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The Impact of Bank Credit on Economic Growth in Lao PDR

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Abstract

This study examines the impact of bank credit on economic growth in Lao PDR from 1992 to 2022 using data from the World Development Indicators and the Bank of Laos. Employing the Cointegration and Error Correction Model (ECM) with the autoregressive distributed lag (ARDL) bounds testing approach, the results reveal that labor and bank credit to the private sector positively influence economic growth in both the short and long term, while credit to state enterprises has a negative impact. The findings suggest that the government should incentivize commercial banks to increase private sector lending and impose stricter regulations on state enterprise credit to mitigate non-performing loans (NPLs).

Keywords: bank credit; economic growth; ARDL bound test; Error Correction Model
JEL Classification: E51; O16; O47

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1. Introduction

The monetary sector is regarded as one of the most critical components of the economic system, as it connects savings to effective investment, particularly for legal entities. Financial development plays a key role in stimulating production and international trade (Leitao, 2010). In this context, the banking sector, a crucial intermediary that injects money into the economy, enhances the production capacity of capital-constrained businesses (Maureen et al., 2012). Bank credit is essential to the economic system, serving as a bridge between those who seek loans and those in need of funds for various productive activities (Korkmaz, 2015). Credit acts as a primary source of capital, stimulating private sector investment. More credit leads to more investors, which promotes internal investment. As investment increases, so do employment and income, thereby improving the economy.

In many developing countries, financial development, especially in the banking sector, positively impacts economic growth. Bank credit, technological advances, and liquid debt (liquid liabilities) foster investment, which intensifies competition among firms and improves production efficiency. Therefore, credit extended to the private sector plays a crucial role in increasing gross domestic product (GDP), contributing more to economic growth than credit extended to public administration (Aurangzeb, 2012; Banu, 2013; Rahimzadeh, 2012; Thongwaroj, 2013).

However, while bank credit generally has a positive effect on economic growth, many studies offer differing opinions. The impact of credit may diminish when controlling for factors such as labor and past performance. In some countries, credit has not spurred growth due to banking crises and budget constraints, which make credit expansion unsustainable and may even slow growth (Koivu, 2002; Maureen et al., 2012).

Research has also shown that bank credit can have a negative effect on economic growth. In Nigeria, for example, high interest rates, easy access to credit outside the banking system, and a lack of collateral requirements led to a long-term negative impact. Other factors, such as inadequate infrastructure, also contributed to this outcome (Judith et al., 2014). Inflation appears to influence the relationship between bank credit and economic growth, with financial crises exacerbating inflationary pressures and hindering growth (Leitão, 2012).

In Lao PDR, the central bank uses credit extension as a tool of monetary policy, affecting commercial bank lending and the overall economy. While many studies have explored the impact of bank credit on economic growth internationally, few have focused on Lao PDR, especially regarding the effects of credit on specific economic sectors. This gap makes it difficult for policymakers to assess whether adjusting interest rates will stimulate or hinder growth. This study aims to analyze the impact of lending to two sectors—state-owned enterprises and the private sector—and will help policymakers develop more effective credit policies to stimulate economic growth. Therefore, this study explores the effect of bank credit on economic growth in Lao PDR.

2. Literature Review

Adam Smith introduced the theory of economic growth in The Wealth of Nations, emphasizing that expert skill, division of labor, and real capital stock significantly enhance productivity. He suggested that bank credit can drive both market and economic growth, though his theory of credit remains conservative (Skaggs, 1999). Henry Dunning Macleod expanded on Smith's ideas, arguing that credit increases capital stock and that commercial banks play a key role in boosting the money supply. Macleod believed that personal credit enhances long-term production by increasing profits and improving business performance. He emphasized that, when allocated correctly, credit can develop the financial sector without reducing total consumption (Skaggs, 2003).

In a closed economy, credit helps increase private sector income by recycling money through the banking system and converting savings into investments. Credit can either raise or lower aggregate demand. Ray Dalio, founder of Bridgewater Associates, also highlighted that credit links lenders and borrowers, playing a crucial role in stimulating consumption, GDP growth, and productivity (Keats, 2015).

Previous research confirms that credit stimulates financial development in sectors such as investment, manufacturing, and commerce, which are key drivers of economic growth (Aurangzeb, 2012; Beck et al, 2004; Duican & Pop, 2015; Kyophilavong et al., 2016; Maureen et al., 2012; Rahimzadeh, 2012). However, some studies argue that credit can negatively impact economic growth (Judith et al., 2014; Koivu, 2002; Korkmaz, 2015; Leitão, 2012;).

