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Economic Growth with Public and Foreign Investment in Vietnam

Ly Dai Hung*

May 29, 2021

Abstract

We analyze the economic growth under impact of public and foreign investment by a vector autoregressive model (VAR) on a quarterly sample of Vietnam economy over 2008-2020. The method stresses the role of exchange rate and liquidity supply on context of open economy. The evidence records that there exists a synergy of public and foreign investment on raising economic growth, reducing inflation and evaluating domestic currency. Moreover, the public investment is crucial to combat economic recession, especially during the current pandemic Covid-19.

Keywords: Economic Growth, Public Investment, Foreign Investment, Vector Autoregression (VAR) model.

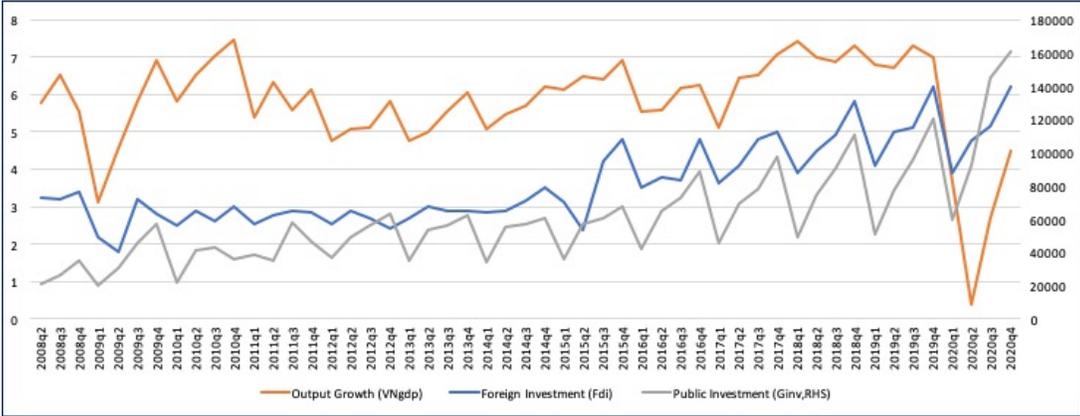
JEL Classifications: E31, F15, F36, F43.

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1 Introduction

The economic growth under the interaction with public and foreign investment is crucial for both academic and policy research. The public investment is constrained by the government balance budget while the foreign investment constitutes one of three block of policy trilemma at financial integration. For Vietnam economy, Figure (1) uncovers two style facts about the macroeconomy. The public and foreign investment tend to increase over time along with the economic growth rate. Moreover, these two types of investment also move closely with each other. These observations opens a question on the jointed impact of public and foreign investment on the economic growth of an small open economy like Vietnam.

Figure 1: Economic Growth, Public and Foreign Investment in Vietnam: Q2/2008-Q4/2020



Source: Vietnam General Statistics Office

Our paper answers the research question by analyzing the interaction between the public and foreign investment on jointly determining the economic growth.

We employ a time-varying-coefficient bayesian structural vector autoregression (TVC-BSVAR) model. The model considers the fundamentals of macroeconomy as centered around the interaction of three variables including economic growth, inflation and exchange rate. Its associated data is a quarterly sample of Vietnam with 51 observations covering from 2008 to 2020. The sample stresses the disbursed government-budget investment as the public investment, and the disbursed foreign direct investment (FDI) capital inflows as the foreign investment. On the context of a small open developing economy as Vietnam, the public investment focuses on the solvency of government, by ruling out the government-borrowing and state-owned enterprises investment. And the foreign investment captures the external supply of capital from the world economy.

The evidence records a synergy between public and foreign investment. In particular, they exert a similar effect on the macroeconomic fundamental: they raises the economic growth rate, reduce the inflation rate and evaluates domestic currency (VND). The evidence also shows that the credit growth rate which raises all of three macro variables (economic growth, inflation and VND depreciation rate). Thus, the public investment can complement the credit supply: a higher public investment combines with more credit supply can raise the economic growth while neutralize both inflation and exchange rate. Moreover, the case study of Covid-19 pandemic in 2020 also uncovers that the public investment is intensively employed and makes significant contribution on the economic growth in Vietnam. This effect substitutes successfully for the reduction of foreign capital inflows during 2020.

The paper belongs to the literature on the macroeconomic impact of pub-

lic investment. According to Blanchard & Perotti (2002), a positive shock of public spending, covering public investment, exerts a positive impact on the output, while a positive tax shock has a negative effect. This effect of public investment is consistent to our evidence. Compared with their framework, ours also employs a VAR model, but, accounts for additional role of exchange rate and monetary policy, while theirs focus on the interaction between public expenditure and tax rate. Thus, our evidence complements to theirs by showing that the public investment exerts a negative impact on the foreign capital inflows.

The negative correlation between public and foreign investment is also different to the finding by Clarida & Findlay (1994). These authors show that the public investment exerts a positive impact on both the economic growth and foreign capital inflows. Along the convergence path to the steady state, public investment goes down, so the economic growth does, and the economy turns to receive less net capital inflows. Their paper shares with ours about the result that a higher public investment goes along with a higher economic growth rate. But ours differs their paper by the evidence that a higher public investment is associated with less foreign capital inflows, rather than more foreign capital inflows as their evidence.

