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The Level of Development and Tax Revenues in the Association of Southeast Asian Nations

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ABSTRACT: In this study, three distinct panel models, namely the Pool Ordinary Least Square (OLS), Fixed Effect (FE), and Random Effect (RE) models, were utilized to investigate the impact of foreign direct investment, trade openness, inflation rate, proportion of value added in agriculture, proportion of value added in industry, civil liberties, political rights index, official development assistance, and human development index on tax revenue in the six ASEAN countries, namely Cambodia, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam, over the period of 2005 to 2021. The FE model was deemed more appropriate than the Pooled OLS model, as indicated by the FE test. Furthermore, a Hausman test was conducted, which revealed that the FE model was more suitable than the RE model. Regarding the empirical findings of the fixed effects (FE) model, it was observed that four indicators, namely FDI, TRADE, INF, and HDI, exhibit a statistically positive correlation with tax revenue. This implies that an increase in these variables would facilitate the promotion of tax revenue. Conversely, two variables, ARG and CIVLIB, despite exhibiting statistically significant correlations with tax revenue, demonstrate negative effects. This leads to the conclusion that an increase in these indicators would result in a decline in tax revenue.

KEYWORDS: Fixed Effect Model, HDI, Pooled OLS, Random Effect Model, Tax Revenue.

INTRODUCTION

The Association of Southeast Asian Nations (ASEAN), is a political and economic union consisting of ten member states in Southeast Asia, namely Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. This union was established on 8 August 1967 and covers a total area of 4,533,518 km2 with an estimated total population of 667,393,019. According to the International Monetary Fund (IMF) Report of 2023, the forecasted gross domestic product using purchasing power parity (GDP(PPP)) and GDP per capita are 11.21 trillion US Dollars and 16,490 US Dollars, respectively [1]. The Asian Development Bank (ADB) Report of 2023 predicts Southeast Asia's economic growth rate to be 4.6% in 2023 [2]. The ASEAN economies have been integrated since the launch of the ASEAN Economic Community (AEC) in 2015, which operates under three community pillars: Political-Security Community, Economic Community, and Socio-Cultural Community [3].

Most countries in Southeast Asia rely on tax revenues to support the development of their countries. Moreover, the tax revenue indicator is one of the most important tools used by tax policy makers to influence economic growth. Sustainable tax revenue management would help promote fiscal balance, reduce public debt, and increase the social welfare of the population. Therefore, it is essential to identify the factors that affect tax revenues in order to draw comprehensive policy conclusions [4].

A research conducted by [5] has identified several key indicators that significantly influence tax revenues in the Organization for Economic Co-operation and Development (OECD). These indicators include gross domestic product (GDP) per capita, education, life expectancy, trade openness, foreign direct investment (FDI), agricultural sector, industry sector, civil liberties, and political rights. The research utilized panel data of 34 countries over a time span of 11 years, from 2001 to 2011. [6] replicated the same models developed by [5] to assess the performance of tax revenues in selected ASEAN member states. However, this study added a new indicator known as Official Development Assistance (ODA) over the period 2000-2016. The level of development of each country in both studies was proxied by three indicators: GDP per capita, education, and life expectancy. The empirical results of both studies produced mixed results.

The [7] determines the level of development of a nation by the weighted average of three variables, including gross national income (GNI) per capita, education level, and life expectancy (health care level measurement), which produces an indicator called the human development index (HDI). Therefore, this current study aims to replicate the methods conducted by the two aforementioned

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studies. However, instead of using GDP per capita, education, and life expectancy to measure the level of development of the selected ASEAN member states, the HDI indicator will be utilized.

