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FISCAL POLICY SHOCK REACTIONS OF THE ECONOMY IN THE VAR MODEL

AdirekVajrapatkul
School of Economic, SukhothaiThammathirat Open University, Thailand.

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ABSTRACT:

This work presents the effects of various shocks on Thailand's economic environment by utilizing Vector Autoregression (VAR) model with the quarterly modified data of Thailand, 2002:Q1-2019:Q2. This model shows the interactions between domestic variables (government spending, domestic price, consumption, investment, employment, and output) and the international related one (export and exchange rate) to present an open economy environment. The results from this work revealed that 1) government spending in the last period positively affected the current level of employment and negatively to the current level of consumption; 2) government spending in the last two period positively affected the current level of employment. However, it negatively affected the current level of domestic price and domestic consumption; 3) no evidence of exchange rate reaction to government spending and channel any effect of this spending to other variables. For the results obtained from variance decomposition and the impulse response analysis, we found that a unit shock of government spending can push down domestic price and consumption, but push up an exchange rate, employment, investment, export, and output, with time delay for some variable. Also, all of these variables oscillate and decline periodically to their equilibrium. According to the results produced from this work, we hence recommend the government authority to take into consideration the expectation dimension when designing the current fiscal policy. Also, it needs to launch a fiscal expansion policy to encounter an economic recession, while taking into account the crowding-out effect.

1. Introduction:

To stabilize the economy or encounter the business cycle, the government can act through an adjustment of its income, expenditure, and debt level. The collective action related to these three items is generally known as fiscal policy. This policy, if the design and implement appropriately, can produce a significant effect on macroeconomic developments [1]. Effectiveness in utilizing the fiscal policy is depended on whether the policy initiators understand its process and effects or not. By launching this policy, without sufficient knowledge and background, one will face the difficulty in predicting the impacts and outcomes of this policy. Thus to overcome that difficulty, several studies via various methods are conducted to learn and understand this fiscal policy's impacts and outcomes.

Vector Autoregression (VAR) [2] is a useful method that has been employed by analysts to learn the impacts and outcomes of policies implemented within an economy. This method is generally used to identify sources of fluctuations, answer questions about unexpected changes, forecast, and predict the effect of such policies. Also, analysts can use this model to simplify analysis and to answer a specific question related to change expected in the future.

Comparing to the close economy, analyzing the effects of a particular change within an open economy is more complicated since this economy is linked to the external economies via, e.g., commodity market and capital market [3][4]. This implies that any change outside an economy can produce impacts on it. Also, the network of connection between countries can limit the capacity and efficiency of domestic policies in stabilizing the economy.

In the context of fiscal policy analysis which is the main objective of this work, there is a puzzle in the results of the model simulation, i.e., the effect of an expansionary fiscal policy tends to be inconclusive [5]. Three outcomes of an expansionary fiscal policy in the economy are possible which are positive (crowding-in), negative (crowding-out), and neutral outcome. For instance, when the model assumes households save nothing but consume all their current disposableincome, the level of consumption was likely positively response to government spending shocks[6]. Also, consumption habits can support the positive effect of government spending on consumption [7]. Corsetti et al., (2012)[8], for example, highlighted the effect of increasing government spending on a reduction in the interest rates which bolsters private consumption even as the investment is crowded out. In contrast, an expansionary fiscal policy may cause a reduction in household consumption. The work of Bilbiie (2011)[9] support this idea by showing that if the government subsidize its budget deficit by raising the tax, the reduction of household consumption could be the result. Also, Furceri & Sousa (2011)[10] who assess the relationship between private consumption growth and a change in the ratio of government consumption to GDP showed that government spending can lead to the crowding-out effects, i.e., it negatively impacts both private consumption and investment. Likewise, Kormilitsina & Zubairy (2018)[11] who investigated the result of the five distinct models of the government spending shock indicated the reduction of consumption in all estimated models. Similarly, the work of Lorusso & Pieroni (2019)[12] showed that even government spending has a positive effect on output, it induces a fall in private consumption. The puzzle of this government spending shock may be explained by the work of [13] who uncover from their study that fiscal policy shocks can produce different effects on consumption since those type of effects

are dependent on the wealth of consumer; i.e., these shocks tend to drop the consumption of the wealthy people while rising the consumption of the poor one [13].

The effects of an expansionary fiscal policy on others macroeconomic variables which were uncovered empirically include, e.g., an increase in government consumption, although, can lead to an improvement in the current account, it has a limited role in correcting large external imbalances [14]; government expenditure shocks can raise inflation, interest rates but reduce output in the long run [15][16]; government spending can raise employment and output [17]; although an expansionary fiscal policy shock can increased output immediately, its effects are temporary. Thus to keep the output growth, the government need to spend continuously [18]; expansionary fiscal policy shock can cause the prices down if consumers expect a reduction of social security in the future and reduce their consumption which in turn cause the prices down [18]; effect of fiscal policy on employment is a sector-specific [19], and the degree and direction of the fiscal impacts on economy are conditioned by period of policy implementation [20].

