Impact of Government Expenditures on Economic Growth: Case of Lao PDR

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ABSTRACT

The article attempts to elucidate long-run and short-run relationships between government expenditures and gross domestic product (GDP). It also aims at exploring the direction of causality between the government expenditures and real GDP, in view of examining the nexus between government expenditure and real GDP. This study is based on data from Laos' public expenditure between 1980 and 2018 in key functional governmental expenditures of recurrent and capital budgets, and GDP in different sectors by using an auto-regressive distributed lags (ARDL) model. We report and analyse the correlation between real GDP and two categories of public expenditures otherwise using Foreign Direct Investment (FDI) and Laos' Labour force or Employment in the selected three sectors as Control Variables. We used econometric techniques such as unit root tests, serial correlation test cointegration test, auto-regressive distributed lags (ARDL) and heteroskedastic tests. Times series data covering the period from 1980 to 2018 on such variables as government expenditure, and real GDP in the three chosen sectors were extracted from many sources such as: Lao Statistics Bureau, The Bank of Lao PDR (Central Bank of Laos), Ministry of Finance, Ministry of planning and Investment and World Development Indicators (WDI) under World Bank Groups. The results of our study, like in most recent literature, confirm that there is a negative long-run relationship between government investment (capital) and administration(recurrent) spending and real GDP, but a positive short-run relation between government investment (capital) and administration(recurrent) spending and economic growth.

Keywords: Lao economic growth, public expenditure, ARDL model.

1. INTRODUCTION

Public expenditure is an important instrument for government to control the economy. It plays an important role in the functioning of an economy whether developed or underdeveloped countries (Okoro, 2013).

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In the case of Lao People Democratic Republic (Lao PDR) economic public expenditure can broadly be categorised into *capital* and *recurrent* expenditure. The *recurrent expenditures* are government expenses on administration such as wages, salaries, government entities administration cost, maintenance etc., whereas *capital expenditures are* expenses on large projects like roads, bridges, airports, riverbank protections, irrigation, water supply, health care centres, hospitals, school building, telecommunication, electricity generation etc. (Lao PDR budgeting system). The relationship between government expenditure and economic growth has continued to generate series of debate among scholars. The GDP composition by sector shows where production takes place in an economy. The distribution gives the percentage contribution of *agriculture, industry*, and *services* to the total GDP, and will total to 100 percent of GDP. Agriculture includes farming, fishing, and forestry; Industry includes mining, manufacturing, electricity, water supply and construction and Services cover stores, hotel-restaurants, warehouse, government activities, communications, transportation, finance, residentials, maintenances and all other private economic activities that do not produce material goods.

Since the second quinquennial (1986-1990) of the Social Economic Development Plan (NSEDP), Lao PDR government has started its three-phase economic reform: the first reform called the *New Economic Mechanism* (NEM) consisted of decentralising government control and encouraging private enterprise alongside state-owned enterprises. The new economic reform aimed at moving a centrally-planned economy to a market-oriented expansion. The NEMs have transformed the socialist economic management system into a market oriented system. The two basic political goals were: 1) Open market policy and 2) Introduction of market economy principles. Since then, Laos has achieved a remarkable economic growth with the privatisation of former state-owned enterprises and a macroeconomic stability. In addition, the country has witnessed a significant rise in public and private investment and an improvement of economic activities. The second reform called "*Economic Structural Reform by Infrastructure*" focuses on the improvement of communication, telecommunication network to link all part of Laos and also link to other Asian regions. The third reform, called "*Sustainable Development*" involves people's contribution. Laos has pursued significant economic and institutional reforms aiming at improving social and economic well-being of the population to guarantee their access to foodstuffs, market, education and health care, and clean environment. It is decentralised to local government and open to foreign investment and promotes official development aid from development partners for sustained socio-economic developments with both regional and global economic cooperation. Those reforms contributed to annual average growth rates of over 6 percent per annum from 1980 to 2018. Moreover, Laos has invited foreign investors and

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accepted assistance from various governments and organisations around the world, all of these factors directly contributed to economic and regional development of Laos.

