0796*		0.0097***	-0.1101*		0.0353		FBA negative to ROA	No conclusion**
5. Liquidity									
ICR		-173.3141	-1.6482		-265.397		4.0753	FBN negative to ICR	Impact on Lao bank is smaller (insignificant)
LTD		-31.0438*	2.3647		-37.6101*		-7.391	FBN negative to LTD	Impact on Lao bank is smaller
6. Bank growth									
LOAN		-0.0658	-0.0045		-0.0977		-0.0019	FBN negative to LOAN	Impact on Lao bank is smaller (insignificant)

Note: FB = 1 when bank with foreign ownership and 0 when bank without foreign ownership.* Cannot conclude because in the model with dummy shows significant negative FB means that the impact on Lao bank is stronger than on a foreign bank. While the model run by bank with foreign ownership, the FBA positively affects TCOST with a coefficient of 0.2430, while it is only 0.2293 in the model by all banks, which means that the impact on Lao bank is smaller. ** Cannot conclude because the model with a dummy produces a significant positive FB, indicating that the impact on the Lao bank is greater than on the bank with a foreign ownership. While the model by bank with foreign ownership, the FBA affects negatively on ROA with a coefficient of -0.1101 (-0.0796 by all banks' data model), which means that the impact on Lao bank is smaller.

4.1 Impact of foreign bank to Lao economy

This model is to detect whether there is a relationship between the foreign bank presence and the Lao economy using the VAR Granger causality model and impulse response function. The variables to be performed in the VAR Granger causality test have to be stationary variables because if the time series variables have a unit root, the Wald ($\chi 2$) test statistic will be worthless and the VAR model will not be effective. As for determining the optimal lag length for the VAR models, we have tested the VAR lag order selection best VAR model and the results suggest using lag 2 in the model.

This paper employed the VAR-based Granger causality test to examine the short-run causal relationships between FBA and Lao economic variables (GDP and CREDIT), while BANK was used as a controlled variable. The results regarding their short-run relationships presented in Table 9 below are based on chi-square tests.

Table 9: The results of VAR Granger Causality/Block Exogeneity Wald Tests for equation (2a) and (2b)

Model	Independent variable	Granger Cause	dependent variable	DF	$\chi 2$	P-value
1	FBA	→	GDP	2	0.2517	0.8818
	GDP	→	FBA	2	195.3017	0.0000
2	FBA	→	CREDIT	2	3.4863	0.1750
	CREDIT	→	FBA	2	16.5806	0.0003

The first model (1) is to test whether FBA Granger causes GDP or GDP Granger causes FBA. This implies that changes in FBA do not significantly cause a change in GDP in Laos. This is probably according to the dominance of domestic commercial banks in Lao banking market, even the foreign bank market share by assets is around 28.7%. Therefore, the domestic banks' dominancy in the banking sector is likely to minimize any reaction by FBA in the host market. Moreover, the result of the first model also shows that the changes in domestic GDP significantly led to changes in FBA.

In model (2), the result shows that FBA does not lead to a change in domestic credit availability, but domestic credit availability leads to a change in foreign bank penetration assets. The presence of causality between domestic credit availability to foreign bank penetration asset is not surprising because most foreign banks in Laos can move their capital from home countries to contribute as the credit availability in host countries when they see the demand for credit accessibility. Fundamentally, in the more competitive markets, credit availability seems to increase, and this result also turns into increased foreign bank penetration assets whenever foreign banks invest in a host country.

Although Granger causality from GDP and CREDIT to FBA was significant at the 5% and 1% levels, the lack of causality from FBA to the domestic economy is not consistent with our hypothesis for this study. There are also previous empirical findings that the foreign bank penetration asset does not lead the domestic economy, as Giannetti and Ongena (2011) found that foreign banks' branches may concentrate on mobilizing capital for large companies and ignore small firms. Such that abandonment, the apprehension that foreign bank penetration may be harmful to the financial performance and growth of small to medium enterprises, which has the potential to significantly reduce economic growth. Ghosh (2017) studies the effects of banking institutions' liberalization on GDP growth by using a panel dataset of 138 countries during the years 1995 to 2013 and finds that a high level of banking sector globalization lowers real economic growth. The result was in line with the studies of Acharya and Subramanian (2009), Dell'ariccia and Marquez (2004), Detragiache et al. (2008), Gormley (2010), Mian (2006), and Sengupta (2007). They have assumed the apprehensions that foreign institutions may encounter the problem of informational asymmetries in developing and least-developed nations, which can obstruct them from lending to small-medium-sized enterprises, which are more informationally opaque, and thus lower real GDP growth.

