The Relationship between Tax Revenue, Economic Growth, and Trade Openness in Developing Countries

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ABSTRACT

Purpose
This research examines the interplay between tax revenue, trade, and economic growth in Bangladesh, Indonesia, Malaysia, Vietnam, and Turkey from 1990 to 2024. It examines whether trade openness weakens growth, whether growth can be strengthened, and whether there is a nonlinear threshold at which excessive trade openness has a negative impact on growth.

Methodology
This study uses annual panel data from 1994 to 2024. Econometric techniques include the Fixed Effects Model (FEM), Generalized Least Squares (GLS), nonlinear estimation, and the System Generalized Method of Moments (GMM). These methods address heterogeneity and possible endogeneity. The models include interaction and squared terms to account for moderating and nonlinear effects of trade openness.

Findings
Tax revenue has a significantly positive impact on economic growth. This finding confirms the role of tax revenue in driving growth by improving fiscal capacity in emerging economies. The trade opening further enhances this relationship, suggesting that liberalization leads to greater efficiency, better allocation, and technological spillovers. Nonlinear analysis reveals no benefits when trade openness becomes excessively high. Hyper-globalization can reduce fiscal space and amplify external vulnerabilities. Control variables indicate that FDI has a positive impact on growth, while inflation, population growth, and high consumption have negative effects.

Conclusion
This paper presents a new analysis by jointly examining taxation and trade openness using a nonlinear panel model, providing specific evidence for emerging Asian economies. Future Research Directions. Further studies could include digital tax reforms, quality of institutions and environmental taxation or expand the analysis to other wider regional panels to test the cross-country heterogeneity.

Practical Implications
Policymakers should coordinate domestic tax reforms and maintain moderate levels of trade openness to support sustainable and inclusive growth in emerging economies.

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1. Introduction

A crucial economic tool utilized by state economists to stimulate revenue collection is Taxation, which promotes macroeconomic stability, social welfare, growth, and equity (Gurdal et al., 2021; Arvin et al., 2021; Maganya, 2020). In emerging and developing economies, the tax system is not only crucial as a resource mobilization tool, but also essential for structural transformation and reducing dependence on external borrowing. However, the performance of tax revenues in emerging economies is much lower than that of developed economies. According to the OECD (2025), the average tax-to-GDP ratio in middle-tier economies is approximately 20 percent, whereas in OECD member states it is approximately 34 percent. This gap has its roots in the still-limited capacity of emerging economies to raise funds for infrastructure, human capital, and innovation, stemming from ongoing fiscal capacity constraints.

Since the early 1990s, many emerging countries, including Bangladesh, Indonesia, Malaysia, Vietnam, and Turkey, have implemented multilateral fiscal reforms to enhance tax efficiency and broaden their revenue base. Despite these reforms, revenue mobilization has lagged behind the rapid growth in public spending on social development and economic expansion (OECD, 2024). Policymakers in these economies face a dilemma: raise tax rates to fund public goods, risking reduced investment and consumption, or maintain lower rates, and risk underfunded services. The effect of tax policy on economic growth remains a central topic in economic development research (Li & Lin, 2023; Xing, 2012).

Over the past three decades, two major forces have shaped the rise of emerging economies: trade liberalization and fiscal reforms. Export and import activity has significantly expanded as a result of trade liberalization, tariff reduction, and integration into global value chains (Combes & Saadi-Sedik, 2006; Gnangnon & Brun, 2019; Maganya, 2020). For instance, Malaysia's trade-to-GDP ratio was over 130 percent in 2023, Vietnam's exports comprise over 90 percent of GDP, and Turkey and Indonesia still base their exports on manufacturing and commodities. These developments suggest that trade openness has emerged as a significant driver of growth, but it also poses critical fiscal challenges. Liberalization can weaken customs revenues, which are traditionally an important source of government income, thereby limiting public investment. According to the World Bank (2024), trade tax revenue in developing economies has fallen from 2.5 percent of GDP in 2000 to 1.7 percent in 2020. The debate between openness and fiscal capacity highlights the crucial and understandable nexus between trade and tax growth.