Literature review

According to [8], inflation played a crucial role in stimulating an upsurge in tax revenue, particularly in cases where there were delays in tax collection. [9] supported this notion by asserting that proportional tax and social security contributions, when imposed at current prices, could align tax revenue with inflation. They further posited that progressive taxation could expedite the growth of tax revenues during inflationary periods, implying that inflation could lead to an increase in tax revenues. However, if taxes were nominal, inflation would have an adverse impact on tax revenue. The correlation between long-term real GDP per capita and industrial sectors with tax revenue is positive, while inflation has a negative and significant impact on tax revenue. [10] empirical investigation indicates that in the short-term, real per capita GDP displays a negative and significant effect on tax revenue.

A study about the determinants of tax revenue in Ethiopia was conducted by [11]. The objective of the study was to identify the factors that influence tax revenue in the country. The study employed a quantitative research method, utilizing a series of data spanning from 1999 to 2016, and several secondary regression model variables using the OLS method. The data collected from relevant institutions were analyzed using descriptive and econometric statistical tests. The findings of the study revealed that the industrial sector, per capita income, and trade openness had a positive and significant impact on tax revenue. Conversely, the agricultural sector on GDP and annual inflation had a significant and negative effect on tax revenue.

In 2018, [12] utilized a Fully Modified Ordinary Least Squares and Dynamic GMM approach to examine the impact of various economic factors on tax revenue in East African countries from 1992 to 2015. Their findings revealed that economic growth, trade openness, agricultural growth, service industry growth, foreign aid, and manufacturing industry growth all had a significant positive effect on tax revenue in the region. Conversely, the study found that exchange rate, urbanization, and inflation had a significant negative impact on tax revenue in East African countries as a whole. Furthermore, the study found that a one period lag of taxation and urbanization had a deleterious effect on tax revenue, while a two period lag of taxation and urbanization had a significant positive influence on tax revenue in the East African group of countries. Overall, these findings suggest that policymakers in East African countries should prioritize policies that promote economic growth, trade openness, and industry growth, while also addressing the negative impact of exchange rate, urbanization, and inflation on tax revenue.

[13] conducted a panel data analysis on the period of 1996-2015, examining the relationship between tax revenue and various economic indicators in both developed and developing countries. The study found that industrial growth, broad money supply, economic growth, trade openness, and agricultural productivity were among the variables that positively influenced tax revenue. [14] conducted a study on European Union countries, utilizing fixed effects, pooled ordinary least squares (OLS), and random effects methodologies. The study found that employment, economic growth, and foreign direct investment had a positive influence on tax revenue growth.

Several studies have indicated a significant positive correlation between tax revenue and human capital development, as demonstrated by the dynamic GMM, random effects, and pooled OLS analyses. However, the fixed effects analysis revealed a positive but non-significant impact of human capital development on tax revenue. These findings were consistent with the arguments posited by [5], who asserted that higher levels of human capital development lead to specialization, improved skills, more sophisticated production methods, and sustained economic growth, resulting in increased tax revenue collection. The results of this study were also congruent with those of previous empirical investigations conducted by [15] and [16].

In line with the assertion posited by [17] regarding the correlation between trade liberalization and a decrease in tariffs and overall tax revenue generated within the economy, the study showcased that trade openness had a significant detrimental effect on tax revenue, as evidenced by all four panel data analysis techniques utilized. These findings were congruent with the empirical research conducted by [18], which similarly observed a negative correlation between trade openness and tax revenue.

The dynamic GMM and random effects models have demonstrated that foreign direct investment (FDI) has had a significant and positive impact on tax revenue. Conversely, the fixed effects and pooled OLS models have indicated that FDI's influence on tax revenue is positive but not statistically significant. These findings are consistent with the observations made by [19], who have noted that FDI inflows contribute to the formalization of economic activities and enhance competitiveness, thereby augmenting tax revenue collection in the economy. Throughout the entirety of this study, it was observed that the interaction between foreign direct investment (FDI) and financial development had a significant and positive impact on tax revenue across all four econometric

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methods employed. This finding suggests that FDI and financial development are complementary factors in the process of revenue generation and collection. Specifically, financial development serves as a conduit through which FDI can enhance revenue generation and collection in the upper middle-income group of countries. These results are consistent with the research conducted by [20], which concluded that FDI entering through more developed formal financial systems is more likely to result in increased revenue collection by the government. Moreover, these findings are consistent with the empirical investigations carried out by [14] and [21].