Recently, Petrović, Arsić & Nojković (2021) shows that the public investment is an important policy tool to combat the recession and stimulate the economic growth. The reason is that a higher public investment raises the short-run demand by increasing wage rate, and enhances the medium-run supply by encouraging private investment. The use of public investment over the business cycle also depends on the stock of debt and magnitude of shock

as shown by Novelli & Barcia (2021). By a theoretical model of a small open economy, these authors show that the public investment is countercyclical to business cycle only for a low level of debts and moderate negative shock, otherwise is procyclical so that it contracts during recession. Thus, the use of public investment to combat the recession can only apply with low debts and weak shock. Our paper agrees with these aforementioned papers that the public investment can be used to fight against the recession and promote the economic growth. But our mechanism is different to theirs. By accounting for the fluctuation of exchange rate, we complements their results by showing that a more public investment raises economic growth, reduces inflation rate and evaluate domestic currency. Moreover, the public investment can compensate a reduction of foreign capital inflows which can happens during the recession.

The paper is closely related to the literature on cross-border capital flows. According to Prasad, Rajan, and Subramanian (2007), the foreign capital inflows can raise the economic growth only when the host country has a high enough financial development level. The positive correlation between the economic growth and capital inflows is also recorded on a cross-section evidence by Alfaro, Kalemli-Ozcan & Volosovych (2014) and on a combination of theoretical model and cross-section edvidence by Hung & Hoan (2020). Our evidence, that the FDI inflows can raise the domestic economic growth, is consistent to these papers. But our paper complements these papers by accounting for the impact of foreign capital inflows on the macroeconomic fundamentals, including economic growth, inflation and exchange rate.

The foreign capital inflows can also induce the volatility of output (Stiglitz

(2000)). Hoffmann, Krause & Tillmann (2019) also show that, on a cross-section sample of 119 economies, a greater macroeconomic uncertainty is associated with more capital outflows. These authors prove that, in the short-run, the uncertainty raises the precautionary savings of households, then, leads to the outflows of capital. Our paper, however, shows that the foreign capital inflows can stabilize the macroeconomy. The FDI capital inflows raises the output growth rate, reduces the inflation rate and evaluate the domestic currency. This evidence is consistent to the finding by Aghion, Bacchetta & Banerjee (2004). By both theory and evidence, the authors prove that, for economy with intermediate financial development level, the FDI inflows never destabilize the economy, i.e, a chronic phases of economic growth with capital inflows and collapse with capital flight. The reason is that the FDI investors bring their own credit, which is unrelated to the state of domestic economy.

The paper also makes contribution on the literature on the output-inflation trade-off on the context of open economy, which is motivated by an international evidence by Lucas (1973). Our evidence shows that a higher growth rate of credit supply raises both the economic growth and inflation rate. Thus, there exists a trade-off between output and inflation. The evidence is consistent to the finding by Ball, Mankiw, Romer, Akerlof, Rose, Yellen, and Sims (1988) on a panel data sample. Our paper differs these papers by employing the credit supply rather than the M2 monetary supply to illustrate the monetary policy. This variables illustrates the liquidity supply which plays a central role on macroeconomy (Brunnermeier and Sannikov (2014)), and also employed recently by Hung (2021) on a empirical model

of Vietnam macroeconomy. And as Bhattacharya (2014) shows, the credit supply has a stronger effect than the M2 supply in the case of Vietnam.

Moreover, on a cross-section data of 91 economies, Badinger (2009) confirms that globalization, measured by higher trade and financial openness, is associated with larger output-inflation trade-off. Our paper, however, shows that the presence of foreign investment decelerates the trade-off. Furthermore, our evidence suggests that the combination of monetary and fiscal policy can eliminate the trade-off between output and inflation. The reason is that an expansion of public investment raises the output growth but reduces the inflation rate, while an expanded monetary supply raises both the output growth and inflation rate.

The paper is structured as following. After the first section on the introduction, the section (2) presents empirical model and characterizes the data sample. Section (3) presents the evidence on the jointed impact of public and foreign investment on the economic growth. And section (4) concludes.

2 Framework

We first describe the model, then, presents the data description to carry out the empirical analysis.

2.1 Empirical Model

The structure of empirical model is based on the recent theoretical results and empirical evidence. Beside the output and inflation as mentioned by traditional textbook, the model stresses the role of exchange rate and liquidity

supply. In fact, the Vietnam economy pursues the independent monetary policy combined with exchange rate management, and capital control when facing the policy trilemma in the international finance (Obstfeld, Shambaugh & Taylor (2005)). Recent theories (?, Farhi and Werning (2014), Obstfeld and Rogoff (1995)) and evidence (Obstfeld, Ostry and Qureshi (2019), Rey (2015)) show that the exchange rate is crucial for the macroeconomic stability even for floating exchange rate regime. Moreover, the credit supply is a proxy for liquidity supply on the economy. Recent theoretical models show that the liquidity is crucial to ensure the stability of macroeconomy, especially in the recession period (Bernanke (1981)). And the liquidity mismatch is a channel for a negative shock to propagate on the economy (Brunnermeier and Sannikov (2014)).