However, Lao PDR has experienced fluctuating trends in its economic growth since its independence in 1975. A closer look into the data from the Bank of Lao People Democratic Republic (Lao PDR) as central bank of Lao PDR and Laos Statistics Bureau, while government has pended for socio-economic development especially investment on infrastructure development to support sustainable economic development growth, the real GDP composition since 1980 in the three selected sectors is as follows: in Agriculture (crop, livestock, fishery and forestry), 11,729.96 Billion Lao Kip (BLAK) [1], in Industry (mining, quarry, manufacturing, construction, electricity, gas and water) only 2,779.17 BLAK and in Service (transport, store and commodity, wholesale and retail trade, banking, ownership of dwelling, hotel and restaurant, non-profit institution, other services) only 4,649.21 BLAK, compared to year 2018, the increase in real GDP[2] in Agriculture was 19,431.09 Billion BLAK, in Industry 39,004.22 BLAK, and in Services 43,350.91 BLAK. Since 1986, Lao Government has implemented a policy to support industrialization and modernization, therefore Industry and Service sectors have witnessed more increase than in Agriculture sector. The average growth of Agriculture sector was 2.26%, Industry 10.15% and Services 9.14%. On the other hand, real government expenditure has been trending upwards. If the average economic growth rate is anything to go by, from 1990 to 2018, Laos has been growing annually at the rate of 6.33% compared to the annual average growth in real expenditure of 14.16%. From year 1995 to 2010, the economy has grown at an average rate of 5.8% instead of the average of 8% as the desired average of recurrent expenditure grew by 14.30% and the capital expenditure grew by 17.2%. We could clearly see the wide disparity. The story is not different either at the disaggregated level as depicted in figures 1 and 3.

[1] Kip is Lao official currency. Based on Bank of Lao PDR (Central Bank of Laos), the average exchange rate in 1990 was 718.75 LAK/USD and in 2018, it was 8,407.26 LAK/USD.

[2] Real GDP base year 2012

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Figure 1: Recurrent Expenditure Trends in Laos

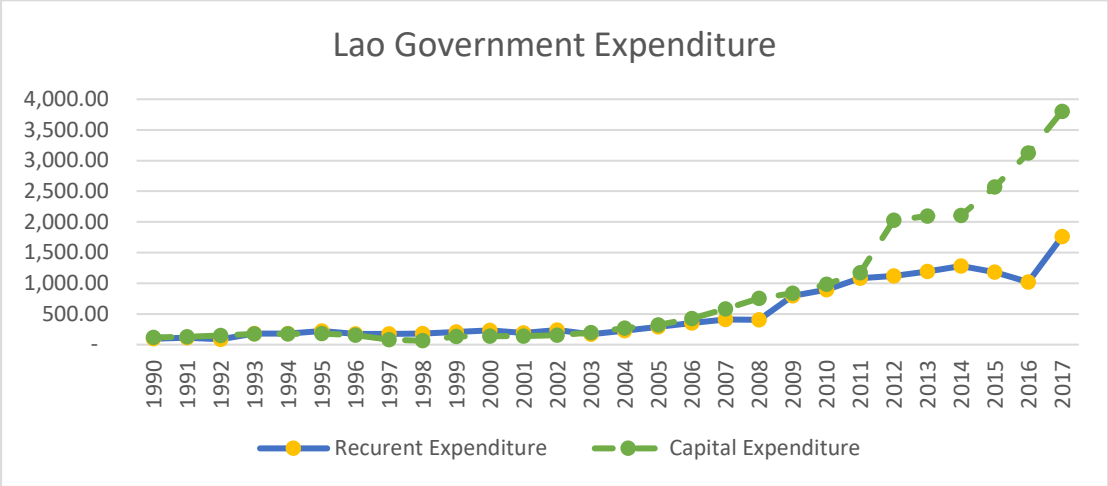
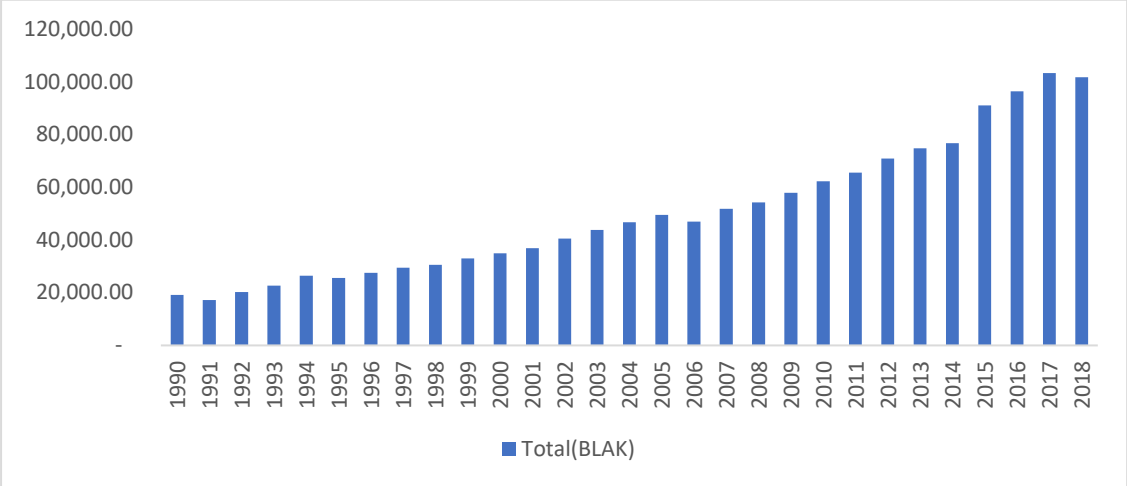