[22] conducted an investigation into the tax effort of a panel comprising 75 countries over the period of 1985-1995. The sample was categorized into three groups, namely 31 low income countries, 19 middle income countries, and 25 high income countries. The findings of the study revealed a significant correlation between tax effort and per capita income, the ratio of trade to GDP, and the share of agriculture sector GDP. [23] research paper centered on 16 Arab nations during the timeframe of 1994-2000. The author devised a tax effort index by dividing the actual tax income by the potential tax income. The objective of the paper was to scrutinize the various factors that impact the proportion of tax revenues in the GDP. The primary factors chosen for this analysis include the percentage of agriculture, extractive industry, and manufacturing industry in the GDP, per capita income, the percentage of exports and imports in the GDP, and the percentage of external debt. The author demonstrated that the tax effort indices were volatile during the period of 1994-2000, despite their upward trend from 12.60% in 1994 to 14.90% in 2000. The econometric findings indicated that the primary determinants of the tax share in the GDP for the Arab countries were the per capita income, the share of agriculture in GDP, and the share of mining in GDP.

The degree of economic development of a country was often approximated by its per capita income level, which had been found to exhibit a positive correlation with tax revenues, as noted by [24]. It was reasonable to infer that a country's ability to generate resources increases with its level of development, as posited by [25]. The main factors identified as causing differences in tax revenues are the level of development, which is usually measured by gross domestic product (GDP) per capita ([26]; [27]), and productive specialization or the structure of the economy, which can be analyzed by the sectoral composition of GDP ([22]; [28]). In addition, external factors such as the level of foreign direct investment (FDI) and trade ([29]; [30]) also play an important role.

[5] conducted a study to investigate the impact of economic, structural, institutional, and social factors on tax revenue in 34 countries that are members of the Organisation for Economic Co-operation and Development (OECD) during the period of 2001-2011. The research employed two types of panel models, namely static and dynamic panel models. The results revealed that gross domestic product (GDP) per capita, the industrial sector, and civil liberties had a positive influence on the dependent variable, while the agricultural sector and foreign direct investment had a negative impact.

Furthermore, the lagged value of the dependent variable, which represented tax revenue, had a positive effect on the equation, and its impact was more significant in high-income countries. In 2018, [16] conducted an analysis of an imbalanced panel dataset comprising a substantial sample of developed and developing nations over a 40-year timeframe (1976-2015) with the objective of identifying the long-term variables, including economic, social, political, and cultural factors, that impact taxes and account for disparities in tax performance. The research outcomes indicate that taxation adheres to a path-dependent process that is predicated on the significance of the lags, taking into account the overall tax burden and revenue generated from consumption and income taxes, as well as a progressiveness index. The findings suggest that taxes are significantly influenced by both historical and structural variables, such as the economic climate and the dynamics of other public income sources, such as inflation.

In accordance with the methodology outlined in [5] study, [6] have employed a range of panel models, including Pooled OLS, Fixed Effects, Random Effects, and Driscoll-Kraay standard error, as well as a dynamic panel data model, to identify the determinants of tax revenue in Southeast Asia. Utilizing a balanced dataset of eight countries, the study has revealed that trade openness, foreign direct investment (FDI), the ratio of foreign debt to gross domestic product (GDP), and the share of value added in industry to GDP have a positive impact on tax revenue, while official development assistance has a negative impact. The findings suggest that Southeast Asian countries should develop more effective policies in international trade, attract greater levels of FDI, expedite the process of economic restructuring, and enhance their capacity to mobilize, manage, and utilize foreign debt and assistance in order to increase tax collection.

