

Searching For Tax Revenue Determinants in N-11: The Moderating Role of Regulatory Quality

Emilio Pascal¹, Suparna Wijaya²

¹Politeknik Keuangan Negara STAN, Indonesia

²Universitas Pembangunan Nasional Veteran Jakarta, Indonesia

Correspondent: 4122220018_emil@pknstan.ac.id

Received : May 20, 2023

Accepted : July 29, 2023

Published : July 31, 2023

Citation: Pascal, e., Wijaya, S.. (2021)
Searching For Tax Revenue Determinants in
N-11: The Moderating Role of Regulatory
Quality. *Ijomata International Journal of Tax
and Accounting*, 4(3), 628-645.

<https://doi.org/10.52728/ijtc.v4i3.844>

ABSTRACT: This study aimed to analyze the effects of the agricultural sector and the Foreign Direct Investment (hereinafter referred to as FDI) on tax revenue in The Next Eleven (N-11) countries. In this research, a moderating variable of regulatory quality was used. The data were obtained from the World Bank and analyzed using panel data regression. The dependent variable in this study was tax revenue, whereas the independent variables comprised the agricultural sector, the FDI, the agricultural sector moderated by regulatory quality, the FDI moderated by regulatory quality, and the regulatory quality. The results indicate that all independent variables simultaneously affect tax revenue. However, when investigating partially, FDI, the agricultural sector moderated by regulatory quality, and regulatory quality have a positive effect on tax revenue while FDI moderated by regulatory quality shows a negative effect on tax revenue. As for the agricultural variable, a significant effect on tax revenue was not shown. It is recommended that governments in N-11 countries focus on developing quality regulations in another sector, particularly agriculture, and encourage foreign investments since these two aspects are proven to increase tax revenue.

Keywords: Tax Revenue, Agricultural Sector, FDI, Regulatory Quality, N-11



This is an open access article under the
CC-BY 4.0 license.

INTRODUCTION

Economy plays an important role in everyday's life and is crucial for the development of a coherent country. The progress in economy helps improve the overall well-being of both the people and the nation. The importance of economy is evidenced by a number of international economic-based groups or organizations such as APEC, BRICs, G7, G20 and OECD. Each of these organizations has membership requirements based on the region and the size of the country's economy. BRICs was first mentioned by Goldman Sachs, a banking institution, and represents a group of countries that are potential to have the strongest economy in the world (O'Neill et al., 2005). BRICs includes countries like Brazil, Russia, India, and China.

A few years later, Goldman Sachs categorized a number of countries into a group called Next Eleven (N-11). The N-11 consists of Bangladesh, the Philippines, Indonesia, Iran, South Korea, Mexico, Egypt, Nigeria, Pakistan, Turkey, and Vietnam. These countries following the BRICs are poised to have the potential in the economic sector ([O'Neill et al., 2005](#)). The assessment uses a system called Growth Environment Score (GES) and is based on five indicators, namely macroeconomic stability, macroeconomic conditions, technological capabilities, human capital, and political conditions. In addition, the N-11 countries vary widely in economic level, in which South Korea is signified as a developed country with more than twice the income of other N-11 countries, whereas Bangladesh becomes one of the poorest countries in the world ([Wilson et al., 2007](#)).

([Ortiz-Ospina & Roser, 2016](#)) stated that developed countries generate more tax revenue than developing countries. Tax is a compulsory form of payment to the government, however the perceived benefits are not proportional to the amount paid ([OECD, 2014](#)). Taxation is in fact the most practical way to raise revenue to finance government spending ([Tanzi & Zee, 2001](#)). There are major principles in taxation, among others are the principle of proportionality, the principle of certainty, the principle of convenience, and the principle of efficiency ([Smith & Wight, 2007](#)).

The principle of proportionality emphasizes that everyone is obliged to pay taxes in accordance with their economic ability, whereas the principle of certainty clarifies the time of payment, the method of payment, and the amount of tax paid by the public. Furthermore, the principle of convenience refers to the comfort of taxpayers when they are imposed to pay the taxes. Finally, the principle of efficiency requires that the tax use and revenue system be made in such a way that the tax collected is not smaller than the cost incurred.

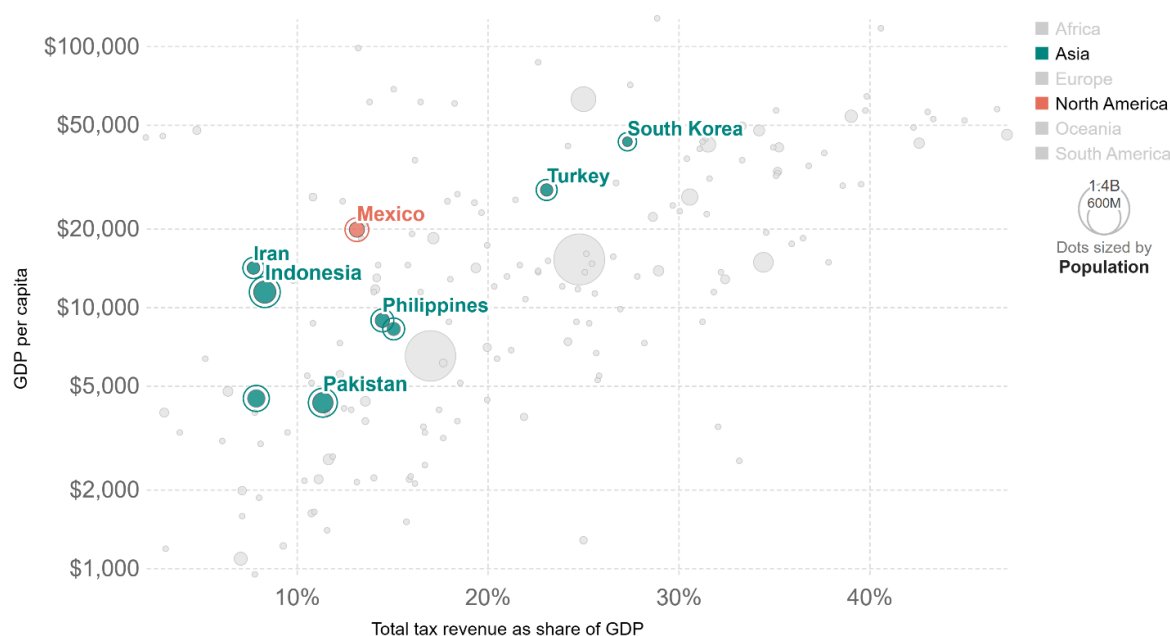
According to [Ortiz-Ospina & Roser \(2016\)](#), developed countries tend to rely on income tax, while developing countries tend to rely on trade and consumption taxes. Low tax revenue in developing countries can hamper the state's spending activities, therefore tax revenue is vital for the sustainability of a country's economy ([Salman et al., 2022](#)). [Tanzi & Zee \(2001\)](#) argued that developing countries find it difficult to build an efficient tax system. The main reason is that most workers in developing countries work either in the agricultural sector or in other informal sectors and they do not have fixed income and bookkeeping system. As a result, it is not easy to calculate the basis for income tax calculation. In addition, workers in developing countries tend to spend their income to purchase daily needs in small shops without accurate records and this lessens tax contribution. The second reason is that developing countries are still working on the establishment of an efficient tax administration system with limited number of competent staff ([Tanzi & Zee, 2001](#)). Instead of building an efficient, modern, and rational tax system, governments in developing countries create tax systems that allow them to exploit any options considered taxable. The third reason is that not only the informal economic structure in developing countries but also the financial limitations make it difficult for tax and statistical offices to produce reliable statistical data ([Tanzi & Zee, 2001](#)). Such limitations lead to a lack of data for policymakers to assess the potential impact of changes to the tax system. Consequently, governments in developing country tend to make marginal changes rather than major structural changes. The fourth reason is the income inequality in developing countries ([Tanzi & Zee, 2001](#)). Although the increasing tax revenue

