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MACROECONOMIC DETERMINANTS OF FISCAL RISK IN INDONESIA: EVIDENCE FROM AN ARDL APPROACH

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ABSTRACT

Research Originality — Many studies identify the effect of macroeconomic dynamics on government debt by using cross-country data. However, such approach often fails to fully explain country-specific characteristics. To address the gap, this research focuses on Indonesia by assessing the effect of macroeconomic volatility on its fiscal sustainability involving a dataset that spans the periods of major economic shocks, including the global financial crisis and the COVID-19 pandemic.
Research Objective — This study focuses on empirically investigating the effect of GDP growth, inflation, and exchange rate fluctuations on government debt as a measure of fiscal risk in Indonesia.
Research Methods — This research employs annual data spanning 1993 to 2024, with government debt serving as the dependent variable to proxy fiscal risk, and the economic growth, inflation, and USD/IDR exchange rate as the independent variables of the macroeconomic parameters. The Autoregressive Distributed Lag (ARDL) method was used by the researchers to illustrate the relationship between variables in both the short-term and the long-term.
Empirical Results — In the long-run, economic growth and inflation are found to exert a negative effect on government debt, whereas exchange rate depreciation will increase it. Meanwhile, in the short-term, only inflation and exchange rate will affect government debt.
Implications — The result of the research provides empirical evidence to support policymakers in formulating the policy to manage fiscal sustainability during macroeconomic shocks. These findings can also support the government in developing scenario analyses across different macroeconomic conditions.

Keywords: Fiscal Policy; Fiscal Risk; Government Debt; Macroeconomic Variable; Risk Management

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INTRODUCTION

The last twenty years have subjected every government in the world to pressure due to several unfavorable events such as the Asian financial crisis, global financial crisis, geopolitical tensions, and COVID-19 pandemic. These experiences have taught the government a lesson on fiscal policy management. If not handled carefully, such issue can also escalate into significant problems. Therefore, the government must identify the root causes appropriately before they emerge to prevent disastrous events from developing into larger issues. This proactive approach, combined with the development of mitigation strategies, forms a forward-looking mechanism known as fiscal risk management. According to de Mello & Ter-Minassian (2024), fiscal risks are defined as events that affect a country's budget in such a way that their realization can lead to significant deviations from its target.

One consequence of poor fiscal risk management is the potential for added strain on the government budget. The pandemic is a recent example of a risk event that leads a country to expand its budget to respond to the emergency. However, several international best practices have established a framework for managing fiscal risks. This framework enables countries to mitigate these risks by developing policies that reduce either the likelihood or the effect of such risks.

A key aspect of managing fiscal risk is the government's capacity to identify, evaluate, and estimate the likelihood of risks and to develop strategies to mitigate them. When a government's ability to manage fiscal risks is limited, these risks can materialize. However, in many cases, fiscal risks often receive little attention from most governments. Fiscal risk management efforts are frequently ineffective, reactive, and overly focused on preventing exposures. In addition, most governments lack the tools and resources needed to manage fiscal risks effectively (Gaspar et al., 2016).

APPLICATIONS FOR PRACTICE

- To develop optimal policy responses, the government must ensure data reliability and strengthen fiscal risk management to improve risk identification, measurement, and mitigation amid future uncertainties.
- The ARDL approach reveals that economic growth, inflation, and exchange rate significantly affect government debt in the long-term. However, in the short-term, only inflation and exchange rate have a significant effect on government debt.
- Given the dynamic nature of financial markets, comprehensive information on data characteristics and their broader ecosystem should be incorporated to provide a forward-looking perspective and enable more effective policy recommendations.

Indonesia has experienced a tedious and extensive journey in dealing with fiscal risks. The nation has proved to be resilient in all crises around the world even though the government must make concessions by extending the budget deficit to facilitate these crises, which in turn leads to debt limit. However, there are numerous aspects that can predispose Indonesia to extreme conditions in case of failure in dealing with them.

The purpose of this research is to identify how the Indonesian government deals with fiscal risks, and particularly, to define their major drivers. In terms of fiscal risk management in Indonesia, this study highlights why effective management is necessary. The auto-regressive distributed lag (ARDL) model was used in this study to analyze different macroeconomic variables and identify the primary factors that affected fiscal risk management.

It is based on this introduction that this paper will discuss the theoretical framework of fiscal risk, its definition, and the urgency of managing it. The next section will analyze the fiscal risks in Indonesia through an evaluation of a few indicators that affect the management of fiscal risks by adopting the ARDL approach. The concluding part will contain the findings of this paper.

LITERATURE REVIEW

Fiscal risk management recently becomes a critical aspect of a fiscal policy. In the United Kingdom (UK), the government has a fiscal role as evident in its control of state finances. The UK government should make sure that its direction towards managing fiscal risks is the right way. That is to say that, being a fiscal authority, the government must take the initiative of coming up with fiscal policies that look at the future economic environments and adjust to them to maintain their performance. However, the control of fiscal risk will frequently present future risks that becomes subject to numerous challenges such as determining the risk, making policies in advance, and taming uncertainties.