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METHODOLOGY

A. Model specification

The examination of the factors influencing tax revenue endeavors can be carried out by means of three distinct panel models, namely, the Pool Ordinary Least Square (OLS), Fixed Effect (FE), and Random Effect (RE) models. The individual characteristics of each model are delineated below.

Pooled OLS Model

$$TAXREV_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 TRADE_{it} + \beta_3 INF_{it} + \beta_4 AGR_{it} + \beta_5 IDN_{it} + \beta_6 CIVLIB_{it} + \beta_7 POLRIG_{it} + \beta_8 ODA_{it} + \beta_9 HDI_{it} + \varepsilon_{it}$$

Where β_j, $j = 0,1,\cdots,9$, are parameters to be estimate. i represents each country, $i = 1,\cdots 6$, since there are six ASEAN member states are selected despite there are ten countries, due to the availability of data set. The period of the study covering from 2005 to 2021 which is $t = 2005,\cdots 2021$. ε_{it} are the residual terms.

Fixed Effect Model

$$TAXREV_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 TRADE_{it} + \beta_3 INF_{it} + \beta_4 AGR_{it} + \beta_5 IDN_{it} + \beta_6 CIVLIB_{it} + \beta_7 POLRIG_{it} + \beta_8 ODA_{it} + \beta_9 HDI_{it} + \nu_{it}$$

The utilization of panel data can serve as a means to account for certain types of omitted variables. In the event that these variables remain constant over time, it is possible to construct a model featuring a composite error, ν_{it}, wherein unobserved variables are present in one component. This composite error is characterized as a white noise process, which is an independent and identically distributed (i.i.d) sequence possessing a zero mean and finite variance. Should a_i be correlated with independent variables, the employment of the OLS estimation method will yield biased results, commonly referred to as endogeneity bias, as a_i constitutes a component of the error term.

$$\nu_{it} = a_i + \varepsilon_{it}$$

Random Effect Model

Commence by utilizing the identical fundamental model featuring a composite error, denoted as a_i. Within the fixed effects (FE) model, it is postulated that a_i is correlated with independent variables. However, in the event that they are not correlated, the ordinary least squares (OLS) method would be reliable, albeit the composite error would be serially correlated. To estimate the model, it is necessary to transform the model, and the Generalized Least Square (GLS) method is employed to address the issue of serially correlated composite error and to generate accurate inferences. A form of weighted average of OLS and FE utilizing quasi-demeaned data will produce the Random Effect (RE) model.

$$\begin{aligned} TAXREV_{it} - \hat{\lambda}\overline{TAXREV_i} &= \beta_0(1-\hat{\lambda}) + \beta_1(FDI_{it} - \hat{\lambda}\overline{FDI_i}) + \beta_2(TRADE_{it} - \hat{\lambda}\overline{TRADE_i}) + \beta_3(INF_{it} - \hat{\lambda}\overline{INF_i}) + \beta_4(ARG_{it} - \hat{\lambda}\overline{ARG_i}) \\ &+ \beta_5(IND_{it} - \hat{\lambda}\overline{IND_i}) + \beta_6(CIVLIB_{it} - \hat{\lambda}\overline{CIVLIB_i}) + \beta_7(POLRIG_{it} - \hat{\lambda}\overline{POLRIG_i}) + \beta_8(ODA_{it} - \hat{\lambda}\overline{ODA_i}) \\ &+ \beta_9(HDI_{it} - \hat{\lambda}\overline{HDI_i}) + (\nu_{it} - \hat{\lambda}\bar{\nu}_i) \end{aligned}$$

Where,

$$\nu_{it} = (1-\hat{\lambda})a_i + (\varepsilon_{it} - \hat{\lambda}\bar{\varepsilon}_i)$$

is i.i.d.

$$\lambda = 1 - \left[\frac{\sigma_\varepsilon}{\sqrt{(\sigma_\varepsilon^2 + T\sigma_a^2)}}\right]$$

In the event that λ equals 1, the estimator utilized is solely the fixed effects (FE) estimator. Conversely, if λ equals 0, the estimator utilized is solely the ordinary least squares (OLS) estimator. As such, the model's proximity to FE is directly proportional to the magnitude of the unobserved effect's variance, with a smaller variance resulting in a closer proximity to OLS. Consequently, the random effects (RE) estimator will be λ multiplied by the error term, which falls within the range of (0,1).