3. Research Methodology

The model used to examine the relationship between bank credit and economic growth is derived from the studies of Barro (1990) and Rebelo (1991), based on the Cobb-Douglas production function, as follows:

$$Y = AK^{\alpha}L^{\beta}$$

Where Y represents real GDP, K is capital, L is labor (labor force), and A is technology. In the Cobb-Douglas model, technology is assumed to be constrained to ensure constant output. By applying the natural logarithm to both sides, we derive the following equation:

$$LnGDP = LnA + \alpha LnK + \beta LnL$$

Following Uddin et al. (2013) and Yusof and Rafindadi (2015), who use total capital instead of capital stock, and Kyophilavong et al. (2016), who use real capital stock per capita as a proxy for capital stock, we opt to use the bank credit variable as a proxy for K (capital stock). This is because bank credit is closely tied to investment, and investment is a key component of capital stock. To avoid data duplication, only the variables for credit and labor are included in our study. The model used in this study is specified as follows:

$$LnGDP_t = \beta_0 + \beta_1 LnCSE_t + \beta_2 LnCP_t + \beta_3 LnLabor_t + \varepsilon_t$$

Where GDP_t is the real gross domestic product, CSE_t is credit to state-owned enterprises, CP_t is credit to the private sector, Labor represents the labor force, and ε_t is the error term; t denotes the time period (details are provided in Table 1). We use annual data for the period 1992–2022, sourced from the World Development Indicators (WDI) and the Bank of the Lao PDR (BOL).

Logarithmic transformations are applied to both dependent and independent variables, as these variables represent monetary amounts with significant value, which may be difficult to interpret in their raw form. The use of logarithms simplifies interpretation by providing elasticities and harmonizing the scale of the variables. This ensures that real gross domestic product, credit to state-owned enterprises and private sectors, and the labor force are comparable within the model.

Table 1: Definition of variables

Variable	Variable Definitions	Unit	Expected Sign	Data Sources
Dependence variable				
GDP	Real gross domestic product	M-LAK		Yusof and Rafindadi (2015)
Independence variables				
CSE	Credit to the state enterprise sector	M-LAK	+	Ye et al. (2021)
CP	Credit to the private sector	M-LAK	+	Timsina (2014)
Labor	Labor force	M-LAK	+	Uddin et al. (2013)

Note: M-LAK stands for million Lao kip (LAK), the currency of Laos. The exchange rate in 2022 was 17,210 LAK per USD.

We use the ARDL Bound Testing approach to estimate the relationship between bank credit and economic growth. The ARDL approach offers advantages over the Engle and Granger (1987) and Johansen and Juselius (1990) methods in three keyways:

1. It does not require variables to be integrated at the same level (they can be I(0) or I(1)).
2. The ARDL bound test addresses the endogeneity problem and is well-suited for small sample sizes.
3. It allows for the simultaneous estimation of both short-term and long-term effects, while distinguishing between the two.

The test equation is expressed as:

$$\Delta \mathrm{LnGDP}_t = \alpha + \sum_{i=1}^{p} \beta_i \Delta \mathrm{LnGDP}_{t-1} + \sum_{j=1}^{p} \beta_j \Delta \mathrm{LnCSE}_{t-1} + \sum_{k=1}^{p} \beta_k \Delta \mathrm{LnCP}_{t-1}$$

$$+ \sum_{L=1}^{p} \beta_l \Delta \mathrm{LnLabor}_{t-1} + \lambda_1 \mathrm{LnGDP}_{t-1} + \lambda_2 \mathrm{LnCSE}_{t-1} + \lambda_3 \mathrm{LnCP}_{t-1}$$
$$+ \lambda_4 \mathrm{LnLabor}_{t-1} + u_t$$

For the hypothesis test, the null hypothesis (H_0: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$) is tested using the F-test, comparing the result to the lower and upper bound critical values. If the F-statistic exceeds the upper bound,

the null hypothesis is rejected, indicating a long-term relationship among the variables. Conversely, if the F-statistic is below the lower bound, the null hypothesis is not rejected, meaning the variables are not correlated in the long run. We also determine the optimal lag values using the Schwarz Information Criterion (SC) and Akaike Information Criterion (AIC), focusing on the lowest values.

Next, we estimate the Error Correction Model (ECM) to evaluate short-term equilibrium relationships and the speed of adjustment to long-term equilibrium. The ECM reflects how quickly deviations from short-term equilibrium return to long-term equilibrium. The model is specified as:

$$\Delta \mathrm{LnGDP}_t = \alpha + \sum_{i=1}^{p} \beta_i \Delta \mathrm{LnGDP}_{t-1} + \sum_{j=1}^{p} \beta_j \Delta \mathrm{LnCSE}_{t-1} + \sum_{k=1}^{p} \beta_k \Delta \mathrm{LnCP}_{t-1} + \sum_{L=1}^{p} \beta_l \Delta \mathrm{LnLabor}_{t-1} + \lambda \mathrm{ETC}_{t-1} + \varepsilon_t$$

Where ECT_{t-1} represents the error correction term from the long-term equilibrium equation, and λ is the speed of adjustment. A higher λ coefficient indicates faster adjustment to long-term equilibrium. As Johansen and Juselius (1990) suggest, cointegration indicates a relationship between the dependent and independent variables. The null hypothesis (H_0: $\lambda = 0$) implies no short-term adjustments. If the null hypothesis is rejected, we conclude that a short-term relationship exists between the variables. If accepted, no short-term relationship is found.

