



DOES REDUCED DWELLING TIME LEADS TO HIGHER TAX REVENUE? THE IMPORTANT ROLE OF GOVERNMENT EFFECTIVENESS IN ASEAN-5

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Abstract

This study aims to analyze the factors that affect tax revenue on international trade in ASEAN-5 countries. Data was obtained from The World Bank and analyzed using panel data regression. Variables used in this study are tax revenue on international trade, import growth, dwelling time, and government effectiveness. The results show that import growth, dwelling time, import growth that has been moderated by government effectiveness, and dwelling time that has been moderated by government effectiveness simultaneously affect tax revenue on international trade. Partially, import growth, dwelling time, and government effectiveness have a positive effect on tax revenue on international trade. However, when moderated by government effectiveness, import growth and dwelling time show a negative effect on tax revenue on international trade. The recommendation from this study is for the government to improve the quality of public services in the process of loading and unloading goods. Effective public services at ports and airports, balanced with efforts to reduce dwelling time, will increase tax revenue on international trade. The steps that the government can take are to simplify business processes at the port, for example, joint inspection between customs and quarantine authorities. In addition, the government needs to sterilize port and airport areas so that unauthorized parties do not hinder the flow of goods in and out. Public service improvements can also be made in other sectors because they have a significant impact on increasing tax revenue on international trades.

Keywords: Dwelling time, Government effectiveness, International trade, Import growth

INTRODUCTION

The Association of Southeast Asian Nations (ASEAN) is an association of countries in the Southeast Asian region formed on August 8, 1967, in Bangkok by Indonesia, Malaysia, Philippines, Singapore, and Thailand. These five countries are the founding countries of ASEAN, commonly called ASEAN-5. One of the objectives of ASEAN is to create a stable, prosperous, highly competitive, and economically integrated single market and production base with effective facilitation of trade and investment, which includes the free flow of goods, services, and investment; facilitating the movement of business people, professionals, talent and labor; and the free flow of capital (ASEAN, 2008). One of the entrances to the flow of goods traffic between countries is container terminal.

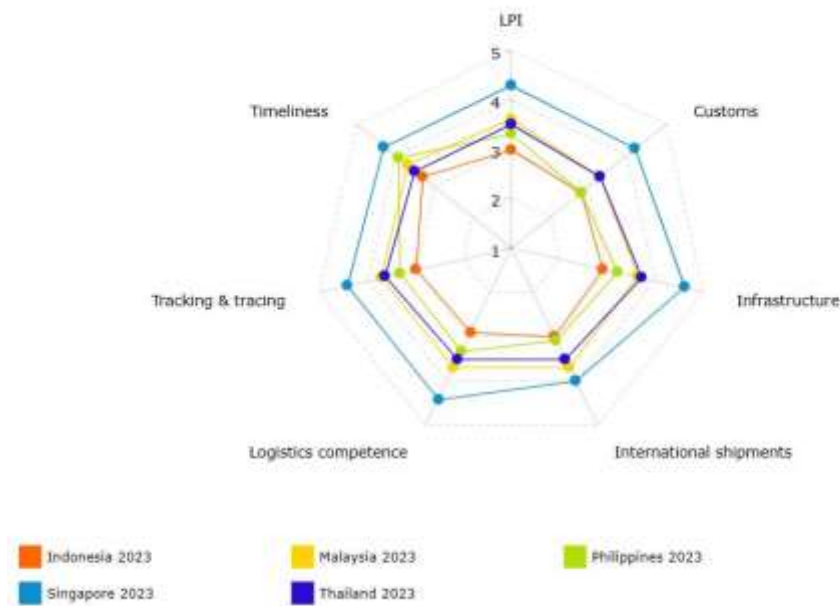
Container terminals are key nodes in the global supply chain (Humphreys, 2023). A container terminal is where containers are handed over before being exported to another country or imported into a mainland port. Therefore, container terminals serve as buffer zones that absorb incapacities and bottlenecks that occur in other parts of the supply chain. Kourouniotti et al. (2016) further explained that the current increase in container volumes combined with the growing number of large container ships demands greater terminal capacity. One solution is to increase the size of the terminal, which in addition to being a very expensive investment, is also not possible due to land limitations. As a result, terminal operators are trying to lower the average dwelling time. Dwelling time is the total time containers spend in one or more terminal stacks (Ottjes et al., 2007). Port dwell time has an indirect relationship with logistics performance (Bank, 2023).