In this regard, the Australian Treasury (2019) has developed its fiscal analysis by describing fiscal risks as something that has not been identified and included in the fiscal predictions. Such definition is important because the identification of risks is a critical process which may result in poor policy responses when it is not able to overcome the process. This definition also points out two main aspects of fiscal risk management. The first is related to the fact that one of the key elements of forward-looking policy is the establishment of the future-oriented fiscal risk management. The second one underlines that efficient risk control should involve the application of thorough forecasting procedures.

In addition, Qingwang & Junxue (2025) further explore the causes of fiscal risks, which they describe as the continuous weakening of fiscal situation and the outbreak of fiscal crisis due to improper fiscal behavior, flawed policies, as well as uncertainties in economic, social, and political development. They acknowledge the complexity of the causes and mechanisms of fiscal risks but manage to classify fiscal risks into two levels. The first is the continuous weakening of fiscal solvency caused by inherent issues within the fiscal system itself such as revenue instability, excessive expansion of fiscal expenditure, inefficient fiscal management, and deficiencies of the fiscal system. The second involves economic uncertainties, including macroeconomic imbalances. Whatever the case is, the main manifestations of fiscal risk are large fiscal deficits and debt crises.

The other area that is not explicitly mentioned in the concepts above is risk management time frame. However, the International Monetary Fund (IMF) explains the significance of examining the sources of fiscal

risks to make government budget less vulnerable. They highlight the effects of fiscal risks on short- to medium-term government budget. However, when the government measures short- and medium-term risks only, it may experience difficulty in forecasting and reducing long-term risks such as pension funds. Therefore, the definition of fiscal risks can be extended to cover other factors or events that affect annual budget estimates and management of state assets and liabilities in the short-, medium-, and long-term, thus making it possible to have a more holistic look at fiscal risks and their time aspect (Cangiano et al., 2013).

Bova et al. (2016) discover that fiscal risks may be very significant, posing a threat to the short-term fiscal solvency and long-term sustainability. Costs of fiscal risks may be very non-linear and economically disruptive. Such risks are normally very much correlated with other factors. Therefore, fiscal risk management is significant since it can affect the short-term and long-term budgetary status of the government.

One of the examples that illustrate the relevance of managing fiscal risks is the COVID-19 pandemic. Nobody could guess what would happen at the end of 2019 or at the beginning of 2020. The Office for Budget Responsibility (OBR) was published by the United Kingdom Office for Budget Responsibility (2019) and singled out and highlighted the risks posed by new contagious and infectious diseases. This report was informative for diseases which might be imported or brought in by non-native animals. However, no further elaboration was made for mitigating these diseases, which led to a suspicion that the probability of this risk to happen was deemed as low or insignificant by the report.

The financial sector has been found to be the cause of numerous fiscal crises before the COVID-19 pandemic. Some of them include the Sweden and Finland financial crises in 1991(M.D. Bordo & C.M. Meissner, 2016), the Asian financial crisis of 1997-1998, and the Russian and Brazil crises in the late 1990s (Icaza, 2017). Leonello (2018) observes that many of the past financial crises are linked to the high use of financial guarantee for financial institutions. The guarantee can lead to an increase in the likelihood (and possibly also in the severity) of a crisis, and thus in the need for and costs of public intervention. the provision of guarantees can entail an actual, and potentially large, disbursement for the government to the point of threatening the solvency of the sovereign. These risks are usually a result of off-budget or off-balance sheet fiscal operations and unaccounted liabilities (Razlog et al., 2020).

The above examples indicate that effective management of fiscal risks requires an in-depth analysis and improvement to achieve good fiscal risk management of the country and achieve macroeconomic stability. Such an urgency has been increased by the occurrence of the global financial crisis, the COVID-19 pandemic, and the recent sharp drop in commodity prices, which made it clear that the public finances are susceptible to unknown shocks. As history has always demonstrated, unpredictable events and ensuing contingent liabilities may result in deviation of fiscal outcomes, which are below the target and may result in a macroeconomic crisis.

Consequently, to protect fiscal stability, governments need to create a more holistic vision of the possible threats to the monetary status. Nonetheless, the existing fiscal risk evaluation, reporting systems and management approaches are in most cases disjointed, incomplete, and primarily qualitative. These in competencies may contribute to uncoordinated and poorly planned responses to policies. Therefore, an integrated and comprehensive assessment of possible deviations of the finances of the population, so-called fiscal stress tests, can help policy makers to simulate the effect of shocks on the base projections and examine their implications on government liquidity, solvency, and funding needs. Proper, timely, and complete fiscal information including all the public bodies, assets and liabilities are important to back this strategy.

Lastly, empirical modelling methods must be embraced by nations in formulating long-term fiscal goals and policy targets they want to achieve within a time span. As part of the fiscal stress tests, these are useful in providing insights to debt sustainability to ensure that policymakers can identify possible risks and make sure that the amount of debt will not exceed the set fiscal guidelines.