The correlation between these variables is mixed. On the one hand, increased openness has the potential to spur growth through technology spillovers, competition, and (Álvarez et al., 2018; Seti et al., 2025a). On the one hand, it can lower tariff revenues and destabilize fiscal balance (Khattry, 2003a; Weisbrot & Baker, 2002). Moreover, excessive openness may make economies highly vulnerable to external shocks, generating nonlinearities in growth. Because of these ambiguities, the interaction between taxation and trade openness is a crucial yet under-researched dimension of economic development policy (Gnangnon & Brun, 2019; Hasan et al., 2025).

The theoretical foundation of this study is based on three important frameworks. First, the Public Choice Theory describes how effective tax systems help governments to fund productive public services that stimulate growth in the longer run (Romer & Romer, 2010; Xing, 2012). Second, the positive influence of trade openness is in line with

Endogenous Growth Theory which focuses on technology transfer, innovation, and efficiency gains emanating from international integration (Michael et al., 1993; Gnangnon and Brun, 2019). Third, there is possible theory that excessive openness might lessen the fiscal growth nexus, which is supported by the Crowding-Out Theory where it is believed that deep tariff reductions and high exposure to external shocks may erode the domestic revenue capacity and reduce growth (Emran & Stiglitz, 2005; Keen & Ligthart, 2005). These theories jointly provide the rationale for a focus of the study on the direct, moderating, and nonlinear effects of tax revenue and trade openness on economic growth.

Although the previous studies including Ho et al. (2023) and Gnangnon and Brun (2019) explore the symbiotic relationship between taxation, trade openness and economic growth, findings in these studies have relied on wider samples of developing countries with shorter time periods or earlier time periods. This study, however, builds on the current literature by applying the same theoretical relationships to five emerging Asian economies, using an updated dataset covering the period 1990-2024 to capture the recent structural reforms and post-globalization dynamics that have not been studied in previous work. In addition, the direct, moderating, and nonlinear effects are re-evaluated with multiple estimation methods (FEM, GLS, and System GMM) in order to check the stability of results across estimation methods. Rather than offering an entirely new framework, this paper builds on established models and provides region-specific, updated evidence for a set of economies in which the tax-openness-growth nexus remains policy-relevant.

The research aims to answer three fundamental research questions: Is the rise in tax revenue (TAXREV) suitable for the economic growth (LGDP) of emerging economies? Finally, does trade openness (TRADE) enhance the constructive association between revenue generated by the state's tax and the growth of the economy? Are the (nonlinear, threshold) effects such that, by opening trade too much, countries damage the tax revenue-growth relationship?

Accordingly, the objectives are to (i) estimate the growth effect of tax revenue directly; (ii) test for moderating effects of trade openness on this effect; and (iii) test for nonlinearity of openness effects. The research will inform policy on how emerging economies can combine fiscal reforms with external integration to ensure long-term growth.

The other part of the paper is organized as follows: Section two is a detailed review of the related literature and the construction of the study's hypotheses. The third section describes the data source and sets out the methodological framework. Section four presents and critically elaborates on the results, and the fifth section concludes the paper by discussing the findings and their implications for policy.

2. Literature Review

Public choice and endogenous growth theories both state that governments play a crucial role in growth through fiscal policy. Tax systems with high efficiency raise resources for public investment in infrastructure, education, and technology to boost productivity and long-run output (Romer & Romer, 2010; Xing, 2012). A more predictable, stable tax base eliminates fiscal drama and boosts investor confidence. There have been many empirical studies on this association. Tosun &Abizadeh (2005) reported a positive relationship between tax policy and growth across 21 OECD countries, while Ocran