Motivated by the importance of fiscal policy and results discovered by previous studies, we are interested in studying the effected of this policy on some macro-level variables to learn its impacts and outcome so that we can provide the appropriate suggestions to bring this policy into action. Thus, to meet our objectives, we design this work to show the effects of fiscal policy shock on the economy by employing the VAR model. In what follows, we organize this work by the 5 main sections. In the next section, we will present the VAR model and the data used for estimation. In Section 3, the results obtained from the model estimation will be discussed. Then some policy recommendations will be carried out in Section 4. Finally, Section 5 will summarize this work.

2.Methodology:

To derive the model for analysis, let consider the following simple two-equation system

$$y_{1,t} = v_{10} + v_{12}y_{2,t} + a_{11}y_{1,t-1} + a_{12}y_{2,t-1} + e_{1,t}$$
$$y_{2,t} = v_{20} + v_{21}y_{1,t} + a_{21}y_{1,t-1} + a_{22}y_{2,t-1} + e_{2,t}$$

which can be solved simultaneously to yield

$$\begin{bmatrix} y_{1,t} \\ y_{2,t} \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} + \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \end{bmatrix} + \begin{bmatrix} u_{1,t} \\ u_{2,t} \end{bmatrix},$$

where

$$b_{10} = \frac{v_{10} + v_{12}v_{20}}{(1 - v_{12}v_{21})}, \quad b_{20} = \frac{v_{20} + v_{21}v_{10}}{(1 - v_{21}v_{12})}, \quad b_{11} = \frac{(a_{11} + v_{12}a_{21})}{(1 - v_{12}v_{21})}, \quad b_{12} = \frac{(a_{12} + v_{12}a_{22})}{(1 - v_{12}v_{21})}, \quad u_{1,t} = \frac{v_{12}e_{2,t} + e_{1,t}}{(1 - v_{12}v_{21})},$$

$$b_{21} = \frac{(v_{21}a_{11} + a_{21})}{(1 - v_{21}v_{12})}, \; b_{22} = \frac{(v_{21}a_{12} + a_{22})}{(1 - v_{21}v_{12})}, \text{ and } u_{2,t} = \frac{v_{21}e_{1,t} + e_{2,t}}{(1 - v_{21}v_{12})}.$$

We can write it in the abstract matric notation form as follow

$$\mathbf{y_t} = \mathbf{b} + \mathbf{B}\mathbf{y_{t-1}} + \mathbf{u_t},$$

which can be present in a general matrix notation with m variables and p lags as follow

$$\mathbf{y_t} = \mathbf{v} + \mathbf{A_0}\mathbf{y_t} + \mathbf{A_1}\mathbf{y_{t-1}} + \mathbf{A_2}\mathbf{y_{t-2}} + \ldots + \mathbf{A_p}\mathbf{y_{t-p}} + \mathbf{e_t} \; .$$

After manipulating, we have[21][22]

$$\mathbf{y}_t = \mathbf{b} + \mathbf{B}_1\mathbf{y}_{t-1} + \mathbf{B}_2\mathbf{y}_{t-2} + \ldots + \mathbf{B}_p\mathbf{y}_{t-p} + \mathbf{u}_t .$$

To estimate the model, we obtain the quarterly data of Thailand from the International Monetary Fund (IMF) database which cover a period of 2002Q1:2019Q2. We name these data series as follow. GLND = Government spending, ELND = Exchange rate in domestic currency, NLND = Employment, PLND = Domestic price, SLND = Domestic consumption, VLND = Domestic investment, XLND = Export, YLND = Output. These data series are then modified by taking a log and also first differences, and hence we obtain the data characterized as presented in Fig. 1. Accordingly, the result of Unit root test of each series based on Augmented Dickey-Fuller (ADF) test as showed in Table 1 indicate that these series are stationary.