Logistics performance can be measured through the Logistics Performance Index (LPI). The LPI is a weighted average of six key dimensions, namely timeliness, customs, infrastructure, international shipments, logistics competence, and tracking & tracing (Bank,



2023). The LPI data for ASEAN-5 countries in 2023 can be seen in Figure 1. It can be seen that Indonesia has the lowest LPI score among the ASEAN-5 countries, with an average score of 3 and the lowest position in all indicators. As a result, Indonesia only ranks 61st in the world. The Philippines is the next lowest country with an LPI score of 3.3 and ranks 43rd in the world. Thailand is 34th in the world and has a score of 3.5. The 26th position in the world is held by Malaysia with a score of 3.6. Lastly, far above the other ASEAN-5 countries, Singapore is ranked first in the world with a score of 4.3.

Figure 1. Logistics Performance Index ASEAN-5 in 2023



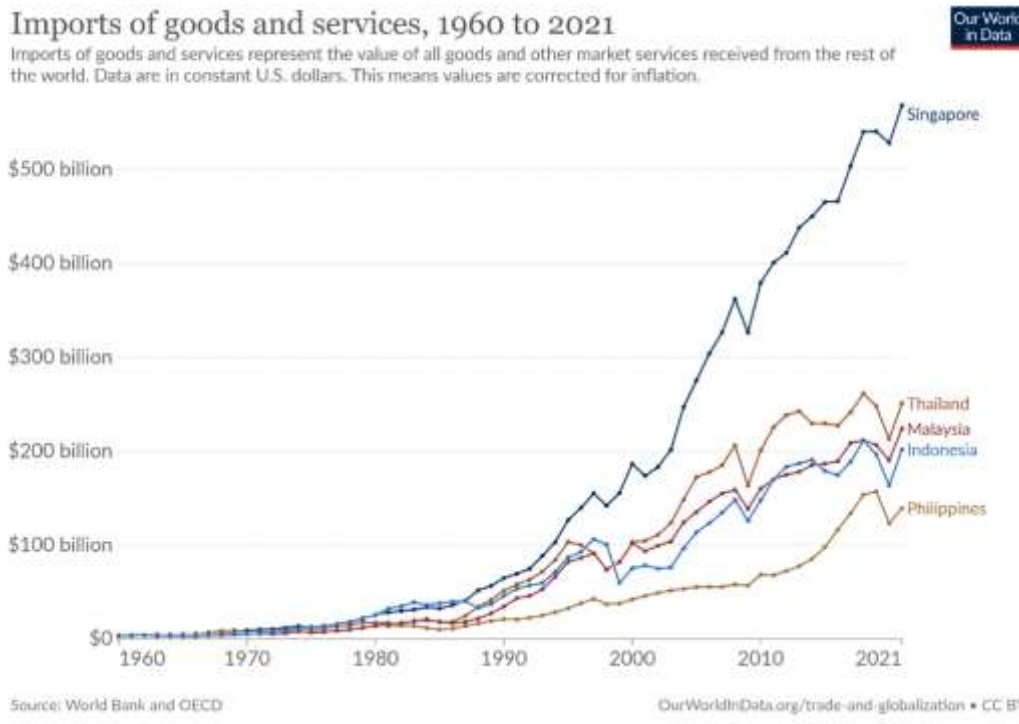
Source: The World Bank

Anita & Asmadewa (2017) explained that the length of the processing and issuance of prohibitions and restrictions licenses is a major obstacle in dwelling time, because importers do not have or have not understood the regulation, the manual processing of prohibitions and restrictions licenses, and the distance of the office where prohibitions and restrictions licensing is processed from the port. According to Purwanto & Indrawan (2020), dwelling time has a significant negative effect on import tax revenue. Similar research conducted by Hilal & Lisna (2019) explains that dwelling time hurts import revenue in the long and short term. This is because dwelling time hurts import value, and import value has a positive effect on import revenue. However, effective dwelling time will increase import tax revenue (Risnarningsih & Liwu, 2023).