(2011) found similar results for South Africa. Babatunde et al. (2017) demonstrated that tax revenue has a positive effect on the growth of African economies, thereby confirming the idea that fiscal capacity is a factor of development. Important qualifications are suggested by a cross-country and sectoral analysis of 2025. African economies, Nigeria, and regional analyses published in 2025 presented that the effect of revenue on growth depends on the composition of taxes. Indirect revenue taxes, such as VAT, often show a positive relationship with economic growth, while corporate income tax and some trade tariffs show neutral or negative short-run effects. These results highlight the fact that the summary tax revenue obscures different incentives and incidence effects with very different growth implications (Lawal et al., 2025). High marginal tax rates on mobile factors; poor design of tax increases; the impact of poorly designed tax increases in reducing incentives - and therefore short-run growth; the measurement and choice of estimator; and political economy frictions that may take the extra revenue away from growth-enhancing uses (Kawano et al., 2025). These conclusions are supported by more recent evidence. Dey (2025) and Kawano (2025) found that highly efficient tax systems increase resource allocation and boost innovation in emerging countries. Both the IMF (2025) and the Organization for Economic Cooperation and Development (2025) highlight the need for better tax administration and digitalization to boost tax productivity and thus provide robust financing for sustainable growth.

H_1: Tax revenue has a positive impact on economic growth.

Bidirectional causality between tax revenue and growth is found in an asymmetric panel analysis of G7 economies that takes economic policy uncertainty into account: Growth helps generate tax revenue, but predictable revenue bases also feed back into investment and growth by reducing uncertainty and financing public goods. The transmission varies by emphasizing context and asymmetry in shock responses for policy design, in which splits are made between positive/negative shocks. The study highlights that, in advanced economies, it is the composition (which taxes, how they are implemented) and policy credibility that drive tax revenue growth, supporting or not (Sakar et al., 2025).

Trade liberalization fundamentally changes a country's revenue structure and economic relationships. Classical trade theory implies that openness has a positive effect on efficiency, specialization, and welfare (Hatzipanayotou et al., 1994; Michael et al., 1993). However, from a fiscal perspective, lower tariffs can, in the short term, reduce the government's revenue. Khattry (2003) and Cage and Gadenne (2014) have warned of persistent deficits arising from liberalization if domestic taxes do not offset the losses from tariff reductions. On the other hand, Gnangnon and Brun (2019) discovered that liberalization and tax reforms can boost revenue performance and growth. For emerging economies, openness can strengthen the growth impact of taxation through several channels. Openness is associated with competition, innovation, and cost-cutting; it may boost economic growth by increasing income and consumption taxable domestically and by diffusing technology through foreign investment and imports, potentially raising productivity. It may also facilitate fiscal transparency and governance reform (Seti et al., 2025). However, these effects are context-dependent and not universally experienced.

However, the empirical literature is still mixed. For instance, Weisbrot and Baker (2002) claim that openness imposes financial strain on the fiscal performance of developing countries that rely on tariff revenues. In contrast, Gnangnon and Brun (2019) demonstrate that openness can deliver net-positive fiscal and growth effects if accompanied by domestic tax reforms. Likewise, Hasan et al. (2025) and Geetha et al.

(2025) show that trade and financial openness improve growth performance in Asia and Africa. Overall, openness has a positive impact on taxation, encouraging growth.

H_2: Trade openness has a positive moderating impact on the relationship between tax revenue and economic growth.

Although openness has significant advantages, the relationship is not necessarily linear. A country's fiscal base is eroded by excessive trade liberalization, which exposes it to shocks from the rest of the world, and the effects on domestic investment patterns are mixed. The crowding-out hypothesis states that over-liberalization, in conjunction with increases in domestic consumption taxes, decreases welfare and growth (Emran & Stiglitz, 2005; Keen & Ligthart, 2005). Empirical evidence from Naito and Abe (2008) and Brun and Chambas (2015) supports the observation that optimal levels of openness and balanced tax structures yield the highest welfare benefits. Above these amounts, marginal benefits decrease. This paper reviews the recent literature on excessive trade openness and its long-run effects on the fiscal performance and economic growth of developing economies. While initial liberalization is usually accompanied by improved revenue mobilization and an increase in the size of the formal sector, greater openness without accompanying tax reforms can undermine growth and fiscal capacity. A similar study of Sub-Saharan African economies found that while trade openness initially boosts tax revenue, excessive tariff reductions and declining domestic tax performance result from exposure to international competition (Abdul-Mumuni et al., 2023). This is the outcome of inelastic adjustment to falling trade taxes by domestic tax systems, resulting in fiscal mismatches and lower productivity of tax revenue in spurring economic growth. Likewise, Seti, Mazwane, and Christian (2025), using a dynamic panel GMM model for emerging and developing economies, found that the positive impact of both trade and financial openness on economic growth is observed only when institutional and macroeconomic variables are stable. In the absence of stability, liberalization can amplify external shocks and reduce the marginal productivity of fiscal revenues, ultimately weakening growth performance.

