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Government Expenditure and Economic Growth in Vietnam: Does Public Investment Matter in The Long-Term?

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Abstract:
Research aims: This study focuses on the correlation between public investment, current expenditure and payment for government debt, and economic growth in short-run and long-run estimations.
Design/Methodology/Approach: Macro data of Vietnam in the period 1991-2020 were extracted from the World Bank and the Vietnam General Statistics Office. This research employed the Autoregressive Distributed Lag (ARDL) for time series.
Research findings: The results of this study uncovered that an improvement in public investment could enhance economic growth; it is also true of the government's current spending. However, it is worth noting that the coefficients of changes in public investment and government current spending reduced the economic growth change in one and two periods ago. Moreover, debt payment was found to have a negative effect on the economy at all lags with different levels of significance.
Theoretical contribution/Originality: This study provides empirical evidence on the role of government spending in economic growth, thereby confirming that Keynesian theory still holds in the case of Vietnam. The study also verifies the vital role of government activity in regulating economic development through investment and expenditure.
Practitioner/Policy implication: Some important implications for policymakers focusing on government spending are: (i) The government needs to have an investment strategy that focuses on the important areas, such as infrastructure and technology foundation. (ii) Government needs to improve accountability and transparency in the management. (iii) Supportive policies on capital, technology, human resources, and the market must be continued to encourage economic investment activities. (iv) The selection, evaluation, and approval of investment portfolios should be carefully and appropriately made.
Research limitation: This study was limited by looking at the overview of government spending with economic growth, ignoring the spending structure due to the lack of necessary data. Therefore, the following studies need to clarify the spending structure of Vietnam to determine which expenditure types have negative/positive impacts on economic growth, thereby providing incentive solutions and necessary support from the government.
Keywords: Public investment; Public expenditure; Economic growth; Vietnam; ARDL

Introduction

Governments' interference in worldwide economic activities was scarcely observed before the Great Recession of 1930. However, for the next

decades, especially with the widespread Keynes' theory of total demand, governments have been taking on a larger role in stabilizing output and employment. In developing countries, the government's involvement in the economy has been enhanced to eradicate poverty and improve economic growth. Public policies in most developing countries are meant to address the market's flaws and assist its normal functioning. Additionally, they are popularly used to increase investment and even production in the public sector (Nguyen & Darsono, 2022; Thanh et al., 2020, Van et al., 2020; Awode, 2019; Muqorrobin, 2015)

As known, the classical view holds that the market economy will establish equilibriums and optimal allocations of resources so that society will reach full employment; unemployment, if any, is due to a temporary and voluntary imbalance. Thus, the competitive free-market economic model is optimal from the classical point of view. However, the reality of the movement of the market economy in capitalist countries has refuted that. Indeed, economic crises and unemployment continued to occur. Taking the opposite approach, Keynes's view holds that state intervention is necessary to combat the crisis and unemployment, thereby increasing aggregate economic demand, stimulating consumption, and encouraging entrepreneurs to invest and do business. Keynes' view is consistent with the view of the economic development model in Vietnam, which has been identified as the "development of a multi-component commodity economy, operating according to the market mechanism, with the management of the state, as "socialist orientation." Thus, the state's macro-regulatory and management role are important in ensuring the market's efficiency and socialist orientation.

According to the economic growth theory, the growth rate is determined by capital formation, and thus fiscal policy plays an important role (Asandului et al., 2021; Topcu et al., 2020). Economic growth, price stability, the balance of payments, and exchange rate stability are among the most vital macroeconomic goals on which governments mainly focus (Blanchard et al., 2010). Fiscal policy refers to the government's modifications of taxes and expenditures to obtain certain macroeconomic goals, especially public investment. For example, the government can increase the tax rate to generate more revenue for public expenditures, such as building roads, hospitals, and schools, and providing needed public services, thereby promoting economic growth by stimulating aggregate demand. Conversely, the government can also cut public spending activities to reduce pressure on inflation, thereby stabilizing the macro-economy. Although it is widely accepted that the significance of investment drives national economic growth, the question of how public investment influences growth is still fragmented. Following Keynes' theory of fiscal policy, the extent to which public expenditures can increase the total demand leading to output growth, depends on the level of the spending multiplier (Cwik & Wieland, 2011). Keynesian economists are inclined to suggest increasing public spending on socio-economic issues and infrastructure activities to promote economic growth. They estimate the value of government through public investment and government expenditure. From this perspective, public investments promote economic dynamism, especially during recessions, when the national self-regulatory mechanisms cannot keep the economy in equilibrium due to the rigidity of the labor market (Jahan et al., 2014).

Besides, according to the classical view, the economy "corrects itself" from the short to the long run. Assume aggregate demand falls in the short run because firms cut back on investment during a crisis. The economy shrinks output and labor in the short run below potential, which means entering a recession. Because demand is low, prices and wages fall. When prices fall, spend less, save more, and lower interest rates. Gradually, when interest rates and wages decrease, businesses take advantage of opportunities to increase investment, and prices fall, causing households to increase spending gradually.

