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TÁC ĐỘNG CỦA TỰ DO HÓA THƯƠNG MẠI ĐẾN CẤU TRÚC THUẾ: NGHIÊN CỨU THỰC NGHIỆM TẠI MỘT SỐ QUỐC GIA ĐANG PHÁT TRIỂN GIAI ĐOẠN 2013-2022

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Tóm tắt

Tự do thương mại đã trở thành xu thế toàn cầu và được thúc đẩy bởi các hiệp định, cũng như các hiệp hội quốc tế. Bài nghiên cứu phân tích tác động của tự do hoá thương mại đến cấu trúc thuế tại một số quốc gia đang phát triển giai đoạn 2013 - 2022. Bằng cách sử dụng dữ liệu của 37 quốc gia và vùng lãnh thổ thuộc phạm vi nghiên cứu và xử lý bằng phương pháp bình phương tối thiểu tổng quát (GLS), kết quả cho thấy tác động của tự do hoá thương mại đem lại tác động tích cực và tiêu cực tùy theo từng loại thuế trong cấu trúc thuế của khu vực. Bên cạnh đó, một số yếu tố kinh tế như thu nhập bình quân đầu người, lao động và chi tiêu công tác động tiêu cực đến một số loại thuế, trong khi giáo dục và kiểm soát tham nhũng giúp tăng hiệu quả thu thuế. Tác động của dân số và lao động khác nhau giữa các loại thuế. Tự do thương mại thúc đẩy thuế thu nhập, tiêu dùng và làm giảm vai trò thuế quốc tế. Từ đó

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nhóm tác giả đề xuất một số khuyến nghị nhằm duy trì và cải thiện cấu trúc thuế cũng như thúc đẩy tự do hoá thương mại.

Từ khoá: tự do hoá thương mại, cấu trúc thuế, GLS, đang phát triển

THE IMPACT OF TRADE LIBERALIZATION ON TAX STRUCTURE: IN CASE OF SOME DEVELOPING COUNTRIES IN THE PERIOD 2013 – 2022

Abstract

Trade liberalization has become a global trend, promoted through international agreements and organizations. This study analyzes the impact of trade liberalization on the tax structure in several developing countries during the period from 2013 to 2022. Utilizing panel data from 37 countries and territories within the study's scope and applying the Generalized Least Squares (GLS) method, the results reveal that trade liberalization has a positive effect on the share of taxes on goods and services, income, profits, capital gains and other types of domestic taxes, while having a negative impact on the share of taxes derived from international trade. In addition, certain economic factors such as per capita income, labor and public spending exert a negative influence on some types of taxes, whereas education and corruption control help improve tax collection efficiency. The effects of population and labor vary across different tax categories. Overall, trade liberalization promotes income and consumption taxes while reducing the role of international trade taxes. Based on these findings, the authors propose several recommendations to sustain and improve the tax structure in line with the progress of trade liberalization.

Key words: trade liberalization, tax structure, GLS, developing countries

JEL Classification: F14, O24, H21

1. Introduction

Trade liberalization is a comprehensive overall reform process in the economy when a country opens its international relations with other national economies, especially in developing countries. According to the study by Keen & Simone (2005), this change has prompted governments to adjust their tax policies reasonably. Thanks to the development of trade liberalization, it not only broadens national revenue sources or boosts the international tax structure within import-export revenues, but also expands domestic revenue sources such as consumption tax, value-added tax (VAT), personal income tax and corporate incomes tax. Besides, the study by Ho Thuy Tien & Tran Xuan Hang (2020) in ASEAN countries also confirmed that trade openness not only contributes to market expansion but also fosters growth in direct tax segments, thereby supporting innovation and enhancing control and management governance efficiency. According to the World Bank (2022), trade liberalization can increase GDP per capita depending on the level of integration and institutional reforms of each country. However, trade openness that too much attracts FDI is often accompanied by tax incentives, leading to the erosion of the corporate income tax segment. Furthermore, developing countries often are the group which has education systems that can not meet the needs of the modern

labor market, causing the workforce to concentrate in the informal sector or have unstable incomes, making it difficult to have tax structure effectively.

Based on the current situation and the research evidence mentioned above, the research group decided to select the topic: “Impact of trade liberalization on tax structure: In case of some developing countries in the period 2013 - 2022” to find out the relationship between international economic integration and shifts in the structure of government revenue more clearly. The ultimate aim is to propose solutions to enhance the effectiveness of the tax structure during global integration.

2. Literature review

2.1. Research on the impact of trade liberalization on tax structure

Nowadays, there are many studies that have shown the bidirectional impact of trade liberalization on the tax structure, where tax revenues are affected both positively and negatively by trade openness across almost all countries, especially in developing countries where import-export activities account for a large share of economic growth. One study that supports a direct positive effect of trade liberalization on tax is that of Keen & Simone (2005), who examined two groups of countries to specifically illustrate the interaction between the two variables. The results showed that developing countries are most affected by trade liberalization, which increases international trade taxes. Other types of taxes, such as income taxes, tend to increase as a way to compensate for the reduction in trade taxes caused by liberalization. Similarly, domestic consumption taxes have been proven to increase to a certain extent, affecting tax collection and domestic consumption. However, through trade liberalization, consumption taxes are not significantly detrimental to the national economy.

Nevertheless, many studies argue that the impact of trade liberalization on certain types of taxes is indirect or shows no specific effect on most national taxes. For instance, Abed (1998), in his study on the relationship between trade and taxation in South Mediterranean countries implementing the EU Free Trade Agreement. It is based on empirical evidence to show that excise duties and corporate income taxes were significantly affected by trade liberalization. However, the author concluded that there was no relationship between trade liberalization and tariff-based tax structures. The main reason given was that tariff indices are constructed through trade indirectly, mainly involving exchange rates or calculated based on the principle of equivalent exchange.