We employ a Time-Varying-Coefficient Bayesian Structural Vector Autoregression (TVC-BSVAR) model to investigate the interaction between output growth, public and foreign investment in Vietnam. The model captures the existence of changing regime of economic fundamentals (economic growth, inflation and VND depreciation rate) over time. In details, by the data of Vietnam General Statistics Office (GSO), both mean and variance of these macroeconomic variables reduces substantially after Q1/2013, and also decrease again after Q4/2015 when the central bank adopts the controlled floating exchange rate regime. Among these variables, the quarterly depreciation rate of VND reduces substantially its mean from 3.70% on the Q1/2007-Q4/2015 period to 1.19% on the Q1/2016-Q4/2020 period. And its associated standard deviation also goes down from 3.44% to 1.30% respectively.

Our strategy follows Justiniano, Primiceri and Tambalotti (2013) who employ a TVC-BSVAR model to analyze the changes on pattern of macroeconomic variable in case of United States. The model is a vector autoregression (VAR) model developed by Sims (1980), augmented with the structural shocks (Blanchard and Quah (1989)), and time-varying coefficients (Cogley and Sargent (2001)). The empirical strategy also employs the Bayesian estimation which is suitable to the small size of 51 observations in our data sample (sim07). Thus, the TVC-BSVAR is appropriated to capture the observed pattern of macroeconomic variables in Vietnam.

The TVC-BSVAR model can be expressed as:

$$y_t = A_{1,t}y_{t-1} + \epsilon_t \quad (1)$$

$y_t = (ycpi_t, VNgdp_t, VND_t, Gcredit_t, Gginv_t, Gfdi_t)$ is a 6x1 vector of endogenous data, including the inflation rate ($ycpi_t$), output growth rate ($VNgdp_t$), VND depreciation rate (VND_t), credit supply growth rate ($Gcredit_t$), public investment ($Gginv$) and foreign investment growth rate ($Gfdi$). $A_{1,t}$ is a matrix of dimension 6x6. And $\epsilon_t = (\epsilon_{1,t}, \epsilon_{2,t}, \epsilon_{3,t}, \epsilon_{4,t}, \epsilon_{5,t}, \epsilon_{6,t})$ is a vector of residuals following a multivariate normal distribution.

$$\epsilon_t \sim \mathcal{N}(0, \Sigma) \quad (2)$$

The VAR coefficients are assumed to follow the autoregressive process:

$$\beta_t = \beta_{t-1} + \nu_t, \nu_t \sim \mathcal{N}(0, \Omega) \quad (3)$$

The covariance matrix Ω is assumed to be a random variable endogenously determined by the model.

The parameters of interest to be estimated include the VAR coefficients

($\beta = \{\beta_1, \dots, \beta_T\}$), the covariance matrix (Ω) for the shocks on the dynamic process, and the residual covariance matrix (Σ). The estimation is based on the Bayesian Estimation, Analysis and Regression toolbox (BEAR), developed by Dieppe, Legrand, and Van Roye (2016).

2.2 Data Description

The dataset is one quarterly time series sample with 51 observations for Vietnam, from first quarter of 2008 to fourth quarter of 2020. Each data is also computed from the raw data so that it is stationary.

The inflation rate, denoted by ($ycpi$) on percent, is the yearly growth rate of consumer price index. The output growth rate, denoted by ($VNgdp$) on percent, is the yearly growth rate of real gross domestic products (GDP). These variables are from Vietnam's General Statistics Office (GSO). The daily exchange rate is measured as the number of domestic currency units (VND) per one unit of United States dollar (USD). The exchange rate is the close rate in the Vietnam interbank market. Then, we take the VND depreciation rate, denoted by (VND) on percent, as the annual change of exchange rate. These two variables are explored from Reuters database.

The credit supply is the difference between the credit from banking system to domestic firm and the deposit from households to banks. Then, we take the annual growth rate of credit supply, denoted by ($Gcredit$). The data is from State Bank of Vietnam.

Finally, two focal variables in our model are the public investment and the foreign direct investment (FDI). These two variables are from the Vietnam's GSO. Then, we compute the annual change of public investment, denoted by

($Gginv$) and foreign investment, denoted by ($Gfdi$).

The public investment is measured by the quarterly disbursed state-budget investment. This variable captures the real quantity of capital which the government injects into the economy, using its own public budget. The largest share of this investment is on the infrastructure construction (Vietnam Ministry of Planning and Investment (2021)). By accounting framework, this variable combines with the investment by state-owned enterprises and government-borrowing investment to form the public sector investment in Vietnam.