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B. Data collection and analysis

As previously mentioned, despite the existence of ten ASEAN member states, only six countries, namely Cambodia, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam, were included in this study due to data unavailability. The civil liberties index and political rights index were obtained from the Freedom database of the World Bank, while the human development indexes were sourced from the UNDP. All other variables were collected from the World Development Indicator of the World Bank. The study period spans from 2005 to 2021, encompassing 16 years and 102 observations from the six cross-sectional countries, with $N = nT$. A balanced panel data approach was employed in this study.

Table 1. Variables Definition

Variables	Definition
$TAXREV$	Tax revenue as percentage of GDP
FDI	Net FDI as percentage of GDP
$TRADE$	Trade as percentage of GDP
INF	Inflation rate
AGR	Proportion of value added in agriculture
IDN	Proportion of value added in industry
$CIVLIB$	Civil liberties index
$POLRIG$	Political rights index
ODA	Net ODA as percentage of GDP
HDI	Human Development Index

This study will employ three panel models, namely Pool OLS, FE, and RE models. However, the study aims to determine the most suitable model among the three. Additionally, the empirical findings of the Pool OLS model will be presented, and a fixed effect test will be conducted.

The test will be based on the following null hypothesis.

$H_0: a_1 = a_2 = a_3 = a_4 = a_5 = a_6 = a$

In the event that the null hypothesis is refuted, a fixed effect is present. This indicates that each distinct country possesses a unique effect, rendering the Fixed Effects (FE) model more suitable than the Pooled Ordinary Least Squares (OLS) model. Furthermore, in the majority of cases, the FE model appears to be more fitting than the Random Effects (RE) model, as it is probable that unobserved variables are correlated with the independent variables. To ascertain whether the FE or RE model should be employed, the Hausman test is conducted. If the null hypothesis of the test is rejected, the FE model ought to be utilized.

EMPIRICAL RESULTS

This section will present an analysis of summary statistics, Pearson's correlation of independent variables, and the empirical results of Pooled OLS, FE, and RE models. As depicted in Table 2, six selected ASEAN countries (n) have been included in the study due to the availability of data sets over a time span of 17 years (T), from 2005 to 2021. The total sample size of 102 (N=nT) observations is a result of multiplying the number of countries and the time period. Throughout the study period, the average tax revenue as a percentage of GDP was approximately 13.84%, which is significantly lower than that of the OECD as of 2021 [31].

Table 2. Summary Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
$TAXREV$	102	13.84190	2.729687	7.893243	19.73206
FDI	102	1.438962	1.576764	-1.244177	6.672114
$TRADE$	102	110.2614	42.73135	32.97218	203.8546
INF	102	4.210073	4.091303	-1.241718	24.09685
ARG	102	2.506186	3.254956	-10.27582	15.72002

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IDN	102	4.753345	4.971253	-13.12110	18.26904
CIVLIB	102	4.166667	0.821534	3	6
POLRIG	102	4.588235	1.825848	2	7
ODA	102	7.34E+08	1.04E+09	-6.93E+08	4.22E+09
HDI	102	0.689637	0.076732	0.499000	0.810000

The Pearson correlation matrix presents the correlation coefficients that measure the degree of linear association between each pair of variables. These coefficients can assume values ranging from -1 to +1. In the event that the correlation coefficient between one or more independent variables in a regression model is +1 or -1, it indicates a perfect positive or negative correlation, respectively. Consequently, such variables will be excluded from the model. However, if the correlation coefficient exceeds +0.8 or -0.8, it indicates a highly positive or negative correlation, respectively, and will undoubtedly impact the statistical significance of an independent variable. Table 3 demonstrates that there is no presence of perfect or highly multicollinearity among all independent variables in this study.

