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Examining the Relationship Between Tax Revenue and Economic Growth in Indonesia Through the Endogenous Growth Model

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ABSTRACT

The aim of this study is to analyze the causal relationship between tax revenues and economic growth in Indonesia using an endogenous growth economic model. The causality analysis employed a multivariate setup using a vector autoregression approach, with the Toda–Yamamoto **method** serving as the causality test. Using time series data from 1983 to 2021, the research **findings** indicate that the control variables — capital, labor, foreign direct investment, government spending, inflation, and exchange rates — reflect innovation mechanisms and technological progress or total factor productivity in the endogenous growth model, which captures the relationship between tax revenues and economic growth in Indonesia. **The results** of the causality test using the Toda–Yamamoto method show that tax revenues and economic growth influence each other; tax revenues help boost economic growth, and at the same time, higher economic growth leads to more tax revenues. The authors **concluded** that, in addition to tax revenue causing or encouraging economic growth through financing economic activities, increased economic growth and activity will also raise the amount of tax revenue, both from the tax base and from nominal tax revenue determined by economic growth.

Keywords: tax revenues; economic growth; endogenous; causality; Toda–Yamamoto; Indonesia

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ОРИГИНАЛЬНАЯ СТАТЬЯ

Изучение взаимосвязи между налоговыми поступлениями и экономическим ростом в Индонезии с помощью модели эндогенного роста

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АННОТАЦИЯ

Целью данного исследования является анализ причинно-следственной связи между налоговыми поступлениями и экономическим ростом в Индонезии с использованием экономической модели эндогенного роста. Для анализа причинно-следственной связи применялась многомерная модель с применением подхода векторной авторегрессии, а в качестве теста — метод Тода–Ямамото. **Результаты исследования** временных рядов с 1983 по 2021 г. показывают, что контрольные переменные — капитал, труд, прямые иностранные инвестиции, государственные расходы, инфляция и обменные курсы — отражают инновационные механизмы и технический прогресс или общую производительность факторов производства в модели эндогенного роста, которая отражает взаи-

мосвязь между налоговыми поступлениями и экономическим ростом в Индонезии. Результаты теста причинно-следственной связи с использованием метода Тоды–Ямамото показывают, что налоговые поступления и экономический рост влияют друг на друга; налоговые поступления способствуют стимулированию экономического роста и в то же время более высокий экономический рост приводит к увеличению налоговых поступлений. Авторы пришли к **выводу**, что в дополнение к налоговым поступлениям, вызывающим или стимулирующим экономический рост посредством финансирования экономической деятельности, возросший экономический рост и активность также увеличат объем налоговых поступлений, как из налоговой базы, так и из номинальных налоговых поступлений, определяемых экономическим ростом.

Ключевые слова: налоговые поступления; экономический рост; эндогенность; причинно-следственная связь; Тода–Ямамото; Индонезия

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1. Introduction

Government intervention in fiscal policy can improve the economy because government spending and taxes have a multiplier effect that stimulates household consumption [1]. Taxation is a fiscal policy instrument that collects state revenue and regulates the economy [2, 3]. Taxes have a significant role for the state, particularly in spurring economic development, because the largest source of state revenue comes from the tax sector [4]. Moreover, tax is a component of economic policy that is indispensable in maintaining, strengthening, and increasing a country's economic growth and competitiveness in a globalized world.

Economic growth is one of the most significant indicators of a country's economy [5]. Indonesia is included in the Wonderlanders Asia group because of its relatively high economic growth [6]. During the last two decades (2002–2021), the average economic growth per year was 4.91% Yo Y.[1] If 2020 is excluded (when economic growth was negative due to the COVID-19 pandemic), Indonesia's average economic growth has been 5.28% Yo Y. Indonesia's relatively high economic growth has often been achieved through fiscal policy, especially from tax revenues. Over the past 20 years, namely the 2002–2021 period, tax revenues in Indonesia have continued to increase, with an average revenue of 899 trillion rupiah over these two decades.[2] Indonesia's GDP for the last two decades has continued to increase yearly, with an average of 8.539 trillion rupiah from the 2002–2021 period.[3]

Viewed from a macroeconomic perspective, a country's revenue increase will increase state spending. With an increase in government spending, GDP also increases. GDP will increase more than public spending if the increase in government spending is allocated to the domestic sector, which can cause a multiplier effect, sparking the country's economic growth and development. The economy's development will increase state revenue sources, especially tax revenues. During the 2002–2021 period, the percentage of tax revenue to GDP in Indonesia remained small, only about 8–13%.