2.2. Research on the impact of other factors on tax structure

Besides trade liberalization, some studies have shown that a country's tax structure is affected by many other factors. According to Tanzi and Zee (2000), the urbanization rate, education level, and economic structure-specifically agriculture, industry, and services-are all important variables affecting tax mobilization capacity. Each tax structure responds differently to these variables, resulting in varying impacts on specific tax types. Bird and Zolt (2008) also emphasized the importance of budget allocation and institutions. Moreover, inflation plays a strong role as explained in the study by Tanzi (1977), which indicated that high inflation in an economic environment strongly impacts revenues and serves as an indirect index for the

influence of other factors on tax revenues. Goudswaard & Van De Kar (1994) found that population growth significantly affects tax structure. Population expansion increases revenues from income and consumption taxes thanks to increased economic output and consumption. However, in the long run, population aging will become a serious threat.

Many empirical studies have shown that the level of economic development, measured by GDP per capita, significantly influences a nation's tax structure. According to Tanzi and Zee (2000), economies with higher levels of development tend to have a higher share of direct taxes such as personal and corporate income taxes. This is largely due to the informal sector's development and limitations in tax administration and infrastructure in developing countries. The study by Bird and Zolt (2005) similarly found that governments tend to shift from indirect taxes to more redistributive tax systems such as direct taxes, aiming to ensure social equity and long-term economic efficiency. The level of economic development not only affects the scale of government revenue but also reshapes the preferred tax structure used in national fiscal planning. The study by Famulska et al. (2021) on the relationship between tax structure and public expenditure structure highlighted a strong correlation between the two. Public spending significantly affects indirect taxes, especially when focused on social services. However, the share of direct taxes, such as corporate income tax, showed no clear relationship with any specific component of public expenditure.

2.3. Research gap

Trade liberalization has become a global trend and has been promoted by various international agreements and organizations. As a result, issues related to trade, import-export, and tax structure in the context of trade liberalization have been discussed in numerous academic articles. However, there is still a lack of studies specifically examining the impact of trade liberalization on tax structure in developing countries in today's era of booming trade and international integration.

Based on the literature review above, the research group has chosen the topic: "Impact of trade liberalization on tax structure: An empirical study in some developing countries" with the goal of building a more comprehensive theoretical framework and proposing an overall model to better understand the relationship between trade and tax structure. Studying and evaluating the factors driving changes in tax structure will provide more practical and applicable insights. This in turn will open up effective solutions to minimize negative impacts while enhancing the positive values of trade and liberalization, particularly in developing countries.

3. Theoretical Framework

3.1. Definition and Classification of Tax Structure

The tax structure refers to the manner in which a country designs and allocates different categories of taxes within its fiscal revenue system, reflecting both its socio-economic characteristics and policy objectives at various stages of development (Hettich & Winer, 1984; Tanzi, 1992; Baunsgaard & Keen, 2005). Although the term lacks a universally agreed definition in the literature, it is commonly understood as the relative share of different types of

tax revenues, such as income taxes, consumption taxes, and trade taxes in total government revenue (Hettich & Winer, 1984).

Taxes are not merely instruments for generating public income but also serve as tools through which governments influence economic behavior and promote social equity. As Hinrichs (1966) noted, there is no single “optimal” tax structure applicable to all countries or across all historical periods. Tanzi (1992) categorized taxes into three broad groups: (i) direct taxes, including personal income tax and corporate income tax; (ii) indirect or consumption taxes, such as value-added tax (VAT), excise taxes, and environmental levies; and (iii) trade taxes, encompassing tariffs and import duties. The weight and role of each category within the overall tax structure vary substantially across countries and evolve over time, depending on their level of economic development, growth strategies and degree of international integration.

3.2. Trade liberalization

Trade liberalization, characterized by tariff reductions and the dismantling of non-tariff barriers, has significantly reduced the share of trade taxes in government revenue, particularly in developing economies that have historically relied heavily on such sources. As governments open up their economies, they often face the necessity of shifting their revenue base from trade taxes to domestic taxes, particularly VAT and income taxes, to compensate for revenue shortfalls (Baunsgaard & Keen, 2005; ESCAP, 2020).

In the short term, this transition can lead to fiscal deficits due to weak tax administration, a large informal sector, and a narrow domestic tax base (ESCAP, 2020). Some governments attempt to increase consumption taxes or corporate taxes to bridge the gap; however, such efforts often fail to generate sufficient revenue during the early phases of reform.

Over the long term, trade liberalization can support sustainable revenue generation and structural fiscal adjustment, provided it is accompanied by institutional reforms that strengthen tax administration, expand the tax base, and enhance taxpayer compliance (Zafar, 2005). Cross-country evidence suggests that high-income countries, with their more effective tax systems and higher compliance rates, are better able to offset the loss of trade revenues through domestic taxation (Baunsgaard & Keen, 2005). By contrast, many low- and middle-income countries face significant institutional and infrastructural constraints that hinder such a transition, resulting in fragile and unbalanced revenue structures.

3.3. Economic Theories Related to Tax Structure

3.3.1. Tax competition theory

Tax competition theory explores how countries adjust their tax policies to attract capital, investment, and businesses in the context of increasing global economic integration. As argued by Zodrow and Mieszkowski (1986) and Wilson (1986), capital mobility places downward pressure on corporate tax rates as governments seek to retain or attract investment. This can lead to a “race to the bottom,” where jurisdictions competitively lower their tax rates to avoid capital flight.

In the context of trade liberalization, where tariff protections are removed, the importance of domestic taxation increases. Developing countries, under pressure to remain competitive in

attracting foreign capital and technology, often resort to tax incentives or restructuring strategies-such as shifting from direct to indirect taxation-to align with global norms. However, these shifts, if poorly managed, may undermine fiscal stability and exacerbate inequality.

Tax competition theory offers a useful lens through which to analyze how trade openness influences the evolution of tax structures in developing countries.

3.3.2. Optimal Tax Structure Theory

Optimal tax theory, originating from Ramsey (1927), seeks to design tax systems that maximize social welfare while minimizing economic distortions. Distortions refer to inefficiencies in resource allocation resulting from taxation, which prevent the economy from achieving Pareto optimality-where no individual can be made better off without making another worse off. Ramsey's rule suggests that taxes should be levied more heavily on goods or factors with inelastic supply or demand to minimize these distortions.

Building on this, Mirrlees (1971) extended the theory to personal income taxation, emphasizing the need to strike a balance between equity and efficiency-ensuring that tax systems do not unduly discourage labor supply or investment.