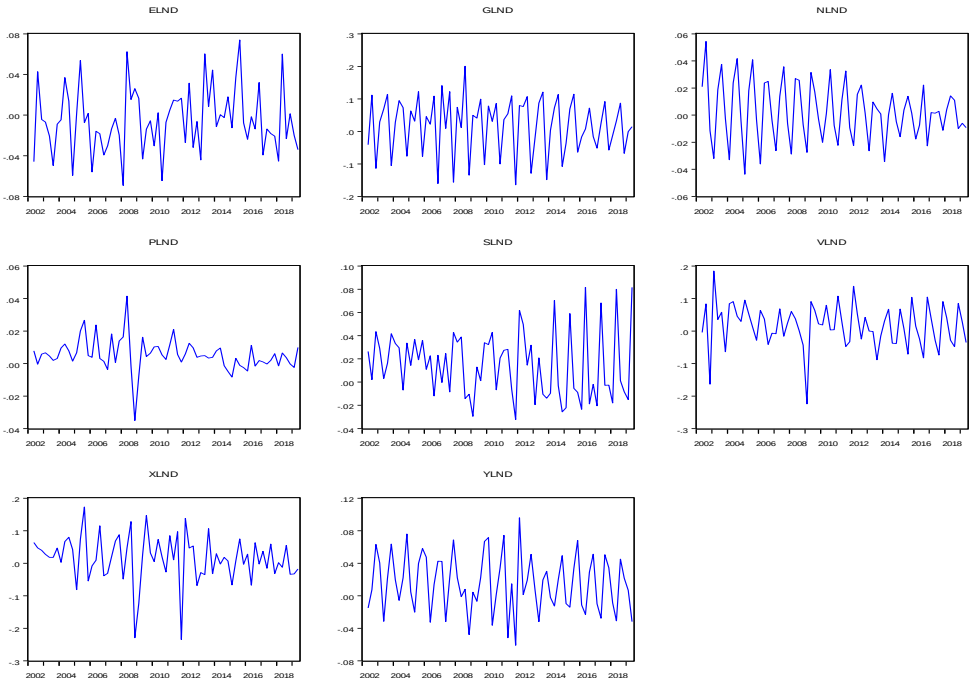

figure 1: The modified data

Source: Author's presentation

Table 1: Augmented Dickey-Fuller test statistic unit root test

Var.	t-statistic	P-value
ELND	-8.699304	.000
GLND	-10.16806	.000
NLND	-18.57132	.000
PLND	-5.234254	.000
SLND	-7.334712	.000
VLND	-9.081289	.000
XLND	-9.360238	.000
YLND	-7.510179	.000

Source: Author's calculation

3. Result and Discussion:

In this section, we will present and discuss what we discovered from the analysis. Firstly, we decide on the number of lags. Based on Final prediction error FPE, Akaike information criterion AIC, Schwarz information criterionSC, and Hannan-Quinn information criterion HQ, shown in Table 2, which assign difference number of lag, we design to use the minimum number of lags assigned by SC. Thus we will apply these two lags for subsequent calculation.

Table 2:VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1044.576	NA	1.18e-24	-32.393	-32.1232	-32.2867
1	1209.234	283.0053	5.16e-26	-35.5386	-33.10982*	-34.5818
2	1324.191	168.8429	1.15e-26	-37.131	-32.5433	-35.3237
3	1436.326	136.6646	3.26e-27	-38.6352	-31.8887	-35.9774
4	1533.014	93.66618*	1.99e-27*	-39.6567	-30.7513	-36.14839*
5	1613.411	57.78565	3.30e-27	-40.16910*	-29.1048	-35.8103

* indicates lag order selected by the criterion
Source: Author's calculation

Now we will show the result of Granger Causality Test [23] to judge whether or not the causality exits between the variables. From Table 3, we found 28 pairs of causality which show either one way or two-way short term relationship between variables indicated by $P \leq 0.1$. Those results lead us to conclude that, e.g., GLND Granger Cause ELND, ELND Granger Cause GLND, ELND Granger Cause PLND, ELND Granger Cause SLND, ELND Granger Cause XLND, NLND Granger Cause GLND, GLND Granger Cause NLND, PLND Granger Cause GLND, GLND Granger Cause PLND and SLND Granger Cause GLND. The rests of the Granger Causality yield in **Table 3** can be read in this similar manner.

Next, the estimated results obtained from the Vector Autoregression model will be discussed. Corresponding to Table 4, we can write, e.g., that 1) the previous price PLND(-2), and output YLND(-1) and YLND(-2) are, at least 10 % level, significantly and negatively affect to output YLND, while employment NLND(-2), price PLND(-1), consumption SLND(-2) are, at least 10 % level, significantly and positively affect to output YLND; 2) Domestic price PLND was at least 10 % significantly and negatively affected by GLND(-2) and PLND(-2), while PLND(-1) and VLND(-2) are, at least 10 % level, significantly and positively affect to output PLND; 3) and

Exchange rate ELND was not significantly affected by any variable within this model. Also, it doesn't affect other variables. Hence the exchange rate is not relevant in this setting. Similar interpretations can be applied to Employment NLND, Domestic consumption SLND, Domestic investment VLND, and Export XLND. However, we will go straight to point out the effects of the fiscal policy expansion and conclude that 1) in the last period GLND(-1) affected negatively to the current level of SLND at 5 % of significant level and positively to the current level of NLND at 1 % of significant level and 2) government spending in the last two period GLND(-2) affected negatively to the current level of PLND at 10 % of significant level and current level of SLND at 1 % of significant level. However, it affected positively to the current level of NLND at 10 % of a significant level. The fiscal policy in the last periods did not significantly affect to exchange rate ELND and XLND.

