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Fiscal Policy and Economic Growth: A Comparative Analysis of Zambia, China, South Africa, and the United States

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ABSTRACT

This study examines the relationship between key fiscal policy instruments-taxes on international trade, tax revenue as a percentage of GDP, and applied tariff rates-and economic growth in four countries with different economic systems: Zambia, China, South Africa, and the United States. Using secondary data from the World Bank and employing statistical techniques through Jamovi software, the analysis includes descriptive statistics, correlation matrices, ANOVA, and regression models. The results show that the impact of fiscal policy varies significantly across countries, influenced by structural and institutional differences. In particular, trade taxes are positively associated with economic growth in Zambia and South Africa, while domestic tax revenues are more strongly associated with growth in China and the United States. Tariff rates show a context-dependent influence, with a moderately positive impact in developing countries. The study contributes to the literature on fiscal policy by providing a comparative empirical approach and by highlighting the importance of context-specific strategies. It underscores the need for revenue diversification, efficient tax administration, and strategic trade taxation in developing countries, while emphasizing the maintenance of stable and progressive tax systems in advanced economies to promote fiscal sustainability and inclusive growth.

Questo studio esamina la relazione tra i principali strumenti di politica fiscale (tasse sul commercio internazionale, entrate fiscali in percentuale del PIL e aliquote tariffarie applicate) e la crescita economica in quattro paesi con sistemi economici diversi: Zambia, Cina, Sudafrica e Stati Uniti. Utilizzando dati secondari della Banca Mondiale e impiegando tecniche statistiche attraverso il software Jamovi, l'analisi include statistiche descrittive, matrici di correlazione, ANOVA e modelli di regressione. I risultati mostrano che l'impatto della politica di bilancio varia in modo significativo da un paese all'altro, influenzato da differenze strutturali e istituzionali. In particolare, le imposte commerciali sono associate positivamente alla crescita economica in Zambia e Sudafrica, mentre le entrate fiscali nazionali sono più fortemente associate alla crescita in Cina e negli Stati Uniti. Le tariffe mostrano un'influenza dipendente dal contesto, con un impatto moderatamente positivo nei paesi in via di sviluppo. Lo studio contribuisce alla letteratura sulla politica di bilancio fornendo un approccio empirico comparativo e sottolineando l'importanza delle strategie specifiche del contesto. Sottolinea la necessità di diversificare le entrate, di un'amministrazione fiscale efficiente e di una tassazione strategica del commercio nei paesi in via

di sviluppo, sottolineando al contempo il mantenimento di sistemi fiscali stabili e progressivi nelle economie avanzate per promuovere la sostenibilità fiscale e la crescita inclusiva.

Keywords: Foreign Aid, Economic Growth, Governance, Institutional Quality, Aid Effectiveness.

1 – Introduction

Fiscal policy plays a central role in shaping the economic development of nations. Through various instruments such as taxation and public spending, governments influence key macroeconomic variables such as inflation, employment, and GDP growth (Tilahun Mengistu, 2022; Chugunov et al., 2021). Among the main fiscal policy tools, taxes on international trade, domestic tax revenues and tariff rates are crucial in shaping government revenues and overall economic performance (Sokolovska, 2016; Ho et al., 2023).

Effective fiscal policies support economic stability and long-term development by mobilizing domestic resources, allocating them efficiently, and maintaining fiscal sustainability (Pasichnyi, 2020; Al-Saadi & Khudari, 2024). In particular, tax policies and trade tariffs shape a country's competitiveness, investment climate, and ability to finance public services and infrastructure (Nguyen & Darsono, 2022; Daoudi, 2023). Evidence suggests that well-targeted government spending and progressive tax systems promote economic growth, while excessive or poorly managed fiscal policies can hinder it (Afonso & Blanco-Arana, 2025; Hakimah, 2025).

For many developing countries, trade taxes remain an important source of government revenue, especially where domestic tax systems are underdeveloped and administrative capacity is limited (Sokolovska, 2016; Adefolake & Omodero, 2022). In contrast, developed economies increasingly rely on diversified and efficient domestic tax systems, such as income and corporate taxes, supported by strong governance and institutional capacity (Tarschys, 1988; Wen & Zhou, 2022). Tariff structures also serve as an indicator of a country's trade orientation-protectionist or liberalized-which can significantly affect both fiscal revenues and economic competitiveness (Ho et al., 2023).