In the context of this study, optimal tax theory provides a theoretical basis for understanding why many developing countries tend to shift toward greater reliance on indirect taxes, such as VAT, as they liberalize trade. These theoretical insights are empirically tested using panel data and a Generalized Least Squares (GLS) estimation framework.

3.3.3. Theoretical Perspectives on the Impact of Trade Liberalization on Tax Revenues and Welfare

Trade liberalization affects both the revenue composition and social welfare of a country. Classical trade theory argues that removing trade barriers improves resource allocation efficiency, raises output and income, and enhances overall welfare. However, in many developing countries-where trade taxes constitute a significant share of fiscal revenue-tariff reductions may lead to substantial revenue losses, posing challenges for budget sustainability.

Keen and Ligthart (2002) demonstrate that, as trade taxes decline, governments must increasingly rely on domestic taxation, particularly VAT, to maintain fiscal balance. Nevertheless, such a shift is not necessarily neutral in terms of welfare. If poorly designed, the burden of domestic taxation may fall disproportionately on consumers and lower-income households, undermining equity objectives.

Moreover, trade liberalization may trigger sectoral shifts and reallocation of resources, resulting in short-term disruptions for certain labor groups or industries, even if aggregate welfare increases in the long run. Thus, the effects of trade liberalization on tax structures must be evaluated through a comprehensive lens that accounts for efficiency, equity, and institutional capacity.

4. RESEARCH MODEL AND RESULTS

4.1. Data collection and analysis methods

4.1.1. Data collection

The data were collected from the official database of the World Bank. The dataset is secondary data presented in tabular form, covering 37 countries over a ten-year period from 2013 to 2022, yielding a total of 370 observations. The selected sample comprises developing countries, including: Albania, Argentina, Armenia, Azerbaijan, Belarus, Brazil, Cameroon, China, Colombia, Costa Rica, Côte d'Ivoire, Dominican Republic, Ecuador, El Salvador, Georgia, Guatemala, Malaysia, Mauritius, Mexico, Moldova, Mongolia, Morocco, Nepal, Nicaragua, North Macedonia, Paraguay, Peru, the Philippines, Serbia, South Africa, Sri Lanka, Tanzania, Thailand, Timor-Leste, Tonga, Türkiye, and West Bank and Gaza.

4.1.2. Analysis methods

Based on the collected data, the research team conducted data compilation and initial processing using Microsoft Excel, followed by statistical analysis using Stata. After that, the team conducted regression analysis, carried out model diagnostics, and addressed potential econometric issues. The study uses a panel dataset and applies four estimation methods, including:

- Pooled Ordinary Least Squares (POLS)
- Fixed Effects Model (FE)
- Random Effects Model (RE)
- Generalized Least Squares (GLS)

The research team conducted diagnostic tests to identify potential model issues, including multicollinearity (using the Variance Inflation Factor – VIF) and heteroskedasticity (using the Breusch-Pagan test). Subsequently, the team carried out specification tests to select the most appropriate estimation method. Specifically, the Breusch-Pagan Lagrangian multiplier test was employed to decide between the Pooled OLS and Random Effects models, while the Hausman test was used to choose between the Random Effects and Fixed Effects models. The results indicated that the Fixed Effects model was the most suitable. Finally, in order to verify and address any remaining issues in the Fixed Effects model, the team performed additional tests, including the Wooldridge test for autocorrelation, and the Wald test for heteroskedasticity. To correct for these issues, the model was re-estimated using the Generalized Least Squares (GLS) method.

4.2. Research Methodology

4.2.1. Research Model

With reference to the empirical studies of Tien, H.T. and Hang, T.X. (2020), Eddine et al. (2021), as well as the aforementioned theories and related literature, the research team proposes a multiple regression model using panel data to analyze the impact of trade liberalization on the tax structure in developing countries, as follows:

$$\begin{aligned} Tax\ share_{it} = & \beta_0 + \beta_1 TRD_{it} + \beta_2 GDPpk_{it} + \beta_3 POPgr_{it} + \beta_4 EDU_{it} + \beta_5 COR_{it} \\ & + \beta_6 AGR_{it} + \beta_7 GOV_{it} + \beta_8 LBp_{it} + u_{it} \end{aligned}$$

Where:

- **i:** represents the observed countries (37 countries)
- **t:** represents the time period of observation (from 2013 to 2022)
- **Tax share:** represents the share of tax revenue from the following sources:
 - **TGS:** Taxes on goods and services
 - **TIPC:** Taxes on income, profits and capital gains
 - **TIT:** Taxes on international trade
 - **OT:** Other taxes
- **TRD:** represents the trade openness
- **X:** represents the control variables

Table 4.1: Describe the meaning and data sources of the variables

Source: Compiled by the authors

Variable	Notation	Meaning	Source
Dependent Variables	TGS	Taxes on goods and services (% of revenue)	WDI
	TIPC	Taxes on income, profits and capital gains (% of revenue)	WDI
	TIT	Taxes on international trade (% of revenue)	WDI
	OT	Other taxes (% of revenue)	WDI
Independent variable	TRD	Trade openness (% of GDP)	WDI
Control variable	GDPpk	GDP per capita (USD)	WDI
	POPgr	Population growth (annual %)	WDI
	EDU	School enrollment, primary (%)	WDI
	COR	Control of Corruption: Estimate by WGI	WDI

	AGR	Agriculture, forestry, and fishing, value added (% of GDP)	WDI
	GOV	General government final consumption expenditure (% of GDP)	WDI
	LBp	Labor force participation rate, total (% of total population ages 15-64)	WDI

4.2.2. Research Hypotheses

Based on prior studies and established theoretical frameworks, the research team posits that trade openness exerts differentiated impacts on various types of taxes. Specifically, trade openness is expected to influence international trade taxes directly, and changes in the proportion of trade-related taxes may subsequently affect the structure of other domestic taxes.

Firstly, regarding taxes derived from global trade, theories such as public choice and tax competition suggest that international integration and trade liberalization inevitably lead to the removal of trade barriers in general, and tariff measures in particular. Although some studies-such as Adandohoin et al. (2021) and Kelly (2020)-argue that taxes may increase under specific circumstances (e.g., quotas or exemptions during commercialization), the majority of the literature supports the aforementioned theoretical stance. In line with this prevailing view, our research team shares a similar perspective. Within the context of developing countries and the current trend of global integration, prioritizing multinational cooperation, building supply chains, and fostering global linkages are strategic directions many nations pursue to achieve development goals. Therefore, improving diplomatic relations with partner countries through favorable tariff policies becomes essential. Accordingly, we propose the following hypothesis:

H1: Trade openness has a negative impact on the proportion of taxes derived from international trade.