Recent literature supports the existence of nonlinearities. Seti et al. (2025) and Hasan (2025) find threshold effects of openness on growth in emerging economies, such that growth returns diminish beyond a threshold in the openness-to-GDP ratio. OECD (2025) also warns that the rise in hyper-globalization is likely to worsen fiscal fragility and inequality. Based on these arguments, the current study predicts a nonlinear relationship: moderate openness increases the tax-growth relationship, whereas excessive openness reduces it.

H_3: Overly open trade is adversely related to the relationship between tax revenue and economic growth.

Recent studies have also begun to show that, although moderate trade liberalization enhances productivity and tax-raising capacity, extreme trade liberalization may create fiscal vulnerabilities and undermine the growth-promoting effect of tax revenue. Makun and Singh (2025) studied the implications of trade deregulation on fiscal revenue in several Pacific Island economies. They found that uncontrolled liberalization, through deep tariff reductions and heavy reliance on imports, destroys national tax bases and limits governments' ability to harness revenue. According to their findings, the benefits of openness have a limit beyond which further liberalization undermines fiscal sustainability and harms long-term economic growth. Osuma and Nzimande (2024) investigated the interactions among openness to trade, external debt, and economic

growth in Sub-Saharan Africa and found that extreme open trade regimes increase macroeconomic uncertainty and fiscal strains, especially when trade shortfalls grow faster than the mobilization of domestic revenues. All these studies suggest that, although openness may lead to growth and revenue creation in the initial stages, the heavy exposure to trade without adequate fiscal adjustment can lead to the crowding out of domestic investments, decreased tax efficiency, and undermine the impactful correlation between the growth of the economy and the state's tax revenue. This kind of evidence supports the non-linear hypothesis that, beyond a certain optimal level of openness, greater trade reduces the positive fiscal-growth nexus in developing countries.

While previous studies offer important insights into the field, several questions remain unanswered. Most pay attention either to the direct tax-growth interaction or to the macroeconomic impact of trade openness. However, they ignore the interaction between these factors. Few studies address the nonlinearity of openness or use dynamic panel methods over longer time periods. Moreover, current research often relies on aggregated samples from developing countries, obscuring heterogeneity within emerging Asian economies. This research examines how trade openness and tax revenue interact to influence economic growth in five emerging Asian economies from 1990 to 2024. The study employs several estimation techniques. The findings show that greater trade openness, when matched with increased fiscal capacity, has a significant and positive effect on growth, though excessive openness can diminish this benefit. Testing for nonlinearities using squared and dummy interaction terms for excessive openness, it derives regionally specific policy implications regarding fiscal and trade policy tradeoffs by leveraging recent theoretical developments, updated data, and sound empirical design.

3. Methodology

The analysis focuses on five developing countries, using data for the model variables from the World Development Indicators (WDI) database spanning 1990 to 2024. The baseline model specifically evaluates the influence of tax revenue on economic growth in these countries, thereby enabling a test of hypothesis H1: higher tax revenue is associated with greater economic growth.

$$LGDP_{i,t} = \propto_0 + \propto_1 TAXREV_{i,t} + \propto_2 X_{i,t} + \mu_t \quad (1)$$

Where, $LGDP_{i,t}$is Gross domestic product, the dependent variable.