Next, the foreign direct investment are measured by the disbursed value of foreign direct investment. Currently, the Vietnam GSO collects both the registered and disbursed quantity of FDI. Two values are different to each other, when the disbursed FDI usually account for 68% of the registered FDI monthly for 01/2007-12/2020. By using the disbursed FDI, the data can capture the real quantity of foreign investment in the economy. Thus, this variable is also consistent to the measurement of public investment.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Inflation Rate (yoy,%) ($yepi$)	51	6.921708	6.739622	0	27.8986
Economic Growth (yoy, %) ($VNgdp$)	51	5.78599	1.298986	.39	7.466842
VND Depreciation Rate (yoy,%) (VND)	51	2.987181	3.119301	-.5961787	9.922976
Domestic Credit Growth Rate (yoy,%) ($Gcredit$)	51	18.16211	9.543387	4.950085	54.39303
Public Investment Growth Rate (yoy,%) ($Gginv$)	51	14.40007	21.46768	-37.99967	78.2832
Foreign Investment Growth Rate (yoy,%) ($Gfdi$)	51	6.778734	22.30111	-57.65878	78.88889

Table (1) reports the descriptive statistics on the sample. The inflation rate has a mean of 6.92 percent with a standard deviation of 6.73 percent. The output growth rate has a lower mean, 5.78 percent, and a less standard

deviation, 1.29 percent. And the VND depreciation rate has both a lower mean (2.98 percent), and a less standard deviation (3.11 percent). Compared with this variable, the credit supply growth rate has both a higher mean at 18.16 percent and a larger deviation at 9.54 percent, while the public investment growth rate has a lower mean at 14.4 but with greater deviation at 21.46. And the FDI growth rate has a lower mean at 6.77 percent but a more deviation at 22.3 percent. In brief, the data set offers rich variation for exploring the relationship between the output growth, public and foreign investment.

3 Evidence

We first characterize the impact of public investment on the economic growth, then, its jointed impact with foreign investment. The result serves a case study of Vietnam during the Covid-19 pandemic in 2020.

3.1 Economic Growth and Public Investment

Figure (2) shows the impulse response function for the baseline model. First, the public investment has a positive impact on the output growth rate. On the second row, a shock of an increase of 1 percent on the growth rate of public investment raises the output growth rate by a maximum of 0.007 percent at the 1st quarter, then the effect decreases gradually and dies out at the 6th quarter. Over Q1/2007-Q4/2020, the quarterly growth rate of public investment is 14.4 percent. Thus, the evidence suggests that the public investment raises 0.1 percent for the quarterly GDP growth rate.

Second, a higher growth rate of public investment can reduce the inflation rate. On the first row, a shock of an increase of 1 percent on the growth rate of public investment reduces the inflation rate by a maximum of 0.012 percent at the 1st quarter, then the effect decreases gradually and dies out at the 5th quarter. Thus, the public investment can stabilize the macroeconomy, since it can raise the output growth rate without inducing the cost of a higher inflation rate.

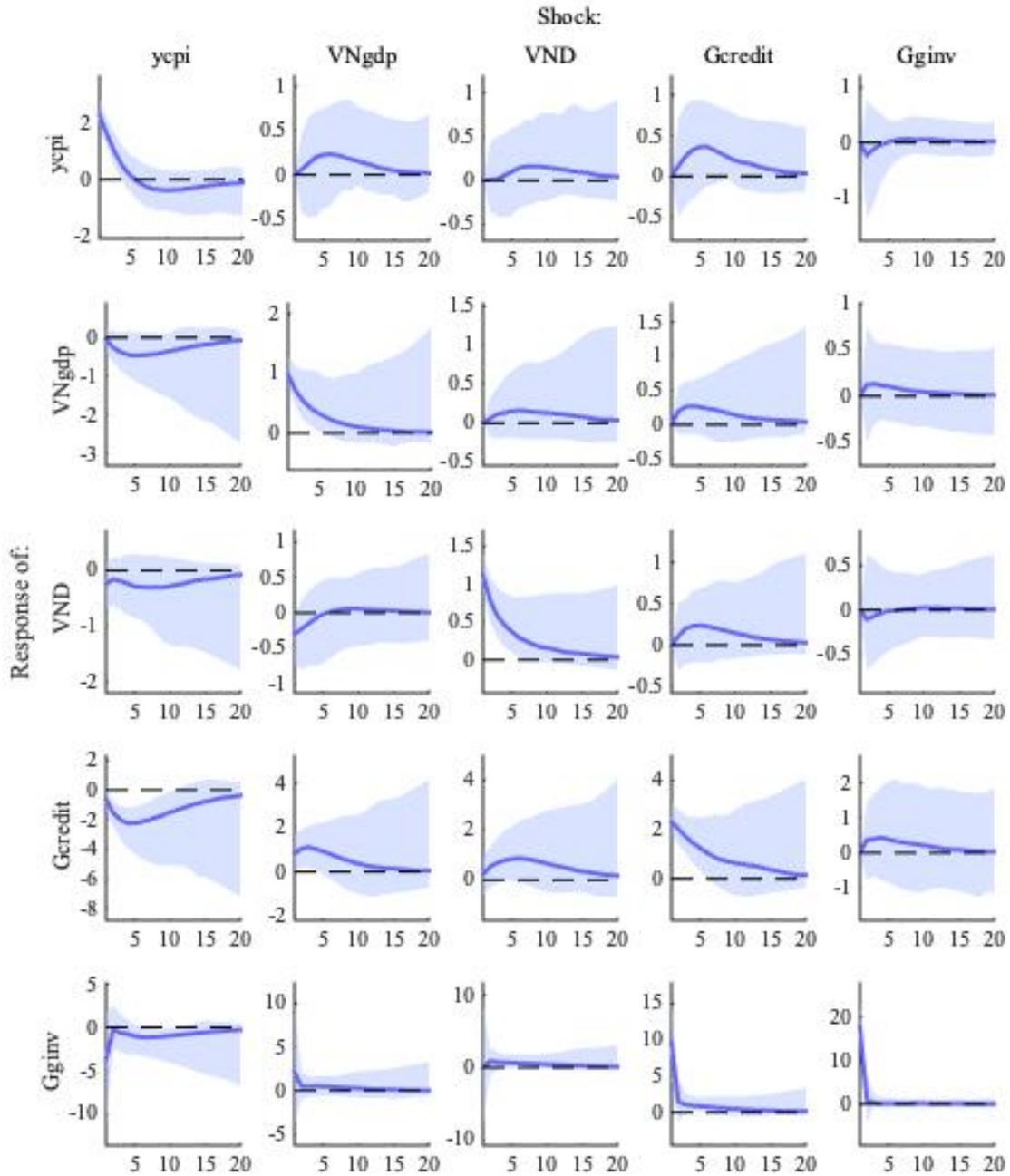
Third, more public investment can result in the appreciation of domestic currency. On the third row, a shock of an increase of 1 percent on the growth rate of public investment reduces the VND depreciation rate by a maximum of 0.006 percent at the 1st quarter, then the effect decreases gradually and dies out at the 5th quarter.