Syadullah and Wibowo [7] conducted an empirical analysis of the factors affecting tax revenues in ASEAN countries during 2003–2012, revealing that the trend of the percentage of taxes to GDP in Indonesia continued to decline by 0.03% per year. The Organisation for Economic Co-operation and Development (OECD) remarked that the percentage of taxes to GDP in Indonesia is still below the average of countries in the Asia-Pacific region, which on average reached 20%. The percentage of tax to GDP in Indonesia in 2021 is only 9.12%, which is the lowest among the G20 and ASEAN countries.

The relationship between taxation and GDP as a proxy for economic growth has long been of great interest to policymakers, academics, and researchers in economics and taxation. Theoretically, two views consider the relationship and influence of tax revenues on economic growth. The first opinion is that taxes harm economic growth. First put forward by Keynes [1], the theory arguing for a negative influence of tax claims that taxes (T) are a government function that reduces household consumption (C). The theory maintains that the larger the T, the smaller the C, and the smaller the effect on economic growth (Y). Thus, the higher the tax revenue, the lower the economic

[1] The World Bank. World Bank national accounts data, and OECD National Accounts data files, Indonesia 2000–2021.

[2] BPS. Statistik Indonesia, Realization of Indonesian state revenue 2000–2021. Statistical Yearbook of Indonesia 2000–2021.

[3] BPS. Statistik Indonesia, Indonesia's GDP by expenditure 2000–2021. Statistical Yearbook of Indonesia 2000–2021.

growth [1]. Taxation harms economic growth due to distortions in choices and the impact of pressure factors attached to taxes [8–10]. Several empirical studies in the 2020s found results supporting Keynes's opinion that tax revenue has a negative relationship and influence on economic growth, including Adhikari et al. [11], Chen et al. [12], Guo and Shi [13], Kim and Park [14], Maganya [15], and Mtui and Ndanshau [16].

The second opinion is that taxes have a positive effect on economic growth, a view first put forward by Peacock and Wiseman [17]. According to the authors, government expenditure is needed to encourage economic growth. To fuel growth, the government requires significant amounts of revenue, including taxes, to fund these expenditures [18]. This opinion is based on the theory of the existence of tax tolerance at a certain level in society, namely the condition that the public understands that the amount of tax the government collects is a source for government spending [17]. The tax tolerance level prevents the government from arbitrarily increasing tax collection. This second view of taxation is supported by scholars such as John F. Due and Steven A. Y. Lin, who claim that taxation has an indirect positive effect through tax-financed government spending [19, 20]. Recent research in the 2020s by theorists following Peacock and Wiseman concurs that tax revenue has a positive relationship and influence on economic growth. These studies include papers by Gurdal et al. [21], Ho et al. [22], Neog and Gaur [23, 24], Phuong et al. [25], Özker [26], and Sihaloho [27]. Empirical cross-country research on the relationship between taxation and economic growth is frequently inapplicable in Indonesia. For example, studies such as Acosta Ormaechea et al. [28] cannot be directly applied in Indonesia because the results are not in accordance with the factual conditions and experiences faced in Indonesia.

The neoclassical economic growth model provides a theoretical basis for the relationship between tax revenues and economic growth [29, 30]. The theory proposes a production function $Y = AF(K, L)$ that incorporates technological progress into the economic growth model. After deducting the contribution of input factor growth from total output growth, we can obtain total factor productivity (TFP), namely, the contribution of technological progress (A) to output, so that A = TFP.