Table 3: Pairwise Granger Causality Tests

Null Hypothesis:		F-Statistic	P-value	Null Hypothesis:		F-Statistic	P-value
GLND ELND	Dng	6.86016	0.0020	SLND NLND	Dng	1.78659	0.1760
ELND GLND	Dng	5.89772	0.0045	NLND SLND	Dng	0.95301	0.3912
NLND	Dng	2.14398	0.1258	VLND	Dng	1.57466	0.2152
ELND NLND	Dng	0.06622	0.9360	NLND VLND	Dng	4.10946	0.0211
PLND ELND	Dng	0.07363	0.9291	XLND NLND	Dng	1.65141	0.2001
ELND	Dng	4.22229	0.0191	NLND	Dng	6.33800	0.0031
SLND ELND	Dng	0.33438	0.7171	YLND NLND	Dng	0.79045	0.4582
ELND SLND	Dng	5.41751	0.0068	NLND YLND	Dng	9.05456	0.0004
VLND	Dng	0.33534	0.7164	SLND	Dng	0.96443	0.3868
ELND VLND	Dng	1.97363	0.1476	PLND SLND	Dng	0.36382	0.6965
XLND ELND	Dng	2.31853	0.1069	VLND PLND	Dng	0.99961	0.3739
ELND	Dng	7.33091	0.0014	PLND	Dng	2.52459	0.0883
YLND ELND	Dng	0.54339	0.5835	XLND PLND	Dng	0.20650	0.8140
ELND YLND	Dng	1.75807	0.1809	PLND XLND	Dng	21.4888	0.0000
NLND	Dng	32.7083	0.0000	YLND	Dng	3.25702	0.0452
GLND	Dng	10.2517	0.0001	PLND	Dng	1.21190	0.3046

NLND				YLND			
PLND GLND	Dng	15.4249	0.0000	VLND SLND	Dng	6.79144	0.0022
GLND	Dng	7.56132	0.0012	SLND	Dng	2.15258	0.1248
SLND GLND	Dng	14.9066	0.0000	XLND SLND	Dng	0.64956	0.5258
GLND SLND	Dng	11.1318	0.0000	SLND XLND	Dng	6.46255	0.0028
VLND	Dng	3.03263	0.0554	YLND	Dng	1.40551	0.2529
GLND VLND	Dng	1.01310	0.3690	SLND YLND	Dng	2.67076	0.0772
XLND GLND	Dng	1.53636	0.2232	XLND VLND	Dng	1.40237	0.2537
GLND	Dng	0.03572	0.9649	VLND	Dng	4.22262	0.0191
YLND GLND	Dng	10.9964	0.0000	YLND VLND	Dng	12.7539	0.0000
GLND YLND	Dng	8.07951	0.0008	VLND YLND	Dng	0.88199	0.4191
PLND	Dng	2.45013	0.0946	YLND	Dng	2.94010	0.0603
NLND PLND	Dng	5.57733	0.0059	XLND YLND	Dng	8.99349	0.0004

Dng = does not Granger Cause

Source: Author's calculation

Table 4: Vector Autoregression Estimation

	GLND	ELND	NLND	PLND	SLND	VLND	XLND	YLND
GLND(-1)	-0.595723	-0.003336	0.119140	-0.007465	-0.132603	-0.099084	0.083408	-0.018665
	(0.12069)	(0.09305)	(0.02517)	(0.02430)	(0.05852)	(0.15443)	(0.16034)	(0.07785)
	[-4.93614]	[-0.03612]	[4.73418]	[-0.30719]	[-2.26588]	[-0.64163]	[0.52021]	[-0.23976]
	{0.0000}	{0.9712}	{0.0000}	{0.7589}	{0.0240}	{0.5215}	{0.6032}	{0.8106}
GLND(-	-	-	0.037	-	-	0.094	-	0.047

	GLND	ELND	NLND	PLND	SLND	VLND	XLND	YLND
2)	0.165633	0.096888	432	0.03594	0.267458	671	0.036738	749
	(0.10526)	(0.08115)	(0.02195)	(0.02119)	(0.05104)	(0.13468)	(0.13983)	(0.06789)
	[-1.57363]	[-1.19392]	[1.70548]	[-1.69569]	[-5.24023]	[0.70293]	[-0.26273]	[0.70330]
	{0.1164}	{0.2332}	{0.0889}	{0.0907}	{0.0000}	{0.4825}	{0.7929}	{0.4823}
ELND(-1)	0.238309	0.039785	0.013909	-0.02398	-0.130607	-0.10485	0.371290	-0.002963
	(0.17817)	(0.13737)	(0.03715)	(0.03588)	(0.08640)	(0.22798)	(0.23670)	(0.11493)
	[1.33754]	[0.28962]	[0.37438]	[-0.66840]	[-1.51172]	[-0.45991]	[1.56858]	[-0.02578]
	{0.1818}	{0.7723}	{0.7083}	{0.5043}	{0.1314}	{0.6458}	{0.1175}	{0.9794}
ELND(-2)	0.194325	0.079857	0.021177	-0.052128	0.071374	0.153017	-0.289074	-0.125221
	(0.19035)	(0.14676)	(0.03969)	(0.03833)	(0.09230)	(0.24357)	(0.25289)	(0.12278)
	[1.02088]	[0.54414]	[0.53352]	[-1.35998]	[0.77325]	[0.62823]	[-1.14309]	[-1.01985]
	{0.3079}	{0.5867}	{0.5940}	{0.1746}	{0.4398}	{0.5302}	{0.2537}	{0.3084}
NLND(-1)	0.334143	-0.296448	-0.281319	-0.103233	0.367268	-1.107267	0.813562	0.313355
	(0.51099)	(0.39397)	(0.10655)	(0.10290)	(0.24778)	(0.65384)	(0.67886)	(0.32961)
	[0.65391]	[-0.75247]	[-2.64016]	[-1.00328]	[1.48221]	[-1.69347]	[1.19841]	[0.95070]
	{0.513	{0.452	{0.008	{0.316	{0.139	{0.091	{0.231	{0.342