Fiscal vulnerability is another important aspect in the measurement of fiscal risks. This situation reveals the weak fiscal state of a nation especially when some negative occurrences hit the economy. According to Chandia et al. (2022), fiscal vulnerability goes beyond the economic situation, where governments and fiscal authorities implement inappropriate macroeconomic strategies and fiscal policies. This represents an inability of the government to implement suitable policies in the country. There are three key metrics in fiscal vulnerability, including, first, the extent to which fiscal pressures weigh on the economy's overall budgetary position, second, the long-term demographic dynamics including national fertility rates and the associated social security obligations that may generate economic burdens, and third, the scale and nature of the country's financing requirements.

The management of fiscal risks certainly includes considering the factors that may affect the fiscal position of the government. These sources of risks may deteriorate fiscal conditions (downside risk) or enhance them (upside risk). The unique causes of fiscal risks do not cut across the board as they depend on the economic situation and features in the country. Outstanding government debt is used in measuring fiscal risks since a larger government debt in relation to national output increases the chance of default because the government is unlikely to fulfill its obligations (Anghel et al., 2022).

The independent variables are commonly selected from several macroeconomic variables to determine the effect they have on the government debt. Such variables include growth and the rate of inflation in the economy and the exchange rates. In Indonesia. Hiddthir et al. (2025) determine that government debt is negatively related to economic growth in both the short- and long-term. Their research found out that the long-run and short-run government debt decreases with an increase in economic growth by 1.87 and 4.55, respectively. In the same vein, Salmon (2021) finds a similar pattern in 40 studies from the existing economic literature in the period of 2010-2020 and reveals that there is a nonlinear debt threshold, above which debt has a significant negative correlation with economic growth rates.

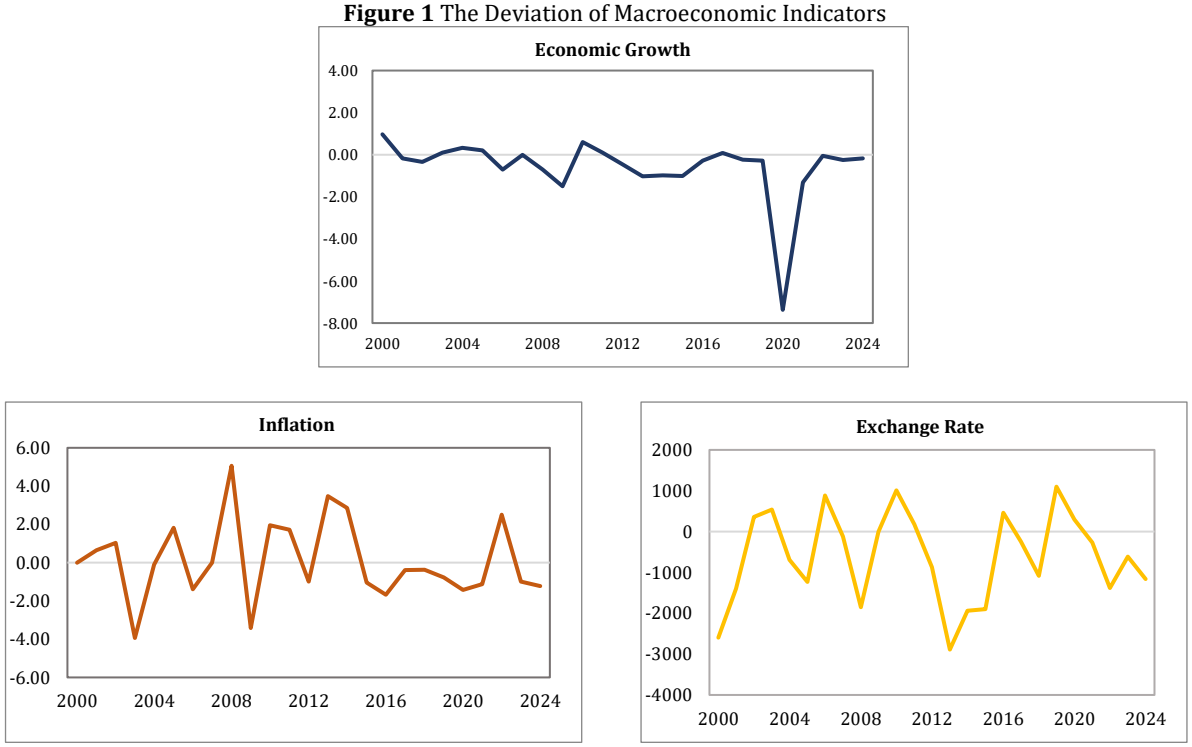
The second macroeconomic indicator is inflation. The vector error correction model (VECM) was used by Belguith & Omrane (2017) who discover that the inflation factor helps to reduce the debt of the government. On the other hand, Chirwa & Odhiambo (2018) use the ARDL to estimate some European countries and find that in the short-term the inflation causes debt accumulation in most of the European countries, except the United Kingdom, France, and Ireland. However, the inflation, in long-term perspectives, was observed to have no major effects on government debt in the European states.