Figure 2: Real GDP Trends in Laos



2. LITERATURE REVIEW

There is a possible impact of government spending on economic growth has been varied as well. Some studies have found the impact to be positive (Constantino Alexiou (2009); Mayandy Kesavarajah (2012); Okoro A.s**.** (2013; Hiroshi Ono (2014)) still have some found there is a negative impact (Gifari Hasnul. (2015); M.P Sáez et al. (2017)); while others have both positive and negative impact (J. N. Muthui et al. (2013), Saad Alshahrani, Ali Alsadiq (2014), Frank Adu and Ishanael Ackah (2015)); There are also some studies that concluded that government spending has no significant impact on economic growth (M. A. Dada et al. (2013); A. Shashid et al. (2013); Ogumakin et all (2019)). With government expenditures are support for many economic growth in different countries, on the one hand, and declining economic growth in these

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economies, on the other, the debate on whether government spending has a positive, negative or neutral impact on economic growth is still augmenting today – with some studies going an extra mile disaggregating government expenditure into various components. Still, the outcome has been largely inconclusive, with some components are positive, however, some are negative. Against this background, the objective of this study is to review the empirical literature available to date on the impact of government spending on economic growth. The aim of this literature review based study is to weigh the existing arguments as to whether government expenditure has any effect on economic growth in three difference sectors (Agriculture, Industry and Service sectors) or not; and further explore the argument of whether government expenditure with recurrent and capital budget have a positive or negative impact on gross domestic products, in the cases where a relationship is established between these two key variables (Government Expenditure and GDP). Understanding the nature of impact, not only government spending on economic growth, but there are also other impacts, Anaman (2006) employed the neoclassical economic growth model to express economic growth as a function of government size, government size squared, the annual growth rate of the real value of total exports, the annual growth rate of total labour force,

Acording Keynesian theory government spending is positive impact on economic growth with more spending cuase the growth rate more higher, so many government use fiscal policy for promote economic growth (Romer 1988), if the government more spending, the aggregage demand will be higther cuase more domesstic produce. Private investment and government investment will support economic growth, government capital expenditure will make private confident to invest so both will support the GDP growth (R.Ram 1986 and K.H. Ghali 1998)

- **Positive impact**

1. Constantino Alexiou (2009) empirically investigated the relationship between economic growth and government expenditure in the South Eastern European (SEE) economies from 1995 to 2005, using both the fixed effects model and the random coefficient model. The results confirmed that government expenditure has a positive impact on economic growth in the study countries.

2. Okoro A.s**.** (2013) study relationship between GDP and government capital expenditure and government recurrent expenditure of Nigeria from 1980 to 20011 use Vector Error Correction Model(VECM), the result to increase in government capital expenditure on the average will lead to increase in the real gross domestic product while increase in the government recurrent expenditure on the average, will lead to also

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increase in the real gross domestic product.

3. Hiroshi Ono (2014) investigaate The government expenditure and economic growth relation in Japan. an analysis by using the ADL test from 1960 to 2010 to prove Keynesian and Wagner Law. the result are cointegration relationship between real government expenditure per capita and real GDP per capita. These results imply that both Wagner's view and the Keynesian view can hold for Japan. In addition, the results of the Granger causality test provide evidence of two-way Granger causality between the variables and Wagner's view is valid for Japan and that the long-run adjustment process towards its equilibrium is asymmetric

4. Saad A. Alshahrani, Ali J. Alsadiq (2014) to explore the relationship between government spending and economic growth in Saudi Arabia, which is measured as the growth rate of real non-oil per capita GDP. While, focusing on seven government spending categories; namely, housing, education, defense, health care, current and capital expenditures, and public investment, Using VAR, cointegration, and VECM techniques with time series data over 1969 to2010. the short-run the main determinants of growth are private domestic investment, openness to trade, public investment, and expenditures on health care and education. The long-run growth are private domestic investment, capital expenditures, and spending on health care which includes human capital.

5. Chinasa E. Urama et al (2018) explore the relationship between government spending and economic growth in Nigeria from 1981 to 2016, the result that Public Capital and Recurrent of Education Expenditures positive impact for economic growth in Nigeria, capital education expenditure will both in the short and long-runs contribute to the growth of the nation's economy, though capital expenditure component exerts stronger influence on the economy than its recurrent counterpart .

- **Positive and Negative impact**

6. John Njenga Muthui et all (2013) e impact of public expenditure composition on economic growth in Kenya from 1964 to 2011 with VECM technique, the result found that public expenditure components like education transport and communication and public order and security are the major drivers of economic growth, while the public expenditure in health contributes negatively to economic growth in Kenya.