The smooth flow of goods can also be seen through imports. Singapore has the highest import value compared to other ASEAN-5 countries. It can be seen that Singapore's imports have grown dramatically since 1990. The countries with the next most significant value are Thailand, Malaysia, Indonesia, and the Philippines. However, in terms of import growth, the results are different. Singapore remains the country with the highest import growth, averaging 8.89% per year since 1960. Then Thailand recorded an average import growth of 8.41%. Next is Indonesia with an average import growth of 8.16% per year. Meanwhile, Malaysia experienced an average import growth of 7.57% per year. Finally, the Philippines only recorded an average import growth of 6.56% per year.



Figure 2. Import Value of Goods and Services of ASEAN-5 in 1960-2021



Source: Our World in Data

In relation to state revenue, imports value affects import duty revenue positively and significantly (Epaphra, 2014). Another study by Hilal & Lisna (2019) supports this and states that the high flow of imports causes an increase in import tax revenue. Furthermore, Purwana (2019) found that the value of imports has a significant positive effect on import duty revenue through trade liberalization which increases the value of imports and then increases import duty revenue. Meanwhile, Morrissey et al. (2016) separated the impact of imports on tax revenue in democratic and non-democratic countries. As a result, imports have a positive and significant effect on tax revenue in non-democratic countries, but no significant effect on tax revenue in democratic countries.

To ensure that export and import traffic runs smoothly, optimal public services are needed. The government plays a role in optimizing the quality of public services to facilitate the flow of goods as the goal of ASEAN. Public perception of public services is reflected in the Government Effectiveness Index. Ouma (2019) found that government effectiveness does not have a significant effect on direct taxes, but has a significant effect on indirect taxes, which include taxes on international trade. On the other hand, Syadullah (2015) stated that government effectiveness has no effect on tax revenue in ASEAN countries.

Based on the description above, there are still differences in findings and there is no agreement on the factors that affect tax revenue on international trade. This study aims to analyze the factors that influence tax revenue on international trade in the hope that it can provide recommendations to increase state revenue. In addition, the use of moderating variables of government effectiveness in this study to examine whether or not efforts to improve public services, especially in streamlining the importation process, are important.

LITERATURE REVIEW

Taxes on International Trade

The rationale for the imposition of import duties is based on the need to protect domestic industries, usually new industries, which need to be protected from aggressive foreign



competition that may occur before the domestic industry has had sufficient time to catch up with foreign competition (Shome, 2021). Once the economy develops, the argument for the continuation of high customs tariffs cannot be easily defended. Indeed, over the years, customs tariffs have been reduced in developing countries. The WTO has played an important role in encouraging economies to become more competitive through reduced customs tariffs.

Theory of Comparative Advantage

Competitive advantage is the advantage of a party in producing goods and/or services at a lower opportunity cost than its trading partners (Ricardo, 1817). In other words, comparative advantage is a condition where a country can produce goods at a low cost and in large quantities compared to other countries (Wulandari & Lubis, 2019). Thus, countries with comparative advantage will benefit more when trading with other countries.

Import Substitution Industrialization Policy

Import Substitution Industrialization (ISI) is an attempt by a country to eliminate import dependency from other countries through the development of production facilities (Baer, 1972). ISI contradicts the Theory of Comparative Advantage which tends to support production specialization while continuing to import and export. This policy is considered important for developing countries to encourage the industrialization process (Adewale, 2017). This is justified because developed countries have now adopted ISI policies first before promoting economic liberalization when the developed countries have reached a certain level of industrial development.

Dwelling Time

Dwelling time is the total time containers spend in one or more terminal stacks (Ottjes et al., 2007). Dwelling time can be affected by several factors such as gate operations, availability and efficiency of hinterland connections, and customs authority regulations (Kourouniotti et al., 2016). The consignee or importer is one of the determining factors of dwelling time as they decide when to pick up the imported containers after customs obligations have been completed.

