



THE DETERMINANT OF FOREIGN DEBT DECOMPOSITION IN INDONESIA

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Abstract

Since 1990, there have been reforms in both monetary policy and fiscal policy in Indonesia. The dynamics, both monetary policy and fiscal policy can affect the decomposition of foreign debt. The World Bank report in international debt statistics 2021 shows that Indonesia is one of the highest countries in foreign debt value, which ranks 7th in the world and first in ASEAN. To determine the response of foreign debt to macroeconomic fluctuations, this study uses time-series data from 1990 to 2021 using the VAR method. Based on the results of the study that shocks to the GDP variable will be responded negatively by debt. The sensitivity of the debt response is shown to be positive when there are shocks to government spending and interest rates. The results of the variance decomposition show that government spending has the largest contribution to variability compared to other variables in the model. The implications of the research need to be careful in adding new debt amid uncertain macroeconomic conditions because it can burden the state budget.

Keywords: *Foreign Debt; VAR; GDP.*

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INTRODUCTION

Indonesia's economic crisis in 1997-1998 has made the government's foreign debt increase drastically when calculated in rupiah. This is due to changes in domestic and global macroeconomic conditions. The economic crisis in 1997 contributed greatly to a significant increase in the Indonesian government's foreign debt (Astanti, 2015). The World Bank report in international debt statistics 2021 which contains debt data from 120 countries with low-middle income (middle-low income) until 2019. The data shows that Indonesia is one of the countries with the most debt which is ranked 7th in the world and first in ASEAN with a total foreign debt of US\$. 402.08 billion, which is larger than the previous year's debt, which was US\$.379.59 billion.

Several studies have shown that, there are differences in the phenomenon of the relationship between debt and economic growth or GDP. Differences in phenomena may occur due to differences in objects or research methods, but developments between the relationship between debt and GDP have grown and become more attractive to study. Nur et al (2017) and Lubis (2020) state that GDP has a negative effect on debt, which means that when GDP increases, debt decomposition will decrease. This contrasts with research by Wijeweera et al (2005) who found that there is a positive relationship between external debt service and GNP in

long-term estimates in Sri Lanka. Cholifihani (2008) in his research in Indonesia that there is a negative relationship between debt and GDP. In the literature the use of debt in the research used is different, where Wijeweera et al (2005) and Cholifihani (2008) use external debt service while Nur et al (2017) and Lubis (2020) use foreign debt service. However, these two debts can create problems if accumulated. Because most public spending and foreign exchange earnings will be absorbed in the debt burden. Clement et al (2003) high debt has an effect on growth through crowding out private investment or changes in the composition of public spending. This study focus on examines the relationship between GDP and foreign debt.

Since 1990 there have been reforms in both monetary and fiscal policies in Indonesia, so that the use of macroeconomic variables related to monetary and fiscal policies and their relation to foreign debt is still relevant. The research contribution to the literature is a). investigate the macroeconomic effects related to monetary and fiscal policies on foreign debt; b). using the VAR method to determine the response of foreign debt to macroeconomic variable fluctuations; c). investigate the decomposition of macroeconomic variability of foreign debt.

THEORETICAL BACKGROUND

Debt and the role of Macroeconomy

Afandi (2022) states that in the long-term interest rates have a positive effect on foreign debt. which means an increase in interest rates will also cause an increase in foreign debt. The strong correlation between foreign debt and interest rates causes changes in foreign debt that depend on changes in interest rates. However, the increase in foreign debt can also be caused by state revenue that is not optimal to finance all state expenditures. To cover the deficit, by increasing foreign debt. Eriyanti (2018) revealed that the higher government spending, the higher the external debt. This happened as a result of the government's efforts to maintain the momentum of economic growth; When growth slows down, the government takes expansionary policies by increasing spending on productive activities such as infrastructure development, as well as resources directed to activities in the health and education sectors, as well as social assistance.