Table 3. Pearson's Correlation of Independent Variables

Variables	*FDI*	*TRADE*	*INF*	*ARG*	*IDN*	*CIVLIB*	*POLRIG*	*ODA*	*HDI*
FDI	1								
TRADE	0.3147	1							
INF	-0.2774	-0.0324	1						
ARG	-0.0301	0.0205	0.3055	1					
IDN	-0.2612	0.0878	0.1497	0.2587	1				
CIVLIB	-0.1854	0.5924	0.0583	0.0260	0.1593	1			
POLRIG	-0.1428	0.6750	0.0732	-0.0243	0.1800	0.8515	1		
ODA	-0.3694	0.1115	0.3867	0.0383	0.1318	0.3978	0.4449	1	
HDI	0.6140	0.0984	-0.4074	-0.3023	-0.4485	-0.2591	-0.2231	-0.3330	1

This study employs three distinct panel models, namely Pooled OLS, FE, and RE models. However, prior to this, a fixed effect test is conducted due to the presence of six countries, each with its own specific effect. The null hypothesis of the test is H_0: $a_1 = a_2 = a_3 = a_4 = a_5 = a_6 = a$. The calculated *F*-statistic is $F(5, 87) = 7.42$, and its probability is 0.0000, which is less than the 1% level of significance. Therefore, the stated hypothesis is strongly rejected, indicating the presence of a fixed effect or individual specific effect for each country. Consequently, the FE model is deemed more appropriate than the Pooled OLS model.

Table 4. Regression Results

Variables	Pooled OLS	FE Model	RE Model
FDI	-0.1171	0.3882**	-0.1171
	(0.1714)	(0.1803)	(0.1714)
TRADE	0.0232***	0.0450***	0.0232***
	(0.0072)	(0.0121)	(0.0072)
INF	0.0807	0.1157**	0.0807
	(0.0535)	(0.0500)	(0.0535)
ARG	-0.1491**	-0.1736***	-0.1491**
	(0.0629)	(0.0576)	(0.0629)
IDN	-0.0019	-0.0300	-0.0019
	(0.0421)	(0.0372)	(0.0421)
CIVLIB	-0.9797**	-1.0393**	-0.9797**

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	(0.4343)	(0.5195)	(0.4343)
POLRIG	0.7753***	-0.0819	0.7753***
	(0.2245)	(0.2963)	(0.2245)
ODA	6.82e-10***	2.57e-10	6.82e-10***
	(2.23e-10)	(2.89e-10)	(2.23e-10)
HDI	11.4733***	30.6093***	11.4733***
	(3.5541)	(8.4960)	(3.5541)
Constant	3.6121	-8.1836	3.6121
	(2.9203)	(6.1746)	(2.9203)

***, **, and * statistically significant at 1%, 5%, and 10%. Standard errors in parentheses.

This study has utilized the Hausman test to assess the appropriateness of fixed effects (FE) and random effects (RE) models. The null hypothesis of the test posits that there is no systematic difference in coefficients. If the null hypothesis is rejected, the FE model is deemed more suitable than the RE model. The Hausman test's calculated Chi-square value is *chi2*(8) = 54.01, with a probability of 0.0000, which is below the 1% significance level. This strongly indicates that the null hypothesis is rejected. Both the FE and Hausman tests demonstrate that the FE model is the most appropriate model when compared to the Pooled OLS and RE models.