$LGDP_{i,t}$ is the logarithm form of the GDP of each country. TAXREVis expressed as a percentage of gross domestic product as tax revenue, $X_{i,t}$ is an array of control variables, including: (1) trade openness denoted by, i.e. Trade liberalization of country *i* in time *t*, and (2) POP, population growth rate (3) INF is inflation (4) FDI is Foreign Direct Investment and (5) CON is Government final consumer spending. The selected model influences economic growth as shown in previous studies (Alfaro et al., 2004; Marcel, 2019; Stoilova, 2024) and (Chirwa & Odhiambo, 2016; Fiaz et al., 2022). μ_t is model's error term. $\propto_i$ represnts value of the coefficient to be estimated.

H_1: higher tax revenue is associated with greater economic growth.

The following model is used in case of growth in the developing countries (H_2 and H_3):

$$LGDP_{i,t} = \propto_0 + \propto_1 TAXREV_{i,t} + \alpha_2 TR * OPN_{it} + \propto_3 X_{i,t} + \mu_t \quad (2)$$

$$LGDP_{i,t} = \propto_0 + \propto_1 TAXREV_{i,t} + \alpha_2 TR * OPN_{it} + \alpha_3 TR * OPN\_2_{it} + \propto_4 X_{i,t} + \mu_t \quad (3)$$

To test H_2 and H_3, models 2 and 3 are used, respectively. TR*OPEN_2 is squared trade openness. All other variables are the same as in equation (1). All the variables are summarized in Table 1.

For the balanced panel, a fixed-effects estimation method is used. The Hausman test (Boubakri et al., 2005, 2013; Dang & Nguyen, 2022; Dritsaki et al., 2004; Nguyen, 2021) is applied to the data. Moulton (1986, 1990) found that cross-country panel data analysis can be affected by group effects, leading to statistical errors. To address this, we also use the general least squares (GLS) estimator, which accounts for spatial autocorrelation within countries and for geographical differences across economies. Finally, the System GMM method is used as a robustness test to address potential endogeneity (Almustafa et al., 2023; Dang et al., 2022; Dang & Nguyen, 2022).

Table.1.Variable Description

Variables	Definition and Measure	Source of Data
LGDP	Gross Domestic Product (GDP) Constant	WDI
TRADE	Trade Openness	WDI
TAXREV	Tax Revenue to Gross Domestic Product (GDP)	WDI
POP	Annual growth rate of the population. That is the actual population in the country, regardless of the legal status or nationality.	WDI
INF	Inflation, as measured by the consumer price index, is the annual percentage change in the cost a consumer must pay to acquire a good or service.	WDI
FDI	Foreign direct investment (FDI) as a percentage of GDP is a measure of net capital inflows into an economy, intended for managerial control over the economy for a more extended period. Inward FDI quantifies the degree of foreign ownership and involvement in a country's domestic economy as a percentage of gross domestic product (GDP).	WDI
CON	Government final consumption expenditure (percent of GDP) is the total government expenditure on goods and services, including defense and security, recorded by the government, excluding expenditure on military capital. It indicates the government's contribution to the provision of public services through economic production.	WDI

Source: Author's own elaboration

4. Results & Discussion

Table.2.Results of Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
LGDP	194	27.016	0.942	24.508	28.995
TRADE	194	4.069	0.561	2.741	5.395
TAXREV	194	2.689	0.281	1.907	3.213
POP	194	0.169	0.609	-2.599	1.081
INF	194	1.524	1.103	-1.492	4.490
FDI	194	0.377	0.915	-2.870	2.170
CON	194	1.362	0.908	-4.006	2.838

Source: Author's own elaboration

Table 2 presents the descriptive statistics for all variables used. The average economic growth (LGDP) is 27.016, and trade openness (TRADE) and tax revenue (TAXREV) are 4.069 and 2.689, respectively, suggesting that the selected emerging economies have moderate trade integration and fiscal capacity. Inflation (INF), foreign direct investment (FDI), population growth (POP), and consumption (CON) are also exogenous control variables that are reasonably varied across the sample period.

Table 3 presents the correlation matrix and multicollinearity diagnostics. As expected, the correlation between TAXREV and LGDP is positive. Variance Inflation Factor (VIF) values range from 3.87 to 6.44, which is below the critical level of 10. This shows that multicollinearity is not a significant issue with the regression analysis. The output for Equations 1 and 2 is reported in Table 4. The regression models 1 and 3 in this table present the results of Equation 1 using the Fixed Effects Model (FEM) and Generalized Least Squares (GLS), respectively.