As a result, the economy moves along the aggregate demand curve, and output adjusts back to long-run equilibrium. However, Keynes's view in *General Theory of Employment, Interest and Money* argues that prices may be flexible in the long run but cannot cause the economy to self-correct back to full employment. In this case, the need to consume or save depends not only on interest rates but also on expectations about the future. Interest rates represent people's willingness to hold money, and Keynes called this need to hold money "liquidity preference" (Keynes, 1936). This view is also supported by Khan and Kumar (1997), Al-Yousif (2002), Ramirez and Nazmi (2003), Bukhari et al. (2007), Cooray (2009), Alshahrani and Al-Sadiq (2014), Su and Bui (2017), and Nguyen and Trinh (2018) who claim that the expansion of public investment and spending contributes to a country's economic growth.

Contrastingly, the classical and neoclassical perspectives consider fiscal policies futile due to direct and indirect repressive effects. Fölster and Henrekson (2001), Afonso and Furceri (2010), and Nurudeen and Usman (2010) indicate that the increase in public spending decelerates the advance of the national economy, while Zouhar et al. (2021) show the inconclusive relation between government spending and economic growth through the survey of the empirical literature. These theories suggest that increased public expenditures cause the replacement of private goods with public goods, reducing private spending even on key goods and services. Indirectly, the public investment and governmental expenditures create pressure on credit markets, pushing up interest rates (Du, 2015). Once interest rates rise, they affect not only the government but everyone else, including the private sector, stifling private investment, and hindering economic growth. Furthermore, this perspective argues that the government may choose to finance its increased spending by raising taxes, which can distort market prices, and resource allocations and even cause tax evasion/avoidance behaviors, eventually negatively impacting the economic growth (Antwi et al., 2013; Widmalm, 2001). Thus, the relation between public investment, government spending, and economic growth has been controversial empirically and theoretically.

In Vietnam, during the five years of 2015-2020, public investment has been made at 2 million billion VND, which is considered to contribute significantly to the total economic output through the spillover effect. Due to the impact of the COVID-19 pandemic, public investment has become a key resource for post-pandemic economic recovery. Capital for public investment is concentrated and arranged for strategic infrastructure projects, such as roads, airports, ports, irrigation works, electricity, communication, and infrastructure of urban areas, industrial parks, hospitals, schools, national target programs for new rural construction, and sustainable poverty reduction (GSO, 2020). In terms of regions, the

public investment capital of the central government in the 2016-2020 period would be allocated to the following regions: North Central and Central Coast (27%), Northern Mountains (24%), Dong Nai and the Mekong River Delta (17%), the Red River Delta (13%), the Southeast (12%), and the Central Highlands (7%)[1].

In addition, in Vietnam, investment efficiency, known as the Incremental Capital Output Ratio (ICOR), is a general economic indicator that reflects how much additional investment capital is needed to increase one unit of gross domestic product (GDP). The ICOR of public investment declined in 2015 - 2020; specifically, the ICOR in the 2016-2019 period was 6.1, lower than the nearly 6.3 level in the 2011-2015 period[2]. However, considering the whole year of the 2020 pandemic, the ICOR of the 2016-2020 period was about 8.5, resulting in a sharp decrease in GDP in 2020 compared to previous years. Although public investment is considered an essential factor of the economy, the proportion of state investment in total social investment gradually decreased, from an average of 39.11% in 2011-2015 to 34% between 2016 and 2020. Therefore, it raises the question of whether increasing the size of public investment will increase the size of the economy in Vietnam.

To the author's best knowledge, studies on the impact of public investment are still limited in Vietnam. Several studies have shown that public investment has a positive role in economic growth, but the findings are very different in the short and long term (Nguyen & Nguyen, 2021; Nguyen & Trinh, 2018; Diep et al., 2016; Tran & Le, 2014). The limitations of these studies lie in the different approaches and the use of different data sets. Therefore, this study fills the gap left by the research by using the Autoregressive Distributed Lag (ARDL) method to find the short-term and long-term effects of public investment, applied to the data set from 1991 to 2020 generated from the Vietnam General Statistics Office and World Bank. This approach provides a more comprehensive view than other approaches such as VAR and VECM because it does not require many samples and only estimates a single equation instead of a system of equations (Pesaran, 1997; Pesaran & Shin, 1999). Thus, it makes the ARDL approach the best model in the Vietnamese context.

In summary, the Keynesian, classical, and neoclassical views offer two different positions regarding the relationship in general and causality between public investment and the economy's growth. While Keynes's view holds that the causality runs from government spending to economic growth, classical and neoclassical schools argue an opposite direction of causality. However, both can be true, depending on the characteristics of each economy. According to the World Bank, developing countries have recently achieved middle-income status through development restructuring. After examining the regional output growth and fiscal trends, this study empirically analyzes the effects of public investment on economic growth in Vietnam. The model's development is based on considering the properties of observed 30-year macroeconomic data and a broad review of the previous literature.

This study also develops a model focusing on public investment and economic growth to clarify these relationships. The study is structured as follows: part 1 focuses on the

research's essential targets, while part 2 presents a literature review and model development. Part 3 shows data and methodology. Part 4 discusses the main results, and finally, part 5 offers conclusions and implications.