Secondly, with respect to other types of taxes, dominant tax structure theories-such as tax competition and optimal taxation-tend to advocate for the reduction of trade barriers as countries integrate economically. This leads governments to compensate for the long-term loss of trade tax revenue by increasing domestic tax components. Furthermore, findings from Tosun (2005) and Gastaldi et al. (2011) confirm that domestic tax revenues rise due to increased consumption when trade integration improves. Similarly, conclusions from Agbeyegbe et al. (2006) and Al-Own et al. (2021) indicate that governments can collect more income taxes from businesses and workers as these groups gain greater opportunities to expand international cooperation, thereby enhancing fiscal capacity through trade liberalization. These implications emphasize that trade openness not only indirectly affects domestic taxes via changes in trade tax proportions but also directly influences each type of domestic tax in distinct ways. Within

the scope of this study, the relationship is expected to be positive. Therefore, we propose the following hypothesis:

H2: Trade openness has a positive impact on the proportion of domestic taxes, including taxes on goods and services, income, profits and capital gains, and other remaining tax categories.

Table 4.2: Expected sign of the independent variables

Source: Compiled by the authors

Independent variables	Dependent variables	Expect the sign of the coefficient
TRD	TGS	(+)
	TIPC	(+)
	TIT	(-)
	OT	(+)

4.3. Descriptive statistics and correlation matrix

Table 4.3: Descriptive statistics

Source: Collected from Stata software

Variable	Obs.	Mean	Std. Dev.	Min	Max
TGS	370	36.52065	11.34019	1.854573	58.60121
TIPC	370	23.44502	11.06465	1.391173	52.85811
TIT	370	6.539563	7.048615	.3492917	41.16053
OT	370	1.837435	2.055295	.0002489	9.885912
TRD	370	72.70397	29.74385	22.48623	166.1474
GDPpk	370	5836.378	3193.203	803.2696	14532.5
POPgr	370	.902723	1.045667	-2.799683	3.407295

EDU	370	103.62	8.930145	80.62491	144.3059
COR	370	-.4283913	.4112168	-1.287625	.8282791

The descriptive statistics table provides a general overview of the research dataset, which includes 370 observations spanning the period from 2013 to 2022. Most variables exhibit substantial variation across countries and time periods.

Regarding the dependent variables, TGS (taxes on goods and services) has an average value of 36.52, with a minimum of 1.85 and a maximum of 58.6, indicating significant disparities among countries and across years. TIPC (taxes on income, profits, and capital gains) ranges from 1.39 to 52.86, with an average of 23.45, reflecting considerable differences in income tax structures across the studied entities. TIT and OT show average values of 6.54 and 1.84, respectively, accompanied by relatively large standard deviations, suggesting notable data dispersion.

As for the independent variable, TRD, which represents trade openness, the average value is 72.70, with a minimum of 22.49 and a maximum reaching 166.15. GDPpk, which reflects GDP per capita, has an average of 5,836.38, but varies widely from 803.27 to 14,532.50, highlighting the development gap among the developing countries included in the study. POPgr has an average of -0.90, indicating that some countries and periods experienced negative population growth. Other control variables also demonstrate considerable diversity: EDU (average 103.62) reflects primary school enrollment rates; COR (average -0.43) represents the control of corruption index; AGR (average 9.97) captures agricultural value added; GOV (average 15.56) denotes government expenditure; and LBp (average 65.94) indicates labor force participation rate, measured as the percentage of the population aged 15 to 64. These variations may stem from the unique characteristics of each country or from global socio-economic shocks such as financial crises or the COVID-19 pandemic.

Table 4.4: Correlation Matrix

Source: Collected from Stata software

	TGS	TIPC	TIT	OT	TRD	GDPpk	POPgr	EDU	COR	AGR	GOV	LBp
TRD	0.0969	0.0189	-0.2523	-0.3415	1.0000							
GDPpk	-0.1656	-0.0540	-0.3859	0.0557	0.0550	1.0000						
POPgr	-0.2473	0.2403	0.3525	0.2029	-0.4132	-0.2880	1.0000					
EDU	-0.1535	0.0709	-0.1878	0.0095	-0.2038	-0.0562	-0.0409	1.0000				
COR	-0.0192	0.0643	-0.1421	0.0284	0.2441	0.4130	-0.2326	-0.0714	1.0000			
AGR	0.1127	-0.0066	0.2653	0.0025	-0.1258	-0.6975	0.2620	0.1886	-0.3107	1.0000		
GOV	-0.4478	-0.0693	-0.1639	-0.1859	0.0740	-0.0764	0.0035	0.2551	0.1239	-0.0224	1.0000	
LBp	-0.1478	0.0607	-0.3137	0.0821	0.0749	0.1800	-0.0341	-0.3398	0.0003	-0.0194	-0.0836	1.0000

Correlation Between Independent and Dependent Variables:

Based on the correlation matrix, the independent variables exhibit varying degrees of association with the dependent variables: **TGS**, **TIPC**, **TIT**, and **OT**.

For **TGS** (taxes on goods and services), **GOV** (government expenditure) shows the strongest negative correlation, with a coefficient of -0.4478 , indicating that higher government spending tends to be associated with lower levels of goods and services taxation. **LBp** (labor force participation) also demonstrates a notable positive correlation with **TGS** (0.1478). Other variables such as **GDPpk**, **POPgr**, and **EDU** display very weak or negligible correlations with **TGS**.

Regarding **TIPC** (taxes on income, profits, and capital gains), none of the independent variables show a particularly strong correlation. All coefficients remain relatively low, with the highest being **AGR** (agricultural value added) at 0.1603 and the lowest being **GDPpk** at -0.0562 .

For **TIT** (international trade taxes), the strongest positive correlation is observed with **GDPpk** (0.3859), suggesting that countries with higher GDP per capita tend to collect more trade-related taxes. Additionally, **TRD** (trade openness) and **OT** (foreign investment) also show moderate positive correlations with **TIT**, at 0.2523 and 0.2512 respectively.