	GLND	ELND	NLND	PLND	SLND	VLND	XLND	YLND
	5}	2}	6}	3}	1}	1}	5}	3}
NLND(-2)	-1.171606	0.025840	-0.198566	0.047366	0.723235	0.737946	0.354285	0.737469
	(0.45996)	(0.35463)	(0.09591)	(0.09262)	(0.22304)	(0.58855)	(0.61107)	(0.29669)
	[-2.54718]	[0.07287]	[-2.07027]	[0.51140]	[3.24263]	[1.25384]	[0.57977]	[2.48564]
	{0.0112}	{0.9419}	{0.0391}	{0.6094}	{0.0013}	{0.2106}	{0.5624}	{0.0133}
PLND(-1)	0.694353	-0.131639	0.549436	0.426842	0.578826	3.086347	3.887385	0.893636
	(0.78841)	(0.60786)	(0.16440)	(0.15876)	(0.38231)	(1.00883)	(1.04743)	(0.50855)
	[0.88070]	[-0.21656]	[3.34201]	[2.68862]	[1.51403]	[3.05935]	[3.71135]	[1.75721]
	{0.3790}	{0.8287}	{0.0009}	{0.0075}	{0.1308}	{0.0024}	{0.0002}	{0.0796}
PLND(-2)	0.213859	0.715797	-0.427044	-0.361692	-0.601492	-0.565775	-2.736297	-1.438539
	(0.83551)	(0.64417)	(0.17422)	(0.16824)	(0.40515)	(1.06909)	(1.11000)	(0.53893)
	[0.25596]	[1.11119]	[-2.45112]	[-2.14982]	[-1.48462]	[-0.52921]	[-2.46513]	[-2.66923]
	{0.7981}	{0.2672}	{0.0147}	{0.0322}	{0.1384}	{0.5970}	{0.0141}	{0.0079}
SLND(-1)	1.372526	0.039042	0.038018	-0.028194	-0.250054	-0.407775	0.192339	0.178600
	(0.25306)	(0.19511)	(0.05277)	(0.05096)	(0.12271)	(0.32381)	(0.33620)	(0.16323)
	[5.4237	[0.2001	[0.7204	[-0.5532	[-2.0377	[-1.2593	[0.5721	[1.0941

	GLND	ELND	NLND	PLND	SLND	VLND	XLND	YLND
	2]	1]	6]	8]	4]	2]	0]	4]
	{0.0000}	{0.8415}	{0.4717}	{0.5804}	{0.0422}	{0.2087}	{0.5676}	{0.2746}
SLND(-2)	0.023290	0.152939	0.041064	0.067055	-0.032122	0.646282	0.061478	0.363218
	(0.29040)	(0.22390)	(0.06056)	(0.05848)	(0.14082)	(0.37159)	(0.38581)	(0.18732)
	[0.08020]	[0.68308]	[0.67812]	[1.14670]	[-0.22811]	[1.73925]	[0.15935]	[1.93903]
	{0.9361}	{0.4949}	{0.4981}	{0.2522}	{0.8197}	{0.0828}	{0.8735}	{0.0532}
VLND(-1)	-0.033294	0.046502	0.070173	0.018324	0.111480	-0.169568	0.256604	0.081518
	(0.11881)	(0.09160)	(0.02477)	(0.02392)	(0.05761)	(0.15202)	(0.15784)	(0.07663)
	[-0.28024]	[0.50768]	[2.83256]	[0.76594]	[1.93509]	[-1.11544]	[1.62576]	[1.06374]
	{0.7794}	{0.6120}	{0.0049}	{0.4442}	{0.0537}	{0.2653}	{0.1048}	{0.2881}
VLND(-2)	0.033478	0.052502	0.030382	0.036607	0.198488	-0.053417	0.067965	0.050562
	(0.09837)	(0.07584)	(0.02051)	(0.01981)	(0.04770)	(0.12587)	(0.13069)	(0.06345)
	[0.34032]	[0.69224]	[1.48113]	[1.84807]	[4.16109]	[-0.42438]	[0.52005]	[0.79685]
	{0.7338}	{0.4892}	{0.1394}	{0.0653}	{0.0000}	{0.6715}	{0.6033}	{0.4260}
XLND(-1)	-0.174435	-0.041145	-0.014589	-0.018578	0.022661	0.013321	-0.474706	-0.023882
	(0.13699)	(0.10562)	(0.02857)	(0.02758)	(0.06643)	(0.17528)	(0.18199)	(0.08836)