Government Effectiveness

The Government Effectiveness Index is one of the six World Government Index (WGI) published by the World Bank. Government effectiveness is measured based on the policies carried out by the government towards society, public services, and policy quality, as well as the implementation and neutrality of the government in politics in a country (Herbowo, 2020). In addition, government effectiveness represents the accountability of the government to run its government better. The Government Effectiveness Index has a range of -2.5 to 2.5.

Previous Research

Import value affects import duty revenue positively and significantly (Epaphra, 2014). Another study by Hilal & Lisna (2019) supports this and states that the high flow of importation causes an increase in tax revenue on international trade. More deeply, Purwana (2019) found that the value of imports has a significant positive effect on import duty revenue through trade liberalization which increases the value of imports and then increases import duty revenue.

Another factor that affects tax revenue on international trade is dwelling time. Purwanto & Indrawan (2020) found that dwelling time has a significant negative effect on import tax revenue. Hilal & Lisna (2019) elaborated further that dwelling time negatively affects import revenue in the long term and short term. This is because dwelling time negatively affects the value of imports, and the value of imports has a positive effect on import revenue. However, effective dwelling time will increase import tax revenue (Risnarningsih & Liwu, 2023).

For government effectiveness, Syadullah (2015) found that government effectiveness has no effect on tax revenue in ASEAN countries. Ouma (2019) goes into more detail, where



government effectiveness has no significant effect on direct taxes, but has a significant effect on indirect taxes.

METHODS

This study uses panel data regression with taxes on international trade revenue, import growth, and dwelling time from ASEAN-5 countries during 2014 to 2019 obtained from the World Bank. Both import growth and dwelling time are moderated using the government effectiveness variable. The operationalization of dependent, independent, and moderation variables are shown in Table 1.

Table 1. Operationalization Variable

Variable	Proxy	Unit
Taxes on International Trade - Dependent	Taxes on international trade	Percent
Import Growth - Independent	Growth in imports of goods and services	Percent
<i>Dwelling Time</i> - Independent	Time required to complete the loading and unloading process at the port of entry	Hours
Government Effectiveness - Moderation	Perception of public service quality	Index

Source: processed by the author

In panel data regression, it is necessary to select a model between common effect (CE), fixed effect (FE), and random effect (RE). The model selection is carried out using the chow test, lagrange multiplier (LM) test, and hausman test. The selected model will be used to explain the relationship between variables (Baltagi, 2021). Chow test, LM test, and Hausman Test are shown in Table 2.

Table 2. Chow test, LM test, and Hausman test

Test	H0	H1
Chow test	CE is better than FE	FE is better than CE
LMtest	CE is better than RE	RE is better than CE
Hausman test	RE is better than FE	FE is better than RE

Source: processed by the author

To ascertain whether the selected panel model can show the relationship between variables, a classical assumption test is conducted (Gujarati, 2022). The classical assumption test are shown in Table 3. The normality test is carried out using skewness and kurtosis tests for normality. This test needs to be done because if it is not fulfilled, the resulting regression coefficient will be biased and the error will be even greater (Sihombing, 2021). In addition, partial and simultaneous hypothesis testing is also irrelevant because both tests are derived from normal distribution. Then, the multicollinearity test is carried out by looking at the variance inflation factor (VIF) value, where if there is an independent variable value with a VIF value of more than 10, then multicollinearity symptoms are indicated. The test needs to be done because when multicollinearity occurs, the regression model estimate of the coefficient becomes unstable and the standard error for the coefficient can increase rapidly (Regression with Stata Chapter 2 - Regression Diagnostics, n.d.). Furthermore, the heteroscedasticity test was conducted using the Weisberg test for heteroscedasticity. This test needs to be done because if heteroscedasticity occurs and the normal assumption is met, the Ordinary Least Squares (OLS) estimator remains unbiased and consistent, but the estimator is no longer efficient in both small and large samples asymptotically (Sihombing, 2021). In this case, the variance of the estimator of the regression coefficient parameters will be underestimated or overestimated. Finally, the autocorrelation test is carried out using the Wooldridge test for autocorrelation. This test needs to be done because if autocorrelation occurs and the normality assumption is met, the OLS estimator will be biased.