Literature Review and Hypotheses Development

According to Perotti (2007), there are two conflicting mechanisms of the transmission of public investment into production. On the one hand, the neoclassical view on the transmission mechanism of fiscal policy predicts that the increase in public spending after a deficit will decline the private consumption and real wages. Specifically, when government expenditure increases, the representative households suffer an increase in the cost of taxes that negatively affects their wealth. The expectation of future tax hikes lessens current consumption and leisure while increasing labor supply and output (Perotti et al., 2007). On the other hand, modern Keynesian models indicate that the government's spending can enhance the total demand for labor. Labor demand growth may be strong enough to effectively offset the loss in real wage caused by a surge of labor supply, consequently raising the real wage. With the assumption that most families have credit constraints and cannot modify their long-term consumption (Galí et al., 2007), a higher real wage leads to greater consumption (Perotti, 2007; Petrović et al., 2021).

Moreover, because infrastructure services are highly complementary, neo-Keynesians also support that increased investment in public infrastructure can boost short-term total demand by providing fiscal stimulus and gathering private investment. Thus, the increase of public capital in infrastructure possibly boosts the productivity of other inputs, such as the labor market and the engagement of private capital, reducing per-unit costs of the output (Cohen & Paul, 2004; Teruel & Kuroda, 2005). By enhancing the marginal productivity of private capital, public infrastructure may increase the capital return rate and promote economic growth (Agénor, 2004; Agénor & Moreno-Dodson, 2006).

Thus, empirical studies on the relationship between public investment and growth are developed in different directions, considering both the short- and long-term effects. Initially, Aschauer (1989) found that government investment in 'core infrastructure', e.g., streets, highways, airports, and other public capital, could stimulate output expansion in the United States from 1949 to 1985, showing that public investment is a critical determinant of productive capacity. Then, Barro (1990) demonstrated that public investment positively affects economic growth through endogenous growth models. Similarly, Easterly and Rebelo (1993) discovered that public investment in transportation and telecommunications in emerging nations results in stronger economic growth. In the 2000s, Ramirez and Nazmi (2003) showed that public or private expenditure could support economic growth, using the cross-country data from Latin American countries between 1983 and 1993.

Meanwhile, Angelopoulos et al. (2007) revealed that economic growth depends on the typical components of public investment and the government's proportion of spending. Besides, Bukhari et al. (2007) demonstrated that the dynamics of public investment had

a favorable impact on growth rates using ARDL analysis in East Asian countries between 1971 and 2000. Using a VAR model for Portugal, Alfredo and Jorge (2007) confirmed that the investment in road transportation is a potent lever for encouraging private investment, employment, and economic growth in the long term. Also, Calderon (2009) analyzed the impact of the infrastructure advance on the economic growth in 39 African nations. He concluded that expanding infrastructure supply and improving infrastructure-related services positively contributed to economic growth. Recently, Nannan and Jianing (2012) and Jedwab and Storeygard (2022) pointed out that public investment provides the basic foundation for a country to achieve higher economic growth and better quality of life, such as public services, security, water, electricity, and transportation services in both developing and developed countries.

However, in contrast, views such as Keefer and Knack (1997) and Dabla-Norris et al. (2012) indicated that public investment might have limited benefits on economic development, contingent on the strength of institutions. Besides, Swaby (2007) found that public investment positively influenced GDP, but this effect was not statistically significant, using Jamaica's vector error correction model (VECM). Modebe et al. (2012) also reiterated in the recent empirical literature separating government expenditure into public investment and current spending. Then, they estimated their relationships with economic growth from 1987 to 2010 in Nigeria. Research results showed that current spending had a positive and insignificant impact on economic growth, while public investment had a negative and negligible impact on economic growth. In addition, Adu and Ackah (2014) investigated the government's investment and spending in the short- and long-term in Ghana, using an ARDL model with annual data ranging from 1970 to 2010. Their study concluded that public expenditure significantly and negatively impacted economic growth, but current spending positively affected economic growth both in the long run and short run. It further suggested a fiscal regulation and efficiency in disbursing public investment to generate positive future benefits. Meanwhile, Dash (2016) estimated the impact of state spending on private investment in India from 1970 to 2013 by including an endogenously driven structural break in the ARDL model developed by Pesaran and Shin (1999) and Pesaran et al. (2001). After controlling for economic variables, the baseline finding showed that a 1% increase in public investment as a ratio to GDP led to 0.81 and 0.53% decreases in private investment as a ratio to GDP in the long run (approximately four to five years) and short-run (about two to three years), respectively.

Moreover, several studies researched the impacts of public investment in Vietnam; however, they are inconsistent and primitive. To (2012) demonstrated that both private and state investment had a statistically significant beneficial influence on yield, using VECM to estimate impulse response. However, state spending crowded out a private investment with minor effects in the first few years and high effects after the fifth year. In addition, Tran and Le (2014) examined the influence of public investment on economic advances from 1988 to 2012 in Vietnam, applying the ARDL model. According to the study's findings, the influence of public investment on economic growth was not statistically significant in the short term, but it had a crowding-in effect over the long run. Diep et al. (2016) also employed the ARDL model in combination with the co-integration of variables using the boundary method of Pesaran (1997). Although the long-term

correlations between public investment and economic growth were found, there was little evidence to support the usefulness of public investment in a total amount of investment in the short term, as indicated by the findings. Recently, Nguyen and Trinh (2018) found that public investment positively affected economic growth from the second year and negatively constrained long-term growth.