In brief, these three evidence together establish that the public investment plays an important role on stabilizing the macroeconomy.

The figure also uncovers other mechanisms underlining the Vietnam macroeconomy. In particular, the impact of public investment is different to that of exchange rate and credit supply, although all of them have a positive effect on the output growth rate. First, the public investment stabilizes the macroeconomy while the exchange rate and credit supply raises the trade-off between output-inflation. In details, a higher public investment raises the output growth rate while reduces the inflation rate. But a higher depreciation rate of domestic currency and a greater growth rate of domestic credit raises both the output growth rate and inflation rate. Second, the effect of public investment is shorter lasting: it dies out after 6 quarters while the effect of exchange rate and credit supply only shuts down after 15 quarters

and 10 quarters respectively. As a result, the public investment can be a short term policy tool while the credit supply can be a long term one.

Figure 2: Impulse Response Functions: Baseline Model



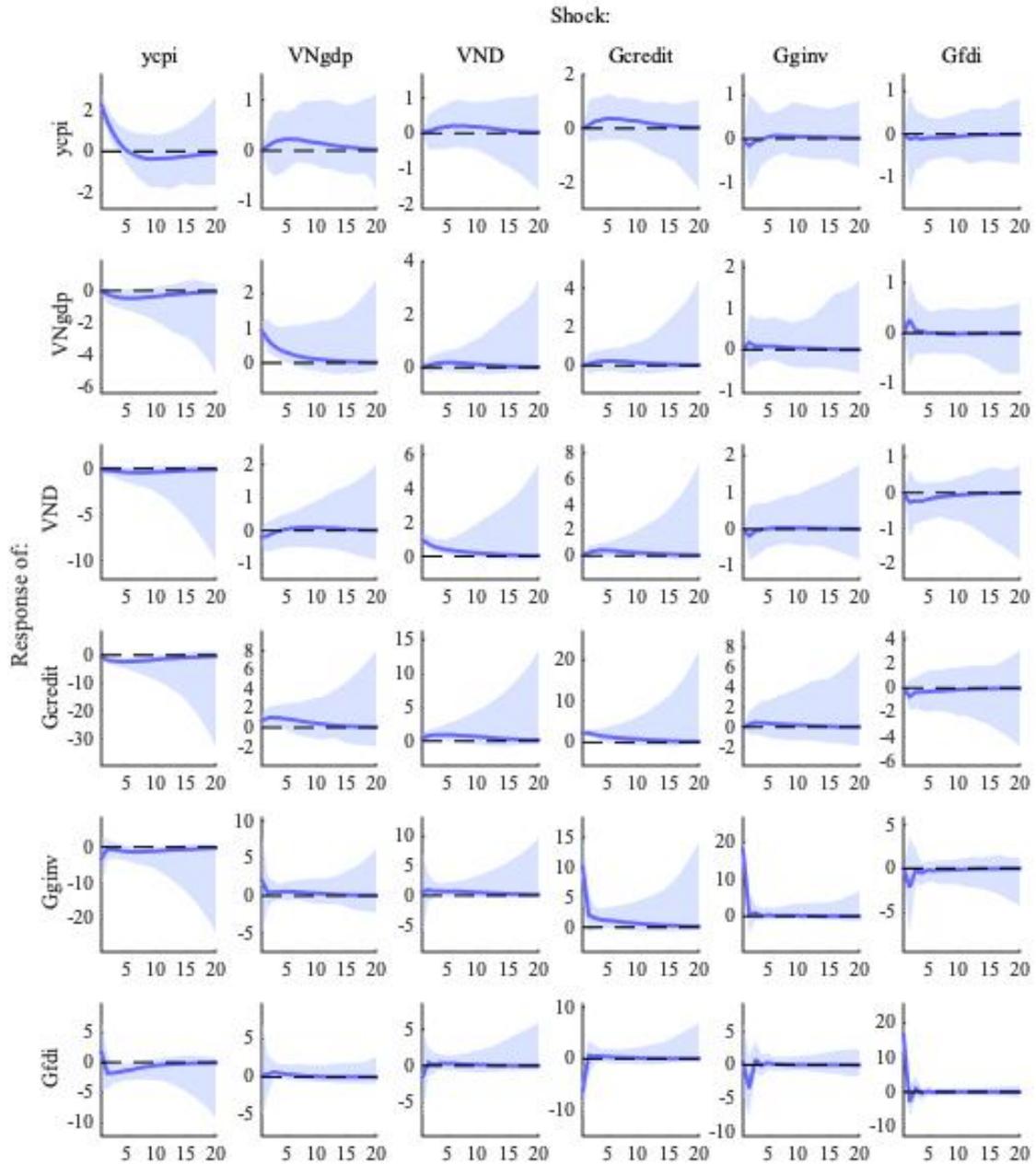
The evidence uncovers the interaction between the fiscal and monetary policy in Vietnam. First, the fiscal policy can offset the monetary policy. Given an increase of 1 percent on the growth rate of credit supply, after 1 quarter, the GDP growth rate raises by 0.06 percent, the inflation rate goes up by 0.108 percent, and the VND depreciation rate increases by 0.064 percent. If the growth rate of public investment raises by 9 percent, the GDP growth rate would raise by an additional 0.063 percent to attain 0.123 percent ($0.123=0.06+0.063$), while the inflation rate remains unchanged ($0=+0.108-0.108$), and the VND depreciation rate only raise by a minimal rate of 0.01 percent ($0.01=0.065-0.054$). Thus, a combination of fiscal and monetary policy can amplify the economic growth rate while neutralize the inflation rate and VND depreciation rate.