As for **OT**, there is a notable positive correlation with **TRD** (0.3415), reflecting the relationship between trade openness and foreign investment. **GDPpk** (0.5507) and **EDU** (0.2620) also exhibit relatively strong positive correlations with **OT**.

Correlation Among Independent Variables:

Most independent variables show low correlation coefficients with one another, indicating a low risk of multicollinearity in the model. However, a few variable pairs exhibit higher correlations that warrant attention, such as **GDPpk** and **EDU** (0.6975), and **EDU** and **LBp** (0.3398). Other pairs show weak or near-zero correlations, such as **COR** and **AGR** (-0.0224),

or **COR** and **GOV** (0.1239), suggesting a relatively high degree of independence among the explanatory factors in the model.

4.4. Regression results

Having conducted regressions using OLS, FEM, REM, we summarized the results as shown in the following table:

Table 4.5: Estimation results

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Source: Collected from Stata software

Dependent variables	TGS			TIPC		
	OLS	FEM	REM	OLS	FEM	REM
TRD	-0.008	-0.019	-0.016	0.062***	0.082***	0.079***
GDPpk	-0.001***	0.000*	0.000**	-0.001***	0.000	0.000
POPgr	-3.674***	0.915*	0.443	3.838***	0.132	0.277
EDU	-0.178***	0.045	0.026	0.331***	0.018	0.020
LBp	-0.253***	-0.120	-0.141	0.218***	0.118	0.116
COR	2.202*	1.673	1.848	4.525***	-3.303***	-3.134***
AGR	0.096	0.080	0.146	-0.451***	-0.061	-0.057
GOV	-0.721***	-0.184**	-0.261***	-0.278***	-0.009	-0.015
Constant	92.375***	45.362***	49.628***	-17.958*	6.441	6.678
Observations	370	370	370	370	370	370
Mean VIF	1.60			1.60		
F test	F > Prob = 0.0000			F > Prob = 0.0000		
Wald test	Prob>chi2 = 0.0000			Prob>chi2 = 0.0000		
BP test	Prob > chibar2 = 0.0000			Prob > chibar2 = 0.0000		
Woolridge	Prob > F = 0.0000			Prob > F = 0.0003		
Hausman	Prob>chi2 = 0.0009			Prob>chi2 = 0.0000		

Dependent variables	TIT			OT		
	OLS	FEM	REM	OLS	FEM	REM
TRD	-0.051***	0.011	0.000	-0.022***	0.002	-0.011*
GDPpk	-0.001***	0.000*	0.000**	0.000	0.000	0.000
POPgr	1.048***	-0.023	0.140	0.238**	-0.733***	-0.429***
EDU	-0.277***	0.004	-0.027	0.013	0.026	0.020
LBp	-0.304***	0.019	-0.061	0.028**	-0.009	0.016
COR	1.196	-0.651	-0.596	0.778***	-0.733	-0.508
AGR	0.127*	-0.126	0.009	-0.018	0.127*	0.054
GOV	-0.114***	0.048	-0.022	-0.055***	-0.010	-0.018
Constant	62.217***	5.888	15.083***	1.487	-0.708	-0.628
Observations	370	370	370	370	370	370
Mean VIF	1.60			1.60		
F test	F > Prob = 0.0000			F > Prob = 0.0000		
Wald test	Prob>chi2 = 0.0000			Prob>chi2 = 0.0000		
BP test	Prob > chibar2 = 0.0000			Prob > chibar2 = 0.0000		
Woolridge	Prob > F = 0.2604			Prob > F = 0.0008		
Hausman	Prob>chi2 = 0.0000			Prob>chi2 = 0.0000		

Based on the estimation results obtained from Stata, it can be observed that all models encounter several common specification issues. First, heteroskedasticity appears in all models, as reflected in the results of the Wald and Breusch-Pagan tests with p-values equal to 0.0000. Next, the Wooldridge test indicates that most models suffer from autocorrelation, except for one model with p-value = 0.2604. In addition, the Hausman test shows that all p-values are less than 0.05, implying that the fixed effects model is more appropriate than the random effects model in all cases. However, the average VIF is 1.60 for all models, indicating no serious signs of multicollinearity. Thus, although the models meet the requirement regarding multicollinearity, they still need to be adjusted to address issues related to heteroskedasticity and autocorrelation to ensure the reliability of the estimation results. After conducting specification tests, the research team applied the GLS model and obtained the following results:

Table 4.6: Estimation results of the GLS model

Source: Collected from Stata software

	TGS_gls	TIPC_gls	TIT_gls	OT_gls
TRD	0.028**	0.030**	-0.006	-0.007***
GDPpk	-0.0006***	-0.0003**	-0.0001	0.00002
POPgr	-1.693***	1.105***	0.613***	0.143**
EDU	-0.038	0.077***	0.008	0.002
LBp	-0.134***	0.158***	-0.091***	0.004
COR	-0.097	1.540*	-0.903*	0.239*
AGR	0.211**	0.046	0.131***	-0.009
GOV	-0.306***	-0.053	-0.141***	-0.023***
_cons	56.182***	3.197	10.941***	1.550*

Based on the estimation results table, the sample regression model is specified as follows:

$$TGS_{it} = 56.182 + 0.028TRD_{it} - 0.0006GDP_{pkit} - 1.693POP_{gri} - 0.038EDU_{it} \\ - 0.097COR_{it} + 0.211AGR_{it} - 0.306GOV_{it} - 0.134LB_{pit} + u_{it}$$

$$TIPC_{it} = 3.197 + 0.03TRD_{it} + 0.0003GDP_{pkit} + 1.105POP_{grit} + 0.077EDU_{it} \\ + 1.54COR_{it} + 0.046AGR_{it} - 0.053GOV_{it} + 0.158LB_{pit} + u_{it}$$

$$TIT_{it} = 10.941 - 0.006TRD_{it} - 0.0001GDP_{pkit} + 0.613POP_{grit} + 0.008EDU_{it} \\ - 0.903COR_{it} + 0.131AGR_{it} - 0.141GOV_{it} - 0.091LB_{pit} + u_{it}$$

$$OT_{it} = 1.550 - 0.007TRD_{it} + 0.00002GDP_{pkit} + 0.143POP_{grit} + 0.002EDU_{it} \\ + 0.239COR_{it} - 0.009AGR_{it} - 0.023GOV_{it} + 0.004LB_{pit} + u_{it}$$