requires the rich to pay higher taxes than the poor, there is a chance for the economic and political power of the rich to intervene in fiscal reformation for the purpose of reducing the amount of taxes they are obliged to pay. This explains why developing countries are incapable of fully increasing the income tax and property tax revenues, and why the tax system is considered less progressive.

Figure 1 indicates that the larger a country's economy as measured by GDP per capita, the higher the country's tax revenue. Goldman Sachs projected that the large economies potential in the N-11 countries will be followed by high tax revenue.

Tax revenue vs GDP per capita, 2020

To allow comparisons between countries, GDP per capita is adjusted for price differences between countries and measured in international-\$.
 Our World in Data



Source: Data compiled from multiple sources by World Bank; ICTD/UNU-WIDER Government Revenue Dataset, August 2021
 OurWorldInData.org/taxation/ • CC BY

Figure I. Comparison of Tax Revenue and GDP per capita of N-11 (except Egypt)

Source: Our World in Data (2016)

(O'Neill et al., 2005) argued that one component of macroeconomic conditions in GES is investment. According to Balıkcıoğlu et al. (2016), FDI has a greater impact on tax revenue for high-tech firms. In developing countries, FDI has a positive and significant effects on total tax revenue, CIT (Corporate Income Tax), PIT (Personal Income Tax), and VAT (Value Added Tax), but impactless on tax revenue from the property sector (Pratomo, 2020). A recent study conducted by Camara (2023) found that FDI has a positive effect on tax revenue, but no effect on tax revenue from the natural resource of exporting countries. However, FDI contributes to tax revenue by imposing tax on additional income generated by FDI in the recipient country (Ketkar et al., 2005). Similar results were found by Okey (2013), where FDI has a positive and significant effect on the

tax revenue by increasing the tax base and the tax revenue and [Aslam \(2015\)](#) who stated that FDI significantly affects tax revenue, and there is a long-term relationship between the two variables. [Minh Ha et al. \(2022\)](#) argued further that FDI acts as an important source of capital in overcoming the shortages of investment capital, thus, it contributes to the economic growth, and increase a country's tax revenue. On the other hand, [Inriama & Setyowati \(2020\)](#) found that FDI does not affect CIT revenue. This occurs since incentives from FDI do not necessarily increase CIT.

[Gnangnon \(2017\)](#) divides the impact of FDI on non-natural resources tax revenue and CIT, where the impact of FDI on tax revenue depends on the ratio of FDI to GDP. On the non-natural resources of the tax revenue side, FDI has a negative and significant effects in countries with an FDI-to-GDP ratio below 1.49%, a positive and significant effect in countries with a ratio above 2.57%, and no effect in countries with a ratio between 1.49% and 2.57%. As for the tax revenue derived from companies, there is a threshold of 0.33%, where FDI has no significant effect in countries, bearing a ratio of FDI to GDP below the threshold, but a significant positive effect in countries having a ratio at the threshold. Another study by [Gaspareniene et al. \(2022\)](#) distinguishes two impacts of FDI on tax revenue. The first is that FDI inflow causes a decrease in tax revenue and the second is that FDI outflow causes an increase in tax revenue. He added that the decrease in tax revenue by FDI inflow is due to the tax incentives for foreign companies which then reduce the tax base and provide benefits the foreign companies at the expense of local companies. Conversely, FDI outflow increases tax revenue since the recipient country provides tax incentives for multinational companies, therefore they pay lower tax than the local companies in the country.

As one of the focuses on Indonesia's policies, FDI is seen as a more enhancing and durable form of capital, in which attracting greater FDI flows help place the country in the international trading system and promote a more competitive business environment ([Gopalan et al., 2016](#)). Similarly, [Mohamed \(2020\)](#) emphasizes that FDI in Egypt is considered one of the tools to promote economic growth and contribute to economic development. In Bangladesh, FDI signifies the infrastructure development, creates many jobs, improves labor skills through the transfer of technological knowledge and managerial capabilities, and helps integrate the domestic economy with the global economy ([Islam, 2014](#)). These advances have led to low wages for skilled labor and stable macroeconomic conditions. Furthermore, FDI plays a significant role for Iran's economic growth, improves the balance of payments, transfers technology, increases employment, accelerates exports, and enhances tax revenues ([Rafat, 2018](#)). FDI inflows also play a role in the structural transformation process of the Mexican economy ([Mühlen & Escobar, 2020](#)). In Nigeria, FDI is considered as crucial in its economic growth and development strategies ([Osabohien et al., 2020](#)).

FDI also benefits the domestic economy through knowledge spillover from multinational companies to local firms in Pakistan ([Rehman, 2016](#)). Moreover, FDI in Vietnam has a major influence on other economic sectors and it stimulates domestic investment, creates competition, promotes innovation and technology transfer, improves production efficiency, and develops supporting industries that help the country participate in global chains ([Hanh et al., 2017](#)). As for the South Korean government, it believes that FDI marks one of the main contributors to its economic growth ([Kim, 2015](#)). In the Philippines, although the overall is still limited and lagging

behind other countries in Southeast Asia, the investment policy reforms and the opening up of more foreign investment sectors resulted in the increased FDI inflows ([Aldaba & Quejada, 2022](#)). Of all the countries described, however, it can be emphasized that Turkey has not gained the expected positive benefits from FDI inflows as seen in the country's economic growth ([Temiz & Gökmen, 2014](#)).