Table 3. Classical Assumption Test

Test	H0	H1
Skewness and kurtosis tests for normality	Data is normally distributed	Data is not normally distributed
Multicollinearity test	There is no linear relationship among some or all of the independent variables that make up the model	There is a linear relationship among some or all of the independent variables that make up the model
Breusch-Pagan/Cook-Weisberg test for heteroskedasticity	The variance of the residuals from one observation to another is constant	The variance of the residuals from one observation to another is not constant
Wooldridge test for autocorrelation in panel data	There is no relationship between the residuals of one observation and other observations that differ in time for time series data, or between locations for spatial data.	There is relationship between the residuals of one observation and other observations that differ in time for time series data, or between locations for spatial data.

Source: processed by the author

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

$$\text{TRIT} = \beta_0 + \beta_1.\text{ImpGro} + \beta_2.\text{DwellTime} + \beta_3.\text{ImpGro.Eff} + \beta_4.\text{DwellTime.Eff} + \beta_5.\text{Eff} + \varepsilon$$

Description:

- TRIT = Percentage of tax revenue on international trade
- β_0 = Constant
- β_1 = Import growth regression coefficient
- ImpGro = Percentage of import growth
- β_2 = Dwelling time regression coefficient
- DwellTime = Dwelling time
- β_3 = Import growth regression coefficient that has been moderated by government effectiveness
- PertImpor.Eff = Percentage of import growth that has been moderated by government effectiveness
- β_4 = Dwelling time regression coefficient that has been moderated by government effectiveness
- DwellTime.Eff = Dwelling time that has been moderated by government effectiveness
- β_5 = Regression coefficient of government effectiveness
- Eff = Government effectiveness
- ε = Error

RESULTS AND DISCUSSION

Results

First, descriptive statistics were conducted to summarize the dataset used as shown in Table 4. The table shows that the average value of tax revenue on international trade in ASEAN-5 countries during the period 2014 to 2019 is 5.33% where the country with the highest tax revenue on international trade is the Philippines at 20.92% and the lowest is Singapore at 0%. These results show that state revenue in the Philippines is highly dependent on international tax revenue. Meanwhile, as one of the countries with a free port and open economy, Singapore imposes import duties of 0% for almost all commodities (ITA, 2022). Furthermore, for import growth, the average percentage of import growth of ASEAN-5 countries is 4.09%. The country with the highest percentage of import growth was the Philippines at 18.81% in 2016. On the other hand, Indonesia is the country with the lowest import growth, even experiencing a decline



of -7.13% in 2019. Then for dwelling time, the average in ASEAN-5 countries is 66.25 hours. Singapore is the country with the lowest dwelling time, which is 33 hours from 2017 to 2019. Lam & Ramakrishnan (2017) stated that Singapore has the largest transshipment port in the world so it encourages business process efficiency at the port. Meanwhile, the Philippines is the country with the highest dwelling time, which is 120 hours in 2018 and 2019. Then for government effectiveness, the average in ASEAN-5 countries is 0.71. The lowest government effectiveness index in ASEAN-5 countries was owned by Indonesia in 2015 at -0.30. While Singapore became the country with the highest government effectiveness index in 2015 at 2.23. Quah (2018) states that Singapore has a favorable policy context and an effective public bureaucracy, while Indonesia has an unfavorable policy context and an ineffective public bureaucracy.