7. Frank Adu and Ishmael Ackah(2014) investigate the relationship between economic growth and government spending of Ghana at the disaggregated level with the ARDL model with annual data spanning from 1970 to 2010, the result negative relationship

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between government capital spending and growth, but a positive relation between recurrent spending and economic growth in the long run with the same relationship prevailing in the short run but with an insignificant recurrent expenditure.

8. Hasnul, Al Gifari (2015)The main objective has been to explore the relationship between government spending and economic growth in Malaysia using the time series data during the period 1970 – 2014 and Ordinary Lease Square(OLS), The result shows that a larger government expenditure may lead to a lower economic growth. Moreover, as we classify the government expenditure into some categories, only two categories of government expenditure, namely development expenditure and housing expenditure, significantly lead to a lower economic growth. Moreover, we found that education, defense, healthcare, and development expenditure do not significantly contribute to the economic growth.

9. M.P Sáez et al. (2017) study impact of government spending on economic growth in the European Union countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, -Ireland, Italy, Netherlands, Portugal, Spain, Sweden, Great Britain, and Luxembourg.) use panel data for the period 1994–2012. The result that impacts of government spending on economic growth in the European Union countries for the period 1994–2012. As a result, we have found a positive relationship for some EU countries (Portugal and United Kingdom) whereas it is negative for others (Austria, Finland, Italy and Sweden) or even not significant (Belgium, France, Greece, Ireland, Luxembourg, the Netherlands and Spain).

10. D.Lupu et al. (2018) analysis the Impact of Public Expenditures on Economic Growth, Case Study of 10 Countries in Central and Eastern European (CEE). Use data from 1995 to 2015 with ARDL methods and brake down expenditure into categories such as: defense, economic affairs, education, health, general public services, social welfare, population, EU economic growth, school enrollment, inflation, investment, , the result that Two of the ten countries analyzed (Hungary and Poland) have no cointegration relationship between public expenditure and GDP, because these variables are interdependent. The other eight countries (Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Romania, Slovakia, and Slovenia) show different cointegration correlations among certain components of public expenditure and GDP. Bulgaria has the highest number of cointegration relationships between public expenditure and GDP, five; Slovenia has four, Romania and Latvia three; Lithuania has only two; and the Czech Republic and Slovakia each have one cointegration relationship.

11. L.U. Okoye et al. (2019) examined the relationship between government

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expenditure both – aggregated and disaggregated and economic growth to determine the extent to which output growth in Nigeria is affected by government spending, during the – period from 1981–2017. Evidence from the ARDL estimation shows significant short-run negative effect of lagged current expenditure on economic growth. It also shows strong positive effect of lagged capital

- **Negative and neutral impact**

12. Mayandy Kesavarajah (2012) to examines whether there is empirical evidence that Wagner's law holds in the Sri Lankan economy using time series annual data over the period from 1960 to 2010 for Sri Lanka, applying cointegration and error correction modeling (ECM) techniques. The result confirmed that Wagner's law, which suggests that the share of the public sector in the economy will rise as economic growth proceeds, does not exist in case of Sri Lanka

13. A. Shashid et al. (2013) to examine the role of sub categories of government expenditures under democratic and military regimes in Pakistan use Time Serie (1972-2009) with ARDL, the result foun that current expenditure does not contribute to economic growth but development expenditure positively affects economic growth, however, overall government expenditures have negative impact on economic growth.

14. Ogumakin et al (2019) study the relationship between Capital capital budget and Economic growth in Nigeria use time series data from 1986-2015 and VECM techniquique, the result capital budget implementation in Nigeria has an impact on economic growth; though over time such dynamic impact has not been significant.

3. METHODOLOGY

The study adopts the aggregate production function as the theoretical basis which the model for analysis will be based. The aggregate production function is stated as,

$$\mathbf{Y = Af(K, L)} \quad \text{.....(1.1)}$$

where Y is real GDP, L and K are labour and capital respectively and A is the total factor productivity, it is a vector of other independent variable that theoretically and empirically have effects on the independent variables. We therefore augment it to include the following independent variables; Following Feder (1982), Ram (1986), Yasin (2002), Gemmell et al (2002), Alexiou (2009), Nketia-Amponsah (2009) , Ahortor et al. (2013) Sakyi and Adams (2012) S. A. Alshahrani, A. J. Alsadiq (2014) Adu and Ackah(2015), the study models the productivity of Laos as;

$$Y = f(xexpa, xexapi, xfdi, xlab) \quad \text{..... (1.2)}$$

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government spending is primarily towards these two expenditure components ; current expenditures (xexpa) as expenditures on goods and services consumed within the current year defines, which needs to be made recurrently to sustain the production of services, minor expenditure on items of equipment, below a certain cost threshold, is categorized as recurrent expenditure, On the other hand, Capital expenditure (xexpi) measures the value of purchases of fixed assets that is, those assets that are used repeatedly in the production processes for more than a year. They include the construction of roads and building of hospitals etc, the private capital flow almost from foreigner investor as a foreign direct investment (xfdi), National labour force (xlab) with population age between 15-65 years old consideration with the employment rate.
The sectoral externalities and productivity differentials are generalized in a gross domestic product (GDP) and labour force be able to use the equation 1.2 to generate in new model for the empirical analysis in the log form is as follows:

$$\ln y_t = \alpha_0 + \alpha_2 \ln xexpa_t + \alpha_1 \ln xexpi_t + \alpha_3 \ln xfdi_t + \alpha_4 lnxlab_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots(1.3)$$