Another contributor to the economic development is the agricultural sector ([Cao & Birchenall, 2013](#)). [Widyawati \(2017\)](#) stated that the agricultural sector contributes the most to labor absorption in Indonesia. She explained further that the agricultural sector acts as a supporting sector for the development of other sectors. Even so, the agricultural sector in Indonesia has not developed and its contribution to GDP is insignificant. The situation is different from Pakistan, where the agricultural sector plays an important role in Pakistan's economy ([Rehman et al., 2015](#)). Agriculture directly supports Pakistan's population and contributes significantly to GDP. In addition, Bangladesh has similar conditions where the economy and livelihoods of most of its population depend on the agricultural sector ([Ferdous et al., 2021](#)). The condition is reflected in Nigeria, where the agricultural sector is the foundation of the economy and a source of livelihood for most of the population ([FAO, 2018](#)). The majority of agricultural workers in Nigeria are on small-scale farms and most of the harvest is used for personal consumption. Besides Nigeria and Pakistan, the agricultural sector becomes one of the most important sectors for the Iranian economy ([Azadi & Barati, 2013](#)). Additionally, all aspects of the economy in Egypt are related to agriculture, despite its having little agricultural land ([El-Ramady et al., 2013](#)). However, agricultural land in Egypt is highly productive and can be harvested two to three times a year. In Vietnam, the agricultural sector is crucial to alleviate poverty, to ensure the security of national food, and to maintain social stability ([World Bank, 2016](#)). Vietnam's agricultural sector is also experiencing explosive growth in its exports of agricultural products.

In Mexico, agriculture serves as one of the most important sectors, although there has been a decline in its contribution to GDP and a decline in the employment sector ([UNCTAD, 2014](#)). Similarly, the decline occurred in Turkey, where the agricultural sector plays a vital role for the Turkish economy and society, despite its minor contribution to the economy. If compared to the rapid growth of the industrial and service sectors, Turkish agricultural has dropped significantly ([Giray, 2012](#)). The decline is reflected in the low productivity, triggered by a poor mechanization, a small land size, and an uncoordinated and unplanned agricultural production. In the Philippines, the agricultural sector absorbs a lot of labor but contributes little to GDP ([Briones, 2021](#)). One of the reasons for the weak performance of the sector is the lack of competitiveness, marked by the low exports from the agricultural sector. Moreover, South Korea's agricultural sector is not export-oriented, as most farming is done on a small-scale ([Neszmelyi, 2017](#)). He argued that the purpose of the agricultural sector in South Korea is only to fulfill domestic needs, thus their agricultural products are not competitive in the international market.

Despite the important role of the agricultural sector in the economy, [Eltony \(2002\)](#) found that it has no effect on tax revenue in the oil-producing Arab countries. It is apparent that the economies of these countries are highly dependent on oil, used to finance its economic activities, therefore, there is no need for a sophisticated tax system. [Mahdavi \(2008\)](#) elaborated further that the

agricultural sector does not affect the overall tax revenue, except for the property tax. In fact, the agricultural sector has become a tax shelter, where there is a transfer of income from other sectors to the agricultural sector for the purposes of tax avoidance or reduction ([Chaudhry & Munir, 2010](#)). According to [Chelliah et al. \(1975\)](#), developing countries find it difficult to tax the agricultural sector since the land is generally owned by the community and is an informal sector. This influences the negative relationship between the tax revenue and the agricultural sector ([Leuthold, 1991](#)). Furthermore, [Tanzi \(1992\)](#) added that tax revenue is increasingly difficult to increase as the agricultural sector grows. This occurs since the administrative costs of tax authorities for regulating and supervising informal subsistence agriculture are higher, if compared to its revenue potential ([Ghura, 1998](#)). Similarly, [Gupta \(2007\)](#) stated that there is a negative and significant relationship between the agricultural sector and tax revenue, where the agricultural sector is difficult to tax if it is mostly a subsistence farming system. A negative relationship between the agricultural sector and tax revenue was also found by [Keen & Lockwood \(2010\)](#), where almost all types of taxes on the agricultural sector, particularly the VAT are difficult to impose. [Rodríguez \(2018\)](#) emphasized that the difficulty of the taxable agricultural sector hurts tax revenue. A research by [Stotsky & WoldeMariam \(1997\)](#) found that the agricultural sector has a negative and significant effect on tax revenue. This is in line with the findings by [Piancastelli \(2001\)](#) which indicated that tax revenue is negatively and significantly related to the agricultural sector. Additionally, [Bird et al. \(2005\)](#) revealed that countries with a high ratio of the non-agricultural sector to GDP generate higher tax revenue as they tend to have a lower tax burden, resulting in lower tax revenue ([Sarmiento, 2016](#)).

Clearly, to ensure that the economy runs optimally, the role of the government is needed. The government plays a vital role in issuing regulations and policies to ensure every economic activity is under its respective corridors. The purpose of regulations includes preventing environmental damage as the impact of the economic activity, ensuring consumer rights are fulfilled, and preventing illegal economic activity ([Davis, 2022](#)). Nevertheless, a study by [Salman et al. \(2022\)](#) found no effect between the regulatory quality and the tax revenue.

The quality of the regulations issued by the governments affects tax revenue in developing countries ([Ajaz & Ahmad, 2010](#)). The government's ability to formulate policies and regulations that encourage private sector development will increase tax revenue ([Syadullah, 2015](#)). [Asmah et al. \(2020\)](#) examined further, where the quality of regulations has a positive effect on tax revenue and weakens the impact of trade misinvoicing, the tax revenue increases.

Based on the above description, there are some differences in the findings and no agreement on the determinants of tax revenue. With the diverse economic conditions in the N-11 countries and their potential to the BRICs, the author considers it is important to determine the effect of the agricultural sector, FDI, and regulatory quality on the tax revenue. This research is expected to provide a conclusion on what factors affect tax revenue and add more insight. Below, the authors have several hypotheses, namely:

H₁: The agricultural sector has a negative effect on tax revenue

H₂: FDI has a positive effect on tax revenue

H₃: Regulatory quality moderates the negative effect of the agricultural sector on tax revenue

H₄: Regulatory quality moderates the positive effect of FDI on tax revenue

H₅: Regulatory quality has a positive effect on tax revenue

METHODS

This study used panel data regression with tax revenue, agriculture, and FDI variables from N-11 member countries within the period of 2010 to 2019. The data used were secondary data obtained from World Development Indicators, World Bank. Each independent variable is moderated using regulatory quality variables and processed through the STATA 17 application. The definition of each variable can be seen in Table 1.