In addition, we used the impulse response function to examine how foreign bank entry and the Lao economy interact over time. Figures 1 to 4 report the response of Lao economic variables to the FBA and vice versa.

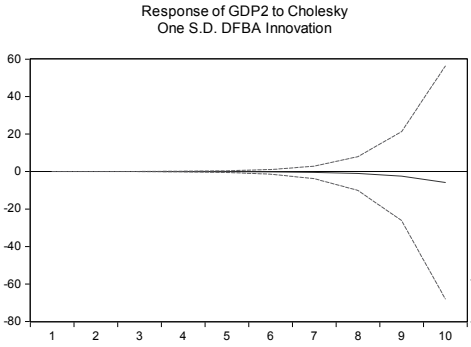

Figure 2: Response of GDP2 to DFBA

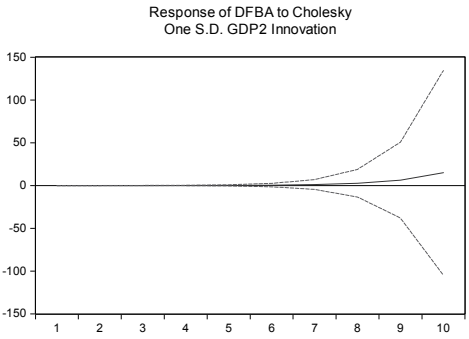

Figure 1: Response of DFBA to GDP2

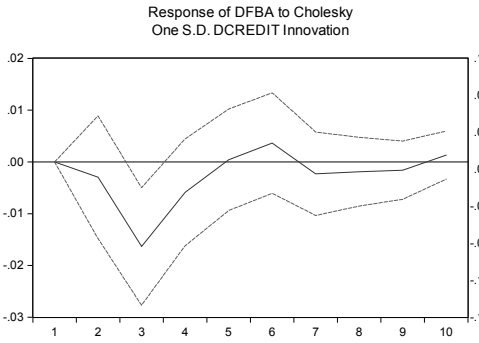

Figure 4: Response of DCREDIT to DFBA

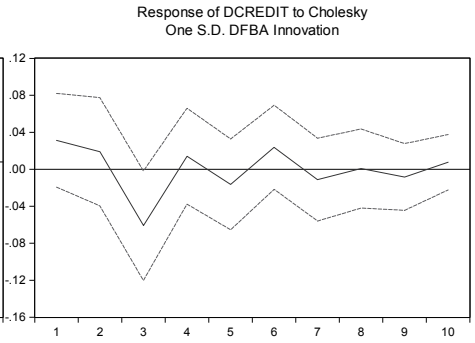

Figure 3: Response of DFBA to DCREDIT

As seen in Figure 1 to 4, the findings from the generalized impulse response functions using a ten-year period, Figure 1 illustrates that the response of GDP2 to DFBA is negative, but the effect of shocks exists after the 5th period. Thus, in Lao PDR, rising foreign bank assets contribute to lower growth rate of GDP in long run. Figure 2 shows that the reverse line is positive after the 5th period. Therefore, rising GDP in Laos leads to an increase in foreign bank assets. However, the significant shock occurs after the 5th period. As they are in long run, if the regulation or trend in the market has changed during these 5 years, the effect can be different.

In figure 3 and 4, present that the response between DFBA and DCREDIT is fluctuating over time. In the short run, especially in the first three periods, they are likely to have a strong negative response to each other before turning up again and tend to have smaller effect in the long run.

Even the empirical finding from VAR Granger Causality can be interpreted as meaning that rising foreign bank entry does not increase GDP growth and credit growth in Lao PDR, but GDP growth and credit growth still have causality with foreign bank entry, which means that however they are still related to each other. So, the figures by impulse response function can tell us the reflection of them as foreign bank entry has no impact on GDP growth in the short run, but rising foreign bank assets can contribute to lower growth rate of GDP in the long run. In terms of credit availability growth rate, in the short run, especially in the first three-year period, they are likely to have strong negative responses to each other before turning up again and seem to be more stable in the long run, which stable growth rate can tell that the scale of credit does not have a tendency to expand. This might due to foreign banks' have become great competitors to domestic banks, until they take some time to renovate and develop themselves to be more competitive in the long term, but still not enough to push the credit growth, as along with the domestic bank challenges, the foreign banks still face the asymmetric information market in Lao PDR, which can be one of the principal obstacles in releasing credit.

