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FACTORS AFFECTING TAX REVENUE FOR DEVELOPMENT IN DEVELOPING COUNTRIES IN ASEAN, AFRICA, AND EUROPE

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Abstract:
This study examines the effects of foreign direct investment (FDI), population, trade openness, and inflation on tax revenue in developing countries across ASEAN, Africa, and Europe. Tax revenue is proxied by the tax-to-GDP ratio and transformed into its natural logarithm for estimation. The study uses secondary data from the World Bank, the International Monetary Fund (IMF), and the Organisation for Economic Co-operation and Development (OECD). The sample covers 22 developing countries during 2016-2024 and forms an unbalanced panel of 193 country-year observations. Panel regression is estimated in EViews. The Chow and Hausman tests select a country fixed-effects model. The results show that FDI has a negative but statistically insignificant association with tax revenue, while population has a positive and significant association (coefficient 0.324537; p = 0.0046). Trade openness is also positive and significant (coefficient 0.001480; p = 0.0284). Inflation is negative but statistically insignificant. The adjusted R-squared is 0.963210, reflecting the explanatory contribution of the regressors, the 2020 control variable, and country fixed effects. Overall, the findings indicate that population and trade openness are the variables most consistently associated with tax revenue in the sample.

Keywords:
tax revenue; foreign direct investment; population; trade openness; inflation; panel data

BACKGROUND

Economic development requires governments to finance public infrastructure, education, health services, social protection, and macroeconomic stabilization. Taxation is therefore central to domestic resource mobilization because it provides a comparatively stable source of public revenue and supports fiscal independence. In this context, the tax-to-GDP ratio is widely used to assess how effectively a government converts economic activity into tax revenue relative to the size of the economy (OECD, 2021). Research summarized by Choudhary et al. (2024) also highlights the relevance of a tax ratio around 15 percent of GDP as an important threshold for stronger state capacity and development outcomes.

The developing countries observed in this study display substantial differences in tax performance. During 2016-2024, the average tax ratio for the ASEAN countries in the sample was 12.90 percent, below the 15 percent reference level. By contrast, the African sample averaged 20.98 percent and the emerging European sample averaged 17.95 percent. These differences are descriptive rather than causal, but they illustrate the heterogeneity in fiscal capacity, economic structure, formalization, and tax administration across the three regions.

Tax revenue is shaped not only by tax policy but also by broader macroeconomic and structural conditions. FDI may expand formal production, employment, and taxable corporate activity,

but tax incentives and cross-border profit-shifting can reduce the fiscal gains from foreign investment. Population may widen the potential tax base through labor income, consumption, and business activity, although large informal sectors can limit tax collection. Trade openness may enlarge the formal and documented tax base through imports, exports, customs systems, and internationally connected firms, while trade liberalization may also reduce tariff revenue. Inflation can increase nominal tax bases but can erode real tax revenue through collection lags and weaker purchasing power, as emphasized by the Olivera-Tanzi mechanism (Tanzi, 1977).

Previous empirical findings are mixed. Minh Ha et al. (2022) found that trade openness and FDI were positively related to tax revenue in Southeast Asia, whereas inflation was not significant. Nguyen-Phuong et al. (2022) also reported a positive FDI-tax revenue relationship across ASEAN-7 plus China and several European countries. In contrast, Gaspareniene et al. (2022) showed that inward FDI can reduce tax revenue in the European Union, while SERIN and DEMIR (2023) found a limited negative effect of FDI on corporate tax revenue in OECD countries. Studies on inflation likewise report negative, insignificant, or context-specific effects (Ayenew, 2016; Kitessa & Jewaria, 2018; Minh Ha et al., 2022). These inconsistencies indicate that the fiscal effects of macroeconomic variables depend on country characteristics and tax-administration capacity.