Table 1. Variable Definition

Variable	Proxy	Unit
Tax Revenue - Dependent	Tax revenue to GDP	Percentage
Agriculture - Independent	Contribution of the agricultural sector to GDP	Percentage
FDI - Independent	FDI Inflow to GDP	Percentage
Regulatory Quality - Moderation	Quality of Regulations issued	Index

Source: processed by the author

To determine the research model that can explain the relationship between variables, a test was conducted, and the best models among the common, fixed and random effects were selected ([Baltagi, 2021](#)). The test for determining the best panel model can be seen in Table 2.

Table 2. Panel Model Determination Test

Test	H ₀	H ₁
Chow test	Common/pooled is better than fixed effect	Fixed effect is better than common/pooled
Lagrange Multiplier (LM) test	Common/pooled is better than random effect	Random effect is better than common/pooled
Hausman test	Random effect is better than fixed effect	Fixed effect is better than random effect

Source: processed by the author

As seen in Table 3, to ascertain whether or not the selected model can show the relationship between variables, several classical assumption tests were conducted ([Gujarati, 2022](#)). A normality

test is a series of procedures to test whether the underlying distribution of random variables is normally distributed (D'Agostino et al., 1990). Meanwhile, a multicollinearity test is conducted to test whether there is more than one linear relationship between variables (Gujarati, 2022). Furthermore, the heteroscedasticity test is carried out to examine the systematic changes in the distribution of residuals over a range of measured values (Frost, 2019). Finally, the autocorrelation test is conducted to measure if there is a correlation between a series of data sorted in space or time (Gujarati, 2022).

Table 3. Classical Assumption Test

Test	H ₀	H ₁
Normality test	Data are normally distributed	Data are not normally distributed
Multicollinearity test	No multicollinearity between independent variables	There is multicollinearity between independent variables
Heteroscedasticity test	Data are homoscedastic	Data are heteroscedastic
Autocorrelation test	There is no autocorrelation	There is autocorrelation

Source: processed by the author

The form of the panel data regression equation used in this study is as follows:

$$TR = \beta_0 + \beta_1.Agri + \beta_2.FDI + \beta_3.Agri.Reg + \beta_4.FDI.Reg + \beta_5.Reg + \epsilon$$

Where:

TR	=	THE PERCENTAGE OF TAX REVENUE TO GDP
B₀	=	The constant
B₁	=	The regression coefficient of the percentage of the agricultural sector to GDP
AGRI	=	The contribution of the agricultural sector to GDP
B₂	=	The regression coefficient of the percentage of FDI to GDP
FDI	=	Foreign direct investment
B₃	=	The regression coefficient of agricultural sector on GDP that has been moderated by regulatory quality
AGRI.REG	=	The percentage of the agricultural sector to GDP that has been moderated by regulatory quality
B₄	=	The regression coefficient of FDI percentage to GDP that has been moderated by regulatory quality
FDI.REG	=	The percentage of FDI to GDP that has been moderated by regulatory quality
B₅	=	The regression coefficient of regulatory quality
REG	=	The regulatory quality
ε	=	The error

RESULTS AND DISCUSSIONS

To determine the characteristics of each variable, descriptive analysis is conducted as shown in Table 4. Based on the table, the average value of tax revenue of N-11 countries is 11.78%. Nigeria is the country with the smallest tax revenue ratio with a value of 3.37% in 2016. According to [Oyedele \(2016\)](#), the low tax revenue in Nigeria is due to several factors, namely incoherent fiscal policy, complicated and inefficient tax administration system, high level of tax evasion, ambiguity in tax laws, and lack of transparency regarding the utilization of tax revenues for social services and visible development. Surprisingly, a country with the largest tax revenue in 2011 was Turkey with a value of 18.68%. One of the factors for high tax revenue in Turkey is the increase in tobacco tax. [Cetinkaya & Marquez \(2017\)](#) explained that Turkey has significantly increased taxes on tobacco since 2002, and the tax revenue from tobacco from 2005 to 2011 increased by 124%. Meanwhile, the contribution of the agricultural sector to GDP in N-11 countries averaged 12.24%, with Pakistan having the highest ratio of 25.13%. The strong figures indicate that the agricultural sector is the 'backbone' of Pakistan's economy ([Rehman et al., 2015](#)).

In 2019, a country with the lowest ratio was South Korea, with a value of 1.62%. [Yoon et al. \(2020\)](#) further explained that the agricultural sector in South Korea was in a situation of massive import opening because it was driven by the FTA. Furthermore, for FDI, the average value in N-11 countries is 1.85%. In 2019, Egypt became a nation with the lowest FDI percentage of -0.2%. This was due to the greater FDI outflow if compared to the inflow as the massive revolution took place in Egypt on January 25, 2011 ([Kamaly, 2011](#)). On the other hand, in 2019 it was indicated that the country with the highest percentage of FDI was Vietnam, with the percentage of 6.9%. The high percentage of FDI to GDP in Vietnam was triggered by the implementation of foreign investment regulations in 1987 aiming to encourage foreign investment through facilitation such as a full foreign ownership of investments and ruling out nationalization ([Le & Thanh, 1995](#)). Thus, the average regulatory quality score of N-11 countries is -0.33. Furthermore, Iran has the smallest regulatory quality index, around -1.71 in 2010. [Ronaghi et al. \(2020\)](#) stated that the country had difficulty in meeting the WGI. Meanwhile, South Korea had the largest regulatory quality index in 2016 with a value of 1.11. According to [Kim \(2016\)](#), regulatory reform is one of the government's national priorities to support the economic growth, focusing on improving or removing regulations to encourage both employment and investment. It is expected that the priorities help increase the economy and step up the institutions' efforts to facilitate the regulatory reform.