In summary, previous studies only analyzed each factor individually and did not provide consistent empirical evidence on the role of these factors in the relationship between public expenditure and growth. Therefore, it needs to be further explored in individual country contexts. Moreover, previous empirical studies in Vietnam are limited because these studies lie in the different approaches and the use of different data sets. For this reason, this study addresses the gap left by previous research by applying the ARDL approach to the data set from 1991 to 2020 to determine public investment's short- and long-term consequences. Accordingly, this study analyzes and tests the role of public investment in Vietnam's economic growth from 1991 to 2020 in Vietnam. In the context of Vietnam, the researcher argues that Vietnam's economic growth is influenced by government intervention in the market through spending and investment under the background of Keynesian theory. Thus, the hypotheses of this study are the following:

***H_1**: Public investment spending positively affects economic growth in the short run.*

***H_2**: Public investment spending positively affects economic growth in the long run.*

Research Method

Model

According to Pesaran and Shin (1999) and Pesaran et al. (2001), the ARDL method has more advantages than the other time-series analysis methods. (1) If the sample size is small, the ARDL model is a more statistically significant approach for testing co-integration. (2) In contrast to conventional methods for finding long-run relationships, the ARDL method does not estimate a system of equations; instead, it only estimates a single equation. (3) Other co-integration techniques require all regressors included in the association to be at the same level of delay; meanwhile, the regressors can have different optimal lags in the ARDL approach. Also, (4) the ARDL method allows the least squares (OLS) technique to estimate the co-integration when the delay of the model is determined. Therefore, it made the ARDL method the best model in this case. The general ARDL equation is expressed as:

$$\Delta Y_t = c + \sum_{k=1}^{n} \alpha_i \, \Delta Y_{t-k} + \sum_{i=0}^{m} \beta_i \Delta X_{t-i} + \varphi_1 Y_{t-1} + \varphi_2 X_{t-1} + \mu_t \quad (1)$$

where:

- ΔY_{t-k} and ΔX_{t-i} are stationary variables that can be used with I(0) or I(1), and c, α_i, β_i are usually estimated by OLS; thus, μ_t is the white noise, and m, n are lag orders. In this paper, the set of X variables is the public investment (GOVINV), government

payment for external debts (GOVPAY), and current expenditure of government (GOVEXP), respectively. Meanwhile, Y is gross domestic production (GDP). All variables were transformed to nature logarithm values.

- Y_{t-1} and X_{t-1} are variables at t - 1 lag, showing the long-term effects.

Then, this study specified to long-run model from Equation (1) as follows:

$$GDP_t = \beta_0 + \sum_{k=1}^{n} \beta_{1i} GDP_{t-k} + \sum_{i=0}^{m1} \beta_{2i} GOVINV_{t-i} + \sum_{i=0}^{m2} \beta_{3i} GOVPAY_{t-i} + \sum_{i=0}^{m3} \beta_{4i} GOVEXP_{t-i} + \mu_t \quad (2)$$

The short-run dynamic parameters were obtained by estimating an Error Correction Model (ECM) associated with the long-run estimates:

$$\Delta GDP_t = \theta_0 + \sum_{k=1}^{n} \theta_{1i} \Delta GDP_{t-k} + \sum_{i=0}^{m1} \theta_{2i} \Delta GOVINV_{t-i} + \sum_{i=0}^{m2} \theta_{3i} \Delta GOVPAY_{t-i} + \sum_{i=0}^{m3} \theta_{4i} \Delta GOVEXP_{t-i} + \varphi' ecm_{t-1} + \mu_t \quad (3)$$

Where θ_{ki}, β_{ki} are long-run and short-run dynamic coefficients of the model's convergence to equilibrium, and φ' is the speed of adjustment to long-run equilibrium following a system shock.

Data

The research data were Vietnam's macro data, collected from the General Statistics Office and World Bank from 1991 to 2020 to ensure the data reliability. Research data were organized into time-series data and logarithmic to reduce magnitude differences between data types while retaining information. This study chose Vietnam as a model for the study on the effects of public spending because (1) Vietnam is one of the countries with impressive economic growth rates in ASEAN; (2) Its increased public investment and government spending have increased over 30 years; (3) Despite this, many scholars still assessed that the effectiveness of public investment in Vietnam is not impressive (To, 2012; Tran and Le, 2014; Diep et al., 2016; Nguyen and Trinh, 2018). Therefore, it is very meaningful to consider the issues of public spending and economic growth in the context of Vietnam, in which developing countries are under the pressure of political-economic crises-society. Therefore, it is necessary to determine the right development direction to overcome difficulties and maintain economic growth.

Methodology

The ARDL method was processed in three steps:

- Unit root test: This step is performed on the variables to check whether the variables are stationary at the unit root I(0) or stationary at the first difference I(1) to avoid spurious regression results (Gujarati et al., 2017). This study used both the Augmented Dickey-Fuller (ADF) test of Dickey and Fuller (1979) and the Phillips Perron (PP) test of the Phillips and Perron (1988).
- ADRL bound test: This test was conducted according to two main procedures. The first procedure was to estimate the ARDL equation using OLS to check for the existence of

a long-term correlation between the variables. Then, the F-statistic was taken for the combined significance level for these variables' coefficients in their lagged states. When the critical value of the F-statistic is greater than the upper limit, it can be concluded that there is a co-integration between the variables. On the contrary, rejecting the null hypothesis of no co-integration is impossible.