5. Conclusion and Recommendations

This study has examined the effects of foreign bank presence on the performance of commercial banks operating in Lao PDR and the effects on Lao Economy. The analysis for the impact on bank performance was based on bank-level data and general macroeconomic data during 2012-2020. The general conclusion of this study is that foreign bank penetration through the opening of branches in the domestic banking sector did contribute to reduce domestic bank performance through CAMEL and also lower bank growth. The results specifically show that the management ability has dropped as the operating expenses and total cost of domestic banks have increased, while the asset quality, liquidity, and bank growth also declined as the diminution of loan to asset, loan to deposit, and market share by loan. All these can point to the reduction of earning ability as well as the profitability of domestic banks as ROE, ROA, and NPM. Nevertheless, the FB variable that we have run in both the model with and without the GDP variable, and even run the model separately by two bank types, has shown the indeterminate answer that if the domestic banks with or without foreign ownership have been impacted more by foreign bank entry, this might happen because of the insufficient data.

For the effect of foreign banks on Lao economy, the dataset was collected from the Bank of Lao PDR for the time period covering 2004–2020. The VAR granger causality result indicates that changes in foreign bank asset percentage (FBA) do not lead to changes in domestic GDP and growth rate of credit to the economy (CREDIT) but the changes in domestic GDP and growth rate of credit to the economy (CREDIT) significantly lead to change in foreign bank penetration asset (FBA). This is probably according to the dominance of domestic commercial banks in Lao banking market, so they do not have impact on host GDP and credit growth. Even the foreign banks in Laos can move their capital from home countries to contribute as the credit availability in host countries when they see the demand for credit accessibility. Since they see the opportunity to expand their market, the more competitive market in Laos generally leads them to open their branches, especially it seems to increase credit availability in the market, which can attract foreign banks to invest in a host country. This result also increases foreign bank penetration asset.

Anyway, the result from the impulse response function reflects that foreign bank entry has no impact on GDP growth in the short run, but rising foreign bank assets can contribute to lower growth rate of GDP in the long run. In terms of credit availability growth rate, in the short run, especially in the first three-year period, they are likely to have strong negative responses to each other and seem to be more stable in the long run, which stable growth rate can tell that the scale of credit does not have a tendency to expand. This might due to foreign banks have become great competitors to domestic banks, until they take some time to renovate and develop themselves to be more competitive in the long term, but still not much enough to push the credit growth, as along with the domestic bank challenges, the foreign banks still face the asymmetric information market in Lao PDR, which can be one of the principal obstacles in releasing credit.

We summarized the results as follows: The change in GDP growth and financial development in Lao PDR leads to a change in foreign penetration in the banking sector. Greater foreign bank presence causes lower domestic financial institutions' roles in the Lao banking market since the Lao economy motivates them to invest in mostly as substitution rather than for complementary reasons, making the competition stronger, which causes lower incomes, profits, liquidity, and growth. It also raises the total cost of domestic banks and decreases credit availability in the short run since domestic banks will continue to play a crucial role in the financial system in a host market. They are likely to revise their management and

investment strategies to be more international and likely to invest in the home market rather than overseas in order to keep their share in the banking sector as high as possible against the foreign banks, but does not lead to increase credit availability in the long term since foreign banks still have asymmetric information problems in their loan expansion. So, this might lower the growth rate of GDP in Lao PDR in the long run.

This study is the first attempt to study the impact of foreign banks in Lao PDR. Some of our results are not consistent with most common evidence, which is because of the shortage of resources and time, which can lead this study to less critical analysis. According to insufficient data, it would not be possible for us to conduct highly reliable results, but we can try to explore the relationship and the effects of foreign banks on different variables that reflect the performance of the Lao banking sector. However, these results can contribute to Lao banking managers and policymakers modifying the existing supervision on banking sector especially on financial integration as well as foreign bank entry as for Lao PDR there is a commitment to liberalize the banking sector under the ASEAN Framework Agreements on Services (AFAS) through the abolition of the limitation on the number of ASEAN foreign employees or event foreign banks who come to the commercial banking system. With the ASEAN Banking Integration Framework (ABIF) as a guideline, it requires member states to have mutual negotiations to establish a foreign branch between them according to the capacity and the selection criteria of each host country in order to maintain stability in the financial system of ASEAN members. So, this study can be used as a new reference to release any regulations to restrict foreign banks to keep domestic banks competitive in the market and can adopt some new directions from foreign banks such as digital banking, risk management, liquidity, and asset management, etc.

For further research, more data could be collected, possibly both by time and by number of banks, with more detailed data to predict some essential policies for the banking industry in Lao PDR, such as whether to remain open to foreign investment in the banking sector or set higher foreign bank entry criteria for some time to protect domestic banks while still integrating into the international banking market. Another recommendation of the research is to conduct further study on the differences in bank performance between domestic and foreign banks to evaluate the influence of ownership structure more in depth, such as by dividing the ownership by the percentage of foreign investor owners or by bank structural change. This may provide the inside story to show the impact on the financial performance of the banks.

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