Table 4. Descriptive Statistics

Descriptive	Tax Revenue	Agriculture	FDI	Agriculture – Regulatory Quality	FDI – Regulatory Quality	Regulatory Quality
Mean	11,78	12,24	1,85	-6,66	-0,58	-0,33
Median	12,45	12,58	1,42	-5,95	-0,49	-0,43
Std. Dev	3,71	6,65	1,56	7,09	1,11	0,66
Minimum	3,37	1,62	-0,2	-19,28	-4,25	-1,71

Maximum	18,68	25,13	6,9	3,23	1,87	1,11
---------	-------	-------	-----	------	------	------

Source: processed from STATA 17

In Table 5, a panel model determination test is conducted to select the model. First, a Chow test is conducted to choose either fixed effect or common effect models. The test result is 0.00 or below $\alpha = 5\%$. This means that the fixed effect model is better. Then the LM test is conducted to determine between the random effect or common effect model. The results show a value of 0.00 or below $\alpha = 5\%$, from which the random effect model is considered better. The last test is executed to examine between fixed effect or random effect using the Hausman test. The result shows a value of 0.76 or above $\alpha = 5\%$. Thus, it can be interpreted that the random effect model will be used in this study.

Table 5. The Result of The Panel Model Determination Test

Test	Value	Result
Chow test	0,00	Fixed effect is better than common effect
Lagrange Multiplier (LM) test	0,00	Random effect is better than common effect
Hausman test	0,76	Random effect is better than fixed effect

Source: processed from STATA 17

Following the above steps, a classical assumption test is carried out to ascertain whether or not it meets the assumptions of normality, heteroscedasticity, and autocorrelation as listed in Table 6. The normality test shows a value of 0.06 or above $\alpha = 5\%$, which means that the data used is normally distributed. Whereas the heteroscedasticity test indicates a value above $\alpha = 5\%$, or 0.35. This signifies the homoscedastic data. However, there is still autocorrelation after the testing is completed, indicated by a value of 0.03 or below $\alpha = 5\%$.

Table 6. The Result of Classical Assumption Test

Test	Value	Result
Normality test	0,06	Data is normally distributed
Heteroscedasticity test	0,35	Data is homoscedastic
Autocorrelation test	0,03	There is autocorrelation

Source: processed from STATA 17

Furthermore, a test was conducted to ascertain whether the assumption of multicollinearity has been met, as shown in Table 7. From the test results, it can be concluded that the variables of agriculture, FDI, agriculture moderated by regulatory quality, FDI moderated by regulatory quality, and regulatory quality moderated variables show values below 10. This indicates that all independent variables do not show symptoms of multicollinearity.

Table 7. Multicollinearity Test

Variable	VIF	Result
Agriculture	3,26	No multicollinearity between independent variables
FDI	2,66	No multicollinearity between independent variables
Agriculture – Regulatory Quality	8,38	No multicollinearity between independent variables
FDI – Regulatory Quality	3,97	No multicollinearity between independent variables
Regulatory Quality	4,31	No multicollinearity between independent variables

Source: processed from STATA 17

For autocorrelation symptoms that occur, treatment is carried out in the form of retesting using xtregar syntax on the selected panel model, namely random effect (Baltagi & Wu, 1999). The results of treatment and hypothesis testing can be seen in Table 8.

Table 8. Hypothesis Test

Variable	Coefficient	Std. err	z	P> z
Agriculture	0,02	0,09	0,26	0,792
FDI	0,25	0,15	1,71	0,087
Agriculture – Regulatory Quality	0,16	0,11	1,48	0,138
FDI – Regulatory Quality	-0,63	0,28	-2,21	0,027
Regulatory Quality	2,09	1,09	1,92	0,055
Constant	12,37	1,02	12,17	0,000
Prob > F = 0.00				

Source: processed from STATA 17

The F-test shows a value of 0.00 or smaller than $\alpha=5\%$, which means that all independent variables affect tax revenue simultaneously. Since the p-value obtained from STATA is two-tailed, it must be divided by two to test the one-tailed hypothesis (UCLA, t.t.). The partial test results show that the value of agriculture is 0.396, which is greater than $\alpha = 5\%$. This demonstrates that the variable partially does not affect tax revenue. Moreover, the finding remains unchanged when the agricultural sector is moderated with the regulatory quality, and the p-value signifies a value of 0.069, meaning that it affects significantly, at the $\alpha=10\%$ level. On the other hand, FDI partially influences tax revenue as indicated by the z-test value that is smaller than $\alpha=5\%$, or 0.044. Similarly, FDI has been moderated by regulatory quality, and there is a change to 0.014 or smaller than $\alpha = 5\%$, therefore it can be interpreted that the variable partially significantly affects tax revenue. Moderately, the regulatory quality has a significant effect on tax revenue with a z-test result of 0.028 or lower than $\alpha = 5\%$. Based on the description above, the regression equation is formed below:

$$\text{Tax Revenue} = 12,37 + 0,02\text{Agri} + 0,25\text{FDI} + 0,16\text{AgriReg} - 0,63\text{FDIReg} + 2,09\text{Reg}$$

The agricultural sector has a coefficient value of 0.02 which indicates that a one percent increase in the contribution of the agricultural sector will be followed by a 0.02% increase in tax revenue. However, since the z-test result shows a value above $\alpha=5\%$, it can be interpreted that the agricultural sector has no effect on tax revenue in N-11 countries and is not in accordance with the hypothesis. This is in accordance with a study by [Mahdavi \(2008\)](#) which found that the agricultural sector has a positive and insignificant effect on tax revenue. Furthermore, Chaudhry & Munir (2010) argued that the agricultural sector is negatively and insignificantly related to tax revenue, since small scale farmers and subsistence farming normally occur in developing countries do not generate large taxable income.

Contrary to a study by [Ghura \(1998\)](#) which stated the negative effect of the agricultural sector on tax revenue, it is indicated that tax revenue increases when there is a decline in the ratio of the agricultural sector to GDP. In addition, it is not easy for the agricultural sector to tax politically ([Gupta, 2007](#)). [Piancastelli \(2001\)](#) added that there is a need to improve the performance of fiscal revenue from the agricultural sector, particularly in low and middle-income countries.

Furthermore, when the agricultural sector is moderated by the quality of regulations, it significantly affects tax revenue. This finding is consistent with the hypothesis. That is, an increase in the agricultural sector moderated by regulatory quality to one percent will increase tax revenue by 0.16%. This shows that the quality of regulation in N-11 countries is able to regulate the agricultural sector, thus that tax revenue from the sector notably improves and contributes to tax revenue. These results are also reflected in the findings by [Leuthold \(1991\)](#), which emphasized that the agricultural sector is difficult to tax. However, this can be overcome by a proper regulatory quality, therefore, tax revenue occurs.