Following the endogenous growth model pioneered by Romer [31], the mechanism of innovation and technological progress (A = TFP) is not constant but varies from time to time. Increasing TFP can encourage the transformation of economic growth to high-quality and efficient types of growth, thereby achieving sustainable economic development by relying on TFP [32]. The assumption that A is expanding allows factors such as foreign direct investment, investment in research and development, government spending, and tax revenues to influence TFP [14, 21, 33–36].

The endogenous growth model can be divided into two types: the basic model and the extensive model. The extensive model defines factors other than production factors (capital and labor) as factors that influence output or economic growth, such as financial, political, policy, and institutional factors [34, 37–39]. This study allows innovation and technology (A) to develop over time following the endogenous growth theory. Empirical studies on economic growth demonstrate that many variables can affect A or TFP. This study analyzes the relationship between tax revenues and economic growth based on an endogenous growth model. The model allows the nature and flow of the causal relationship between the two macroeconomic variables, tax revenues and economic growth, to be seen clearly, both theoretically and empirically.

In this paper, control variables in the form of capital (K), labor (L), foreign direct investment (FDI), government spending (GOV), inflation (INF), and the exchange rate of the rupiah against the US dollar (KURS) are used to illustrate the causal relationship between tax revenues and economic growth. In addition to being an illustration of the variables that affect A or TFP, the function of the control variable, which is endogenous, is to link tax revenue and economic growth so that only constants become exogenous variables.

Causality analysis in this study uses a vector autoregression (VAR) approach. The VAR is needed to model structural equations by treating all variables in the system as endogenous [40]. This study uses the Toda–Yamamoto causality test, which overcomes weakness in the Granger causality test by avoiding the spurious regression of nonstationary data at level [41].

Based on research and empirical evidence in various countries, an analysis of the exact effect of taxation on economic growth is vital for policymakers or the government. However, the nature of the causal relationship between these two macroeconomic variables has an equally important meaning. A causal flow of tax revenues to economic growth indicates that the government can use taxation as a tool of fiscal policy to influence economic activity.

The author is interested in researching the relationship between tax revenue and economic growth in Indonesia, aiming to: (1) Estimate and analyze the causal relationship between tax revenues and economic growth in Indonesia from the perspective of an endogenous growth model. The research assesses whether tax revenue follows economic growth, that is, economic growth causes an increase in tax revenue, which will ultimately increase overall state revenue, or the opposite — tax revenues are a determinant of economic growth. This relationship is indicated by the causality of tax revenue (financial sector) toward economic growth (real sector). (2) This work considers and assesses the role of the tax revenue variable in boosting the rate of economic growth in Indonesia by examining indicators of the real and financial sectors affecting *A* or TFP in the form of capital, labor, foreign direct investment, government spending, inflation, and exchange rates.

2. Materials and methods

2.1. Materials

In this study, researchers used secondary data with time series data types, which were obtained from the World Bank, the Indonesia Ministry of Finance (Directorate General of Taxes), Bank Indonesia, Statistics Indonesia, and other data sources. The data used in this study include tax revenue, economic growth, foreign capital, total workforce, government spending, inflation, and exchange rates from 1983–2021 (annual). The selection of research data began in 1983 because it was in this year that Indonesia's tax reform began. Consequently, empirical analysis of the relationship between taxation and the economy must start from this year of reform.

2.2. Methods

In this study, the analytical model used to answer the research objectives is a VAR model with a Toda–Yamamoto causality test to analyze the causal relationship between tax revenues and economic growth. Toda and Yamamoto [41] developed their causality test to overcome the weakness of the Granger causality test by avoiding spurious regression data that is not stationary at levels. According to Toda and Yamamoto, the Granger causality test can be applied to nonstationary data. It will obtain valid estimation results if the maximal order is at the level of integration (*dmax*) used in the analysis model. We can overcome spurious causality by using an augmented VAR model with the optimal lag order plus the maximum integration order in the variables. This technique can also ensure that statistical and causality tests have a standard asymptotic distribution.