3.2 Economic Growth, Public and Foreign Investment

Figure (3) illustrates the impulse response functions in the full model having both public and foreign investment. The impact of public investment on macroeconomic variables is similar as the core model without the foreign investment. The public investment still raises the output growth rate, reduces the inflation rate and evaluate the domestic currency. More importantly, the impact of foreign investment follows a similar pattern as that of public investment. In details, they have an approximated equal impact on the economic growth: the effect of 1 percent increase on the public investment raise the output growth rate by a maximum of 0.009 percent while the effect of 1 percent increase on the foreign investment raise the output growth rate by a maximum of 0.012 percent. And they raises the economic growth, reduces the

inflation rate and VND depreciation rate. Therefore, the public investment and the foreign investment together stabilizes the macroeconomy.

Figure 3: Impulse Response Functions: Full Model



The public investment tends to substitute for the foreign investment. The response of public investment to the shock on the foreign investment is on the graph at 5th row from top and 6th column from left. The evidence shows that for an increase of 1 percent on the FDI inflows, the growth rate of public investment reduces by 0.104 percent after 1 quarter. And the effect decreases until it dies out after 3 quarters. And the response of foreign investment to the shock on the public investment is on the graph at 6th row from top and 5th column from left. The evidence shows that for an increase of 1 percent on the public investment, the growth rate of FDI capital inflows reduces by 0.182 percent after 1 quarter. The substitution between public and foreign investment can relies on the impact of these variables on the macroeconomy. Since both of them exerts a similar effect on the key macroeconomic variables, an increase of public investment can used to offset the decrease of FDI capital inflows.