4. Results and Discussion

Table 2 presents the results of the unit root test using the ADF method at levels, first differences, and second differences. The results indicate that some variables, such as Ln(GDP), Ln(CP), and Ln(Labor), are stationary at I(0), while others, like Ln(CSE) and Ln(CP), are stationary at I(1). Given this, the ARDL Bound Testing approach is appropriate for estimating the relationships between the dependent and independent variables.

Table 2: The unit root test for stationary with Augmented Dickey - Fuller (ADF) test Statistics

	Variable	Level		First Different		Second Different	
LnGDP	Intercept	-0.67475		-1.53366		-9.48147	***
	Trend and Intercept	-3.36680	*	-1.41598		-9.47896	***
LnCSE	Intercept	-1.33551		-3.63915	***	-6.57596	***
	Trend and Intercept	-2.66593		-3.58903	**	-6.45982	***
LnCP	Intercept	-0.25882		-3.35578	**	-7.12995	***
	Trend and Intercept	-3.84617	**	-3.29812	*	-6.96155	***
LnLabor	Intercept	-3.67715	***	-2.90584	*	-8.23265	***
	Trend and Intercept	1.26177		-3.40869	*	-8.12758	***

Note: *, **, *** are the statistically significant at 10%, 5% and 1% respectively

We next determine the optimal lag length, as the F-statistic is sensitive to lag order. We employ vector autoregression (VAR) to find the optimal lag, assessing values such as the LR test statistic, Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn Information Criterion (HQ). As shown in Table 3, the optimal lag length for our test is 1, based on the minimum values of AIC and SC, marked with an asterisk. Other indicators also confirm these results (see Appendix 1).

Table 3 shows the ARDL Bound Test for cointegration, revealing an F-statistic (15.341) higher than the upper bound (4.66) at the 1% significance level. Thus, we confirm cointegration between the real GDP and its independent variables.

Table 3: ARDL Bound Test for Cointegration

Test Statistic			k	Signif.	Critical Value Bound	
	Value				Lower bound	Upper bound
F-statistics	15.34125	***	3	10%	2.37	3.2
				5%	2.79	3.67
				1%	3.65	4.66

Note: *, **, and *** indicate statistical confidence levels of 90%, 95% and 99% respectively.

In the long run (Table 4), both the labor force and private-sector credit have positive and statistically significant impacts on real GDP at the 1% and 10% significance levels. A 1% increase in private-sector credit leads to a 0.2581% rise in GDP, while a 1% rise in the labor force increases GDP by 2.2742%. However, credit to state-owned enterprises has no significant long-term effect on GDP.

Table 4: Long-Run Results

Long-run Analysis				
Dependent variable = $LnGDP_t$				
Variable	Coefficient		Std. Error	t-Statistic
$LnCSE_t$	-0.0950		0.15802	-0.6014
$LnCP_t$	0.2581	*	0.13879	1.8596
$LnLabor_t$	2.2742	***	0.75512	3.0117
Contant	-24.0565	**	10.26625	-2.3433

Note: *, **, and *** indicate statistical confidence levels of 90%, 95% and 99% respectively.

The short-run results in Table 5 demonstrate that the labor force and private-sector credit positively impact GDP at the 5% and 10% levels, respectively. In contrast, credit to state enterprises has a negative and significant effect on GDP at the 5% level. A 1% increase in the labor force from the previous year results in a 0.0055% rise in GDP, and a 1% increase in private-sector credit leads to a 0.0659% rise. However, a 1% rise in state-enterprise credit decreases GDP by 0.0586%.

Table 5: Short-Run Results

Short-run Analysis				
Dependent variable = $\Delta LnGDP_t$				
Variable	Coefficient		Std. Error	t-Statistic
$\Delta LnCSE_{t-1}$	-0.0586	**	0.02225	-2.63496
$\Delta LnCP_{t-1}$	0.0659	*	0.03429	1.92318
$\Delta LnLabor_{t-1}$	0.0055	**	0.00243	2.28569
ECT_{t-1}	-0.1298	***	0.01363	-9.52118
R-squared	0.553987		Mean dependent var	0.061937
Adjusted R-squared	0.502524		S.D. dependent var	0.042647
S.E. of regression	0.030079		Akaike info criterion	-4.04638
Sum squared resid	0.023524		Schwarz criterion	-3.85955
Log likelihood	64.69571		Hannan-Quinn criter.	-3.98661
Durbin-Watson stat	2.212348			

Note: *, **, and *** indicate statistical confidence levels of 90%, 95% and 99% respectively.