The Solow and Swan [29, 30] growth model illustrates that a country's economic output is the result of two types of input, namely capital and labor, with the following production function:

$$Y_t = f\left(K_t, L_t\right), \tag{1}$$

where Y = output, K = capital, and L = labor, the production function is a constant return to scale, meaning that the same percentage increase in all factors of production also causes an increase in production with the same percentage. Furthermore, by incorporating technology into the production function, the production function becomes:

$$Y_t = f\left(K_t, L_t, A_t\right), \tag{2}$$

A is a new variable in the form of technological progress, which causes capital and labor efficiency. Capital efficiency includes the use of technology in the form of tools and machines in the production process. Meanwhile, labor efficiency refers to increasing labor productivity in the form of improving the workforce's education, skills, and health. The production function in Solow and Swan's [29, 30] model is based on the following Cobb–Douglas production function:

$$Y_t = A_t K_t^{\alpha} L_t^{\beta}. \tag{3}$$

The equation above shows the Cobb–Douglas function, where Y represents the total production in an economy. A represents total factor productivity (TFP), K is capital, L is labor, and the parameters α and β are the elasticity of capital and labor output, respectively. These values are constants determined by the available technology. The Cobb–Douglas production function can be described as economic output in the form of economic growth and GDP [42]. Economic growth arises from capital accumulation, population or labor growth, and technological change as exogenous.

This study adopts an endogenous growth model by allowing technological variables, A or TFP, to develop over time. Empirical studies on economic growth have revealed that many variables can affect A or TFP. The production function equation used in this research model adopts previous research conducted by Fosu and Magnus [43], Ghazo et al. [44], Gurdal et al. [21], Mtui and Ndanshau [16], and Takumah and Iyke [36], by replacing and adding new variables, the equation becomes as follows:

Table 1
Stationarity test results from ADF and PP tests

Variable	ADF test		PP test	
	Level	First difference	Level	First difference
Y	1.0000[d]	0.0029*	1.0000[d]	0.0031*
K	0.3492[d]	0.0006*	0.5562[d]	0.0006*
L	0.4905[d]	0.0021*	0.0190**	0.0006*
TAX	0.9985[d]	0.0000*	0.9994[d]	0.0000*
FDI	0.5780[d]	0.0000*	0.6780[d]	0.0000*
GOV	0.2676[d]	0.0000*	0.2676[d]	0.0000*
INF	0.0004*	0.0000*	0.0004*	0.0001*
KURS	0.8181[d]	0.0000*	0.8608[d]	0.0000*

Source: Developed by the authors.

Note: * significant at 1% degree of confidence; ** significant at 5% confidence level; [d] not significant

$$A_t = f\left(TAX_t, FDI_t, GOV_t, INF_t, KURS_t\right) = \\ = TAX_t^{\delta_1}\ FDI_t^{\delta_2}\ GOV_t^{\delta_3}\ INF_t^{\delta_4}\ KURS_t^{\delta_5}. \quad (4)$$

By substituting equation (4) into equation (3), the following equation model is obtained:

$$Y_t = \mu K_t^{\alpha}\ L_t^{\beta} TAX_t^{\delta_1}\ FDI_t^{\delta_2} GOV_t^{\delta_3}\ INF_t^{\delta_4}\ KURS_t^{\delta_5}. \quad (5)$$

By changing $\mu = \gamma$, then the equation (5) becomes:

$$Y_t = \gamma + \alpha K_t + \beta L_t + \delta_1 TAX_t + \delta_2 FDI_t + \\ + \delta_3 GOV_t + \delta_4 INF_t + \delta_5 + \varepsilon_t, \quad (6)$$

where ε_t denotes the unobserved determinant of the total output and Y_t is white noise.

The VAR approach is needed to model structural equations by treating all variables in the system as endogenous variables. These endogenous variables are described as a function of all endogenous variables' past (*lag*) values. Theoretically, economic growth (*Y*), capital (*K*), labor (*L*), tax revenues (TAX), foreign direct investment (FDI), government spending (GOV), inflation (INF), and the rupiah exchange rate against the U.S. dollar (KURS) are interrelated variables. Therefore, the eight variables are endogenous and can then be analyzed using the VAR method, leaving only constants as exogenous variables.