Lubis (2020) in his research that GDP has a negative and significant influence on external debt. where an increase in GDP indicates an increase in consumption, investment, and exports in a country. The higher the GDP, it shows an increase in social welfare in order to reduce foreign debt. According to monetarist theory, an increase in GDP will boost exports so that the increase in the current account and external debt decreases, in line with research developed by Nur et al (2017) that GDP has a

negative and significant long-term effect on external debt. Consequently, when GDP is insufficient to cover the budget deficit, the government uses foreign debt as a tool to finance development. To boost GDP, the government must be able to strengthen leading sectors as well as exploring non-leading sectors. thus, Indonesia's high GDP will reduce external debt.

Research developed by Were (2001) and Isa Audu (2004) in Kenya and Nigeria, research investigates the relationship between external debt service and economic growth and shows that external debt service has a negative effect on economic growth. This contrasts with research by Wijeweera et al (2005) which found a positive relationship between external debt service and GNP in the long-term estimation in Sri Lanka, but in the short term there is a negative relationship. Cholifihani (2008) in his research in Indonesia that there is a negative relationship between debt and GDP, where a 1 percent increase in debt will reduce the level of GDP by 0.13 percent, besides that in the short-term period, Indonesia does not face the phenomenon of debt overhang.

There is still debate regarding the nature of debt and exports, whether they occur directly or indirectly. Sayuti (2021) in his research stated that exports have no effect in the short term, this shows that there is an indirect effect between debt and exports. The importance of using the export variable in the model as

government power in making payments on the debt. The results of his research state that the amount of foreign debt payments depends on around 15-17 percent of state revenue from exports.

RESEARCH METHOD

This study focuses on the interrelationship between macroeconomic variables such as GDP, government spending, interest rates, exports and foreign debt using a structural vector autoregressive (SVAR) approach. The data source used is from the publication of the Central Bureau of Statistics (BPS) of Bank Indonesia (BI) and the Ministry of Finance (Ministry of Finance) from 1990-2021. This method is used to examine the transmission and effects of macroeconomic variable shocks on money demand. Bacchiocchi and Fanelli (2015) state that the SVAR method is used as a policy analysis and a variable's response to shocks, as it is known that structural shocks need to be identified for the simulation of a policy. Magnusson and Mavroeidis (2014) in their research showed that structural changes that occur in macroeconomics can be used constructively to identify structural relationships with time invariants.

This research focuses on foreign debt and its environment such as a country's macroeconomic conditions. Macroeconomic variables used as an illustration of fiscal and monetary policies on foreign debt in Indonesia. The contribution of this research is to provide an overview of the importance of

fiscal and monetary policies with a quantitative approach and foreign debt responses based on macroeconomic variables and their shocks. To achieve this goal, the SVAR approach is used for policy analysis. The SVAR model was developed based on the theoretical basis and previous research. Impulse response analysis and forecast error variance decomposition were applied to describe the empirical findings of the study. According to Arwatchanakarn (2017) that the SVAR model is more interesting and profitable than the VAR model because it can use several economic theories and previous research and know the response of a variable when shocks occur in other variables.

The equation of SVAR based on Carillo et al (2020) as follow:

$$A^{-1}X_t = C + \sum_{\ell=1}^p B_{\ell}X_{t-\ell} + v_t$$

Where C is n x 1 which is a constant vectors. A^{-1} is n x n which is used as a matrix of contemporary structural relationships between the variables in the model, B_{ℓ} is persistent matrix, and v_t is a vector of structural innovation with a mean equal to zero, contains no autocorrelation, and a variance-covariance matrix equal to $E\{v_t, v_t\}=I_n$. Then in system A can be explain as:

$$X_t = \tilde{C} + \sum_{\ell=1}^p \tilde{B}_{\ell}X_{t-\ell} + \xi_t$$

Where $\tilde{C} \equiv AC$, $\tilde{B} \equiv AB$ dan $\xi_t \equiv Av_t$ which is the derived vector form of the innovation form with the same variance-covariance matrix to $E\{\xi_t, \xi_t\} = \Omega$. Then, matrixs A follow $AA' = \Omega$. To fulfill the exogeneity block, then the matrix A and \tilde{B}_ℓ is a matrix with blocks equal to zero, so it can be written as follows:

$$A \equiv \begin{bmatrix} A_{zz} & \mathbf{0} \\ A_{zy} & A_{yy} \end{bmatrix} \text{ and } \tilde{B}_\ell \equiv \begin{bmatrix} \tilde{B}_{zz,\ell} & \mathbf{0} \\ \tilde{B}_{zy,\ell} & \tilde{B}_{yy,\ell} \end{bmatrix}$$