Additionally, the short-run results show that the error correction term (ECT_t-1) is negative and significant at the 1% level, indicating a speed of adjustment of 12.98% per year towards long-run equilibrium. After estimating the model, we tested for autocorrelation and heteroscedasticity, and the results show no such issues in either the short-run or long-run tests, confirming the validity of our estimated equation.

We also examined model stability using the CUSUM and CUSUM of Squares methods. The results (Appendix 2) show that the model is stable at the 5% significance level, although CUSUM of Squares deviated from the threshold in 2009.

Overall, our results indicate that credit to the private sector has a positive effect on GDP in both the short and long run. This aligns with economic theory and previous studies, such as Timsina (2014) and Yakubu and Affoi (2014), which highlight that private-sector credit stimulates investment and competition, ultimately raising GDP. In contrast, credit to state enterprises has a negative effect, which may be due to inefficiencies and non-performing loans during 1990–2006, as reported by the World Bank (2007). Adam Smith's theory also suggests that a market-driven economy, with competition among private-sector businesses and minimal public-sector intervention, yields better economic outcomes.

5. Conclusions

This study aimed to estimate the impact of bank credit on economic growth in Lao PDR using annual time series data from 1992–2022. Based on the ARDL bounds test approach, our results reveal consistent relationships between the dependent variable and our independent variables in both the short-run and long-run.

The labor force and credit to the private sector were found to have positive and significant effects on GDP. Conversely, credit to state enterprises showed a negative impact on GDP. These findings underscore the

crucial role of commercial bank credit in economic growth, particularly highlighting the more substantial effect of credit to the private sector compared to credit extended to state enterprises.

Based on these results, we recommend that the government continue to promote and encourage commercial banks to extend more credit to the private sector. This approach could stimulate total investment, enhance the efficiency of goods and services production, and contribute to GDP growth. Simultaneously, we suggest that the government implement stricter and more detailed measures for lending to the state enterprise sector. Such measures could mitigate the risks of delayed repayments and reduce the incidence of non-performing loans (NPLs).

In conclusion, this study provides empirical evidence supporting the importance of targeted credit policies in fostering economic growth in Lao PDR. Future research could explore the specific mechanisms through which private sector credit contributes to economic growth and investigate optimal policy frameworks for managing state enterprise lending.

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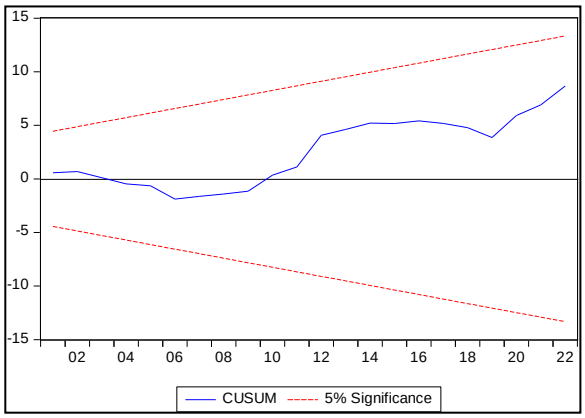
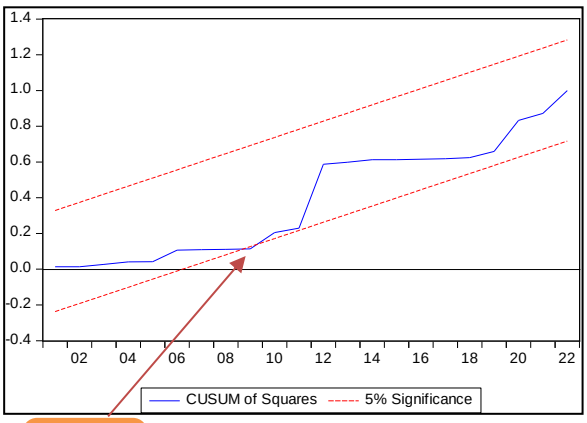
Appendix 1: Optimal lags test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	12.219420	NA	0.033275	-0.566856	-0.378264	-0.507791
1	55.410210	71.48821*	0.001816*	-3.476566*	-3.240825*	-3.402735*
2	55.565230	0.245892	0.001930	-3.418291	-3.135403	-3.329694

Note: * denotes selected the optimal lag

Appendix 2: CUSUM and CUSUM of Squares





2009