The TAXREV coefficient is statistically significant and positive with LGDP in both regressions, suggesting that an increase in tax revenue is conducive to economic growth in the emerging economies under study. This result aligns with hypothesis H_1 and is consistent with public-choice theory, which holds that governments in emerging markets aim to increase tax collection to finance public spending and invest in growth-oriented policies. Similarly, the government must determine how these tax funds will be used to achieve economic development goals. The results align with the literature, which found that tax revenue has a growth-enhancing effect in developing countries (Dey, 2025; Kawano et al., 2025), and continue to confirm the importance of tax mobilization in emerging economies.

Table.3.Correlation Matrix

	LGDP	**TRADE**	**TAXREV**	**POP**	**INF**	**FDI**	**CON**	**VIF**
LGDP	1.000							
TRADE	-0.473	1.000						6.44
TAXREV	0.074	-0.034	1.000					4.45
POP	-0.642	0.380	0.055	1.000				3.87
INF	-0.236	-0.198	-0.039	0.028	1.000			5.11
FDI	-0.166	0.465	0.341	0.389	-0.287	1.000		4.54
CON	-0.061	-0.146	-0.143	0.099	-0.112	0.08	1.000	5.11

Source: Author's own elaboration

To test hypothesis H_2, there is an interaction term, TAXREV x TRADE. The output results for the second and 4th regressions in Table 4 present the model results for the 2nd equation using FEM and GLS, respectively. The coefficients on TAXREV were found to be positive and statistically significant in 2 and 4 regressions with LGDP, supporting hypothesis H_1. The coefficients for the term (TAXREV x TRADE) are statistically significant and largest in magnitude among the regressors, suggesting that the positive relationship between tax revenue and economic growth increases trade openness. In other words, trade openness seems to create a more favorable environment for taxation revenue to translate into growth. In emerging economies with greater levels of trade openness, tax policy and revenue reforms can therefore be more effective. This output aligns with the

second hypothesis, H_2, and is in line with recent findings showing that openness magnifies the impact of fiscal capacity on growth (Seti 2025; Hasan 2025).

Table.4.Test Results for Fixed Effect Estimation and Generalized Least Square

	FEM		GLS	
	Coefficient (t-Stat)	**Coefficient (t-Stat)**	**Coefficient (Z-Stat)**	**Coefficient (Z-Stat)**
Variables	**1**	**2**	**1**	**2**
TRADE	1.147***	4.132***	-0.807	3.435***
	5.661	4.054	-7.989	3.097
TAXREV	(1.978) ***	3.329***	-0.678	5.317
	-5.522	1.837	-3.541	3.382
POP	(0.514) ***	(0.473) ***	-0.825	-0.713
	-5.672	-5.283	-9.813	-8.276
INF	(0.284) ***	(0.291) ***	-0.134	-0.142
	-4.890	-5.114	-2.652	-2.921
FDI	0.203***	0.188***	0.297	0.256
	3.476	3.266	4.470	3.929
CON	(0.036) ***	(0.020) ***	-0.021	-0.005
	-0.849	-0.482	-0.381	-0.098
TR*OPNE		(1.222) ***		-1.591
		2.985		-3.840
Cons	28.159***	15.131***	47.619***	16.431***
	28.646	3.386	35.385	3.906
R-square	0.693	0.705		
Wald Test (P-value)			0	0
Obs	194	194	194	194

Source: Author's own elaboration

For the control variables, TRADE coefficients (the direct effect of trade openness) are negative and statistically significant in regressions (except regression 3). This shows that although trade openness is indirectly positive for growth through tax revenue (through the interaction term), it may be directly negative for economic growth in these emerging economies - perhaps because trade liberalization often implies tariff reductions and revenue losses or increased exposure to external shocks. This finding is consistent with the literature, which emphasizes a complex behavioral mechanism through which openness affects growth (Monyela & Saba, 2024; Geetha et al., 2025). FDI shows statistically significant and impactful regression results, confirming previous studies that foreign direct investment inflows contribute to growth through spillovers, enhanced trade integration, and improved competitiveness (Hasan et al., 2025). Meanwhile, the coefficients on CON, INF, and POP (consumption, inflation, population growth) are all negative and significant in most regressions, implying that higher consumption growth (if unsustainable), higher inflation, and rapid population growth may hamper economic growth in these contexts. These results are broadly consistent with previous empirical work that shows that macro-instability and demographic pressures lower growth (Ho et al., 2023).