Following Yamada [45], the estimation of the VAR analysis model using the Toda–Yamamoto causality test begins with testing the stationarity of the data or variables whose purpose is to determine the order of integration to obtain the *dmax* value. Next, the optimum lag (*m*) to be used is determined for a multivariate causality test (because several variables are used in the study).

3. Results and discussion

3.1. Results

To estimate and analyze the quality relationship between tax revenues and economic growth, control variables are used that affect *A* or TFP, the steps conducted include the following.

3.1.1. Stationarity testing with the ADF and PP tests

The results of differencing at the first difference level indicated that all variables are stationary using either the ADF or PP stationarity tests. All variables estimated in this study were stationary at the first difference or integrated at the integration degree of one, *I*(1), or *dmax* = 1 (*Table 1*).

3.1.2. Optimum lag length test with FPE and AIC

In particular, this study uses FPE and AIC criteria in determining the length of the optimal lag as well as the information shown in *Table 2*. An optimal lag of 3 not only fulfills the FPE and AIC criteria but also the LR and HQ; thus, the optimal lag length used in this study is 3, or *m* = 3.

3.1.3. Johansen cointegration test

Cointegration test results show a long-term balance among the variables in this study (*Table 3*). The Toda–Yamamoto causality test can be used to see long-term relationships between variables and is

Table 2
Optimal lag length test results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	–1953.089	NA	2.86e+37	108.9494	109.3013	109.0722
1	–1669.819	424.9055	1.60e+32	96.76773	99.93477*	97.87311
2	–1597.421	76.42048	1.76e+32	96.30116	102.2833	98.38910
3	–1450.820	89.58958*	1.25e+31*	91.71221*	100.5095	94.78271*

Source: Developed by the authors.

Table 3
Johansen cointegration test results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized	Eigenvalue	Trace	0.05	Prob.**
No. of CE(s)		Statistic	Critical Value	
None *	0.861876	209.2675	159.5297	0.0000
At most 1 *	0.620632	136.0222	125.6154	0.0099
At most 2 *	0.609259	100.1599	95.75366	0.0240
At most 3	0.473569	65.39067	69.81889	0.1072
At most 4	0.440402	41.65019	47.85613	0.1688
At most 5	0.338604	20.17037	29.79707	0.4114
At most 6	0.117494	4.874492	15.49471	0.8220
At most 7	0.006731	0.249882	3.841466	0.6172

Source: Developed by the authors.

Note: * Denotes rejection of the hypothesis at the 0.05 level. **MacKinnon–Haug–Michelis (1999) p-values.

still able to produce valid and reliable estimates on data that has integration, no integration, cointegration, or even no cointegration at all, if the maximal order of integration (*dmax*) and optimal *lag* (m) are added to the model [46–49].

3.1.4. Toda–Yamamoto causality test with modified Wald test (mWald test)

Testing with the Toda–Yamamoto method aims to examine the relationship between the variables analyzed in the study (*Table 4*). The question posed in this research regards the causal relationship between the development of tax revenue and economic growth in Indonesia. Specifically, this study examines whether the development of tax revenue follows economic growth so that economic growth causes an increase or change in tax revenue as well as other control variables. This study also examines the converse, asking whether tax revenues and control variables representing *A* or TFP in the endogenous growth model are determinants of economic growth.

3.2. Discussion

Endogenous growth theory is one of the economic theories used to look at the relationship and influence of tax revenues on the economic development of a country, both in terms of the factors that drive economic growth and in realizing sustainable economic development. Robust evidence from this study demonstrates that the variable tax revenue is one factor that influences A or TFP. Several previous researchers who justified the variable tax revenue as a critical factor affecting economic growth as seen from endogenous growth models were Arvin et al. [50], Bhattacharyya and Gupta [51], Curtis et al. [52], Fu and Le Riche [53], and Todtenhaupt and Voget [54].