This study addresses that empirical variation by examining 22 developing and emerging-market economies across ASEAN, Africa, and Europe within one panel framework. It asks whether FDI, population, trade openness, and inflation are significantly associated with tax revenue after controlling for time-invariant country characteristics and a 2020 dummy variable. The cross-regional design is intended to capture a wider range of economic and fiscal structures than studies confined to a single region.

THEORETICAL FRAMEWORK

Tax Revenue and Fiscal Capacity

Tax revenue represents the public resources collected through compulsory taxation. In this study, tax revenue is measured by the tax-to-GDP ratio, which relates total tax revenue to the size of the national economy. A higher ratio generally indicates greater capacity to mobilize domestic resources, although the ratio also reflects the structure of the economy, tax policy, compliance, and administrative effectiveness (OECD, 2021). The ability-to-pay principle further suggests that a broader and more productive economic base increases the potential capacity of individuals and firms to contribute to public finance.

The analysis focuses on four determinants that can affect the tax base and the ability of governments to capture economic activity: FDI, population, trade openness, and inflation.

Foreign Direct Investment

FDI can increase tax revenue through formal investment, corporate profits, employment, household income, consumption, and spillovers to domestic firms. Musah et al. (2024) describe several channels through which FDI may contribute to consumption taxes, labor taxes, trade taxes, and taxes on corporate profits. However, the fiscal effect is not necessarily positive. Governments frequently use tax holidays, tax allowances, tariff exemptions, and special economic zones to attract foreign investors. Multinational firms may also use transfer pricing, debt financing, and profit-shifting strategies that reduce taxable income in the host country (Gaspareniene et al., 2022; SERIN & DEMIR, 2023).

Based on the expected tax-base expansion mechanism, the first hypothesis is: H1: Foreign direct investment has a positive and significant effect on tax revenue.

Population

Population can widen the tax base by increasing the number of workers, consumers, entrepreneurs, and potential taxpayers. A larger population may raise aggregate consumption and production and thereby increase the potential collection of income and consumption taxes. Nevertheless, the effect depends on labor-market formalization and tax registration. In many developing economies, a large share of the population works in informal activities that are difficult for tax authorities to identify and monitor. Effendi et al. (2019) emphasize that demographic opportunities translate into tax revenue only when working-age populations are integrated into productive and formal economic activity.

Because the study uses total population rather than the working-age share, the original hypothesis emphasizes the possible administrative burden and hard-to-tax informal sector: H2: Population has a negative and significant effect on tax revenue.

Trade Openness

Trade openness is measured by the ratio of exports plus imports to GDP. Internationally traded activity is often more formal and traceable because it passes through customs, banking, and documentation systems. These features can increase tax visibility and widen the tax base. At the same time, trade liberalization may reduce import tariffs and customs duties. Gnangnon and Brun (2019) show that the revenue effect of openness depends on whether governments can replace declining trade-tax revenue with domestic taxes such as value-added tax and income taxes. Ho et al. (2023) likewise show that the relationship between openness and tax performance is conditioned by domestic structures and fiscal capacity.

Accordingly, H3 states: Trade openness has a positive and significant effect on tax revenue.

Inflation

Inflation can raise nominal transaction values and therefore nominal tax bases, particularly for ad valorem taxes. However, high inflation can weaken real purchasing power, compress real consumption, increase production costs, and reduce the real value of tax receipts. The Olivera-Tanzi effect explains that when there is a lag between tax assessment and collection, inflation erodes the real value of revenue received by government (Tanzi, 1977). Empirical evidence is mixed: Ayenew (2016) and Kitessa and Jewaria (2018) report negative effects, whereas Minh Ha et al. (2022) find no statistically significant effect in Southeast Asia.

The fourth hypothesis is therefore: H4: Inflation has a negative and significant effect on tax revenue.