	GLND	ELND	NLND	PLND	SLND	VLND	XLND	YLND
	[-1.27336]	[-0.38957]	[-0.51074]	[-0.67348]	[0.34114]	[0.07599]	[-2.60838]	[-0.27028]
	{0.2036}	{0.6971}	{0.6098}	{0.5010}	{0.7332}	{0.9395}	{0.0094}	{0.7871}
XLND(-2)	-0.318747	-0.094814	-0.058387	0.009805	-0.028896	-0.242437	-0.189749	0.110631
	(0.13656)	(0.10528)	(0.02848)	(0.02750)	(0.06622)	(0.17473)	(0.18142)	(0.08808)
	[-2.33420]	[-0.90056]	[-2.05047]	[0.35659]	[-0.43639]	[-1.38748]	[-1.04592]	[1.25599]
	{0.0201}	{0.3684}	{0.0410}	{0.7216}	{0.6628}	{0.1661}	{0.2962}	{0.2099}
YLND(-1)	-0.263002	-0.13326	-0.178867	0.044925	-0.106979	0.447766	0.096703	-0.324669
	(0.25519)	(0.19675)	(0.05321)	(0.05139)	(0.12375)	(0.32654)	(0.33903)	(0.16461)
	[-1.03060]	[-0.67730]	[-3.36128]	[0.87425]	[-0.86451]	[1.37126]	[0.28523]	[-1.97236]
	{0.3034}	{0.4986}	{0.0009}	{0.3825}	{0.3878}	{0.1711}	{0.7756}	{0.0493}
YLND(-2)	0.702125	-0.116535	0.055497	-0.043332	0.054595	0.123557	0.115894	-0.539692
	(0.29154)	(0.22478)	(0.06079)	(0.05871)	(0.14137)	(0.37305)	(0.38732)	(0.18806)
	[2.40831]	[-0.51845]	[0.91288]	[-0.73811]	[0.38618]	[0.33121]	[0.29922]	[-2.86986]
	{0.0165}	{0.6044}	{0.3619}	{0.4609}	{0.6996}	{0.7407}	{0.7649}	{0.0043}
C	0.013366	-0.0035	-0.000529	0.004290	0.019330	-0.002298	0.002695	0.017671

	GLND	ELND	NLND	PLND	SLND	VLND	XLND	YLND
	(0.00874)	(0.00674)	(0.00182)	(0.00176)	(0.00424)	(0.01119)	(0.01161)	(0.00564)
	[1.52893]	[-0.51927]	[-0.29037]	[2.43698]	[4.56007]	[-0.20542]	[0.23203]	[3.13387]
	{0.1271}	{0.6039}	{0.7717}	{0.0152}	{0.0000}	{0.8373}	{0.8166}	{0.0019}
R-squared	0.836671	0.247159	0.876789	0.470957	0.660004	0.556936	0.584583	0.600645
F-statistic	16.00814	1.025943	22.23792	2.781892	6.066280	3.928149	4.397560	4.700122
Akaike AIC	-3.374663	-3.894828	-6.510067	-6.579932	-4.822247	-2.881624	-2.806518	-4.251564
Schwarz SC	-2.815264	-3.335428	-5.950667	-6.020533	-4.262848	-2.322225	-2.247118	-3.692164

* Standard errors in ( ) & t-statistics in [ ] & P-value in { }
Source: Author's calculation

To visualize the effects of an expansionary fiscal policy, we conducted the impulse response analysis which produces the results as shown in Fig. 2. Here we can observe that a unit shock of government spending can initially push up the level of exchange rate ELND, investment VLND, export XLND, and output YLND, while initially push down domestic price PLND, domestic consumption SLND but initially unaffected to employment NLND. However, all of these variables jump above and decline periodically to their equilibrium.