- ADRL estimation: The study determined the lag of the variables in the ARDL model using the SBC or AIC criteria. Then, ARDL estimation with defined lags was then applied to test the long-run relationship and short-run impacts of variables by error correction model (ECM), based on the ARDL approach for co-integration.

Result and Discussion

Data and Descriptive Statistics

Table 1 presents the statistical results of the variables in this study (number of observations, mean, standard deviation, minimum and maximum values). It can be observed that the mean of economic growth (lnGDP) was 6.8895, and its standard deviation was 1.3252, respectively; its minimum and maximum values were recorded from 4.3400 to 8.7472. It displayed a positive trend of economic growth in Vietnam from 1991 to 2020. In addition, the mean of public investment (GOVINV) and government spending (GOVEXP) were 4.2716 and 5,0575, respectively, while their standard deviations were 1.4125 and 1.4305, respectively. Then, the minimum and maximum values of public investment were 0.9988 and 6.1540, while the minimum and maximum values of government spending were 2.0909 and 7.0193. Finally, government debt servicing (GOVPAY) had a mean of 3.4870, a standard deviation of 1.3057, and minimum and maximum values of 0.3097 and 5.1693. They showed the government spending priorities for 1991-2020, with the majority going to current expenditure and public investment, respectively.

Table 1 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
lnGDP	30	6.8895	1.3252	4.3400	8.7472
lnGOVINV	30	4.2716	1.4125	0.9988	6.1540
lnGOVPAY	30	3.4870	1.3057	0.3097	5.1693
lnGOVEXP	30	5.0575	1.4305	2.0909	7.0193

Source: World Bank (2021)

During the period 1991 - 2020, it can be observed that the growth of the economy (GDP) had the same trend as the increase in public investment (GOVINV) and government spending (GOVEXP). Meanwhile, debt payments (GOVPAY) tended to decrease, and there seemed to be no association with economic growth, as shown in Figure 1.

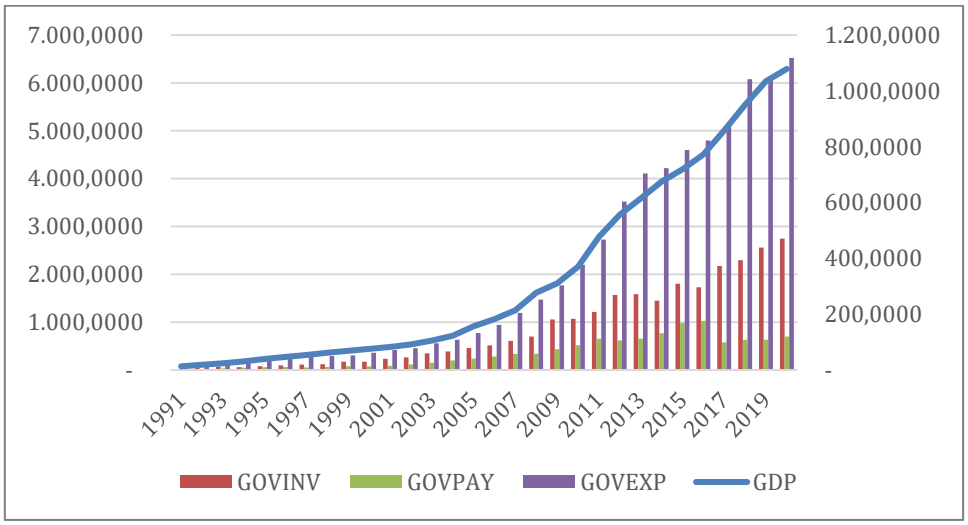

Figure 1 The linear relationship between public investment, government spending, and gross domestic production
Source: World Bank, 2021

Empirical findings

In both ADF and PP unit root tests in Table 2, the absolute value of the statistic was less than its critical values at I(0), so this study could not reject the null hypothesis, excluding the GOVINV and lnGOVPAY variables. Meanwhile, the absolute value of the statistic was smaller than its critical values at I(1). Therefore, the researcher could conclude that variables were stationary at the root level I(0) at a 5% significance level, excluding the lnGOVINV and lnGOVPAY. Therefore, these results in the unit root test provided important evidence to use the ARDL co-integration approach proposed by Pesaran and Shin (1999), which is suitable for checking the long-run relationship among the variables.

Table 2 Unit root tests

Variables	Lag	t-statistic value of ADF unit root test	Critical value at 5%	t-statistic value of PP unit root test	Critical value at 5%	Results
lnGDP	I(0)	-1.5013	-2.9719	-2.7095	-2.9678	Non-stationary
lnGDP	I(1)	-3.4195**	-2.9719	-3.4160**	-2.9678	Stationary
lnGOVINV	I(0)	-1.703749	-2.9719	-3.2682**	-2.9678	Stationary
lnGOVINV	I(1)	-8.5497***	-2.9719	-8.5496***	-2.9678	Stationary
lnGOVPAY	I(0)	-3.8225***	-2.9719	-3.8225***	-2.9678	Stationary
lnGOVPAY	I(1)	-3.6686**	-2.9719	-3.6286**	-2.9678	Stationary
lnGOVEXP	I(0)	-0.9316	-2.9719	-2.4837	-2.9678	Non-stationary
lnGOVEXP	I(1)	-3.2850**	-2.9719	-3.2849**	-2.9678	Stationary

Note: *, **, *** respectively show the results at the significance level of 10%, 5%, and 1%.