Table 4. Descriptive Statistics

Descriptive	TRIT	ImpGro	DwellTim	ImpGro – Eff	DwellTime – Eff	Eff
Mean	5.33	4.09	66.25	2.51	30.39	0.71
Std. Dev	7.14	6.87	27.63	4.96	30.99	0.84
Minimum	0	-7.13	33	-2.41	-29.44	-0.30
Maximum	20.92	18.81	120	17.87	79.04	2.23

Source: processed from STATA 17

Table 5 shows the results of normality, heteroscedasticity, and autocorrelation tests. The results of the skewness and kurtosis tests for normality show a value of 0.1104 or more than $\alpha = 5\%$. This means that the data used is normally distributed. However, the results of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity show a value of 0.00006 or below $\alpha = 5\%$. This means that the variance of the residuals from one observation to another is not constant. Similarly, the result of the Wooldridge test for autocorrelation in panel data shows a value of 0.0024 or below $\alpha = 5\%$. This means that there is relationship between the residuals of one observation and other observations that differ in time for time series data, or between locations for spatial data. To overcome the problem of heteroscedasticity and autocorrelation, a treatment will be done.

Table 5. Classical Assumption Test Results

Test	Value	Result
Skewness and kurtosis tests for normality	0.1104	Data is normally distributed
Breusch-Pagan/Cook-Weisberg test for heteroskedasticity	0.0006	The variance of the residuals from one observation to another is not constant
Wooldridge test for autocorrelation in panel data	0.0023	There is relationship between the residuals of one observation and other observations that differ in time for time series data, or between locations for spatial data.

Source: processed from STATA 17

Table 6 shows the results of multicollinearity test. Based on the test results, only the government effectiveness variable shows symptoms of multicollinearity with VIF value 11.62 or above 10. In contrast, the variables of import growth, dwelling time, import growth moderated by government effectiveness, and dwelling time moderated by government effectiveness show values below 10, which means that there are no symptoms of multicollinearity between the independent variables. However, Disatnik & Sivan (2016) showed that multicollinearity occurs due to misinterpretation of the high correlation between



independent variables and interaction with moderating variables so it is not a problem in moderation regression.

Table 6. Multicollinearity Test Results

Variable	VIF	Result
ImpGro	1.29	There is no linear relationship among some or all of the independent variables that make up the model
DwellTime	2.23	There is no linear relationship among some or all of the independent variables that make up the model
ImpGro – Eff	1.95	There is no linear relationship among some or all of the independent variables that make up the model
DwellTime – Eff	7.61	There is no linear relationship among some or all of the independent variables that make up the model
Eff	11.62	There is a linear relationship among some or all of the independent variables that make up the model

Source: processed from STATA 17

For the symptoms of heteroscedasticity and autocorrelation that occur, treatment is carried out in the form of testing using the `xtgls` command. The `xtgls` command can be used to overcome symptoms of heteroscedasticity, autocorrelation, and cross-sectional correlation when the number of $N < T$ or in this study, the number of countries is less than the number of years (Hoechle, 2007). The treatment results can be seen in Table 7.

Table 7. Hypothesis Test

Variable	Coefficient	Std. err	z	P> z
ImpGro	0.24	0.13	1.85	0.065
DwellTime	0.09	0.04	2.01	0.044
ImpGro – Eff	-0.15	0.09	-1.60	0.109
DwellTime – Eff	-0.11	0.05	-2.42	0.016
Eff	2.69	1.90	1.42	0.156
Constant	-0.29	2.66	-0.11	0.912

Source: processed from STATA 17

Discussion

To test the hypothesis used in this study, which is one-tailed, the p-value must be divided by two since the p-value produced by STATA is two-tailed (*FAQ: What Are the Differences between One-Tailed and Two-Tailed Tests?*, n.d.). The partial test results show a p-value of 0.033 for the import growth variable. This means that import growth significantly affects tax revenue on international trade at the $\alpha=5\%$ level. When moderated by government effectiveness, import growth has a p-value of 0.055 which shows a significant effect on tax revenue on international trade at the $\alpha = 10\%$ level. Then the dwelling time variable shows a p-value of 0.022 which means that dwelling time significantly affects tax revenue on international trade at the $\alpha = 5\%$ level. When moderated by government effectiveness, dwelling time has a p-value of 0.008. This means that dwelling time moderated by government effectiveness significantly affects tax revenue on international trade at the $\alpha = 1\%$ level. Finally, the government effectiveness variable significantly affects tax revenue on international trade at the $\alpha = 10\%$ level with a p-value of 0.078. Based on the findings above, the following regression equation can be formed:

$$\text{TRIT} = -0.29 + 0.24\text{ImpGro} + 0.09\text{DwellTime} - 0.15\text{ImpGro.Eff} - 0.11\text{DwellTime.Eff} + 2.69\text{Eff} + \varepsilon$$