The exchange rate is also another crucial determinant of government debt. Ouhibi & Hammami (2020) state that the effect of the fluctuations of exchange rate on the government debt in European countries is statistically significant and positive. Meanwhile, in sub-Saharan Africa, the correlation is significant and negative. Similarly, Keyser & Paczos (2023) find that changes in exchange rate have a significant effect on the increase in public debt, and in economies with floating exchange rate regimes, the risks increase with higher public debt-to-GDP ratios.

According to the research undertaken by IMF (2016) in 80 countries in the period between 1990 and 2014, one of the risks that affect government debt the most in the world is the macroeconomic pressure. Macroeconomic factors give rise to fiscal risks that happen once in about twelve years, and during the event, the fiscal burden is about 9% of the GDP of a country. These circumstances emphasize the need to set macroeconomic baseline assumptions, which will determine the budget implementation. A great variance between the assumptions and the realized budget will raise more financial burdens. The next part of this paper will address the problem of mismatches in the anticipated and achieved macroeconomic indicators and how they affect fiscal management and the reaction of policies to this scenario.

The government has shown greater abilities in designating possible fiscal risks due to variations in macroeconomic conditions in the fiscal risk management context in Indonesia. To construct Figure 1, the researchers discussed the deviations between the macroeconomic conditions that would be statistically achieved in the 2000-2024 period to the macroeconomic baseline assumptions of the state budget (APBN). Figure 1 shows that these deviations have a narrowing tendency, particularly with respect to some of the baseline indicators, including the economic growth, the inflation rate, and the exchange rate.

Figure 1 The Deviation of Macroeconomic Indicators



Source: Financial Notes and Central Government Financial Reports 2000-2024, Processed by the Authors

However, it is difficult to foresee the effects of the shock caused by enormous economic recessions. As an example, in the year 2020, as the COVID-19 pandemic began, Indonesia registered a massive negative economic growth of -7.5%. In 2019, based on continuous growth in consumption, investment, and exports, the government in the state budget forecasted an economic growth of 5.3% in 2020, conditional on a measured government spending. However, the pandemic with the spread in Indonesia resulted in the imposed mobility restrictions and the ban of domestic and international activities. These actions had a significant effect on the economic growth of Indonesia as the actual economic decline of -2.2% was experienced in 2020.

Figure 1 also shows how the process of developing the macroeconomic baseline assumptions is a difficult dimension of the construction of government annual budget plans. The process is tough since budget plans by the government are long and largely determined by the prevailing assumptions and global and domestic settings. Deviations on the budget, however, happen when the real performance is not as per the expectations as the real occurrences. As stated above, a fiscal risk is prospective since it covers a broad spectrum of probabilities and largely depends on the system of risk events under consideration. Therefore, a risk event analysis should involve strong analytical software and the integration of all possible past data to gain more insight into the risk and ways to control it, thus developing more relevant future forecasts. Because of its complexity, risk assessments tend to be professional.

METHODS

Fiscal sustainability is one of the indicators that the government has been successful in its management of fiscal risk. One of the variables that are significant in the evaluation of fiscal sustainability is the outstanding government debt. Such a debt is achieved where the government assumes an expansionary budgetary policy, which consequently boosts the fiscal deficit, hence the government debt accumulation takes place. The increase of government debt may potentially increase the debt repayment obligations and, if it is not handled correctly, may increase the risk of default. In addition, the conditions may reduce the fiscal space and weaken the fiscal capacity of absorbing adverse events, and this results in crisis vulnerability.

After the COVID-19 pandemic, the problem of the growing government debt in different countries has become more significant because of the financial vulnerability. In a world that is becoming more characterized by uncertainty, macroeconomic factors are of high relevance since they have the potential of affecting the financial policies and strategies of a country significantly. Therefore, it is necessary to comprehend how macroeconomic variables may produce a continuous effect on the debt position of the government.

This study was conducted by analyzing three macroeconomic indicators, which include economic growth, inflation, and exchange rates. Past studies have indicated the existence of a negative relationship between economic growth and the amount of government debt (Hiddthir et al., 2025). Accordingly, this analysis took the figures of annual growth rate of GDP of the Central Bureau of Statistics of Indonesia as a symbol of economic growth and examined its relationship with government debt.

Similarly, previous literature recommends that inflation has the potential to lower the government debt. In this way, we attempted to explore the impact of inflation by using annual data of the national inflation rates obtained through the Central Bureau of Statistics. The USD to Rupiah exchange rates represent an exchange rate as a critical variable in explaining the external debt and the total government debt exposure because of depreciation of currency (in this case USD) on the foreign-denominated debt. This rate was selected because it is used as a proxy to most of the international trade and currency transactions in Indonesia. Table 1 lists all the variables that were used in this analysis.