Meanwhile, FDI with a coefficient value of 0.25 indicates that it has a significant positive effect on tax revenue, where a one percent increase in FDI will increase tax revenue in N-11 countries by 0.25%. This finding is consistent with the hypothesis. [Minh Ha et al. \(2022\)](#) found similar point, that FDI has a positive effect on tax revenue through not only export-import activities, but also infrastructure development and economic growth. The finding is in line with a research by [Okey \(2013\)](#) which states that FDI can increase tax revenue directly to both foreign companies and entrepreneurs.

In contrast to these findings, a study by [Gaspareniene et al. \(2022\)](#) states that FDI inflow has a negative impact on tax revenue. It occurred since small and medium-sized enterprises are incapable to compete with foreign companies formed from FDI, consequently, potential tax revenue is affected ([UNCTAD, 2012](#)).

Interestingly, when FDI is moderated by regulatory quality, the coefficient becomes -0.63. This means that a one percent increase in FDI moderated by regulatory quality reduces tax revenue by 0.63%. This indicates that the application of both rules and regulations to FDI lowers tax revenue to N-11 countries and shows conformity with the hypothesis. [Mudambi et al. \(2013\)](#) explains that the greater the economic freedom or the fewer regulations governing economic activity, the bigger the inflow of foreign investment. Therefore, the application of regulations to foreign investment

reduces FDI and results in a decrease of the potential tax revenue from the the utilization of these investments.

For the regulatory quality variable itself, it shows a significant positive effect on tax revenue as indicated by a coefficient value of 2.09 and a z-test result of 0.028. If interpreted, an increase in regulatory quality by one signifies the tax revenue by 2.09% and it is obviously in line with the hypothesis. This suggests that regulatory quality plays an crucial role in increasing tax revenue in N-11 countries. Similar results were found by [Syadullah \(2015\)](#) who stated that regulatory quality has a positive impact on tax revenue, where good government policies and regulations towards the private sector improves tax revenue. In addition, [Asmah et al. \(2020\)](#) found that an increase in regulatory quality will be followed by an increase in tax revenue.

Nevertheless, several research results do not match the findings. [Yaru & Raji \(2022\)](#) argued that regulatory quality has no impact on tax revenue, whereas [Salman et al. \(2022\)](#) stated that the government's ability to formulate and implement the development policies of private sectors has no correlation with the level of the economy.

CONCLUSIONS

This study examines the effects of the agricultural sector, FDI, and the moderating variable of regulatory quality on tax revenue in N-11 countries. The results indicate that the agricultural sector, FDI, agriculture moderated by regulatory quality, FDI moderated by regulatory quality, and regulatory quality simultaneously affect tax revenue. Partially, the agricultural sector shows no effect on tax revenue. Meanwhile, FDI, the agricultural sector moderated by regulatory quality, and regulatory quality affect tax revenue positively and significantly. However, when the FDI variable is moderated by regulatory quality, it shows a significant negative effect on tax revenue.

From the findings, it is suggested that governments in N-11 countries not spend resources on regulating the FDI sector, especially when the aim is increasing tax revenue. This is because the quality of regulations will reduce tax revenue from FDI. Instead, the government should issue quality regulations in other sectors, such as agriculture, and based on the analysis, agriculture will have a positive impact on tax revenue. Moreover, the government needs to encourage the entry to foreign investment into N-11 countries for the purpose of increasing the tax revenue. It is obvious that the proper overall regulatory quality have a significant impact on increasing tax revenue.

Nevertheless, this study has limitations, in which only FDI inflow as a proxy for FDI and a short time span are used. For future research, it is recommended that not only the FDI Inflow variable but also the FDI outflow and a longer time span be considered. Moreover, it is necessary to investigate how the moderating variables of corruption control and the rule of law affect the tax revenue.

REFERENCES

- Ajaz, T., & Ahmad, E. (2010). The Effect of Corruption and Governance on Tax Revenues. *The Pakistan Development Review*, 49, 405–417. <https://doi.org/10.2307/41428665>
- Aldaba, R. M., & Quejada, A. D. (2022). *FDI Spillover Effects: Evidence from the Philippines*. Economic Research Institute for ASEAN and East Asia.
- Aslam, A. L. M. (2015, March 4). *A case study of Cointegration relationship between tax revenue and foreign direct investment*. Faculty of Islamic Studies and Arabic Language, South Eastern University of Sri Lanka. Retrieved from <http://ir.lib.seu.ac.lk/handle/123456789/878>
- Asmah, E. E., Kwaw Andoh, F., & Titriku, E. (2020). Trade misinvoicing effects on tax revenue in sub-Saharan Africa: The role of tax holidays and regulatory quality. *Annals of Public and Cooperative Economics*, 91(4), 649–672. <https://doi.org/10.1111/apce.12289>
- Azadi, H., & Barati, A. A. (2013). Agricultural land conversion drivers in Northeast Iran. *The Land Deal Politics Initiative, Working Paper*, 36.
- Balıkçioğlu, E., Dalgıç, B., & Fazlıoğlu, B. (2016). Does Foreign Capital Increase Tax Revenue: The Turkish Case. *International Journal of Economics and Financial Issues*, 6(2), 776–781.
- Baltagi, B. H. (2021). *Econometric Analysis of Panel Data*. Cham: Springer International Publishing. <https://doi.org/10.1007/978-3-030-53953-5>
- Baltagi, B. H., & Wu, P. X. (1999). Unequally Spaced Panel Data Regressions with AR(1) Disturbances. *Econometric Theory*, 15(6), 814–823. JSTOR. Retrieved from JSTOR.
- Bird, R. M., Martinez-Vazquez, J., & Torgler, B. (2005). Societal Institutions and Tax Effort in Developing Countries. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.662081>
- Briones, R. M. (2021). *Philippine Agriculture: Current State, Challenges, and Ways Forward*. Retrieved from <https://www.pids.gov.ph/publication/policy-notes/philippine-agriculture-current-state-challenges-and-ways-forward>
- Camara, A. (2023). The Effect of Foreign Direct Investment on Tax Revenue. *Comparative Economic Studies*, 65(1), 168–190. <https://doi.org/10.1057/s41294-022-00195-2>
- Cao, K. H., & Birchenall, J. A. (2013). Agricultural productivity, structural change, and economic growth in post-reform China. *Journal of Development Economics*, 104, 165–180. <https://doi.org/10.1016/j.jdeveco.2013.06.001>
- Cetinkaya, V., & Marquez, P. V. (2017). *Tobacco taxation in Turkey*.
- Chaudhry, I. S., & Munir, F. (2010). Determinants of low tax revenue in Pakistan. *Pakistan Journal of Social Sciences*, 30(2), 439–452.
- Chelliah, R. J., Baas, H. J., & Kelly, M. R. (1975). Tax Ratios and Tax Effort in Developing Countries, 1969-71. *Staff Papers - International Monetary Fund*, 22(1), 187. <https://doi.org/10.2307/3866592>
- Clark, C. (1967). The conditions of economic progress. *The Conditions of Economic Progress*.