Research Design and Sample

The study uses a quantitative panel-data design. The unit of analysis is the country-year observation. Countries are drawn from the IMF classification of emerging market and developing economies in ASEAN, Africa, and Europe (International Monetary Fund, 2025). The observation period is 2016-2024. The final sample contains 22 countries: 4 ASEAN countries, 8 African countries, and 10 European developing or emerging economies. With nine potential observations per country, a balanced panel would contain 198 observations; after retaining only country-year observations with complete data for all model variables, the estimation sample contains 193 observations. The resulting dataset is an unbalanced panel.

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Secondary data were obtained from the World Bank, IMF, and OECD. World Development Indicators provide the main macroeconomic series, while IMF and OECD sources are used for country classification and complementary tax-revenue information.

Variables and Measurement

Variable	Role	Measurement	Transformation
Tax revenue	Dependent	Tax revenue (% of GDP)	Natural log of tax ratio
Foreign direct investment	Independent	FDI net inflows (% of GDP)	None
Population	Independent	Total population	Natural log
Trade openness	Independent	Exports (% GDP) + Imports (% GDP)	None
Inflation	Independent	Consumer prices (annual %)	None
2020 dummy	Control	1 for 2020; 0 otherwise	None

Empirical Model and Estimation Procedure

The panel regression model is specified as:

$$ln(TAX_it) = beta0 + beta1\ FDI_it + beta2\ ln(POP_it) + beta3\ TRADE_it + beta4\ INF_it + beta5\ D2020_t + mu_i + epsilon_it$$

where ln(TAX_it) is the natural logarithm of the tax-to-GDP ratio for country i in year t; FDI_it is FDI net inflows as a percentage of GDP; ln(POP_it) is the natural logarithm of total population; TRADE_it is trade openness; INF_it is annual inflation; D2020_t is the 2020 control dummy; mu_i represents country fixed effects; and epsilon_it is the idiosyncratic error term.

Common-effect, fixed-effect, and random-effect specifications were estimated in EViews. Model selection followed the Chow test and Hausman test at the 5 percent significance level. The study also reports the Jarque-Bera test for residual normality, an inter-variable correlation matrix for multicollinearity screening, the Glejser test for heteroskedasticity, and the Durbin-Watson statistic as a serial-correlation diagnostic. Hypotheses are evaluated using the coefficient signs and p-values from the selected model.

RESULT

Descriptive Results

The regional tax-ratio averages indicate substantial heterogeneity across the sample. ASEAN recorded the lowest average during 2016-2024, while the African and emerging European groups were above the 15 percent reference level.

Region	Average tax ratio (%)
ASEAN	12.90
Africa	20.98
Emerging Europe	17.95
Reference threshold	15.00

Table 2 reports descriptive statistics for the variables used in the regression. The tax ratio and population are reported in natural-log form because these are the forms used in the final model.

Variable	n	Mean	Median	Minimum	Maximum	Std. Dev.
Ln Tax Ratio	193	2.846306	2.860787	2.117472	3.694483	0.317561
FDI	193	2.788590	2.490723	-1.701615	18.49070	2.321896
Ln Population	193	16.49439	16.80595	14.03527	19.46268	1.528646

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Trade Openness	193	93.43170	89.00468	32.97218	166.1474	32.17779
Inflation	193	5.870319	3.927180	-3.233389	72.30884	8.401222

Model Selection and Diagnostics

Test / Statistic	Value	p-value	Interpretation
Chow: Cross-section F	160.817380	0.0000	Fixed effects preferred to pooled model
Hausman: Cross-section random	13.513583	0.0190	Fixed effects preferred to random effects
Jarque-Bera residual normality	3.896879	0.142496	Residual normality not rejected
Largest absolute X correlation	0.573067	-	Below 0.80 screening threshold
Durbin-Watson	1.484742	-	Reported serial-correlation diagnostic

The Chow and Hausman tests both select the country fixed-effects model. The standardized residuals pass the Jarque-Bera normality test. The largest absolute correlation among the independent variables is 0.573067, below the study threshold of 0.80. In the Glejser regression, all individual p-values exceed 0.05 (FDI 0.1716; ln population 0.4820; trade openness 0.1785; inflation 0.2453; D2020 0.3234), providing no individual-variable evidence of heteroskedasticity in the study framework. The Durbin-Watson statistic from the final fixed-effects model is 1.484742.