Table 1 Descriptions and Sources of the Variables of the Study

No	Variables	Symbol	Data Sources	Data range	Measurement
1	Government Debt (Central Government Debt)	LN_DEBT	Ministry of Finance, Indonesia	1993-2024 (annually)	Nominal (Natural Log)
2	Economic Growth (GDP Growth)	EG	Central Bureau of Statistics, Indonesia	1993-2024 (annually)	Percent
3	Inflation	INF	Central Bureau of Statistics, Indonesia	1993-2024 (annually)	Percent
4	USD/IDR Exchange Rate	LN_ER	International Monetary Fund	1993-2024 (annually)	Nominal (Natural Log)

Source: Processed by the authors

Then, the natural logarithm transformed all the nominal data of the dependent variables and the independent variables to make percentage changes and linearization of the variables relationships to ensure the variables are analyzable in the ARDL model. All these variables were tested to observe their effect on fiscal sustainability that is shown by government debt. In this way, the ARDL methodology was employed.

The authors chose the ARDL method because it has several merits. To begin with, ARDL model can provide dynamic effects of macroeconomic variables in the short-run and the long-run, thus offering a more exhaustive statistical framework when it comes to the making of policies. The second reason is that as Shrestha & Bhatta (2018) point out, this method is applicable for time series with mixed order of integration. Finally, the ARDL

model can also be employed when the sample size is fairly small as it is effective in reducing statistical significance problems.

The ARDL approach to the analysis has some important steps. The initial one is to perform a stationarity test by the Augmented Dickey-Fuller (ADF) test. This is done to statistically establish whether the variables are stationary at level I(0) or with initial differencing I(1). A cointegration test is then generated and applied to the bound testing method; at this point, all the variables are tested against specified levels of significance and compared to the F-statistic to establish whether there is a statistically significant long-run relationship or not. The third stage is to identify the best lag length to use to ensure that the ARDL model does not under or overfit a relationship. The Akaike Information Criterion (AIC) is used to select the best lag length. The fourth step, after the optimum lag is determined, is the estimation of the long-run relationship between macroeconomic variables and the debt of the government based on the ARDL model as indicated by the AIC.

The fifth step will be a short-run analysis with the help of the Error Correction Model (ECM) to see the influence of macroeconomic variables on government debt in the short-run and how fast the model can move toward the long-run equilibrium. Lastly, the evaluation of the reliability of the model by using diagnostic tests of the normality, autocorrelation, heteroscedasticity, and stability parameters is conducted to ensure that the results obtained are valid.

The ARDL model was formulated to reflect both short-term and long-term relationships in outstanding debt. The term ΔYt captures the short-term dynamics of outstanding debt. The formula $\sum_{i=1}^{n} \beta_i \, \Delta Y_{t-1}$, captures the effect of past changes in outstanding debt on the current change in outstanding debt; in this model, we considered the summation of multiple past periods. On the other hand, $\sum_{i=0}^{n} \delta_2 \, \Delta X_{t-1}$ captures the effect of past changes in %GDP Growth or Inflation Rate or LN of Exchange Rate on the current change in outstanding debt; in this model, we considered the summation of multiple past periods. For the long-term relationship, the specification includes the lagged level of the dependent variable outstanding debt ($\varphi_1 y_{t-1}$) and the lagged level of each independent variable ($\varphi_2 x_{t-1}$). Finally, μ_t represents unobserved factors that may affect outstanding debt but not explained in the model.

The ARDL model can be further detailed through the following equations:

$$\Delta Yt = \beta_o + \sum_{i=1}^{n} \beta_i \, \Delta Y_{t-1} + \sum_{i=0}^{n} \delta_2 \, \Delta X_{t-1} + \varphi_1 y_{t-1} + \varphi_2 x_{t-1} + \mu_t \ldots (1)$$

Where, referring to equation (1), the short-term relationship is described through:

$$\Delta Yt = \beta_o + \sum_{i=1}^{n} \beta_i \, \Delta Y_{t-1} + \sum_{i=0}^{n} \delta_2 \, \Delta X_{t-1} + \mu_t \ldots (2)$$

The long-term relationship in equation (1) is described by:

$$Yt = \varphi_1 y_{t-1} + \varphi_2 x_{t-1} + \mu_t \ldots (3)$$

To do this, the analysis was done based on annual data within a long duration of 1993 to 2024 with fiscal sustainability as the dependent variable, i.e., government debt of Indonesia. The independent variables were macroeconomic variables and were expressed as the economic growth (GDP Growth), the inflation rate of Indonesia and the exchange rate between the USD and the IDR. The analysis of the next period is the reflection of the economy of Indonesia which has passed through many different dynamics such as the crisis of 1998, the crisis of 2008 connected with subprime mortgages, and the COVID-19 pandemic.

RESULT AND DISCUSSION

The authors performed a unit root analysis to establish the presence of stationarity at various levels as this is a requirement when using the ARDL model. A set of data may be regarded as being at rest when the values of the mean, covariance, and variance of the same are fixed. The ADF test method, therefore, gives a summary of whether I(0) was stationary or not as well as whether I(1) was also stationary or not.