Unit root test of the variables are conducted with the help of the Augmented Dickey Fuller test and Philip Peron Test to prevent spurious regression results and to tackle auto correlation in the test procedure. The models are analyses within the ARDL framework due to the need to take stock of the long run and short run implications of the analysis. Moreover, ARDL cointegration procedure is efficient in small samples and makes it possible to estimate cointegration through ordinary least squares. Another advantage that must be mentioned: "The ARDL approach has the additional advantage of yielding consistent estimates of the long-run coefficients that are asymptotically normal irrespective of whether the underlying regressors are I(1) or I(0)" Pesaran (1997). The final ARDL model that is used to test for cointegration is given as,

$$\begin{aligned} lny_t = {} & \beta_0 + \sum_{i=1}^{n} \beta_1 lny_t + \sum_{i=0}^{p} \alpha_1 (\ln xexpa_t) + \sum_{i=0}^{p} \alpha_2 (\ln xexpi_t) \quad + \\ & \sum_{i=0}^{p} \alpha_3 (\ln xfdi_t) + \sum_{i=0}^{p} \alpha_4 (\ln xlab_t) + \emptyset_1 lny_{t-1} + \emptyset_2 lnxexpa_{t-1} + \\ & \emptyset_3 lnxexpi_{t-1} + \emptyset_1 lnxfdi_{t-1} + \emptyset_1 lnxlab_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1.4) \end{aligned}$$

The various lags of the variables are expected to be determined based on the majority of 5 criterion **(**likelihood-ratio test(LR), Final Predict Error (FPE), Akaike information criterion (AIC), Schwarz information criterion(SC) and Hannan Quinn Information Criterion(HQ)) because it has the confirm by at least two or three methods.
The second step is to test for the long run relationship between the variables. This section forms a conditional ARDL model of order (n, q1, q2, q3, q4) to test the long run relationship between all the variables of interest. The ARDL model will assume the form,

$$lny_t = \beta_0 + \sum_{i=0}^{n} \beta_1 lny_{t-i} + \sum_{i=0}^{p1} \alpha_{1i} (\ln xexpa_{t-i}) + \sum_{j=0}^{p2} \alpha_{2j} \left(\ln xexpi_{t-j}\right) +$$

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$$\sum_{k=0}^{p3} \alpha_{3k}(\text{lnxfdi}_{t-k}) + \sum_{l=0}^{p4} \alpha_{4l}(\text{lnxlab}_{t-l}) + \varepsilon_t \quad \text{.....(1.5)}$$

The lag length of the variables is selected based on majority of five methods. The short run dynamics is captured by the error correction model,

$$\Delta lny_t = \beta_0 + \sum_{i=0}^{n} \beta_1 \Delta lny_{t-i} + \sum_{i=0}^{p1} \alpha_{1i}(\Delta \text{ln}xexpa_{t-i}) + \sum_{j=0}^{p2} \alpha_{2j}\left(\Delta \text{ln}xexpi_{t-j}\right) +$$

$$\sum_{k=0}^{p3} \alpha_{3k}(\Delta \text{lnxfdi}_{t-k}) + \sum_{l=0}^{p4} \alpha_{4l}(\Delta \text{lnxlab}_{t-l}) + \Theta_1 Z_{t-1} + \varepsilon_t \quad \text{.....(1.6)}$$

Where, α_{1i}, α_{2j}, α_{3k} *and* α_{4l} are the short-run dynamics coefficients of the model's dynamic adjustment to equilibrium. Z_{t-1} term is the Error Correction factor. Thus it represents the short run disequilibrium adjustment of the estimate of the long-run equilibrium error term. ρ measures the speed of adjustment to obtain equilibrium in the event of shock.

4. EMPIRICAL RESULTS

Unit Root Test

The study employed the Augmented Dickey-Fuller (ADF), (Dickey & Fuller, 1979 and 1981) and PP tests (Phillips & Perron, 1988) in testing for the stationarity of the data. Time series data is said to be stationary if the mean and variance are constant overtime. The unit root test shows that the lny and lnxlab are stationary in their level or $I_{(0)}$, while the rest lnxexpa, lnxexpi and lnxfdi are stationary in their different forms with the intercept and the trend. This finding implies that our variables have an order of integration that is $I_{(1)}$.