To test hypothesis H_3, the estimation results for Equation 3 are shown in Table 5 (i.e., the possibility of the occurrence of a non-linear effect of trade openness on the tax revenue-growth relationship). First, results indicate that the TAXREV coefficient is notably

positive with LGDP in both regressions 1 and 2, thereby continuing to support H_1. The TAXREV x TRADE interaction has a positive coefficient, indicating that trade openness is positively associated with tax revenue growth (supporting H_2). Importantly, the coefficient for the squared interaction term (TAXREV x TRADE 2, the excessive openness) is negative and statistically significant with LGDP. This result implies that there may be a threshold above which very high trade openness may decrease the positive effect of tax revenue on growth, consistent with hypothesis H_3. Initially, tax expansion aids trade openness, but it may undermine it (for example, by eroding domestic tax bases, making them more vulnerable to external shocks, or incentivizing tax avoidance). This does seem to support the crowding-out argument for very open emerging economies.

Table.5.Tax Revenue, Trade Openness, and Economic Growth: Results of Non-Linear Regression

	Fixed Effect Estimations		**Generalized Least Squares Estimation**	
	Coefficients	**t-stat**	**Coefficients**	**z-stat**
Variables	**1**		**2**	
TRADE	-7.059	-2.459	-1.539	-0.671
TAXREV	-1.342	-3.116	-2.229	-0.650
POP	-0.466	-5.424	-0.597	-6.144
INF	-0.290	-5.294	-0.191	-3.675
FDI	0.149	2.651	0.269	4.178
CON	-0.011	-0.269	0.007	0.129
TR*OPNE	5.690	3.322	1.555	1.161
TR*OPNE_2	-0.120	-4.147	-0.057	-2.468
Cons	47.272	5.339	29.592	4.379
R-square	0.748			
Wald Test (P-value)			0.000	
Obs	194	194	194	194

Source: Author's own elaboration

4.1. Robustness Test

To address endogeneity concerns, we used the System GMM estimator. The results of the estimation of Equations 1, 2, and 3 are given in Table 6. First, the coefficient on TAXREV is positive and statistically significant in all regressions, providing further support for hypothesis H_1. Second, the coefficients on TAXREV x TRADE remain positively significant and continue to support H_2. Third, the coefficient on the excessive openness interaction term turns negative and is statistically significant in the 3rd regression model, again showing that greater trade openness reduces the positive relationship between tax and growth and thus supports H_3. The Hansen and AR (2) tests suggest that the instruments are valid and that there is no second-order autocorrelation, confirming the appropriateness of the System GMM approach.

The above nonlinear specification shows a statistically significant turning point in the effect of trade openness. Based on the Fixed Effects estimates ($b_1 = 5.690$ and $b_2 = -0.120$), the threshold level of trade openness is 23.71. This means that the relationship between trade openness and tax is reinforced in the case of trade openness below 23.71, but in case of openness beyond, there is a weakening effect of tax revenue on economic growth. These findings are consistent with the logic of the Crowding-Out Theory which

argues that deep openness diminishes the capacity of the fiscal system by lowering the revenues from tariffs and increasing the vulnerability to external shocks.