Fiscal policy varies considerably between developed and developing countries in terms of tax base, revenue dependence, and institutional quality. For example, countries such as the United States and China have broader tax bases and lower average tariff rates due to liberalized trade regimes and diversified economic structures (Kim et al., 2021; Pastpipatkul & Ko, 2025). On the other hand, countries such as Zambia and South Africa often rely more heavily on trade-related taxes and face difficulties in expanding domestic revenue mobilization (Yangailo, 2024; Mwale & Mulenga, 2024). These contrasts call for a comparative perspective to better understand the effectiveness and broader implications of fiscal policy in different economic settings (Kalbiyev & Seyfullali, 2024).

This study focuses on four core fiscal policy variables: taxes on international trade, tax revenues as a percentage of GDP, applied tariff rates, and GDP growth. These variables provide important insights into how countries use fiscal mechanisms to promote or inhibit economic growth, especially in different economic contexts (Kim et al., 2021; Vintilă et al., 2021).

The primary objective of this study is to examine the relationships between key fiscal policy variables-taxes on international trade, tax revenue as a percentage of GDP, and applied tariff rates-and economic growth in four countries: Zambia, China, South Africa, and the United States. By examining these relationships, the study seeks to identify both common patterns and

distinct fiscal dynamics that influence economic performance in developing and developed economies (Puscan Visalot et al., 2025; Kim et al., 2021). This comparative analysis provides valuable insights into how different fiscal structures contribute to economic resilience and growth in different contexts.

This comparative analysis focuses on Zambia, China, South Africa, and the United States because these countries have markedly different fiscal and economic profiles. Together, they provide a meaningful framework for understanding how fiscal policy influences growth across varying stages of development. Including economies ranging from low- to high-income brackets allows the analysis to capture a broad spectrum of institutional capacities, revenue mobilization strategies, and developmental objectives.

Zambia, for example, is a low-income, trade-dependent economy that relies heavily on trade taxes. This reliance, as noted by Yangailo (2024), highlights the fiscal vulnerabilities and administrative limitations often found in resource-rich but capacity-constrained nations. Studying Zambia provides valuable insights into the challenges of revenue diversification and fiscal management in sub-Saharan Africa.

South Africa presents a contrasting picture as an upper-middle-income country. Despite its relatively sophisticated tax system, the country continues to grapple with entrenched income inequality and structural unemployment. These characteristics reflect the fiscal tensions common in transitioning economies, which must balance growth imperatives with redistributive demands (Hakimah, 2025). The South African case illustrates how tax policy and social spending are used to address systemic disparities.

Meanwhile, China provides an example of a rapidly emerging economy that has harnessed fiscal policy as a strategic tool for industrialization. Its state-led growth model, coupled with a carefully managed domestic taxation framework, demonstrates how fiscal instruments can align with long-term development planning (Kim et al., 2021). China's approach offers important lessons for other developing economies seeking to accelerate structural transformation.

The United States is a high-income country with a liberalized trade regime and a broad, diversified tax base. It serves as a benchmark for advanced economies. As Afonso and Blanco-Arana (2025) have noted, its fiscal model reflects the principles of mature market economies, in which fiscal policy is employed primarily for stabilization and redistribution rather than for foundational economic transformation.

Including these four countries enables a rich comparative analysis. Their varying levels of economic development, institutional strength, and fiscal structures allow us to test theoretical assumptions about the effectiveness and adaptability of fiscal policy in different national contexts. This approach aligns with the framework proposed by Kalbiyev and Seyfullali (2024), who advocate for cross-contextual analysis to grasp the broader applicability and limitations of fiscal interventions in promoting economic growth.

This study provides critical insights into how fiscal policy affects economic growth in different national contexts. It contributes to the global discourse by highlighting the importance of fiscal policy reforms in developing countries, particularly in reducing reliance on trade taxes while enhancing domestic revenue capacity (Tilahun Mengistu, 2022; Afonso & Blanco-Arana, 2025). At the same time, it provides a comparative framework that enriches our understanding of fiscal sustainability and inclusive economic growth in both emerging and advanced economies (Al-Saadi & Khudari, 2024; Wen & Zhou, 2022). The findings are particularly relevant

for policymakers seeking to balance trade-based revenues with broader, more sustainable fiscal strategies.