Table 1: Unit Root Test Results

variables	ADF (Probability)				PP(Probability)			
	Level		1st difference		Level		1st difference	
	Constant	trend& intercept	Constant	trend& intercept	Constant	trend& intercept	Constant	trend& intercept
lny	0.9118	0.0349*	0.0000*	0.0000*	0.9419	0.0396*	0.0000*	0.0001*
Lnxexpa	0.9902	0.8714	0.0046*	0.0105*	0.9888	0.8697	0.0053*	0.0130*
Lnxexpi	0.9365	0.3848	0.0000*	0.0000*	0.9857	0.3848	0.0000*	0.0000*
Lnxfdi	0.6460	0.6010	0.0003*	0.0020*	0.6272	0.4757	0.0003*	0.0020*
Lnxlab	0.797	0.0004*	0.6818	0.9680	0.9518	0.7783	0.6831	0.9233

Optimal Lags Determination

VAR Lag Order Selection Criteria for equation 1.3 The table 2 presents the result of the optimum lag structure for the VAR. The essence of arraying out this test is to determine the lag length to be used in the estimation of the cointegration test and the VECM. The

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lag length is selected if the majority of the selection criteria is in favour of a particular lag. A cursory look at table 2 shows that majority of the selection criteria such as the LR, FPE, AIC, SC and the (HQ) select the optimum lag length, the result that real GDP and Government expenditure, its lag selection is lag 3.

Table 2: Optimal Lag Determination

Lag	LogL	LR	FPE	AIC	SC	HQ
0	15.67279	NA	3.03E-07	-0.820984	-0.579042	-0.751313
1	167.6173	233.761	1.81E-11	-10.58595	-9.134297	-10.16792
2	215.3943	55.1272	4.00E-12	-12.33802	-9.676663	-11.57165
3	268.086	40.532*	9.95e-13*	-14.46815*	-10.59708*	-13.35342*

Cointegration

Cointegration is achieved when either, the 'F'-Statistic lies above the upper boundary of the respective significant level chosen (in this case the 5% to 10% level with null hypothesis (H0: $\pi1 = \pi2=\pi3= \pi4=\pi5=\pi6=\pi7=0$) are no cointegration, on the other hand, (H1: $\pi1\neq\pi2\neq\pi3\neq\pi4\neq\pi5\neq \pi6\neq\pi7\neq0$) are cointegration among variables). It is worthy of note that the "F" test is premised on the null hypothesis of no cointegration among the variables (Pesaran et al. 2001). The conducted tests for cointegration relationship are performed within three conditions: 1.) if the F-statistic worthy is higher than upper critical bound there are long run cointegration among variables, if the result is in between lower and upper critical bound there are not able to conclude integration or not, if the worthy are lower than lower critical bound, there are no cointegration among variables. We can also test coefficient of Error Collection Term (ect-1) to find the short run relationship among variables if its significant mean there are short run relationship (Bahmani-Oskooee and Ratha (2008)), the test result of the in three Models as indicated above in the methodology section. The various statistics are reported in Table 5 below.

Table3: Critical bound test

Critical Value	5 percent level	10 percent level
Lower bounds	2.86	2.45
Upper bounds	4.01	3.52
F-statistics	17.75015	

The model of relation between real GDP, Government Spending (Recurrent and Investment), FDI and Labour show that the F-Statistics are above the upper and lower critical bound values for both significant 5% and 10%, so there are long run

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cointegration among dependent and independent variables.

- **Long Run Relationship**

Table4: Long Run Coefficients

Long Run Coefficients using the ARDL Approach				
Selected Model: ARDL(3, 3, 3, 3, 3) selected based on AIC				
Dependent Variable: LNY				
Dynamic regressors (3 lags, automatic): LNXEXPA LNXEXPI LNXFDI				
Regressor	Coefficient	Standard Error	T-Ratio	Prob
LNY(-1)	-0.05223	0.203061	-0.257216	0.8056
LNY(-2)	-0.45224*	0.222325	-2.034156	0.0882
LNY(-3)	-0.57824***	0.106998	-5.404176	0.0017
LNXEXPA	-0.04097	0.03181	-1.287892	0.2452
LNXEXPA(-1)	-0.09977**	0.035098	-2.84256	0.0295
LNXEXPA(-2)	0.112846***	0.035472	3.181246	0.019
LNXEXPA(-3)	-0.14256***	0.048101	-2.96379	0.0252
LNXEXPI	-0.04324*	0.021567	-2.004788	0.0918
LNXEXPI(-1)	-0.04196	0.021797	-1.92481	0.1026
LNXEXPI(-2)	0.027745	0.033891	0.818668	0.4443
LNXEXPI(-3)	-0.10621***	0.03644	-2.914687	0.0268
LNXFDI	0.02552	0.016525	1.544395	0.1734
LNXFDI(-1)	0.013922	0.008009	1.738258	0.1328
LNXFDI(-2)	-0.0176	0.009449	-1.862879	0.1118
LNXFDI(-3)	-0.02969***	0.009183	-3.233205	0.0178
LNXLAB	-10.7901	6.168258	-1.749292	0.1308
LNXLAB(-1)	-15.5273	11.97595	-1.296542	0.2424
LNXLAB(-2)	47.92046***	10.39683	4.609143	0.0037
LNXLAB(-3)	-14.6613***	4.285492	-3.421136	0.0141
C	-77.71***	10.44538	-7.439651	0.0003