Import growth has a coefficient value of 0.24 which indicates that a 1% increase in import growth in ASEAN-5 countries will be followed by a 0.24% increase in tax revenue on international trade. That is, the higher the import growth of a country from year to year, the



higher the country's tax revenue on international trade. Epaphra (2014) found similar results where an increase in the ratio of imports to GDP increases import duty revenue. Another study by Hilal & Lisna (2019) found that import value has a significant positive effect on import tax revenue, both in the short and long term. Import value has a significant positive effect on import duty revenue through trade liberalization which increases the value of imports and then increases import duty revenue (Purwana, 2019).

When import growth is moderated by government effectiveness, import growth has a significant negative effect on tax revenue on international trade as seen from the coefficient value of -0.15. The result shows that an increase in import growth that has been moderated by government effectiveness by 1% will reduce tax revenue on international trade by 0.15% in ASEAN-5 countries. This finding implies that when public services in the import sector run effectively, it will reduce tax revenue on international trade.

Meanwhile, dwelling time with a coefficient value of 0.09 indicates that dwelling time has a significant positive effect on tax revenue on international trade, where an increase in dwelling time by one hour will increase international trade revenue in ASEAN-5 countries by 0.09%. This can happen because a more thorough inspection process at the port, either by customs authorities or other agencies, can potentially produce findings that can increase revenue. Reduced physical and document inspection, which in turn reduces dwelling time, will reduce import duty revenue due to the potential for fraudulent import declaration to go undetected (Nurhidayati & Cahyani, 2020).

However, dwelling time moderated by government effectiveness makes the coefficient -0.11. It can be interpreted that a one-hour decrease in dwelling time that has been moderated by government effectiveness will increase tax revenue on international trade by 0.11%. Similar research by Purwanto & Indrawan (2020) found that dwelling time has a significant negative effect on import tax revenue. This shows that dwelling time is very influential on the smooth flow of international trade, especially imports in that dwelling time negatively affects import tax revenue through import value, where dwelling time negatively affects import value, and import value has a positive effect on import tax revenue (Hilal & Lisna, 2019).

Then government effectiveness shows a significant positive effect on tax revenue on international trade as shown by the coefficient value of 2.69. If interpreted, an increase in government effectiveness by one will increase tax revenue on international trade by 2.69% and in accordance with the hypothesis. This shows that government effectiveness plays an important role in increasing tax revenue on international trade in ASEAN-5 countries. This finding is supported by Ouma (2019) who found that government effectiveness has a significant positive effect on indirect taxes, including taxes on international trade. On the other hand, Syadullah (2015) found that government effectiveness has no effect on tax revenue in ASEAN countries.

CONCLUSION

This study tries to examine the effect of import growth, dwelling time, and the moderating variable of government effectiveness on tax revenue on international trade in ASEAN-5 countries. The results showed that import growth, dwelling time, import growth moderated by government effectiveness, dwelling time moderated by government effectiveness, and government effectiveness simultaneously affect tax revenue on international trade. Partially, import growth, dwelling time, and government effectiveness have a positive and significant effect on tax revenue on international trade. However, once import growth and dwelling time are moderated by government effectiveness, it produces a negative effect on tax revenue on international trade.

The findings explain that efforts to optimize public services need to be made for the loading and unloading of goods. Effective public services at the port, balanced with a decrease



in dwelling time, will increase tax revenue on international trade. The steps that the government can take are to simplify business processes at the port, for example joint inspection between customs and quarantine authorities. In addition, the government needs to sterilize the port area so that unauthorized parties do not hinder the flow of goods in and out. Public service improvements can also be made in other sectors because they have a significant impact on increasing tax revenue on international trades.

Suggestions for future research are to expand the scope of countries studied and the period of data used. In addition, it is also necessary to study the effect of moderating variables on the quality of regulations and the rule of law in increasing tax revenue on international trades.

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