Figure 4: Forecast Errors Variance Decomposition

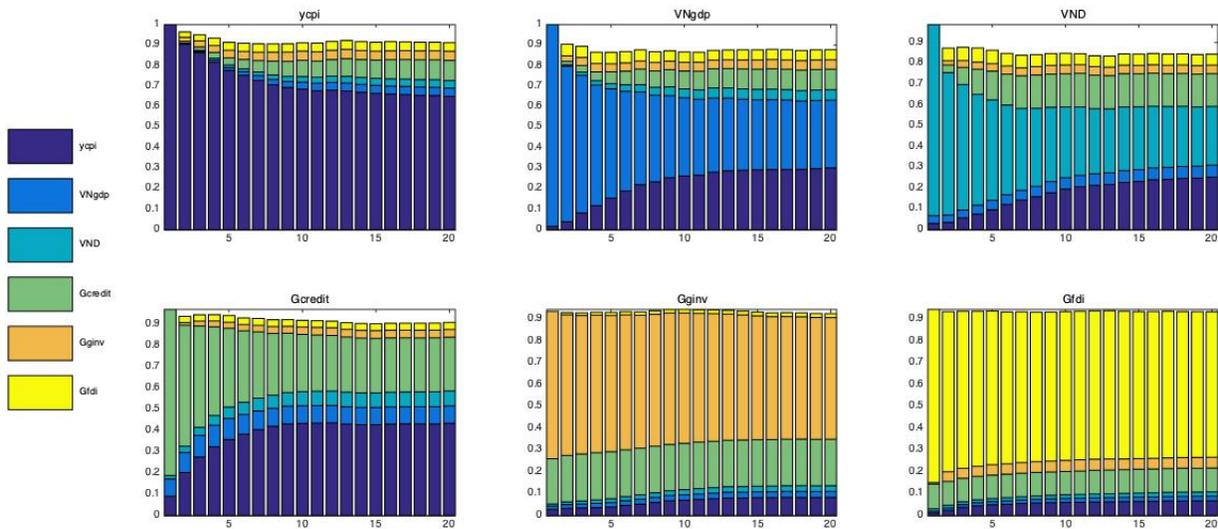


Figure (4) shows the forecast errors variance decomposition, which compares the relative role of each variables on forecasting the macroeconomy. For the output growth rate, the public investment accounts for an equalized shares as the foreign investment. Their share is even greater than that of the VND depreciation rate, while less than that of the growth rate of credit supply. Thus, the public investment and foreign investment have a similar role on forecasting the economic growth rate.

For other macro variables, two types of investment continues to have an equalized share on forecasting the inflation rate as well as the VND depreciation rate. And these impact is weaker than that the impact of credit growth rate on forecasting the inflation, output growth and VND depreciation rate. Thus, the fiscal policy, proxy by public investment is strong as the FDI inflows but weaker than the monetary policy, proxy by credit supply, on forecasting the change of core macroeconomic variables.

Figure (4) also uncovers that the fluctuation of public investment is largely determined by itself. Its lagged values account for up to 60 percent of current value. The second important variable is the credit supply, and the inflation rate. A similar pattern applies for the FDI inflows. And the impact of credit supply and inflation rate is weaker than in the case of public investment. In brief, both the public and foreign investment is larged dependent on its lagged value and the credit supply.

3.3 Case Study: Covid-19 Pandemic Time

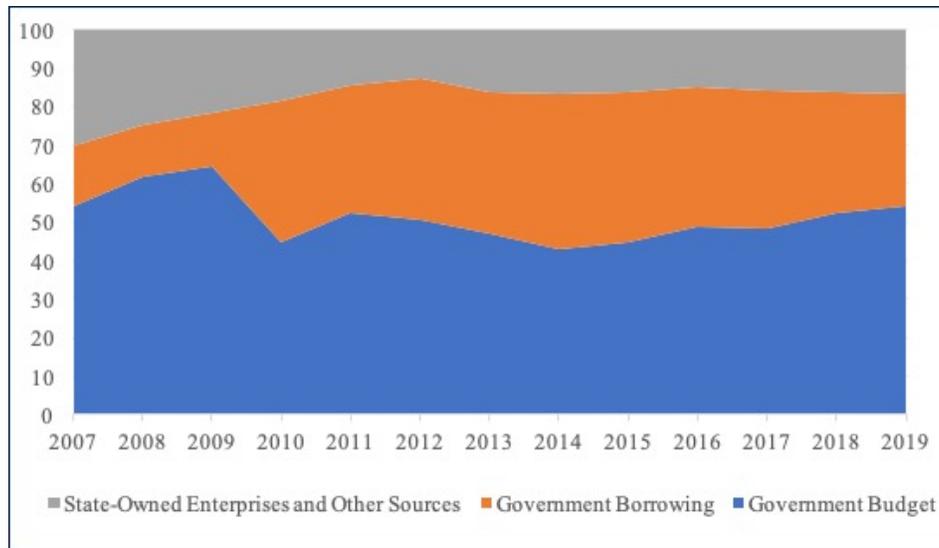
The covid-19 pandemic happens from beginning of 2020. While the world economy experiences a negative averaged economic growth rate, the Viet-

nam economy still gains an economic growth rate at 2.91 percent in 2020 (Vietnam General Statistics Office (2021)). Our case study aims to investigate the public investment as a crucial tool for the Vietnam government to recover the economy in the pandemic time.

The public investment is a priority policy of Vietnam government since many years. It is even considered as a strategy to transform the economy into a new path of development (Vietnam Government (2018)). For the institution, the Law of Public Investment was introduced in 2014, and is replaced by a new law in 2019, only after 5 years. In each year, the Vietnam government organizes a symposium on the public investment, around every June, to promote the disbursement of public investment. Currently, the greatest share of public investment covers the infrastructure construction such as communications and transportation system (Vietnam Ministry of Planning and Investment (2021)).

The Vietnam government employs the public investment to fight against the recession. In particular, the total public investment are 1,926,063.00 billion VND, being equivalent to 83.7 billion USD (Vietnam Ministry of Planning and Investment (2021)). The disbursement of public investment attains an annual average of 83.4 percent over 2016-2020, with a highest rate of 97.46 percent in 2020 - the year beginning of the pandemic. During 2020, the government also promotes the disbursement of government-budget investment as a solution to fight against the pandemic Covid-19 (Vietnam Ministry of Planning and Investment (2021)). As a result, the growth rate of public investment attains an average of 30 percent per quarter in 2020, which is much higher than the average of 14.4 percent per quarter over 2008-2020 period.