From the summary table of results, it is observed that TRD has a positive impact on the TGS variable and is statistically significant at the 5% level. The regression coefficient of 0.028 means that when trade openness increases by 1 unit, goods and services tax increases by 0.028 units. This result is consistent with hypothesis H1 proposed by the research team. It indicates that developing countries tend to shift toward domestic consumption taxes when trade is liberalized. Furthermore, the study by Zabri & Ahmad provides empirical evidence from Malaysia, where, after sharply reducing import duties during WTO accession, the government replaced them with the goods and services tax (GST) in 2015 to offset revenue losses. However, this result contradicts the findings of Baunsgaard & Keen (2010), who argue that trade liberalization often leads to a decline in revenue from taxes on consumer goods and

international trade. This implication also helps explain the trend of import tax reductions in developing countries before the 2000s, such as the Dominican Republic, which implemented tax and trade reforms in the 1990s, reducing the maximum import tax rate from 35% to 20% by 2001 and eliminating all export taxes (Naciones Unidas). To compensate for this dependency, the government increased the value-added tax from 8% to 12% and cut subsidies for state-owned enterprises. These policies reinforce the tax competition theory mentioned above by the research team.

TRD has a positive effect on the tax on income, profits, and capital gains variable and is statistically significant, with a regression coefficient of 0.03. This means that when trade openness increases by 1 unit, the average tax on income, profits, and capital gains increases by 0.03 units. This result aligns with the studies of Tosun (2005) and Aizenman & Jinjark (2009), which suggest that as countries integrate, they tend to restructure their tax systems toward strengthening direct taxes such as personal and corporate income taxes. However, this result contradicts the policy of Côte d'Ivoire, which in 1995 reduced the corporate income tax rate from 50% to 35%. The result shows that when trade is liberalized, these countries increased income taxation to offset the decline in trade tax revenue. Colombia reformed its corporate income tax in 2017, after signing a series of trade agreements, to stabilize budget revenue (OECD, 2018).

In the model where international trade tax is the dependent variable, TRD is not statistically significant, but the coefficient is negative. This is consistent with theoretical expectations: import and export taxes decrease with trade liberalization. The study by Baunsgaard & Keen (2010) shows that Mexico reduced more than 80% of its import tariff lines from 1990 to 2008 upon joining NAFTA. This led to a decline in the share of international taxes in total government revenue. OT (other taxes): TRD has a negative and highly significant impact. This contradicts the study by Karimi et al. (2016), which argues that trade liberalization in the form of trade openness does not strongly affect major tax sources in developing countries, whereas liberalization through tariff reduction contributes more to the tax structure.

For other variables such as GDP per capita, the results show a clear negative and significant impact in the TGS and TIPC models. This is consistent with the assumption that “as income increases, the tax-to-GDP ratio decreases.” Annual population growth has mixed effects across tax types, possibly due to differences in demographic structures among countries. The primary school enrollment rate has a positive effect on TIPC, consistent with the expectation that higher education levels lead to a more efficient income tax system. The labor force participation rate (ages 15–64) has a negative effect on TGS and a positive effect on TIPC, suggesting that a higher labor rate helps expand the income tax base. COR (corruption control index): has a positive impact on TIPC and OT, indicating that institutional improvements enhance tax collection efficiency. GOV (government expenditure): has a clear negative impact on all types of taxes. This suggests that higher public spending does not necessarily improve tax collection efficiency. The results show that trade liberalization positively affects income tax and domestic consumption tax, while reducing the role of international trade tax and other taxes. This is consistent with the tax restructuring process in developing countries such as Malaysia, Colombia and Mexico.

5. Current Situation and Policy Implications

5.1. Current Situation

Developing countries often exhibit a high degree of trade openness, sometimes even surpassing that of developed nations. However, their participation in international trade agreements frequently results in reduced tariffs and lower import-export duties, which leads to a decline in government revenue from trade taxes. On the other hand, economic liberalization can increase revenue through other tax channels, such as value-added tax (VAT) on traded goods. Additionally, trade openness helps attract foreign direct investment (FDI), which in turn boosts corporate income tax (CIT) collections and generates employment, thereby increasing personal income tax (PIT) revenues. Nevertheless, FDI is often accompanied by excessive tax incentives, which can erode the corporate tax base. Among countries with high trade openness, such as Thailand, Serbia, and Mauritius, international trade taxes tend to be lower (averaging around 3%), while indirect taxes are relatively high (averaging 41%). In contrast, countries with lower levels of trade openness, like Argentina, Sri Lanka, and Tanzania, impose higher trade taxes (averaging 10%) and collect lower indirect taxes (averaging 33%).