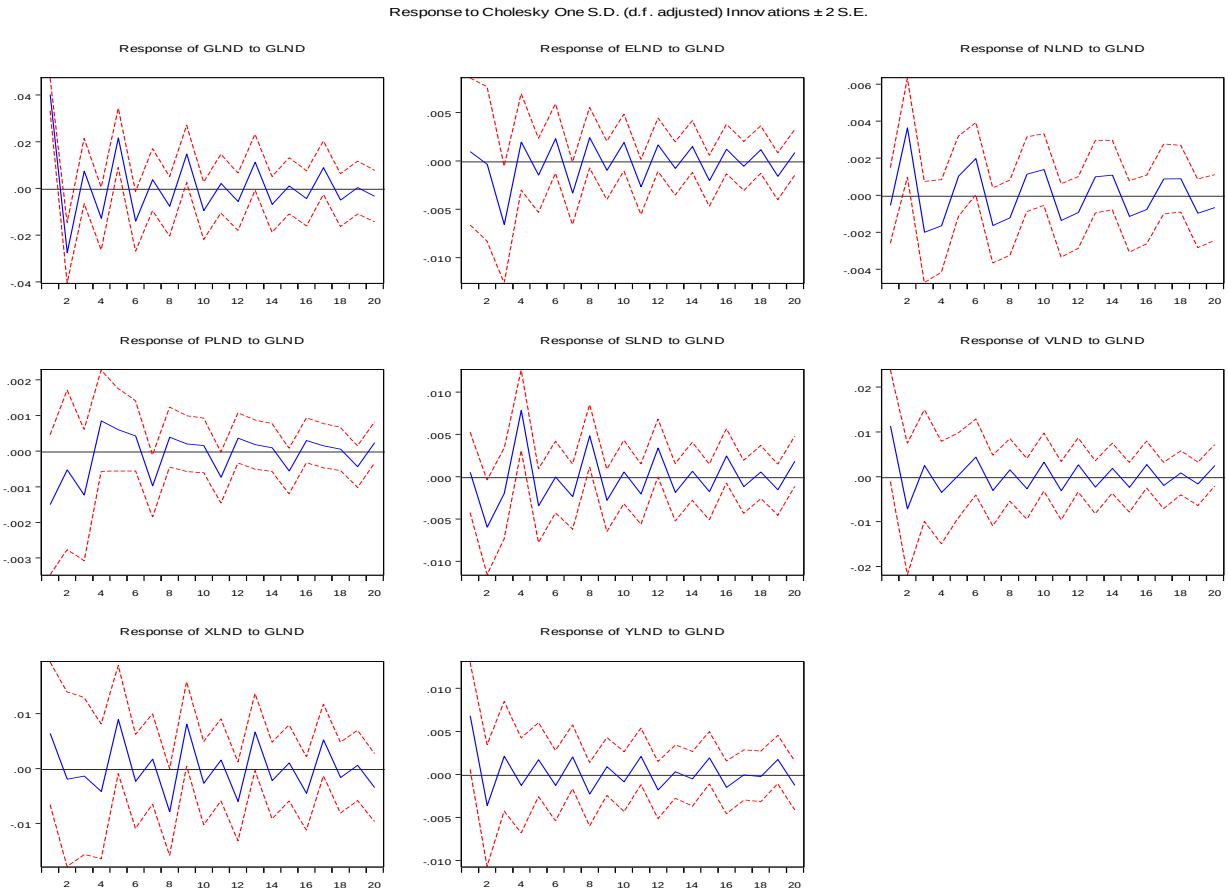

figure 2: Respond to a unit shock of the government spending
Source: Author's presentation

To have an idea about the proportions of variation of each variable caused by fiscal policy shock, we conducted the variance decomposition analysis over 10 quarters showed in Table 4. According to table 4, it shows that, in the first period, all variables are affected by this fiscal policy shock. For instance, of 100 % of the variation in the first period, about 0.095 % of ELND, 0.437 % of NLND, 3.449 % of PLND, 0.07 % of SLND, 4.88 % of VLND, 1.434 % of XLND, 6.876 % of YLND variation are caused by the fiscal policy shock. The interpretation for the successive Quarters can be done in the same way. Also to interpret the composition of variation in other variables, one can do similarly.

Table 5: Variance Decomposition

Quarter	S.E.	GLND	ELND	NLND	PLND	SLND	VLND	XLND	YLND
Variance Decomposition of GLND:									
1	0.04	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.06	66.07	1.06	2.78	4.38	12.85	4.66	4.76	3.45
6	0.07	63.97	1.11	2.19	4.03	14.04	4.65	5.49	4.51
8	0.08	59.17	1.49	3.88	4.03	14.71	5.24	5.90	5.59

Quarter	S.E.	GLND	ELND	NLND	PLND	SLND	VLND	XLND	YLND
10	0.08	57.98	1.61	3.49	3.91	14.83	5.17	6.34	6.69
Variance Decomposition of ELND:									
1	0.03	0.10	99.91	0.00	0.00	0.00	0.00	0.00	0.00
4	0.03	4.43	89.04	0.58	1.14	1.03	0.19	2.99	0.61
6	0.03	4.98	86.95	0.86	1.65	1.52	0.20	2.99	0.85
8	0.03	6.30	84.34	0.89	1.65	2.30	0.31	3.15	1.06
10	0.03	6.59	83.21	1.11	1.64	2.64	0.41	3.18	1.21
Variance Decomposition of NLND:									
1	0.01	0.44	4.40	95.16	0.00	0.00	0.00	0.00	0.00
4	0.013	12.52	2.59	48.56	10.23	3.42	2.65	8.23	11.80
6	0.01	12.91	2.34	43.96	10.55	3.14	2.72	9.12	15.26
8	0.02	13.10	2.33	40.19	10.73	3.14	2.90	10.11	17.51
10	0.016	13.11	2.22	37.97	10.86	2.90	3.03	10.71	19.22
Variance Decomposition of PLND:									
1	0.01	3.45	0.37	0.55	95.63	0.00	0.00	0.00	0.00
4	0.01	4.93	9.93	1.28	77.01	1.72	3.31	1.08	0.73
6	0.01	5.31	9.92	2.57	74.74	1.74	3.34	1.58	0.81
8	0.01	6.22	9.64	2.73	73.07	2.14	3.30	1.87	1.04
10	0.01	6.19	9.60	3.15	72.22	2.14	3.32	2.11	1.27
Variance Decomposition of SLND:									
1	0.02	0.07	1.88	5.36	21.11	71.58	0.00	0.00	0.00
4	0.03	14.31	5.26	10.03	12.75	40.21	15.58	0.38	1.49
6	0.03	13.73	5.25	8.72	11.36	39.66	17.47	2.04	1.76
8	0.03	15.92	5.34	8.55	10.64	37.03	17.78	2.18	2.56
10	0.03	15.85	5.23	8.22	10.06	36.91	17.81	2.77	3.14
Variance Decomposition of VLND:									
1	0.052	4.89	5.34	0.23	3.21	6.53	79.81	0.00	0.00
4	0.07	4.75	8.47	1.52	16.24	6.50	52.73	2.71	7.08