Table 3 shows the tests of the long-run co-integration relationship among the variables (Pesaran, 1997). In this step, if the obtained value of the F-statistic is greater than the upper critical bound, the long-run relationship between the variables exists. Otherwise, if

the obtained value of the F-statistic is less than the lower critical bound, the long-run relationship does not exist. However, if obtained F-statistic value falls between the lower and upper critical bounds, the long-run relationship is inconclusive (Mintz, 1991; Tilahun, 2021).

Table 3 ADRL bound test for co-integration

K	Value of F-statistic	The critical value bounds, according to Pesaran (1997) (Restricted constant và no trend)							
		90%		95%		97,5%		99%	
		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
3	7.3181	2.37	3.20	2.79	3.67	3.15	4.08	3.65	4.66

Note: *, **, *** respectively show the results at the significance level of 10%, 5%, and 1%.

Due to the many variables and the small sample size in this model, the number of lags incorporated in the ARDL dynamic equations was limited over a period. The ARDL bound test results in Table 3 showed that the F-statistic 7.3181 was higher than the upper critical bound test both in I(0) and I(1) (Pesaran et al. (2001) and Narayan (2004)), corresponding to the significance level of 1%. Thus, hypothesis H_0 was rejected, and hypothesis H1 was accepted, stating a co-integration relationship among variables. In other words, the model had a long-run relationship among these variables. Also, the optimal lag order (4, 5, 3, 4) was chosen based on Akaike Information Criterion (ACI), shown in Figure 2.

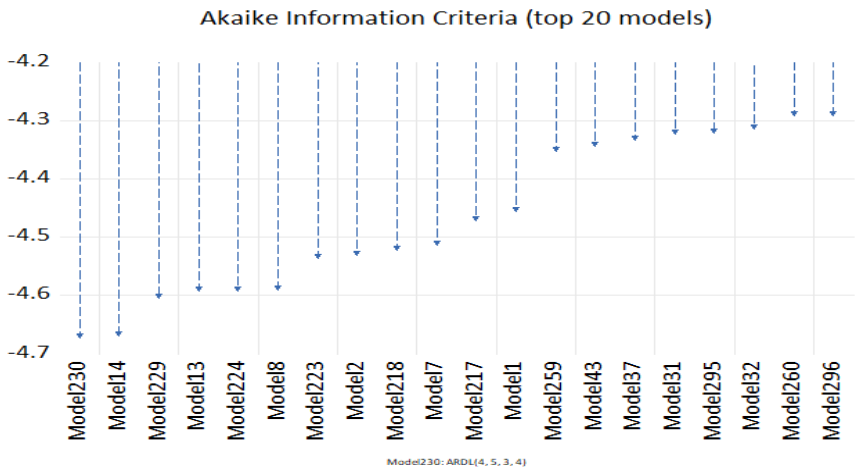

Figure 2 ARDL lag selection based on Akaike information criteria

In the next steps, Figure 3 and Figure 4 depict the Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Square of Residuals (CUSUMSQ) plots. Both figures of CUSUM and CUSUMSQ stayed within the critical boundaries at 5% significance. The finding provided evidence that the model parameters had no structural instability. Thus, the long-run estimation was stable and had no structural break. Thus, these ARDL estimates were reliable and valid, paving the way for interpreting estimates in an ARDL approach.