There are a long-run relationships, which are related to the long-run impact of the government investment and administration expenditures on real GDP in Lao PDR, are as follows:

$$\text{lny} = -77.71 - 1.08\,\text{lny} - 0.17\text{lnxexpa} - 0{,}06\text{lnxexpi} - 0.01\text{lnfdi} + 6{,}94\text{lnxlab} \quad \text{.....(1.7)}$$

In this study, we found that both categories of government expenditures, FDI and Labor

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statistically significant, only labor has positive impact to real GDP, while government investment and administration expenditures and foreign direct investment have a negative impact.

- **Short Run Relationship**

The term, error-correction, relates to the fact that last period deviation from long-run equilibrium (the error) influences the short-run dynamics of the dependent variable; Thus, the coefficient of ECT, φ, is the speed of adjustment, because it meansures the speed at which Y returns to equilibrium after a change in X.

Table5: Short Run Coefficients

EC Representation for the Selected ARDL Model				
Selected Model: ARDL(3, 3, 3, 3, 3) selected based on AIC				
Dependent Variable: D(LNY)				
Regressor	Coefficient	Standard Error	T-Ratio	Prob
C	-77.71	6.378897	-12.1824	0
D(LNY(-1))	1.030479***	0.11808	8.726993	0.0001
D(LNY(-2))	0.578236***	0.078011	7.412194	0.0003
D(LNXEXPA)	-0.04097***	0.015309	-2.67601	0.0367
D(LNXEXPA(-1))	0.029716*	0.015699	1.892804	0.1072
D(LNXEXPA(-2))	0.142562***	0.019072	7.474874	0.0003
D(LNXEXPI)	-0.04324***	0.014075	-3.07207	0.0219
D(LNXEXPI(-1))	0.078465***	0.023749	3.303879	0.0163
D(LNXEXPI(-2))	0.106211***	0.021893	4.851253	0.0028
D(LNXFDI)	0.02552***	0.004901	5.206828	0.002
D(LNXFDI(-1))	0.047293***	0.005507	8.588098	0.0001
D(LNXFDI(-2))	0.029691***	0.005856	5.070385	0.0023
D(LNXLAB)	-10.7901***	3.194542	-3.37766	0.0149
D(LNXLAB(-1))	-33.2592***	5.706924	-5.82787	0.0011
D(LNXLAB(-2))	14.66125***	2.733753	5.36305	0.0017
ECT(-1)*	-2.08271***	0.171245	-12.1622	0

From the results of VECM estimated value, we can summaries to be the equations as follows:

- Estimated VECM with ΔLNY as target variable or shorth-run equation model:

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$$\Delta(lny) = -77.71 + 1.612\Delta(lny) + 0.13\Delta(lnxexpa) + 0.14\Delta(lnxexpi) + 0.10\Delta(lnxfdi) - 29.38\Delta(lnxlab) - 2{,}08\, ect \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1.8)$$

There are positive short run impact between both government expenditures and real GDP and FDI is also positive impact with real GDP in the short run, by the way, labor have negative short term relationship with the real GDP in Lao PDR.

The speed of adjustment coefficient (-2.08) with t-statistic (-12.1622) is statistically significant in the cointegration equation. The error correction coefficient exhibits that the average adjustment is 2.08% in the cointegration equation. It means that 2.08% adjustment to the short run disequilibrium shows a GDP of Lao PDR.

Diagnostic Check

- **Serial Correlation**

Table6: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	3.621962	Prob. F	0.1593
Obs*R-squared	20.37468	Prob. Chi-Square	0.0001

There is no serial correlation among variables

- **Heteroscedasticity**

Table7: Heteroscedasticity ARCH Test

Heteroskedasticity Test: AR			
F-statistic	1.716758	Prob. F	0.1974
Obs*R-squared	4.904967	Prob. Chi-Square	0.1789

No Heteroscedasticity

- **CUSUM**

The diagnostic tests show that the estimates are free from misspecification and heteroskedasticity in the long run and short-run model. The stability of the ARDL parameters is examined by applying the cumulative sum control chart (CUSUM) tests developed by Brown, Durbin and Evans (1975). Figures 1 show that the plot of the statistics from the CUSUM stays within the critical bounds, which indicates the stability of the equation for importation model with changing by government expenditure