2 – Literature Review

2.1– *Overview of Fiscal Policies*

Fiscal policy, which encompasses government taxation and spending, is a central tool for macroeconomic management and a key driver of economic development. It plays a critical role in shaping a country's economic trajectory by influencing demand, investment, and the provision of public services. Since the 2008 global financial crisis, the importance of fiscal policy has increased, especially in the context of increasing volatility in both fiscal and climate-related policies due to political influences (Wen & Zhou, 2022). According to Tilahun Mengistu (2022), fiscal policy refers to the strategic use of government spending and taxation to manage a nation's economic performance. When effectively designed and implemented under the right conditions, fiscal policy can be a powerful catalyst for sustainable economic growth and development.

A core component of fiscal policy is the structure and efficiency of tax revenue systems. In developed economies, tax systems tend to be broad-based, relying on a diverse mix of personal, corporate, and value-added taxes. These systems are supported by strong institutional frameworks and advanced administrative capacity, allowing for more stable and predictable revenue collection. In contrast, developing countries often rely heavily on trade taxes-such as import and export tariffs-due to limited domestic tax bases and weaker administrative infrastructure. This reliance reflects the practical challenges of expanding tax systems in environments with large informal sectors and lower tax compliance.

The relationship between fiscal policy and trade liberalization is a long-standing challenge, particularly for developing countries. The reduction or elimination of tariffs and non-tariff barriers-a hallmark of trade liberalization-can significantly reduce government revenues (Sokolovska, 2016). This loss of revenue poses risks to fiscal sustainability and complicates long-term development planning, particularly in contexts where alternative sources of public revenue are underdeveloped.

Historically, tariffs played an important role in the early stages of economic development, particularly in mercantile economies where control over trade routes was essential for government revenue. Over time, however, modern economies have shifted from trade-based revenues to tax-based systems, with greater emphasis on broad and efficient domestic taxation (Tarschys, 1988). Nonetheless, non-tax revenues-such as user charges, fees, and profits from state-owned enterprises-remain important, especially in times of what Tarschys (1988) calls "crisis of the fiscal state," when traditional tax systems come under pressure from economic, political, or institutional constraints.

2.2 – *Fiscal Policy and Economic Growth: Theoretical and Empirical Perspectives*

The relationship between fiscal policy and economic growth is well established in the economic literature, with several theoretical frameworks offering different perspectives. Two dominant schools of thought-Keynesian and supply-side economics-provide contrasting yet complementary views on how fiscal instruments affect growth.

From the Keynesian perspective, government spending and taxation are key tools for managing aggregate demand. Fiscal expansion - achieved through increased public spending or tax cuts - is seen as an effective way to stimulate economic growth, particularly during periods of economic downturn or recession. This approach underscores the importance of countercyclical fiscal policy in stabilizing the economy and promoting recovery.

On the other hand, supply-side economics emphasizes the role of incentives in determining long-term economic performance. According to this school of thought, lower taxes encourage greater investment, productivity and labor supply by reducing distortions in economic decision-making. Excessive taxation, in this view, hinders efficiency and discourages both entrepreneurial activity and capital formation. Thus, supply-side policies advocate a leaner tax system that promotes a more dynamic and competitive economy.

Endogenous growth theory adds depth to the analysis by incorporating fiscal policy variables into models of long-run growth. These models show how taxation and government spending - especially on infrastructure, education, and research and development - can shape incentives to save, invest, and innovate. In this framework, fiscal policy is not just a short-term stabilizer, but a fundamental determinant of sustainable economic progress through its influence on productivity and capital accumulation.

2.2.1 – Fiscal Policy as a Growth Stimulus

Pasichnyi (2020) emphasizes that the effectiveness of fiscal policy depends on the structure of public spending and taxation. Based on data from OECD countries, the study emphasizes the importance of productive spending - especially those aimed at human capital development - and balanced budgets in promoting growth. Similarly, Kim et al. (2021) illustrate the case of China, where local government spending has a greater impact on growth than central government spending. They also observe a shift in public investment from traditional sectors such as manufacturing to R&D, which aligns fiscal policy with innovation-driven growth.