Table.6.GMM Estimation Results of Robustness

	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
Variable	**1**		**2**		**3**	
TRADE	-0.7966	-12.3727	3.33955	4.86467	-0.71258	-0.36833
TAXREV	-0.61899	-4.29776	5.25419	5.3906	-0.88581	-0.31241
POP	-0.83297	-7.90594	-0.75104	-9.46553	-0.63079	-6.44757
INF	-0.16255	-3.5971	-0.16364	-3.77007	-0.18894	-4.0597
FDI	0.20685	4.21942	0.17171	3.74345	0.17944	3.99483
CON	0.00127	0.02201	0.00387	0.06055	-0.00027	-0.00418
TR*OPNE			-1.55178	-5.98092	1.04438	0.89454
TR*OPNE_2					-0.04753	-2.30382
Cons	32.1658	77.3411	16.5611	6.53061	27.0205	5.09812
AR(2) (P-Value)	0.477		0.635		0.632	
Hansen J (P-value)	0.133		0.412		0.498	
Number of Instruments	21		24		27	
Obs	194		194		194	

Source: Author's own elaboration

Overall, after using System GMM and alternative measures of openness as robustness checks, our findings remain aligned with the initial results and expectations. All three hypotheses (H_1: positive tax revenue-growth link; H_2: trade openness improves such link; H_3: excessive trade detracts from the link) are strongly supported. It indicates strong empirical evidence on the interplay among tax revenue, trade openness, and economic growth in emerging economies.

5. Conclusion

The study uses annual panel data for Bangladesh, Indonesia, Malaysia, Vietnam, and Turkey to examine selected emerging economies for the period 1990-2024. Using a series of Panel estimators of Fixed Effects, GLS, Nonlinear models, and System GMM for robustness, the empirical results indicated that tax revenue (TAXREV) has a positive and statistically significant effect on economic growth (LGDP). This suggests that improved fiscal capacity and tax collection are important for achieving long-term growth in emerging markets. In addition, trade openness (TRADE) was found to reinforce the positive relation between tax revenue and economic growth, suggesting that trade openness enables the state to be more efficient in tax administration, increases investment confidence, and enhances resource allocation. However, the nonlinear analysis showed that excessive trade openness mitigates the positive impact of tax revenue on growth, indicating the existence of a threshold beyond which openness starts to harm the economy, making it vulnerable to external shocks. These findings are in line with mainstream economic theories and recent empirical evidence and re-establish the importance of both sound taxation and well-managed trade liberalization for sustainable development in emerging economies. From a policy standpoint, the governments in the latter countries must seek to build on their tax administration capabilities for effective revenue mobilization while advancing low levels of trade openness that promote competitiveness without sacrificing domestic fiscal capacity. Fiscal and trade policies

should go hand in hand. An increase in the mobilization of tax revenue can provide the resources needed for infrastructure, education, and technology investment, and balanced trade openness can increase market access and spur innovation. However, policymakers should not over-liberalize to the point of losing tariff revenue and becoming vulnerable to global volatility. Finally, despite the strong evidence on the tax-trade-growth nexus in the selected emerging economies, the study has some limitations in terms of the geographical coverage and sample size. Future direction would build on the analysis by including a larger sample of developing or advanced economies, using institutional quality and digital tax reforms as moderating variables, and testing for asymmetric or threshold effects of openness using sophisticated nonlinear panel techniques. Overall, the study shows that the key to successful economic growth in emerging economies lies in the right mix of sound tax policy and sensible trade openness, with fiscal capability and openness to the international economy complementing and strengthening each other rather than counteracting.

Policy Implications

The selected emerging economies, i.e., Bangladesh, Indonesia, Malaysia, Vietnam, and Turkey, the results indicate that the governments should consider not merely increasing tax revenue, but doing so in a context of moderate trade openness, where trade liberalization is managed to preserve tax bases and mitigate external risks. Furthermore, it is important to develop institutional capacity so that tax revenues are well directed toward growth-enhancing investments (rather than being wasted through inefficiencies or macroeconomic instability). Finally, although openness remains a growth-friendly force, policymakers should monitor the point at which openness above this threshold begins to erode the tax-growth-positive externality, and, if necessary, adjust tariff and trade-liberalization policies accordingly.

Author Contributions

Ahmed Adekunle carried out the conceptualization, formal analysis, and revision, estimation of results, data tabulation, and responses to reviewers' comments.

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Conflicts of Interest

No conflict of interest.

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