Figure 5: Structure of Vietnam Public Sector Investment by Financing Sources (%)

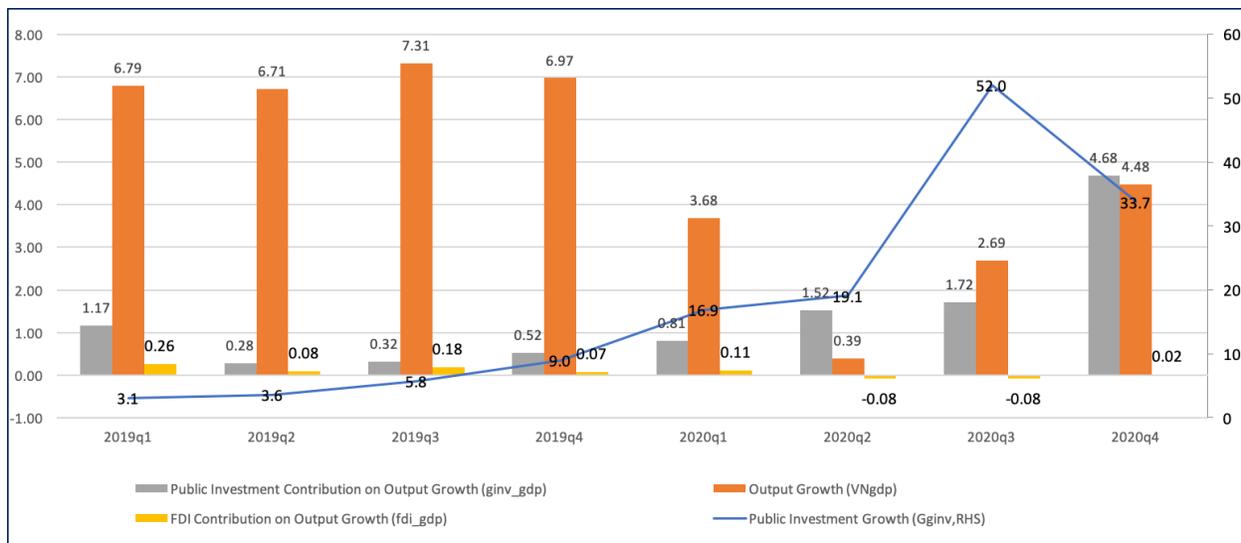


Source: Vietnam General Statistics Office

Figure (5) shows the share of government-budget investment, a proxy for public investment in our paper, over the public sector investment in Vietnam. Over the 2007-2019 period, the government-budget investment accounts for largest share of public sector investment. On average, its share is 50 percent, compared with 30.65 percent by government borrowing and 18.16 percent by state-owned enterprises and other sources. Over the same period, the public sector investment also account for an average of 37.14 percent of total investment (Vietnam General Statistics Office (2021)). Thus, the government-budget investment accounts for an average of 18.55 percent of total investment. Moreover, there is also a tendency that the share of government-budget investment is stable, while the share of government-borrowing investment increases and the share of state-owned enterprises and others decrease over 2007-2019.

Figure (6) illustrates the economic growth rate, the public and foreign investment in the covid-19 pandemic time. In 2020, the quarterly output growth rate reduces substantially in Vietnam: it fall from 6.97 percent in Q4/2019 to 0.39 percent in Q2/2020. Over same time, the growth rate of public investment raises from 9.0 percent in Q4/2019 to 52 percent in Q3/2020, before falling to 33.7 percent in Q4/2020.

Figure 6: Public Investment In Pandemic Time



Source: Author’s calculation from data of Vietnam General Statistics Office

The figure uncovers the contribution of public investment and FDI inflows on the economic growth in Vietnam during 2020. By the coefficient estimated by TVC-BSVAR model that the impact of 0.07 percent after 1 quarter, the public investment contributes to the output growth rate by 1.52 percent in Q2/2020, 2.69 percent in Q3/2020, and 4.68 percent in Q4/2020. These numbers account for a large part of output growth rate over quarters of 2020. In comparison with the public investment, the contribution of FDI inflows on

the economic growth is much more smaller, even be negative (-0.08) for the Q2 and Q3/2020. In brief, the public investment plays an important role on recovering economic growth in Vietnam during the pandemic in 2020.

4 Conclusion

We employ a time-varying-coefficient vector autoregression (TVC-BSVAR) model to analyze the interaction of public and foreign investment on determining the economic growth rate. The data is a sample of Vietnam macroeconomy from the Q2/2007 to Q4/2020. The evidence records a synergy between public and foreign investment. They exert the same effect on the macroeconomic fundamental, by raising the economic growth rate, reducing the inflation rate and leading to the appreciation of domestic currency.

The paper implies an important policy. The public investment can offset the impact of domestic credit which raises all of economic growth, inflation rate and depreciation of domestic currency. Then, a higher credit supply can be accompanied by a greater public investment to raise the economic growth and neutralize the inflation rate and depreciation rate of domestic currency.

For the future research avenue, the empirical model can take into account other type of investment such as the government-borrowing investment, or even the private sector investment. Then, the analysis can also account for the potential crowding-in or crowding-out effect between public, private and foreign investment. Moreover, the paper can be extended to have a theoretical model which can explain the relationship between government-budget and public investment. According to this direction, a dynamic stochastic general equilibrium (DSGE) can be a potential candidate.

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