Based on the empirical findings of the fixed effects model, it has been determined that six out of the nine independent variables, namely foreign direct investment, trade openness, inflation rate, proportion of value added in agriculture, civil liberties, and human development index, have a statistically significant impact on tax revenues in the six ASEAN member states. It is noteworthy that *ARG* (-0.1736) and *CIVLIB* (-1.0393) have a statistically significant negative impact on tax revenue at the 1% and 5% levels, respectively. Conversely, the slope coefficient of *FDI* is positive at 0.3882 and is significant at the 5% level, indicating that an increase in *FDI* will lead to a rise in tax revenue. Similarly, tax revenue is positively influenced by *TRADE* and *INF*, as evidenced by the estimated parameters of 0.045 and 0.1157, respectively, both of which are statistically significant at the 1% and 5% levels. Of particular interest, the level of development, as measured by the human development index (*HDI*), has a highly positive and significant impact on tax revenue, with a slope coefficient of 30.6093 and a very low standard error, as expected. The *F*-statistic of the fixed effects model has been computed to be *F*(9,87) = 4.54. Given that its probability is lower than the 1% level of significance, the null hypothesis is strongly rejected. This implies that all variables in the model collectively account for the variation in tax revenue.

Under both Pooled OLS and RE models, *FDI* and *INF* do not appear to have a significant impact on tax revenue when the individual effects of each country are not controlled for. However, in contrast, there are two variables that significantly explain tax revenue in these models, but not in the FE model: *POLRIG* and *ODA* indicators. The estimated slope coefficients of *POLRIG* are identical in both models, at 0.7753, and are highly significant at the 1% level. This suggests that tax revenue will increase as political right increases. The parameters of *ODA* are also the same in both Pooled OLS and RE models, at 6.82e-10, and are statistically significant at the 1% level. In all models, it has been observed that four out of nine variables, namely *TRADE*, *ARG*, *CIVLIB*, and *HDI*, exhibit statistical significance in explaining tax revenue at the levels of 1%, 5% (Pooled OLS and RE models), and 1% (FE model). Whilst certain variables exhibit a noteworthy impact on tax revenue in both Pooled OLS and RE models, their influence on tax revenue is not significant in the FE model. However, with respect to the FE test and Hausman test, the explication of the empirical findings of this study will primarily depend on the FE model.

RESEARCH CONCLUSIONS

This study utilized three distinct models, namely Pooled OLS, FE, and RE models, to examine the tax revenue efforts in six ASEAN states. The study incorporated nine independent variables, including *FDI*, *TRADE*, *INF*, *ARG*, *IDN*, *CIVLIB*, *POLRIG*, *ODA*, and *HDI*. The FE model was deemed more appropriate than the Pooled OLS model, as indicated by the FE test. Furthermore, a Hausman test was conducted, which revealed that the FE model was more suitable than the RE model. Therefore, the interpretation of the empirical results primarily relies on the FE model.

With respect to the empirical findings of the fixed effects (FE) model, it has been observed that four indicators, namely *FDI*, *TRADE*, *INF*, and *HDI*, exhibit a statistically positive correlation with tax revenue. This implies that an increase in these variables would

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facilitate the promotion of tax revenue. Conversely, two variables, ARG and CIVLIB, despite exhibiting statistically significant correlations with tax revenue, demonstrate negative effects. This leads to the conclusion that an increase in these indicators would result in a decline in tax revenue.

The implementation of policies that facilitate foreign direct investment and trade openness has been found to significantly enhance tax revenue in the six ASEAN countries, as demonstrated by the empirical investigation conducted in this study. Additionally, an increase in the general price level, resulting from the interaction of economic activities, can contribute to the value of goods and services and, consequently, tax revenue. Notably, this research has identified the level of development of member states, as measured by the Human Development Index (HDI), as a particularly interesting indicator. Previous studies by scholars in various countries and regions have typically integrated three variables - GDP per capita, education level, and life expectancy – as a measurement of level of development. In this study, the replacement of these three variables with the HDI is considered a valuable contribution. Furthermore, the empirical findings of this research confirm that higher levels of national development are associated with greater tax revenue, as expected. More interestingly, this indicator is statically explain tax revenue in all three models: Pooled OLS, FE, and RE models.

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