Where A_{zz} is the impact of shocks from variables on the system, A_{zy} indicates the effect of macroeconomic variables, and A_{yy} representation of the impact of macroeconomic variable shocks. So is the notation $\tilde{B}_{zz,\ell}$ is the effect of the variable with lagged ℓ to the variables as they occur as shocks, $\tilde{B}_{zy,\ell}$ is the effect of current macroeconomic variables, and $\tilde{B}_{yy,\ell}$ is the effect of macroeconomic variables lagged ℓ to the foreign debt.

RESULTS AND DISCUSSION

The first step in testing time-series data is the stationarity test. The stationarity test uses the Phillips-Perron (PP) approach. A data is stationary if the t-statistics value from Phillips-Perron is greater than the t-statistics value of MacKinnon's critical values test at the level of 1%, 5%, or 10%. The results of the unit root test in this study are shown in the following table:

Table 1. Stationary Test

Variable	No Trend	No Trend
	Level	First-Difference
Debt	-3.595**	-9.011***
GDP	-0.949	-5.558***
Gov	-0.028	-6.642***
Exp	-2.404	-3.828**
r	-4.557***	-14.619***

Note: Note: The ***, **, and * indicate the statistically significant level at 1%, 5%, and 10%, respectively.

Table 1 explains that the variables used in the study are stationary at the 1st difference using the Philips Perron approach, this is because the Phillips-Perron t-statistics values for all variables are greater than the critical values or alpha test values of 1%, 5%, and 10 %. The Philips Perron approach is used to eliminate the problem of heteroscedasticity in data.

The lag optimum test on VAR estimation is used to analyze the length of the period of influence between variables (Gujarati, 2013). The criteria for determining the lag in this analysis use the Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Sharz Information Criterion (SIC), and Hannan Quinn (HQ). Determining the optimum lag in this study is used to determine the length of the period in determining the model to get its balance in the long run, in this case investigating the interrelationship between macroeconomic variables such as GDP, government spending, interest rates, exports and foreign debt. Determining optimum lag is also useful to show how long the reaction of a variable to other variables.

Table 2. Optimum Lag Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-85,96949	NA	0,000457	6,479820	6,735714	6,570547
1	60,30914	229,8664*	8,17e-08	-2,164939	-0,737577*	-1,728580
2	90,54466	36,71456	6,79e-08*	-2,5389408*	0,077926	-1,738913*

Note: The value has * representing automatic lag length was selected by using Schwarz Information Criterion (SIC)

Based on table 2, the results show an FPE value of 6.79e-08*, AIC of -2.5389408*, and HQ of -1.738913* which indicates optimal lag. This condition provides a relationship between the variables used in the VAR analysis using lag 2.

The stability of VAR can be seen from the value of the inverse roots characteristic of the AR polynomial. The VAR system is said to be stable if all the roots in the AR roots table have a modulus less than one (1) and all of them lie within the unit circle.

Table 3. VAR Stability Test

Root	Modulus
0.970701	0,970701
0.774632	0.774632
0.293546 - 0.481710i	0.564104
0.293546 + 0.481710i	0.564104
-0.479566 - 0.247079i	0.539474
-0.479566 + 0.247079i	0.539474
0.375553 - 0.367758i	0.525629
0.375553 + 0.367758i	0.525629
0.396366	0.396336
-0.281572	0.281572

Note : No root lies unit circle

Based on the results of the VAR stability test, it can be concluded that the estimated VAR to be used for IRF and FEVD analysis is stable at its optimal lag, because the tested unit has a modulus range of less than one, which ranges from 0.281572-0.970701.

Impulse response function is one of the methods in the VAR model that is used to observe the response of endogenous variables to the shock effect of other endogenous variables in the model. Impulse response is useful in knowing the change or response of a variable to an event (shock) at a certain time, so that it can observe how long it takes for the dependent variable to respond to the shock of the independent variable.