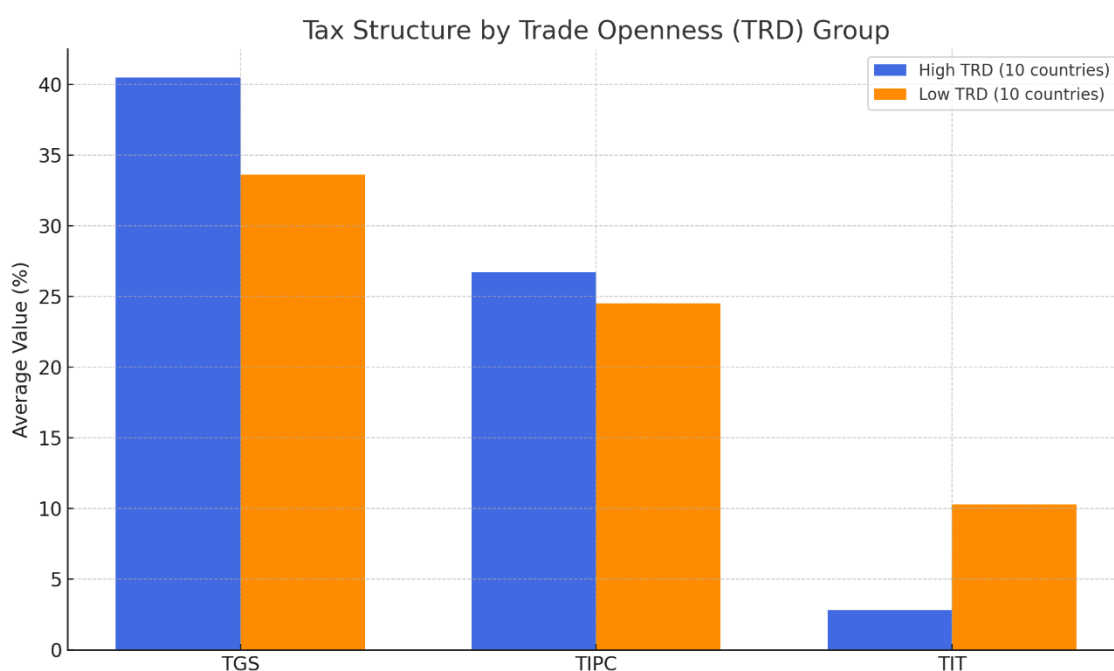


Figure 5.1: Comparison of Tax Types by TRD Group, 2022

Source: Compiled by the authors

Regarding GDP, developing countries are typically characterized by low or lower-middle per capita income, extensive informal sectors (including self-employed households, freelance laborers, and subsistence agriculture), low labor productivity, limited capital accumulation, and dependence on primary exports or assembly manufacturing. As a result, direct taxes account for a small share of total revenue due to low personal incomes and a small formal business sector. Conversely, indirect taxes dominate as they are easier to administer and collect. Accordingly, countries with higher GDP such as China, Brazil, and Mexico tend to have higher

direct tax revenues (averaging 23%) and lower indirect tax revenues (averaging 30%). In contrast, countries with lower GDP like Tonga, Timor-Leste, and Moldova exhibit lower direct tax revenues (averaging 20%) and higher indirect tax revenues (averaging 34%).

In terms of political institutions, developing countries often suffer from weak governance, lack of transparency, and unstable legal systems that are susceptible to influence from special interest groups. Tax incentive policies are frequently broad and poorly targeted. Tax systems tend to be complex and full of loopholes, making reforms difficult due to institutional constraints. Among countries with high levels of corruption control such as Georgia, Costa Rica, Mauritius, Malaysia, and South Africa, direct tax revenues are higher (averaging 33%). Conversely, countries with low corruption control such as Cameroon, Nicaragua, Azerbaijan, Paraguay, and Guatemala have lower direct tax revenues (averaging 24%).

Regarding education, while many developing countries have relatively high literacy rates, the quality of education-particularly vocational and higher education-often fails to meet the demands of modern labor markets. Consequently, the labor force remains concentrated in the informal sector, lacking formal contracts and stable incomes, which hinders the effectiveness of personal income tax collection. Furthermore, limited educational programs on taxation, public finance, and civic ethics contribute to low taxpayer awareness and participation. This underlying issue explains why developing countries often rely more heavily on indirect taxes, which are easier to collect and enforce, rather than direct taxes, which require self-reporting and voluntary compliance. In countries with high primary school enrollment rates such as Nepal, Timor-Leste, Tonga, and Argentina, direct taxes are higher (averaging 26%) and indirect taxes are lower (averaging 35%). Meanwhile, in countries with low primary school enrollment rates like Tanzania, North Macedonia, and Belarus, direct taxes are lower (averaging 20%) and indirect taxes are higher (averaging 38%).

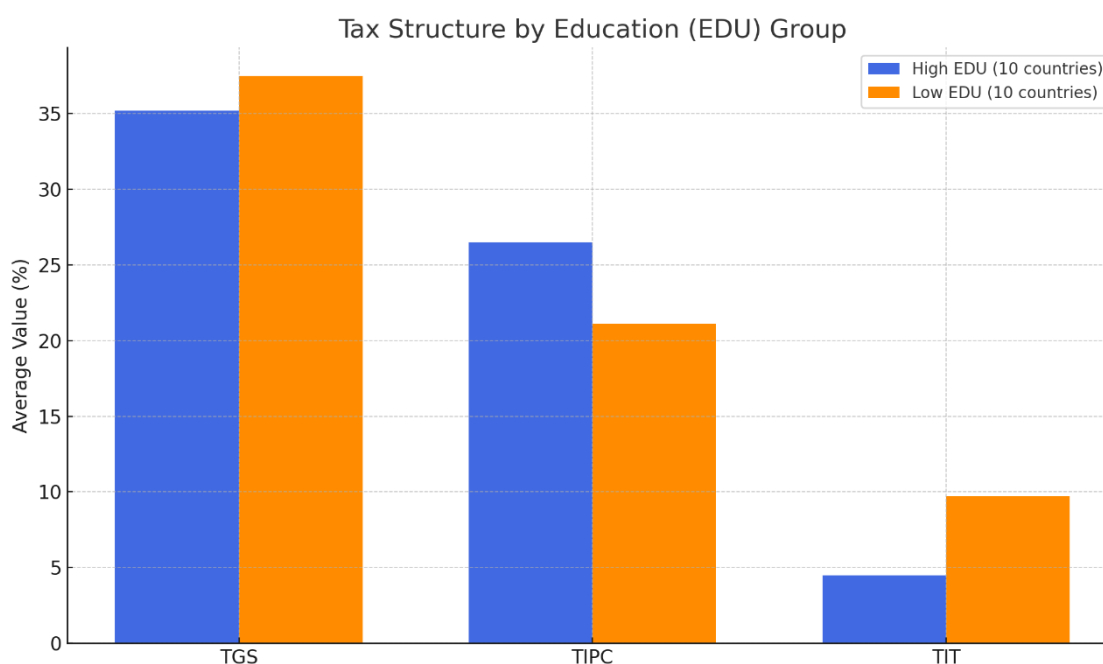


Figure 5.2: Comparison of Tax Types by EDU Group, 2021

Source: Compiled by the authors

Regarding government expenditure, governments in developing countries often maintain high levels of spending due to pressing needs in education, healthcare, infrastructure, and social welfare. However, many of these governments allocate significant resources to administrative costs, subsidies, and inefficient spending, rather than prioritizing improvements in the tax system. This results in substantial public expenditure without corresponding improvements in tax collection efficiency. Countries with high government spending, such as Timor-Leste, Brazil, Tonga, and South Africa, tend to have lower international trade and indirect tax revenues (averaging 6% and 32%) compared to countries with lower government spending such as Nepal, Sri Lanka, and Tanzania (averaging 11% and 39%).