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Figure 3: CUSUM Graph

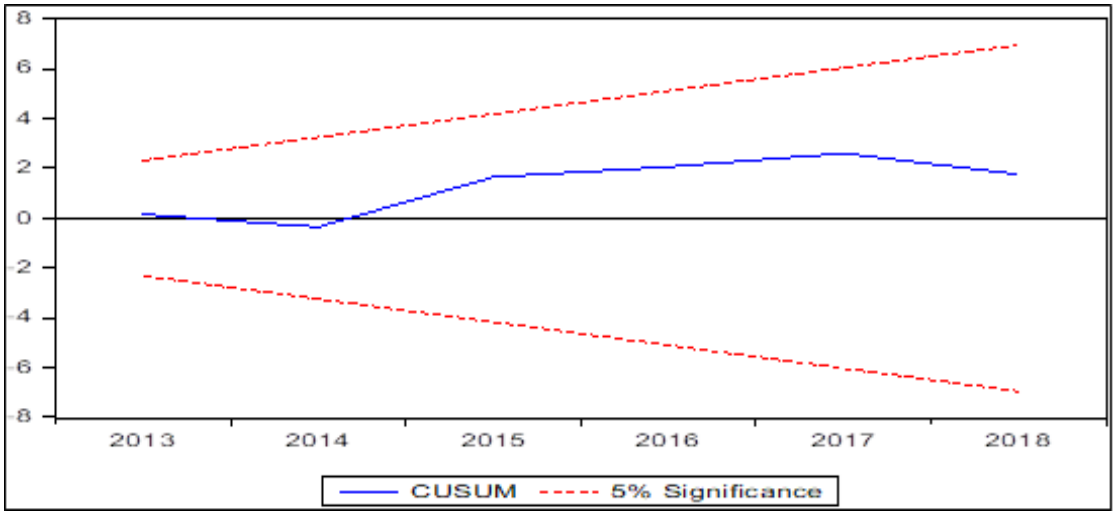
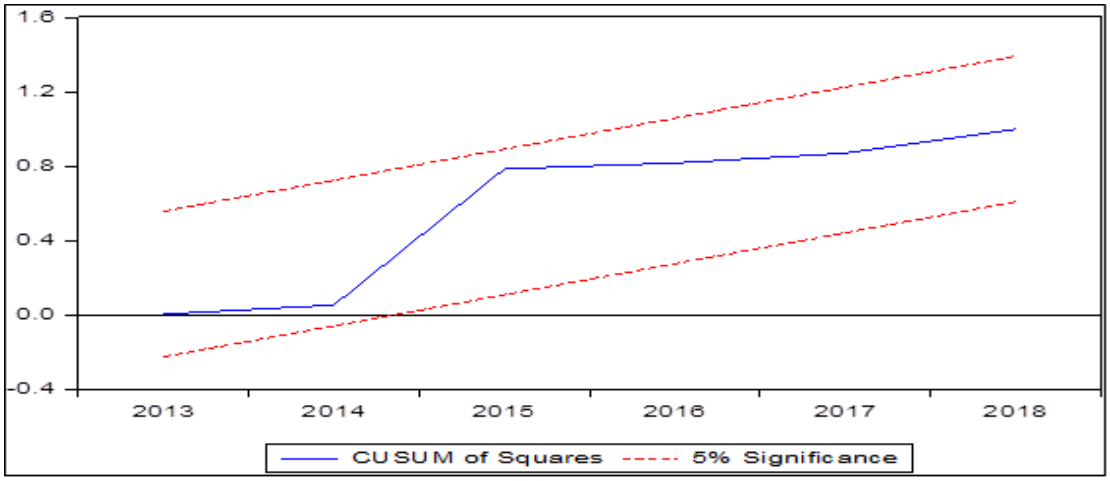


Figure 4: CUSUM Square Graph



5. CONCLUSION

The study set out to find out the relationship between government spending and economic growth at the aggregated level. The study finds a negative long run relationship between government investment (capital) and administration(recurrent) spending and real GDP, but a positive short run relation between government investment (capital) and administration(recurrent) spending and economic growth. The negative relation could be due to the fact that, it takes a longer time to realize the returns made in popular investments by government of Lao PDR especially investment in infrastructure development with spend more in newly projects(new construction project) with insufficient fund for maintenance and operation cost inside government capital expenditure, and many non-profitable projects with low return on investment but

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support the government policies with every districts have to have good infrastructure especially the access roads to connecting with urban town for all seasons especially in the rainy season. The study result is supporting the economize policy to reduce recurrent spending; though deduct government consumption expenditure is growth enhancing, there is the need to ensure maximum productivity in the public service in order to sustain the positive impact it has on economic growth.

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