Fixed-Effects Estimation

Variable	Coefficient	Std. Error	t-statistic	p-value	Result
Constant	-2.636255	1.861087	-1.416514	0.1585	Not significant
FDI	-0.001002	0.002703	-0.370707	0.7113	Not significant
Ln Population	0.324537	0.112974	2.872677	0.0046	Positive, significant
Trade Openness	0.001480	0.000669	2.210820	0.0284	Positive, significant
Inflation	-0.000544	0.000786	-0.692025	0.4899	Not significant
D2020	-0.024290	0.015185	-1.599605	0.1116	Not significant

The fixed-effects model has an R-squared of 0.968192 and an adjusted R-squared of 0.963210. The model F-statistic is 194.3383 with p = 0.0000. Because country fixed effects absorb time-invariant differences among countries, the high explanatory power should be interpreted as reflecting both the observed regressors and the estimated country effects.

FDI has a coefficient of -0.001002 (p = 0.7113), so H1 is not supported. Population is positive and significant at 0.324537 (p = 0.0046); because both tax revenue and population are in natural logs, a 1 percent increase in population is associated with an approximately 0.3245 percent increase in the tax ratio, holding other variables constant. This direction is opposite to H2. Trade openness is positive and significant at 0.001480 (p = 0.0284), supporting H3; a one-percentage-point increase in trade openness is associated with an approximately 0.148 percent increase in the tax ratio. Inflation is negative but insignificant at -0.000544 (p = 0.4899), so H4 is not supported. The 2020 dummy is also negative but insignificant (p = 0.1116).

DISCUSSION

Foreign Direct Investment and Tax Revenue

The negative but statistically insignificant FDI coefficient indicates that higher FDI inflows were not consistently associated with higher tax revenue in the sample. This differs from the positive relationships reported by Nguyen-Phuong et al. (2022) and Minh Ha et al. (2022), but it is compatible with the argument that the fiscal effects of FDI are conditional. Gaspareniene et al. (2022) show that inward FDI can reduce tax revenue, while SERIN and DEMIR (2023) find only a limited negative effect on corporate tax revenue.

The result can be interpreted through offsetting channels. FDI can enlarge formal production, employment, and consumption, yet fiscal incentives such as tax holidays, tax allowances, and tariff exemptions can reduce the tax collected from the additional activity. Multinational firms may also use transfer pricing and profit shifting. Moreover, contemporaneous FDI inflows may not immediately generate taxable profits because projects can still be in investment or expansion phases. These mechanisms can weaken the direct statistical relationship between annual FDI inflows and the tax ratio.

Population and Tax Revenue

Population is positive and statistically significant, contrary to the original negative hypothesis. The coefficient suggests that the tax-base expansion associated with a larger population dominates the expected administrative burden from hard-to-tax informal activity in the pooled sample. A larger population can increase the number of workers, consumers, and business owners, thereby expanding income, consumption, and business-related tax bases.

This interpretation is consistent with Effendi et al. (2019), who argue that demographic change can create fiscal opportunities when the working-age population is connected to productive and formal economic activity. The result should nevertheless be read as an aggregate relationship because the study uses total population rather than working-age population, labor-force participation, formal employment, or the number of registered taxpayers. The positive coefficient therefore does not imply that every increase in population automatically raises tax revenue; it indicates that, within the observed sample and model, changes in population are positively associated with changes in the tax ratio after controlling for country fixed effects.

Trade Openness and Tax Revenue

Trade openness has a positive and significant association with tax revenue. This result supports the idea that internationally traded activity is relatively formal, documented, and visible to customs and tax authorities. Imports can generate value-added tax and customs-related revenue, while exports and internationally connected firms can increase production, profits, employment, and transactions that enter the domestic tax base.