The results of the causality test using the Toda-Yamamoto method show that tax revenues determine and cause changes and increase economic growth, with a chi-squared value of 78.96730 and a very real probability of $\alpha = 0.0000$. The growth of economic activity requires many funds to expand; this can be done if the sources of state revenue are fulfilled or are in large numbers, and through tax revenues, as

Table 4
mWald test causality test results

Variable	Chi-Squared	Probability	Conclusion
K → Y	5.141001	0.1618[d]	There is no causality
L → Y	37.78705	0.0000[*]	Have causality
TAX → Y	78.96730	0.0000[*]	Have causality
FDI → Y	12.49263	0.0059[*]	Have causality
GOV → Y	9.652102	0.0218[**]	Have causality
INF → Y	74.44929	0.0000[*]	Have causality
KURS → Y	6.864010	0.0764[***]	Has causality at α = 10%
Y → K	17.69821	0.0005[*]	Have causality
L → K	15.13820	0.0017[*]	Have causality
TAX → K	16.81594	0.0008[*]	Have causality
FDI → K	20.70149	0.0001[*]	Have causality
GOV → K	16.52883	0.0009[*]	Have causality
INF → K	15.23952	0.0016[*]	Have causality
KURS → K	18.68051	0.0003[*]	Have causality
Y → L	8.791405	0.0322[**]	Have causality
K → L	10.42271	0.0153[*]	Have causality
TAX → L	3.143121	0.3701[d]	There is no causality
FDI → L	6.730624	0.0810[***]	Has causality at α = 10%
GOV → L	5.135627	0.1621[d]	There is no causality
INF → L	6.408598	0.0933[***]	Has causality at α = 10%
KURS → L	2.426588	0.4887[d]	There is no causality
Y → TAX	7.291364	0.063[2***]	Has causality at α = 10%
K → TAX	32.81029	0.0000[*]	Have causality
L → TAX	16.57753	0.0009[*]	Have causality
FDI → TAX	13.86143	0.0031[*]	Have causality
GOV → TAX	20.51545	0.0001[*]	Have causality
INF → TAX	8.992576	0.0294[**]	Have causality
KURS → TAX	21.59716	0.0001[*]	Have causality
Y → FDI	0.632820	0.8889[d]	There is no causality
K → FDI	0.942870	0.8151[d]	There is no causality
L → FDI	1.357898	0.7154 [d]	There is no causality
TAX → FDI	3.913526	0.2710 [d]	There is no causality
GOV → FDI	1.329687	0.7221[d]	There is no causality
INF → FDI	1.928040	0.5875[d]	There is no causality
KURS → FDI	7.227704	0.0650[***]	Has causality at α = 10%
Y → GOV	0.413011	0.9375[d]	There is no causality
K → GOV	2.139001	0.5441[d]	There is no causality
L → GOV	2.110619	0.5498[d]	There is no causality
TAX → GOV	1.787212	0.6177[d]	There is no causality
FDI → GOV	3.582055	0.3103[d]	There is no causality
INF → GOV	0.953870	0.8124[d]	There is no causality
KURS → GOV	1.895864	0.5943[d]	There is no causality

Table 4 (continued)

Variable	Chi-Squared	Probability	Conclusion
Y → INF	21.34223	0.0001*	Have causality
K → INF	10.27779	0.0163*	Have causality
L → INF	13.80633	0.0032*	Have causality
TAX → INF	21.50674	0.0001*	Have causality
FDI → INF	1.496107	0.6832[d]	There is no causality
GOV → INF	4.618413	0.2020[d]	There is no causality
KURS → INF	1.967998	0.5791[d]	There is no causality
Y → KURS	174.2510	0.0000*	Have causality
K → KURS	46.01384	0.0000*	Have causality
L → KURS	156.0532	0.0000*	Have causality
TAX → KURS	178.9649	0.0000*	Have causality
FDI → KURS	32.08240	0.0000*	Have causality
GOV → KURS	53.31360	0.0000*	Have causality
INF → KURS	170.3759	0.0000*	Have causality

Source: Developed by the authors.