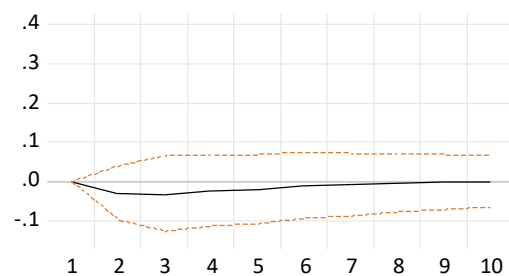


Figure 1. Response Debt of GDP Shock

During the 10 periods, the response from foreign debt has consistently decreased from the 2nd to the 10th period where foreign debt responds negatively to shocks to the GDP variable. The existence of a negative response to the GDP value shock is in line with Lubis (2020) which reveals that GDP has a negative and significant effect on foreign debt. Besides that, shocks to the GDP variable will be responded negatively by foreign debt. It also

supports monetarist theory, where an increase in GDP will encourage an increase in exports. , so that the increase in the current account and debt will decrease. When the value of exports is higher than the value of imports, net exports are positive, and when exports are high, foreign exchange reserves can be increased and can reduce foreign debt. In line with Nur et al (2017) which states that GDP has a negative effect on foreign debt, where an increase in national income will reduce foreign debt. Research developed by Ramzan and Ahmad (2014) states that external debt service has a negative effect on economic growth in Pakistan, and some of the adverse effects on economic growth through external debt service can be prevented through sound macroeconomic policies.

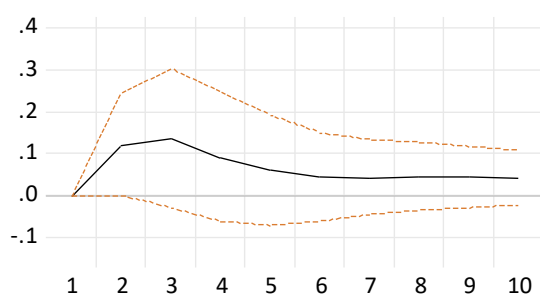


Figure 2. Response Debt of Gov Spending Shocks

The response from foreign debt increases from the first period to the third period, from 0.12 to 0.14. foreign debt response positively to the shock of government spending from the second to fourth periods. And in the fifth to tenth period they still respond positively but decrease. Where these results are in line with Eriyanti (2018) which states that higher

government spending causes an increase in debt. This happened as a result of the government's efforts to maintain the momentum of economic growth; When the economy slowed down, the government pursued expansionary policies by increasing government spending on productive activities such as infrastructure development, as well as resources directed at activities in the health and education sectors, as well as social assistance. Because expansionary policies and state revenues are unable to cover state spending, a deficit will occur, in which the deficit is mainly funded through debt.

The budget deficit that occurs makes the government need more funds to cover the budget deficit, and one of the sources of funding is foreign debt. So that the greater the foreign debt, the higher the government spending to repay the foreign debt. It is undeniable that the development of a country requires high funds, but the obstacle that often occurs in this process is the formation of capital originating from government revenues, so that one of the funding alternatives that is able to meet these capital requirements is one that comes from foreign debt.

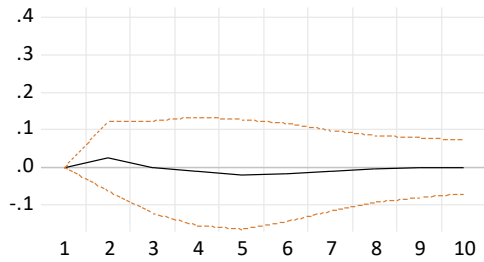


Figure 3. Response Debt of Export Shocks

The estimated VAR impulse response in Fig. 3 is the response of the foreign debt to the value of exports. During 10 periods, the response of the foreign debt is fluctuated. The response from foreign debt decrease until the sixth period, from 0.03 to -0.02. the response is negatively to shocks from exports from the second to the ninth period. The negative response to the shock in the export value is in line with Sadim (2019) which states that exports have a negative effect on foreign debt. Which there is an increase in exports will cause the value of debt to decrease. Even so, not all of the export proceeds are used to pay foreign debts.