Quarter	S.E.	GLND	ELND	NLND	PLND	SLND	VLND	XLND	YLND
6	0.07	4.89	8.55	2.41	15.67	6.62	50.36	2.60	8.90
8	0.07	4.94	8.59	2.48	15.50	7.15	48.70	2.59	10.05
10	0.07	5.15	8.59	3.06	15.38	7.14	47.38	2.59	10.72
Variance Decomposition of XLND:									
1	0.05	1.44	0.27	0.03	15.13	6.66	11.76	64.72	0.00
4	0.07	1.37	6.25	3.15	28.44	5.34	7.83	47.53	0.10
6	0.07	2.96	6.51	3.45	27.04	6.64	7.37	45.72	0.30
8	0.07	4.09	6.44	4.75	26.30	6.73	7.11	44.01	0.56
10	0.07	5.26	6.39	4.66	25.50	7.52	6.90	42.81	0.96
Variance Decomposition of YLND:									
1	0.03	6.88	1.48	0.01	9.76	11.61	5.93	28.84	35.49
4	0.03	6.83	5.51	1.19	15.28	8.69	5.51	23.68	33.30
6	0.03	6.74	5.46	1.68	14.48	9.46	5.38	22.07	34.73
8	0.03	7.23	5.67	1.75	14.10	8.99	5.37	21.12	35.76
10	0.03	7.06	5.46	2.56	13.76	9.21	5.42	20.49	36.05

Source: Author's calculation

4. Policy Recommendations:

According to the results of Vector Autoregression Estimation which showed the reduction of consumption SLND caused by government spending in the last period GLND (-1) and the reduction of domestic price PLND and consumption SLND caused by government spending in the last two periods GLND (-2), we recommend that government authority should put the forward-looking perspective or expectation dimensions in designing the current policy. However, the results obtained from the impulse response analysis which show the reactions to a unit shock of government spending convince us to suggest that government authority should conduct an expansionary fiscal policy to encounter an economic recession since it can encourage investment VLND, export XLND, and output YLND.

5. Conclusions:

Fiscal policy is a crucial tool for government authority for stabilizing the economy. To use this tool effectively, the analysts need to understand its effect on the economy. An essential method that the analysts can employ to understand such effect of the policy is Vector autoregression (VAR) which allow the analysts to investigate simultaneously the effect of particular change and responses of various variables. Follow several previous works conducted to study the effect of this fiscal policy shock, this work presents the effects of this shock on Thailand's economic

environment. The model used to analyze those effects is the usual vector autoregression (VAR) model with the quarterly modified data of Thailand, 2002:Q1-2019:Q2. We formulated the model that shows the connection and interactions between domestic variables (Government spending, Domestic price, consumption, investment, Employment, and Output) and the international related one (Export and Exchange rate) to present an open economy environment. In particular, this model is utilized to highlight the effects of fiscal policy shock on these variables. The results from this work showed that 1) government spending in the last period GLND (-1) affected negatively to the current level of consumption SLND at 5 % of significant level and positively to the current level of employment NLND at 1 % of significant level; 2) government spending in the last two period GLND(-2) affected negatively to the current level of domestic price PLND at 10 % of significant level and current level of consumption SLND at 1 % of significant level. However, it affected positively to the current level of employment NLND at 10 % of a significant level; and 3) fiscal policy in the last periods did not significantly affect to exchange rate ELND and export XLND. The results gained from variance decomposition and the impulse response analysis showed that a unit shock of government spending can 1) initially drive up the level of exchange rate ELND, investment VLND, export XLND, and output YLND, 2) initially drive down domestic price PLND and consumption SLND; 3) unaffected initially to employment NLND. However, all of these variables jump above and decline periodically to their equilibrium. According to the results produced from this work, we hence recommend the government authority to take into consideration the expectation dimension when designing the current fiscal policy. Also, it needs to launch a fiscal expansion policy to encounter an economic recession, while taking into account the crowding-out effect.

Initiatively, this work was designed to contribute to theeconomic policy designers in taking consideration intoa more holistic picture of the interaction effect between fiscal policy action, domestic and foreign variables, as well as the delay effect of their interaction whichcan deviate the effect of this fiscal policy. Although this research framework tries to include variables that are most possible impacted by fiscal policy, it still uncovers the reactions that might be emerged from the monetary related policy variables. Therefore, it should be a chance for researchers who know thisinteraction and interest in continuing this line of research.

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