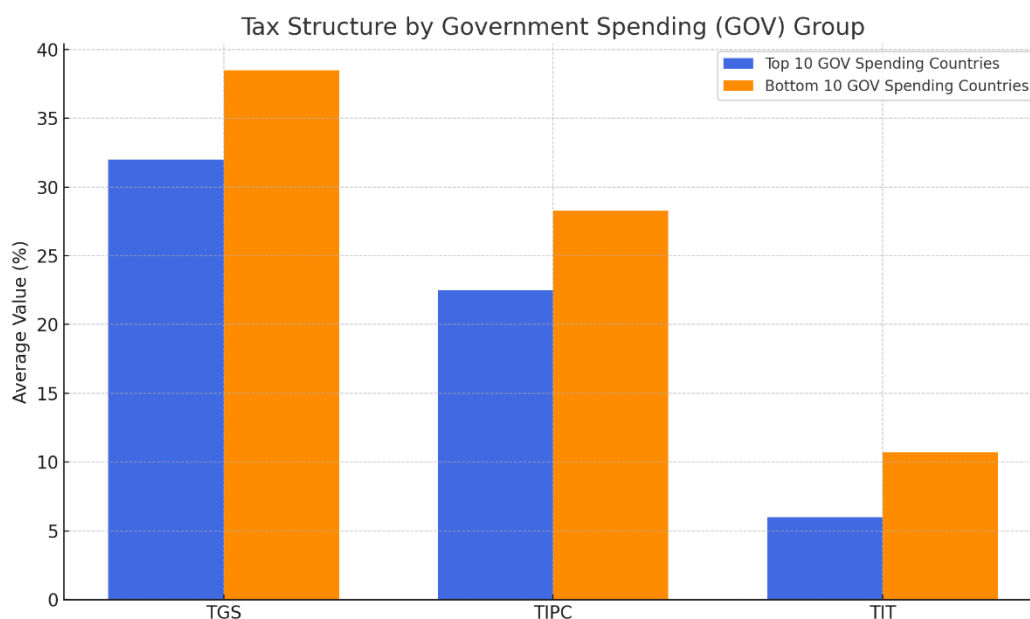


Figure 5.3: Comparison of Tax Types by GOV Group, 2020

Source: Compiled by the authors

Developing countries also typically have young populations and high population growth rates. Although urbanization is advancing rapidly, infrastructure remains underdeveloped and income inequality is high. These economies are characterized by low labor force participation, high unemployment, and low labor productivity. Consequently, while the potential for personal income tax revenue is considerable, it is difficult to realize due to the prevalence of informal employment, lack of income declaration, and low productivity. In countries with high labor force participation, such as Peru, China, and Thailand, direct tax revenues are higher (averaging 19%). In contrast, countries with low labor force participation, such as Nepal, Sri Lanka, and Tonga, collect lower direct tax revenues (averaging 11%).

5.2. Policy Implications

Based on the research findings, this section proposes several policy implications for the tax structure in developing countries:

First, gradually reduce reliance on import-export taxes and diversify the domestic tax base. Developing countries should decrease the role of trade taxes in total government revenue while diversifying domestic tax sources to ensure sustainable revenue. This includes strengthening

domestic value-added tax (VAT) collection and designing a tax system that balances direct and indirect taxes. Tax instruments should be selectively used to support prioritized industries such as supporting industries and deep-processing manufacturing, while avoiding over-dependence on raw material exports.

Second, broaden the personal income tax (PIT) base in a rational and progressive manner. The PIT base should be expanded reasonably by applying a soft progressive tax rate at lower brackets to avoid burdening newly emerging middle-class groups. Personal deductions for dependents and expenses on education and healthcare should be increased to reduce the burden on vulnerable groups. More effective taxation of high-income earners and self-employed professionals (e.g., freelancers, KOLs, specialists) is needed through better tax administration and monitoring. The introduction of property taxes and inheritance taxes should also be considered to enhance fairness and inclusiveness in the tax system.

Third, increase investment in universal education and skills training to expand the long-term tax base. Investment in education and vocational training is a key strategy for broadening the tax base. Policies should incentivize businesses to participate in training by offering tax incentives or financial support. Priority should be given to vocational education, STEM, digital skills, and soft skills, particularly for rural populations and young people entering the labor market. Allowing training expenses to be deducted from taxable income is an effective way to encourage lifelong learning and improve workforce quality.

Fourth, enhance transparency and accountability in public financial management. Establish a comprehensive public budget disclosure system that allows citizens to monitor government spending. Develop an integrated database system connecting taxation, population, social insurance, banking, education, and employment data. Employ digital technology, artificial intelligence, and big data analytics to track income, expenditures, and cash flows. A personal tax identification system linked with bank accounts and social insurance should be established. Additionally, strengthen transparency and accountability in fiscal governance by disclosing budgets and empowering audit agencies and legislative bodies to oversee public finances.

Finally, leverage the "demographic dividend" to expand the tax base. Policies should aim to integrate young labor forces into the formal economy by creating quality jobs and encouraging labor shifts from agriculture to higher-productivity sectors. Sustainable revenue sources such as property taxes and environmental taxes should be developed to reduce reliance on labor-based taxation. Consider integrating tax and social insurance contributions into a single, flexible mechanism for informal workers to ensure social protection while contributing to the public budget.

6. Conclusion

Research shows that trade liberalization has a positive impact on the tax structure of developing countries, as evidenced by an increase in the share of domestic taxes such as income and consumption taxes, along with a decline in the role of international trade taxes. This result reflects a shift in revenue sources in line with the context of global economic integration. However, the study has several limitations, such as relying on aggregated secondary data, not

fully capturing the institutional characteristics of each country, and failing to adequately control for lag effects or endogeneity among variables. These limitations suggest directions for future research, including the use of more advanced econometric models and more detailed data to provide a more comprehensive assessment of the long-term impact of trade liberalization on tax systems.

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