According to Table 2, the data is stationary because a probability value below 5% shows that the data is stationary. The findings indicate that the economic growth (EG) variable is the only one that is stationary. However, the four variables are stationary in the first level of difference whereby the probability values are less than 5%.

Table 2 Stationary Test Results

Unit Root Level		Unit Root First Difference	
Variable	Prob.	Variable	Prob.
LN_DEBT	0.392	*LN_DEBT*	0.000
EG	0.003	*EG*	0.000
INF	0.104	*INF*	0.000
LN_ER	0.109	*LN_ER*	0.009

Source: Processed by the authors

The bounds test was then conducted to compute and find out whether the relationship between the research objects under scrutiny in the ARDL model is long-term or not. Cointegration is a positive sign of

relationship. In case of cointegration, the long-term and short-term relations can be examined in the model. The test was performed through the comparison of the result of F-statistic with critical values at 5% significance level. If the level of the test indicates a lower level than the F statistic level, then the alternative hypothesis is accepted, which means that there is cointegration and it is the confirmation of a long-term relationship. This is a test that can be used to analyze the interaction of the variables more comprehensively with time.

Table 3 F-Bound Test Results

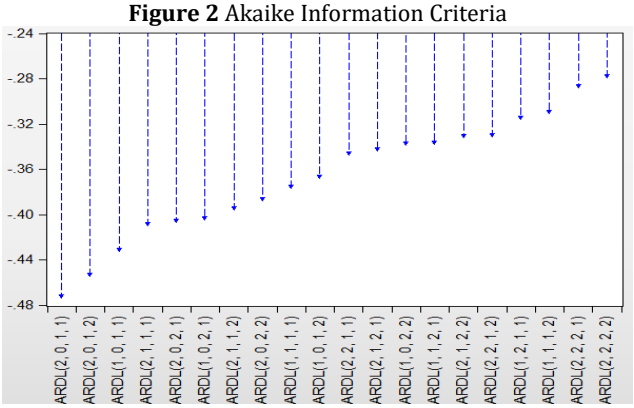
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	16.2	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: Processed by the authors

Table 3 indicates that the value of the F-statistic is 16.2. Comparing this value of F-statistic with the upper bound value at the 5% significance level, we can conclude that there is cointegration, which implies the presence of long-term dynamics in all the used variables of the research. Furthermore, the long-term correlation is not that weak because the value of F-statistic is still greater even when the significance level is greater by 2.5% and 1%.

The second step will be to choose the best lag length to obtain the model of ARDL that is accurate and not over and underfitting. Overfitting occurs when the model assumes too many lags and is including random noise instead of true relationships and thus reduces the predictive values and generalizability. On the other hand, there is underfitting, which happens when the number of lags is insufficient and the bias to the omitted variables and the poor representation of the dynamic relationships are obtained.

Figure 2 Akaike Information Criteria



Source: Processed by the authors

The optimal lag length test results with the AIC method are provided in Figure 2. The findings indicate that the ARDL model having a lag (2, 0, 1, 1) results in the least AIC value. Therefore, this ARDL model was the most effective and suitable for analysis.

Having identified the best model, the researchers examined the relationship dynamics which can be observed in both the short-term and the long-term. There was a test done to determine the dynamics of the long-run interval, and the results are displayed in Table 4.

Table 4 ARDL Model (2,0,1,1) in Long-Term

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EG	-0.115	0.054	-2.108	0.046
INF	-0.126	0.032	-3.878	0.000
LN_ER	1.442	0.261	5.525	0.000
C	2.683	2.761	0.971	0.341

Source: Processed by the authors

Table 4 indicates that all the three macroeconomic variables are significantly related to government debt in the long-term. The economic growth is the first macroeconomic variable negatively affecting, with a coefficient value of -0.115 and p-value of 0.046. This finding implies that an increase in economic growth by 1% will decrease the amount of government debt by 0.115% and the reverse will also work. Therefore, economic growth will result in lower government debt over the long-term. In the meantime, the coefficient of inflation variable was calculated as -0.126 and the p-value was 0.000. This finding implies that the growth of government debt will reduce by 0.126 to every 1% change in inflation and vice versa. On the other hand, the effect of the

exchange rate variable on government debt is very positive in the long-run with the increase of 1 percent of the exchange rate leading to a corresponding increase in government debt by 1.442%. This outcome implies that depreciation of rupiah will have a debt-creating effect.

Table 5 Short-Term Dynamic Error Correction Representation for the ARDL Model (2,0,1,1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF)	-0.027	0.003	-7.241	0.000
D(LN_ER)	2.233	0.179	12.411	0.000
*CointEq(-1)**	-0.371	0.037	-9.784	0.000

Source: Processed by the authors

The results of the short-term testing of the relationship between macroeconomic variables and government debt are shown in Table 5. These findings suggest that economic growth (EG) is not a major factor that affects the fiscal sustainability in the short-term since this is not indicated in the short-term estimates. On the contrary, there is confirmed significant negative correlation between inflation and government debt with a coefficient of -0.027 and p-value of 0.000. This outcome implies that, in case the inflation in Indonesia rises by 1 percent, the government debt will decline by 0.027%. In the meantime, the exchange rate (LN_ER) variable demonstrates a significant positive short-term effect; the coefficient is 2.233 and the p-value is 0.000. This outcome implies that when the exchange rate increases by 1 percent, the government debt can increase by 2.233%. Also, the analysis of error correction term (ECT) or CointEq value, which has a p-value of 0.00, helps prove that there is a stable long-term relationship between the tested variables. The coefficient of determination (in other words, CointEq)-1 = -0.371 means that the deviations are corrected at 37.1% each year, which is an average rate of adjustment.