- D'Agostino, R. B., Belanger, A., & D'Agostino, R. B., Jr. (1990). A Suggestion for Using Powerful and Informative Tests of Normality. *The American Statistician*, 44(4), 316. <https://doi.org/10.2307/2684359>
- Davis, M. (2022, March 17). Government Regulations: Do They Help Businesses? Retrieved April 19, 2023, from Investopedia website: <https://www.investopedia.com/articles/economics/11/government-regulations.asp>
- El-Ramady, H. R., El-Marsafawy, S. M., & Lewis, L. N. (2013). Sustainable agriculture and climate changes in Egypt. *Sustainable Agriculture Reviews: Volume 12*, 41–95.
- Eltony, M. N. (2002). *The Determinants of Tax Effort in Arab Countries*.
- FAO. (2018). *Country factsheet on small holder family farms: NIGERIA*. FAO. Retrieved from <https://www.fao.org/documents/card/en?details=I9930EN%2f>
- Ferdous, Z., Zulfiqar, F., Datta, A., Hasan, A. K., & Sarker, A. (2021). Potential and challenges of organic agriculture in Bangladesh: A review. *Journal of Crop Improvement*, 35(3), 403–426. <https://doi.org/10.1080/15427528.2020.1824951>
- Frost, J. (2019). *Regression analysis: An intuitive guide for using and interpreting linear models*. Pennsylvania, U.S.A.: Statistics By Jim Publishing.
- Gaspareniene, L., Kliestik, T., Sivickiene, R., Remeikiene, R., & Endrijaitis, M. (2022). Impact of Foreign Direct Investment on Tax Revenue: The Case of the European Union. *Journal of Competitiveness*, 14(1), 43–60. <https://doi.org/10.7441/joc.2022.01.03>
- Ghura, D. (1998). Tax Revenue in Sub-Saharan Africa: Effects of Economic Policies and Corruption. *IMF Working Papers*, 98(135), 1. <https://doi.org/10.5089/9781451855685.001>
- Giray, H. (2012). Turkish agriculture at a glance. *J Food, Agric Environ*, 10, 292–295.
- Gnangnon, S. K. (2017). Impact of foreign direct investment (FDI) inflows on non-resource tax and corporate tax revenue. *Economics Bulletin*, 37(4), 2890–2904.
- Gopalan, S., Hattari, R., & Rajan, R. S. (2016). Understanding foreign direct investment in Indonesia. *Journal of International Trade Law and Policy*, 15(1), 28–50. <https://doi.org/10.1108/JITLP-01-2016-0003>
- Gujarati, D. N. (2022). *Basic econometrics*. Prentice Hall.
- Gupta, A. S. (2007). *Determinants of tax revenue efforts in developing countries*.
- Hanh, N. P., Van Hùng, Đ., Hoat, N. T., & Trang, D. T. T. (2017). Improving quality of foreign direct investment attraction in Vietnam. *International Journal of Quality Innovation*, 3(1), 7. <https://doi.org/10.1186/s40887-017-0016-7>
- Inriama, M., & Setyowati, M. S. (2020). Pengaruh Pertumbuhan Ekonomi, Foreign Direct Investment dan Tax Rate Terhadap Penerimaan PPh Badan Negara ASEAN. *Indonesian Treasury Review: Jurnal Perbendaharaan, Keuangan Negara Dan Kebijakan Publik*, 5(4), 325–342. <https://doi.org/10.33105/itrev.v5i4.240>

- Islam, K. A. (2014). Foreign direct investment (FDI) in Bangladesh: Prospects and challenges and its impact on economy. *Asian Business Review*, 4(1), 24–36.
- Kamaly, A. (2011). *Inward FDI in Egypt and its policy context*. <https://doi.org/10.7916/D8S75Q96>
- Ketkar, K. W., Murtuza, A., & Ketkar, S. L. (2005). Impact of corruption on foreign direct investment and tax revenues. *Journal of Public Budgeting, Accounting & Financial Management*, 17(3), 313–341. <https://doi.org/10.1108/JPBAFM-17-03-2005-B004>
- Kim, J. (2016). *Economic Effect of Regulatory Reforms in Korea*. 한국개발연구원. Retrieved from 한국개발연구원 website: <https://doi.org/10.22740/KDI.PS.E.2016.01>
- Kim, M. (2015). Productivity spillovers from FDI and the role of domestic firm's absorptive capacity in South Korean manufacturing industries. *Empirical Economics*, 48(2), 807–827. <https://doi.org/10.1007/s00181-014-0804-z>
- Le, T., & Thanh, T. (1995). The Legal Aspects of Foreign Investment in Vietnam. *Int'l Trade & Bus. LJ*, 1, 45.
- Leuthold, J. H. (1991). Tax shares in developing economies A panel study. *Journal of Development Economics*, 35(1), 173–185. [https://doi.org/10.1016/0304-3878\(91\)90072-4](https://doi.org/10.1016/0304-3878(91)90072-4)
- Mahdavi, S. (2008). The level and composition of tax revenue in developing countries: Evidence from unbalanced panel data. *International Review of Economics & Finance*, 17(4), 607–617. <https://doi.org/10.1016/j.iref.2008.01.001>
- Minh Ha, N., Tan Minh, P., & Binh, Q. M. Q. (2022). The determinants of tax revenue: A study of Southeast Asia. *Cogent Economics & Finance*, 10(1), 2026660. <https://doi.org/10.1080/23322039.2022.2026660>
- Mohamed, W. M. H. (2020). Determinants of Foreign Direct Investment in Egypt. *IOSR Journal of Business and Management*.
- Mudambi, R., Navarra, P., & Delios, A. (2013). Government regulation, corruption, and FDI. *Asia Pacific Journal of Management*, 30(2), 487–511. <https://doi.org/10.1007/s10490-012-9311-y>
- Mühlen, H., & Escobar, O. (2020). The role of FDI in structural change: Evidence from Mexico. *The World Economy*, 43(3), 557–585. <https://doi.org/10.1111/twec.12879>
- Neszmelyi, G. I. (2017). The Main Characteristics of The South Korean Agriculture. *Economic and Local Aspects of Rural Development*, Szent Istvan University, Budapest, Hungary, 31–43.
- Okey, M. K. N. (2013). Tax revenue effect of foreign direct investment in West Africa. *African J. of Economic and Sustainable Development*, 2(1), 1. <https://doi.org/10.1504/AJESD.2013.053052>
- O'Neill, J., Wilson, D., Purushothaman, R., & Stupnytska, A. (2005). Global economics paper no: 134. *How Solid Are the BRICs*.
- Ortiz-Ospina, E., & Roser, M. (2016). Taxation. *Our World in Data*. Retrieved from <https://ourworldindata.org/taxation>