Note: * significant at 1% degree of confidence; ** significant at 5% confidence level; *** significant at 10% confidence level; [d] not significant.

the most potential and largest source of state revenue, will be able to meet the needs of the government to encourage economic growth. Similar results that tax revenue has a causal relationship and a positive influence on economic growth were also obtained by Chen et al. [12] in Vanuatu, Ho et al. [22] in 29 developing countries, Neog and Gaur [23] in India, and Takumah and Iyke [36] in Ghana, who examined the relationship between tax revenue and economic growth by modeling the endogenous growth model in assessing the relationship and effect of taxation on economic growth.

Furthermore, with a chi-squared value of 7.291364 and a real probability of $\alpha = 0.0632$, economic growth causes an increase in tax revenue, which will ultimately result in an increase in overall state revenue. These findings indicate that there is a bidirectional causality relationship between tax revenues and economic growth. This means that besides tax revenue causing or encouraging economic growth through financing economic activity, increased economic growth and economic activity will also increase the amount of tax revenue, both from the tax base and nominal tax revenue. Previous empirical studies that yielded the same findings, namely that there was a two-way relationship or mutual influence between tax revenues and economic growth, were research conducted by Maganya [15] in Tanzania and Vatavu et al. [55] in some Central and Eastern European countries and the richest European countries. Gurdal et al. [21] found two conflicting pieces of evidence in analyzing the relationship between tax revenue and economic growth in G7 countries. The study uses two different causal panel approaches to make comparisons. According to the causality test results based on the time level, there is no causal relationship between economic growth and tax revenues. On the other hand, the results of causality in the frequency domain indicate that there is mutual causality between economic growth and tax revenues. Combining tax revenues and economic growth will reduce long-term dependence on debt and aid from other countries [56–58]. This good combination can be realized by ensuring good governance for the people by promoting government openness and accountability [59].

The results of this study also prove that the control variables used in this study represent innovation, mechanisms, and technological progress, symbolized by A or TFP in the endogenous growth model, to capture the relationship between tax revenue and economic growth in Indonesia. Endogenous growth theory implies that policies that adhere to openness, competition, change, and innovation will encourage economic growth [60].

The size of the effect of tax revenue in driving the rate of economic growth depends on the structure of the model and the value of the parameters in the model. Endogenous growth theory provides a model that can assess the relationship and influence of taxation on economic growth. When economic growth

is endogenous, taxation has an influence and can also influence the factors that determine the level of economic growth [61].

4. Conclusion and recommendations

The endogenous growth theory provides a model that can assess the relationship and influence of taxation on economic growth. Based on the analysis of the VAR model with Toda Yamamoto's causality test, there is a bidirectional causality phenomenon between tax revenues and economic growth in Indonesia. Tax revenue acts as an engine that will boost economic growth through the availability of funds from tax revenue collection to facilitate economic activity and expansion. The size of the effect of tax revenues in driving economic growth depends on the structure of the model and the parameter values in the model. The results of this study confirm that taxes are an important instrument for the government and must be used to boost economic growth. Likewise, economic growth will increase the amount of tax revenue, both from the tax base and nominal tax revenue.

Indonesia is one of the countries that fall into the category of countries that often experience budget deficits. Policymakers or the government can implement policies that increase the scope of tax revenue to increase state revenue from the taxation sector. Increasing the scope of tax revenue will be realized if the government or policymakers can ensure that the government has good legitimacy, accountability, and responsiveness to the community through promoting government openness and accountability. This policy certainly requires the role and contribution of the government, economic actors, and society. An efficient, effective, safe, fair, transparent, and legally clear tax system will become a source of state revenue, which, apart from boosting economic growth, is also to get out of dependence on debt or foreign aid and natural resources.

5. Limitations and future research

This study it is not free from limitations. This research only analyzes the relationship between tax revenues and economic growth by using quantitative variables originating from the financial sector and the real sector. The author suggests further research involving qualitative variables such as certainty and accountability of law enforcement, political stability and security, regulatory quality, fraud and corruption control, market sentiment, and other variables that could be considered so that the role and contribution of tax revenues in driving economic growth and creating sustainable economic development can be further optimized.

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