The researchers then performed residual diagnostic tests to detect the presence of key econometric assumptions in the ARDL model (2,0,1,1) to enable it to be used in making interpretation. The tests performed on the residuals are the normality test, heteroscedasticity test, and autocorrelation test as shown in Table 6.

Table 6 Residual Diagnostic Test Results

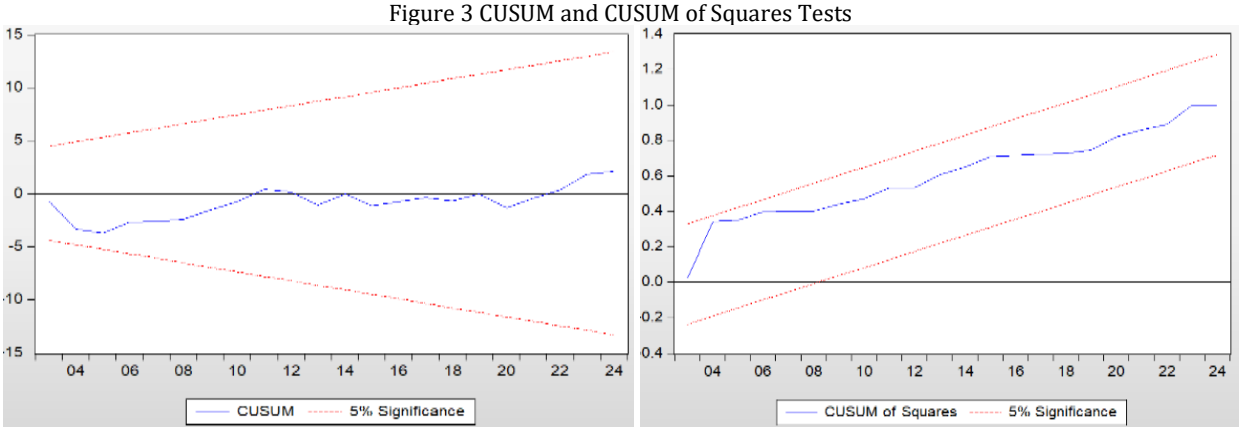
Test Name	Test Statistic	Value obtained	P-Value	Remarks
Normality Test (Jarque-Bera Test)	JB-Statistic	0.101	0.950	Normally distributed
Heteroscedasticity Test (Breusch Pagan-Godfrey Test)	F-Statistic	0.126	0.881	Homoscedastic
Autocorrelation Test (Breusch-Godfrey Serial Correlation LM Test)	F-Statistic	0.940	0.496	No serial correlation

Source: Processed by the authors

All the residual test values have been found to have p-values greater than the set significance level (5%). Accordingly, the ARDL equation (2, 0, 1, 1) was normally distributed, it did not indicate any autocorrelation, and it did not indicate heteroscedasticity. These findings show that ARDL model (2,0,1,1) has survived the classical assumptions tests and that it is statistically valid.

Second, there was a test of model stability to show if the model is stable during the observation period. The test will make sure that the model is relevant with time. The stability test was implemented on CUSUM and CUSUMQ; the details are provided in Figure 3.

Figure 3 CUSUM and CUSUM of Squares Tests



Source: Processed by the authors

Both the CUSUM test and CUSUMQ test values on the ARDL model (2,0, 1,1) are always within the critical ranges. This finding is an indication of the stability of the model in both the short-run and the long-run as well

as an indication of the fact that although there is a long-run stability of the model, this may indicate that the estimated parameters of the model do not change significantly over time.

The findings of this paper illustrate how various macroeconomic variables may have an effect on fiscal sustainability. To begin with, the short-term analysis of this study found that there was no sign that the economic growth of Indonesia directly affects government debt in the short-term. Conversely, when the findings are viewed in the long-term, it indicates that increased growth in the economy can decrease the government debt. The value of the coefficient of 0.115 implies that as the economic growth of Indonesia increases by 1%, the government debt decreases by 0.115%, and the opposite is true. In terms of fiscal policy, such relationship can be justified through the fact that economic growth is usually an indication of consumer purchasing power and high business productivity. This would consequently increase the government revenues due to the increase in other tax objects. The extra tax is an improvement to the possibility of budget surplus, and hence the government debt is minimized. This observation is in line with Hiddthir et al. (2025), who remark that higher economic growth leads to the growth of tax revenues and assists the nation to service its debts.