The finding is consistent with Minh Ha et al. (2022) and Ho et al. (2023), who report a positive role for trade openness in tax performance. It also complements the argument of Gnangnon and Brun (2019): openness can weaken traditional trade taxes when tariffs fall, but the overall fiscal outcome can become positive when the domestic tax system is able to replace lost trade taxes with value-added, income, and corporate taxes. In the present sample, the positive coefficient suggests that the formalization and tax-base channels outweigh potential tariff-revenue losses on average.

Inflation and Tax Revenue

Inflation has a negative coefficient but is not statistically significant. The negative direction is consistent with the Olivera-Tanzi mechanism, under which inflation erodes the real value of tax receipts when collection occurs with a lag (Tanzi, 1977). High inflation can also reduce real purchasing power, raise firms' costs, and weaken taxable consumption and profits.

The absence of statistical significance is consistent with Minh Ha et al. (2022), who found no significant inflation effect in Southeast Asia, but differs from Ayenew (2016) and Kitessa and Jewaria (2018), who reported significant negative effects. One reason is that the dependent variable is a tax ratio. Inflation may raise nominal tax receipts and nominal GDP simultaneously, so the ratio can change less than the underlying nominal values. Cross-country differences in tax structure, indexation, compliance, and collection efficiency may also reduce the consistency of the inflation effect across the sample.

Cross-Regional Context and the 2020 Control

The descriptive evidence confirms wide regional and country-level heterogeneity. ASEAN has the lowest average tax ratio in the sample, while Africa and emerging Europe have higher averages. These patterns should not be interpreted as region-specific regression effects because the fixed-effects model is estimated jointly for all 22 countries. Instead, they reinforce the need to control for country-specific characteristics when evaluating the macroeconomic determinants of tax revenue.

The 2020 dummy is negative but insignificant. This indicates that, after controlling for the four explanatory variables and country fixed effects, the common 2020 indicator does not show a statistically distinct effect on the tax ratio at the 5 percent level in this sample. Country-specific pandemic responses, fiscal support, tax deferrals, and recovery patterns may have differed enough to prevent a uniform 2020 effect from appearing in the pooled estimate.

CONCLUSION

Using an unbalanced panel of 22 developing and emerging-market economies in ASEAN, Africa, and Europe for 2016-2024, this study evaluates the relationship between FDI, population, trade openness, inflation, and tax revenue. The Chow and Hausman tests select a country fixed-effects model. The main empirical result is that population and trade openness are positively and significantly associated with the tax-to-GDP ratio, whereas FDI and inflation are negative but statistically insignificant. The 2020 control dummy is also statistically insignificant.

The findings imply that policies aimed at enlarging formal economic participation and improving the visibility of transactions may be especially relevant for domestic revenue mobilization. The positive population result points to the fiscal potential of a broader economic base when people participate in formal employment, consumption, and business activity. The positive trade-openness result emphasizes the importance of customs administration, transaction documentation, and data integration between tax and trade authorities. By contrast, FDI promotion should be assessed together with the fiscal cost of tax incentives and the capacity to limit transfer pricing and profit shifting. Price stability remains important for macroeconomic management, but the results suggest that inflation control alone is not sufficient to explain stronger tax performance in this sample.

The study has several limitations. The panel is unbalanced and contains only 22 countries, so the findings should not be generalized to all developing economies. Tax revenue is measured in aggregate and does not distinguish personal income tax, corporate income tax, consumption

taxes, or trade taxes. Population is measured as total population rather than working-age population or formal employment, while FDI and trade openness are also aggregate indicators. Future research can expand the country coverage, use more detailed demographic and institutional variables, distinguish tax categories, separate exports from imports, and examine lagged FDI effects or interactions between trade openness and domestic tax reform.

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