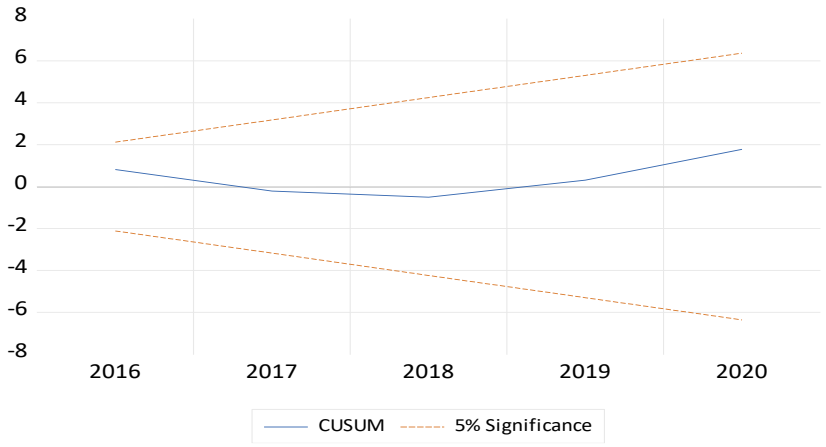

Figure 3 CUSUM: Cumulative sum of recursive residuals

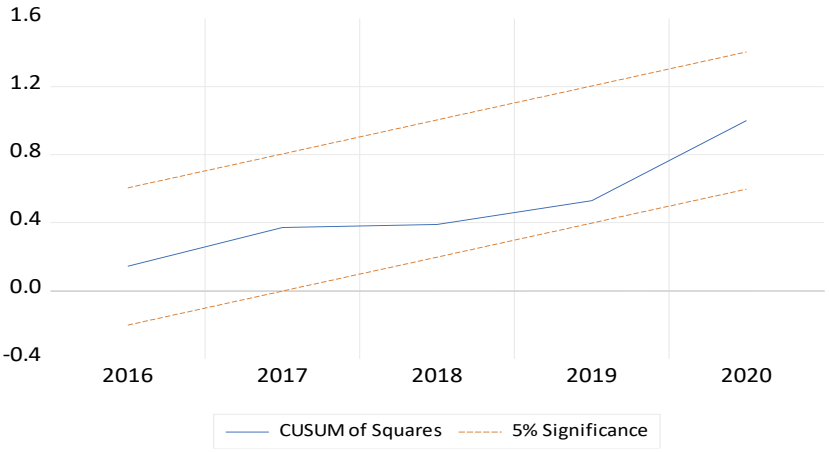

Figure 4 CUSUMSQ: Cumulative sum of the square of residuals

Similarly, Table 4 presents the results of the error diagnostic tests for the ARDL approach. These tests were performed because the validity of the ARDL results was based on the satisfaction of OLS assumptions. The statistical values were all greater than 0.100, confirming that the model did not violate the estimation errors; therefore, the ARDL estimation was reliable.

Table 4 Error diagnostic tests for the ARDL approach

Diagnostic error	Test	F-statistic	P-value
Heteroskedasticity	Breusch-Pagan-Godfrey (H0: Homoskedasticity)	0.6120	0.8008
Serial correlation	Breusch-Godfrey Serial Correlation LM Test (H0: No serial correlation at up to 2 lags)	0.7576	0.1210
Functional form	Ramsey's RESET test using the square of the fitted values (H0: Functional form is correct specification)	0.6891	0.2874

Note: *, **, *** respectively show the results at the significance level of 10%, 5%, and 1%.

Then, the next step was estimating the appropriate ARDL model to find out the long-run coefficients, presented in Table 5.

Table 5 ADRL estimation for long-run coefficients

Dependent variable: lnGDP	ARDL estimation			
	Coefficient	**Standard error**	**t-statistic**	**p-value**
lnGOVINV	0.4356***	0.0695	6.2714	0.0015
lnGOVPAY	-0.0302	0.0357	-0.8467	0.4358
lnGOVCEX	0.5411***	0.0654	8.2765	0.0004
C	2.4086***	0.0647	37.2196	0.0000

Note: *, **, *** respectively show the results at the significance level of 10%, 5%, and 1%.

Based on Table 5, public investment and the government's current expenditure had positive effects in a long-term relationship at 1% statistically significant. As the table results, a 1% increase in public investment will cause 0.4356% in GDP. Meanwhile, 1% growth in the government's current spending will increase economic growth by 0.5411% at 1%, statistically significant in the long-run time. These findings confirm Keynes's view that government expenditure plays an important role in the development of the economy. The findings of this study in Vietnam are also consistent with the view of Calderon (2009), Nannan and Jianing (2012), and Jedwab and Storeygard (2022) and support that government spending has a relationship with economic growth, each of its components having different effects on growth. In this study, the government's current spending was associated with higher growth than a public investment with a greater coefficient. Therefore, this study suggested that the Keynes theory is supported in the case of Vietnam, affirming the role of government intervention in the market economy to correct errors and promote aggregate demand growth through public spending and investment. Thus, it could be concluded that the role of government current spending is vital for economic growth in Vietnam due to the significant boost in aggressive demand. However, it is noteworthy that debt servicing expenditures had no impact on economic growth at statistical significance, implying that these activities were not the drivers of economic growth in the long run. Moreover, its negative coefficient requires further studies on the role of debt payment on economic growth in future studies as a premise for consideration of the government's foreign debt. Next, Table 6 presents the error correction estimation for short-run coefficients.

Furthermore, the error correction term (ECT) is obtained from the corresponding model for the long run, whose coefficients are estimated by normalizing the Equation. The ECT indicates how the dynamic model is adjusted to restore equilibrium; thus, it must be statistically significant and have a negative coefficient. Banerjee et al. (1998) stated that the highly significant ECT confirms a stable long-run relationship. The results in Table 5 show that the estimated negative coefficient of ECT was very significant, confirming a long-run relationship between the variables with their significantly different lags. Indeed, the ECM coefficient of 1.8711 implies that the deviation from long-run growth in GDP would be adjusted to equilibrium next year. The high coefficient of R-squared also explains that about 96.43% of GDP changes were due to changes in public investment, debt servicing, and current government spending. Additionally, the DW statistic did not suggest autocorrelation, and the F statistic showed unbiased results.