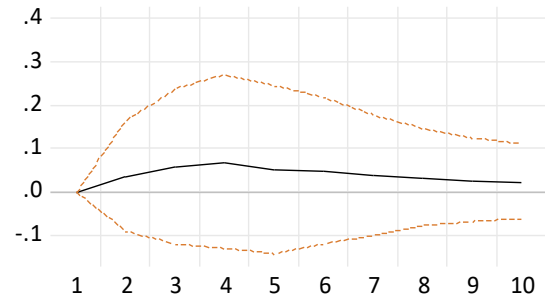


Fig 4. Response Debt of Interest rate Shocks

Positive response from the foreign debt to the shock of interest rates from the second period to the fifth period with an increasing trend from 0.04 to 0.07 and the 5th to 10th periods experienced a decrease from 0.05 to 0.02. This is in line with Afandi (2022) which states that in the long-term interest rates have a positive effect on debt. which means an increase in interest rates will also cause an increase in debt.

The purpose of implementing the variance decomposition in the VAR model is to measure the magnitude of the contribution or composition of the variability of the use of macroeconomic models, in this case, GDP, government spending, exports and interest rates on debt in Indonesia.

Table 4. Forecast Error Variance Decomposition

Period	S.E	Debt	GDP	Gov	Exp	r
1	0.266	100.000	0.000	0.000	0.000	0.000
2	0.412	89.600	0.525	8.662	0.446	0.764
3	0.477	82.059	0.819	14.661	0.333	2.125
4	0.504	78.485	0.932	16.467	0.348	3.766
5	0.516	76.853	1.014	17.068	0.497	4.566
6	0.525	75.892	1.015	17.229	0.570	5.292
7	0.533	75.365	1.007	17.398	0.590	5.638
8	0.540	74.896	0.986	17.657	0.582	5.876
9	0.545	74.501	0.966	17.949	0.570	6.011
10	0.550	74.145	0.960	18.242	0.561	6.100

Note: Author Calculation

Table 4 shows that in the first period, variations in the value of debt derived from the variable itself reached 100%, while the value of interest rates, government spending, GDP, and exports there is variability to debt. In the following period, changes in the value of the external debt were still dominated by the external debt variable itself at 89.60%, followed by the government spending variable at 8.66%. The interest rate variable has a relationship with external debt of 0.76%, GDP of 0.52%, and exports has a relationship of 0.45%.

Each variable contributes a different variability to debt up to the tenth period. The contribution given by the interest rate variable tends to increase every year, from 0.76% to 6.10% in the tenth period. Likewise with government expenditure variables and export variables, where the contribution of these two variables to external debt has consistently increased from 8.66% in the second period to 18.24% in the tenth period for the government expenditure variable, and for the export variable from 0.44% to 0.56 in the tenth period. While the GDP variable also contributes with fluctuating movements until the tenth period. The largest contribution value in the tenth period came from government spending of 18.24%, followed by an interest rate variable of 6.10%, then GDP of 0.96%, and exports with a relationship value of 0.56%. Therefore, it is concluded that changes in debt values are more influenced by

the variability of government spending, interest rates, GDP and exports.

CONCLUSION

Based on the results of the study that shocks to the GDP variable will be responded negatively by debt, this shows that an increase in GDP will boost exports so that the increase in the current account and external debt decreases. The sensitivity of the debt response is shown to be positive when there is a shock to the variable government spending and interest rates, where a high level of government spending and an increase in interest rates can increase debt. The results of the variance decomposition show that government spending has the largest contribution to variability compared to other variables in the model on debt, this shows that expansionary fiscal policy by increasing government spending can increase debt in Indonesia.

The policy of taking on new debt to cover the budget deficit or old debt needs to be reviewed, because in the long term the policy of covering old foreign debt by taking on new debt can have implications for increasing the total amount of foreign debt from year to year which will make Indonesia enter a trap. debt, so that it will provide a very large burden on the state budget in the long term.

LIMITATION

Research on foreign debt has provided a broad picture of the overhanging debt phenomenon,

but it would be more exclusive if it applied debt other than the government sector such as the private sector and BUMN so as to provide a more comprehensive picture of debt and macroeconomic conditions.

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