The next variable tested was the rate of inflation, which yielded meaningful findings and was seen to be negatively related to the government debt in the short-term as well as in the long-run. These findings point to the fact that an increase in inflation rate can decrease government debt. Economically, inflation has the propensity of lowering the real value of local currency. In this case, the true value of government debt liabilities goes down while the nominal value of government revenues goes up. When inflation rises by 1%, government debt decreases by 0.126% in the long-term. Nevertheless, Chirwa & Odhiambo (2018) contrast the results as they state that inflation causes a debt-creating effect in seven countries in Europe. Meanwhile, inflation is effective to decrease government debt in the United Kingdom, Ireland and France only. Similarly, Belguith & Omrane (2017) observe that inflation has been one of the drivers of a decline in the government debt in Tunisia.

The exchange rate was identified to be positively correlated with the government debt of Indonesia in various periods. The short-term coefficient of the variable was 2.233 with a p-value of 0.000. This finding suggests that when there is a 1 percent decrease in the exchange rate (LN_ER), there would be an increment in the short-term government debt by 2.233%. This short-term impact can be attributed to the rise in the value of the debt in foreign currency during depreciation of the local currency. The exchange rate is also established to affect government debt in long-term since the coefficient of both the exchange rate and p-value is 1.442 and 0.000, respectively. Economically, this finding can be attributed to the fact that a prolonged exchange rate depreciation will keep on increasing government debt in the long-run. Keyser & Paczos (2023) also achieve similar results and conclude that increases in the exchange rates positively affect government debt. Therefore, to cope with fiscal risks and address the dynamics of the exchange rate changes, the government must introduce the methods of financing, including the minimization of its dependence on external debt to minimize exposure to the exchange rate risks. However, the long-run results focus on the fact that the exchange rate depreciation continues to play an important role in the accumulation of debt, and it is much better to have stable exchange rates to regulate the government debt.

CONCLUSION

The governments are more conscious that the financial crises are becoming frequent with the progression of time. Therefore, it is essential to predict and prevent the development of negative events in the future. Fiscal risk management units need to increase their ability to deal with fiscal risks, including developing relevant policy responses (IMF, 2016). Technically, the projections of risks are based on the input of data to facilitate an analysis. Historical data is employed and analyzed with the help of technical tools in common practice to provide results. However, the presence of high-frequency data is not usually as expected. The historical data provided usually does not span a long enough time to encompass the main development and important events to be able to have effective fiscal risk management. Consequently, governments need to put into consideration the quality of the data to be more effective by identifying, measuring, and reducing risks. This points out the relevance of accuracy in future projections.

The time series analysis applied in this research is useful to discuss how many facts can affect fiscal issues. It gives a review of possible fiscal risks that can occur due to variations in these factors. The results indicate that economic growth and inflation affect the amount of government debt negatively, which means that in the long-term both of these variables can reduce the level of government debt. On the contrary, exchange rates have a converse effect that a devaluation of the domestic currency in relation to foreign currencies, the US dollar in particular, will increase government debt. Short-term, inflation, and exchange rate were identified to affect the change in government debt. The effect of both factors within the long-run is constant; increasing inflation is likely to reduce the amount of government debt, whereas the depreciation of the exchange rate is likely to increase it. These results indicate that the government ought to strive to boost the economic growth to raise tax collection to mitigate the fiscal deficit hence reducing of the requirement to borrow. In addition, an increase in inflation, including a decline in the real value of government debt, can also be beneficial indicators of a stronger domestic demand and indirectly increase state revenues. The government should also concentrate

on ensuring stability of the exchange rates to make sure that the effects of currency variations on its debt are minimized.

The research offers technical details which policy makers can use when dealing with expansionary policies in macroeconomic shocks to be able to come up with more sustainable fiscal policies. Contrary to previous studies which focus on the role of fiscal policies on economic growth and stability of prices, this study narrows down the effect of GDP growth, inflation, and exchange rates on fiscal sustainability in Indonesia. The long-term outcomes found in this study offer insights into the Indonesian fiscal policies. The findings can be used as an early warning mechanism from the policy makers by empirically evaluating the effects of different macroeconomic variables in fiscal sustainability. They may also assist the government to build a scenario analysis under various macroeconomic conditions and assess their effect on national finances, especially on the government debt.

However, data series cannot be used as the sole source of data to base a given analysis. There are instances where series of data may not provide precise information and represent special events accurately which can then have an effect on the results of the analysis. Indicatively, an economic crisis does not necessarily feature the best in an analysis in cases where tranquil periods information is dominating. Besides, fiscal risk is always considered in relation to future considerations. Therefore, past data is not sufficient when it comes to drawing conclusions.

In addition, projections and forecasts need advanced analytical software, a strict process, and a dependable dataset. However, due to the dynamism of the financial market and the state of the world and home environments, extensive information about the data features and their ecosystem should also be included in the analysis. These factors, therefore, need to be integrated to make policy suggestions to predict or reduce fiscal risks more efficient and knowledgeable.

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