Table 6 ADRL error correction estimation for short-run coefficients

Dependent variable: ΔlnGDP	Error correction estimation for selected ARDL			
	Coefficient	**Standard error**	**t-statistic**	**p-value**
ΔlnGDP (-1)	0.8691	0.1643	5.2894	0.0032
ΔlnGDP (-2)	0.2269	0.1418	1.6007	0.1703
ΔlnGDP (-3)	1.3399	0.1620	8.2737	0.0004
ΔlnGDP	0.3301	0.0643	5.1366	0.0037
ΔlnGOVINV (-1)	-0.2303	0.0605	-3.8054	0.0126
ΔlnGOVINV (-2)	-0.2438	0.0704	-3.4614	0.0180
ΔlnGOVINV (-1)	0.0818	0.0440	1.8581	0.1223
ΔlnGOVINV (-2)	0.1123	0.0277	4.0560	0.0098
ΔlnGOVPAY	-0.1387	0.0270	-5.1322	0.0037
ΔlnGOVPAY (-1)	-0.0191	0.0242	-0.7908	0.4649
ΔlnGOVPAY (-2)	-0.1009	0.0269	-3.7425	0.0134
ΔlnGOVEXP	0.3407	0.0720	4.7288	0.0052
ΔlnGOVEXP (-1)	-0.7303	0.1289	-5.6639	0.0024
ΔlnGOVEXP (-2)	-0.7179	0.1256	-5.7144	0.0023
ΔlnGOVEXP (-3)	-0.4917	0.0985	-4.9898	0.0041
ECT (-1)*	-1.8711	0.2306	-8.1156	0.0005
R-squared	0.9643	Akaike info criterion		-4.9887
Adjusted R-squared	0.9048	Schwarz criterion		-4.2086
Durbin-Watson stat	2.4849	Hannan-Quinn criterion		-4.7723
EC = lnGDP – (0.4356* lnGOVINV – 0.0302* lnGOVPAY + 0.5411* lnGOVEXP + 2.4086)				

Note: *, **, *** respectively show the results at the significance level of 10%, 5%, and 1%.
() is t-test results.

On the other side, the short-term results revealed a significantly positive relationship between the change in GDP and the change in public investment in the base year, consistent with the long-term results. As is the case, in the long run, this result suggests that Wagner's law applies to Vietnam, as the economic growth is influenced by the amount of public investment and government expenditure in the economy. However, it is worth noting that the coefficients of changes in public investment 1 and 2 periods ago reduced the change in current GDP. This effect was similarly found in current government expenditure. It indicates that public investment and current spending appear to be the crowding-out effect of non-state investments, as has been shown in previous studies (Ahmed & Miller, 2000; Farla et al., 2016; Nguyen and Trinh, 2018). Therefore, this finding reinforces the view that public investment and current expenditure must be implemented properly while playing an important role in the economy. Meanwhile, debt payment was found to have a negative effect on the economy at all lags with different levels of significance, confirming that debt repayment carries a burden on the national economy.

Conclusion

The study focuses on the relationship between government expenditure activities, such as public investment, debt repayment, recurrent expenditure, and economic growth in Vietnam. This study used Vietnam macro data for the period 1991 - 2020, extracted from

the databases of the World Bank and the General Statistics Office of Vietnam. To fit the time series data, this study employed the ADRL approach to investigate expenditure variables' short- and long-term effects on economic growth. Theoretically, this study provides empirical evidence on the role of government spending in economic growth, confirming that Keynesian theory still holds in the case of Vietnam.

The study results also indicate that an investment improvement could boost economic growth; the same is true of current government spending. According to the Keynesian school, an increase in public investment and recurrent government spending boosts the demand for labor, leading to an increase in real wages, which causes an increase in consumer demand. Thus, aggregate demand in the economy is driven by an increase in spending under the expansionary fiscal policy (Galí et al., 2007). Furthermore, an increase in public investment brings infrastructure and technology, boosting the productivity of other inputs, such as labor and private capital. As a result, it reduces unit output costs, increases return on capital and promotes economic growth (Cohen & Paul, 2004; Agénor, 2004). However, this study also uncovered the crowding out of public investment and government spending through its negative effect on economic growth at later lags. According to previous studies by Ahmed and Miller (2000), Farla et al. (2016), and Nguyen and Trinh (2018), public investment can crowd out other forms of capital investment in the economy, so controlling government investment spending becomes essential.

Other contributions of this study provide some key implications for policymakers focusing on government spending. First, to promote economic growth, the government needs to have an investment strategy focusing on the areas that create the infrastructure and technology foundation of the economy, as mentioned by Wagner's law. The researcher also believes that the government needs to improve accountability and transparency in the management and use of public investment capital and current expenditure activities at all management levels. It requires the government to continue to reform the public financial system as a top priority. Moreover, supportive policies on capital, technology, human resources, and the market need to be continued to encourage investment activities in the economy. Besides, investment portfolio selection, evaluation, and approval should be carefully and appropriately made.

Nevertheless, this study was limited by looking at the overview of government spending with economic growth, ignoring the spending structure due to the lack of necessary data. Thus, the following studies need to clarify the spending structure of Vietnam to determine which expenditures have negative/positive impacts on economic growth, thereby providing incentive solutions and necessary support from the government. Extended studies should also focus on sustainable investment (see Darsono et al., 2022a, Darsono et al., 2022b), cultural dimensions (see Darsono et al., 2021), monetary instrument, public investment, and economic growth (Johari et al., 2022), public debt, budget deficit, and sustainable economic development (Van et al., 2020), and innovation and economic growth (see Phung et al., 2019).

Endnote:

[1] See more at https://kinhtevadubao.vn/chat-luong-dau-tu-cong-nhin-lai-giai-doan-2016-2020-va-nhung-giai-phap-trong-thoi-gian-toi-22450-22450.html.

[2] Directives 13/CT-TTg of the Prime Minister of Vietnam, dated May 23rd, 2021, on speeding up and improving the quality of construction of the medium-term public investment plan for the 2021-2025 period.

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