- Osabohien, R., David Awolola, O., Matthew, O., Queen Itua, O., & Elomien, E. (2020). Foreign direct investment inflow and employment in Nigeria. *Investment Management and Financial Innovations*, 17(1), 77–84. [https://doi.org/10.21511/imfi.17\(1\).2020.07](https://doi.org/10.21511/imfi.17(1).2020.07)
- Oyedele, T. (2016). *Guess how many Nigerians pay tax and how our government spends the money*. Retrieved from https://pwcnigeria.typepad.com/tax_matters_nigeria/2016/06/guess-how-many-nigerians-pay-tax-and-how-our-government-spends-the-money.html
- Piancastelli, M. (2001). Measuring the Tax Effort of Developed and Developing Countries: Cross Country Panel Data Analysis - 1985/95. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.283758>
- Pratomo, A. W. (2020). THE EFFECT OF FOREIGN DIRECT INVESTMENT ON TAX REVENUE IN DEVELOPING COUNTRIES. *Jurnal BPPK: Badan Pendidikan Dan Pelatihan Keuangan*, 13(1), 83–95. <https://doi.org/10.48108/jurnalbppk.v13i1.484>
- Rafat, M. (2018). The Interactive Relationship between Economic Growth and Foreign Direct Investments (FDI): A VAR Analysis in Iran. *Iranian Economic Review*, 22(1). <https://doi.org/10.22059/ier.2018.65355>
- Rehman, A., Jingdong, L., Shahzad, B., Chandio, A. A., Hussain, I., Nabi, G., & Iqbal, M. S. (2015). Economic perspectives of major field crops of Pakistan: An empirical study. *Pacific Science Review B: Humanities and Social Sciences*, 1(3), 145–158. <https://doi.org/10.1016/j.psrb.2016.09.002>
- Rehman, N. U. (2016). FDI and economic growth: Empirical evidence from Pakistan. *Journal of Economic and Administrative Sciences*, 32(1), 63–76. <https://doi.org/10.1108/JEAS-12-2014-0035>
- Rodríguez, V. M. C. (2018). Tax determinants revisited. An unbalanced data panel analysis. *Journal of Applied Economics*, 21(1), 1–24. <https://doi.org/10.1080/15140326.2018.1526867>
- Ronaghi, M., Kohansal, M. R., & Ghorbani, M. (2020). The Effects of Agricultural Governance Variables on Iran's Livestock and Meat Market. *Journal of Agricultural Economics and Development*, 33(4), 377–394. <https://doi.org/10.22067/jead2.v33i4.83167>
- Salman, R. T., Sanni, P., Olaniyi, T. A., & Yahaya, K. A. (2022). Governance Transparency of Tax Revenue Performance in West Africa. *Business Ethics and Leadership*, 6(1), 14–24. [https://doi.org/10.21272/bel.6\(1\).14-24.2022](https://doi.org/10.21272/bel.6(1).14-24.2022)
- Sarmento, J. (2016). The determinants of value added tax revenues in the European Union. *The European Journal of Management Studies*, 21(2), 79–99.
- Stotsky, M. J. G., & WoldeMariam, M. A. (1997). *Tax effort in sub-Saharan Africa*. International Monetary Fund.
- Syadullah, M. (2015). Governance and Tax Revenue in Asean Countries. *Journal of Social and Development Sciences*, 6(2), 76–88. <https://doi.org/10.22610/jsds.v6i2.845>

- Tanzi, V. (1992). Structural factors and tax revenue in developing countries: A decade of evidence. In I. Goldin & L. A. Winters (Eds.), *Open Economies* (1st ed., pp. 267–285). Cambridge University Press. <https://doi.org/10.1017/CBO9780511628559.023>
- Tanzi, V., & Zee, H. (2001). Economic Issues No. 27—Tax Policy for Developing Countries. Retrieved May 12, 2023, from IMF website: <https://www.imf.org/external/pubs/ft/issues/issues27/>
- Temiz, D., & Gökmen, A. (2014). FDI inflow as an international business operation by MNCs and economic growth: An empirical study on Turkey. *International Business Review*, 23(1), 145–154. <https://doi.org/10.1016/j.ibusrev.2013.03.003>
- UNCTAD. (2012). *World Investment Report 2012*. Retrieved from https://unctad.org/system/files/official-document/wir2012_embargoed_en.pdf
- UNCTAD. (2014). *Mexico's Agriculture Development: Perspectives and Outlook*. Retrieved from https://unctad.org/system/files/official-document/ditctncd2012d2_rev1_en.pdf
- WDI - Home. (n.d.). Retrieved April 21, 2023, from <https://datatopics.worldbank.org/world-development-indicators/>
- Widyawati, R. F. (2017). Analisis keterkaitan sektor pertanian dan pengaruhnya terhadap perekonomian Indonesia (analisis input ouput). *Jurnal Economia*, 13(1), 14–27.
- Wilson, D., Stupnytska, A., Poddar, T., Bhundia, A., Morra, P., & Ahmed, S. (2007). Global Economics Paper No: 153. *Goldman Sachs*.
- World Bank. (2016). *Transforming Vietnamese Agriculture*. <https://doi.org/10.1596/24375>
- Yaru, M. A., & Raji, A. S. (2022). Corruption, Governance and Tax Revenue Performance in Sub-Saharan Africa. *African Journal of Economic Review*, 10(1), 234–253.
- Yoon, C., Lim, D., & Park, C. (2020). Factors affecting adoption of smart farms: The case of Korea. *Computers in Human Behavior*, 108, 106309.