Further supporting this perspective, Vintilă et al. (2021) find that effective expansionary fiscal policy has a positive impact on economic growth in OECD countries, although excessive government spending can have negative effects. Strong global governance is also shown to amplify the positive effects of fiscal policy. Chugunov et al. (2021) offer a complementary view, stressing the importance of coordinating fiscal and monetary policies to ensure sustainable development, especially in emerging economies. Their study emphasizes that fiscal spending alone may not have a significant impact on GDP unless it is combined with favorable institutional settings and monetary policies.

2.2.2 – Fiscal Policy in Developing and Resource-Dependent Economies

In Ethiopia, Tilahun Mengistu (2022) disaggregates government expenditures and tax revenues to show that productive spending stimulates growth while distortionary taxes hinder it. This analysis provides critical insights for policymakers seeking to reallocate spending and reform tax structures. Similarly, Daoudi (2023) uses SVAR modeling in the context of Algeria to show that public spending has only short-term positive effects on growth, largely constrained by the country's dependence on oil revenues.

In developing countries, the interplay between fiscal and monetary policy has often been difficult to balance. Hakimah (2025) highlights the challenge of managing inflation and growth simultaneously in these economies and argues for better coordination between the two policy

instruments. The importance of strategic and transparent fiscal management is also underscored by Mirasol et al. (2025), who examine the Philippines' fiscal reforms amid economic shocks and geopolitical risks.

In the Zambian context, Yangailo (2024) examines the country's fiscal trajectory and emphasizes the need for targeted social spending, sectoral diversification, and effective debt management to promote long-term stability. Similarly, Mwale and Mulenga (2024) find that while tax revenues boost GDP, high levels of public spending and external debt undermine economic growth, suggesting the need for a broader tax base and fiscal restraint.

2.2.3 – Fiscal Policy, Innovation, and Economic Complexity

On the broader scale of economic transformation, Aktug et al. (2025) examine how fiscal policy can increase economic complexity by incentivizing R&D and supporting knowledge-based industries. This is consistent with the findings of Pastpipatkul and Ko (2025), who show that in Thailand, fiscal policy is critical for economic recovery during recessions, while monetary policy plays a more consistent role in sustaining growth.

2.2.4 – Sectoral and Country-Specific Fiscal Dynamics

In Peru, Puscan Visalot et al. (2025) use fiscal multipliers to show that capital spending leads to immediate and sustained growth, while current spending often leads to short-term declines in GDP. Similarly, in Indonesia, Saragih et al. (2024) report that taxes significantly boost growth, while subsidies and inefficient human capital investment hinder growth.

Afonso and Blanco-Arana (2025) provide evidence from Least Developed Countries (LDCs) showing that strong fiscal ratings and government effectiveness are positively correlated with economic growth. These results underscore the need for sound fiscal institutions and public financial management in low-income countries. Kalbiyev and Seyfullali (2024) offer a resource-based perspective from Azerbaijan and find a long-run positive relationship between government spending and economic growth, although short-term effects can be negative. They argue for greater efficiency in public spending, especially in the face of declining oil revenues.

In Oman, Al-Saadi and Khudari (2024) examine how good governance interacts with fiscal policy to promote growth. Their study finds both bidirectional and unidirectional causal relationships between governance indicators and GDP, highlighting the need for institutional reforms and digital financial inclusion. Similarly, Nguyen and Darsono (2022) highlight the complex relationship between tax revenues and investment in ASEAN, finding that while tax revenues generally depress growth, the negative effects can be mitigated with higher revenues and well-regulated investment.

2.2.5 – Trade Liberalization and Fiscal Sustainability

The trade dimension of fiscal policy is further elaborated by Ho et al. (2023), who show that while trade openness strengthens the positive effects of tax revenues on growth, excessive openness can reverse these gains. A similar argument is made by Sokolovska (2016), whose study confirms a negative relationship between trade liberalization and tax revenue in low-income countries. This underscores the fiscal vulnerability of developing countries undergoing liberalization without adequate compensatory mechanisms.

In Nigeria, Adefolake and Omodero (2022) examine the impact of specific tax instruments on GDP. They find that petroleum revenue tax (PPT) and value-added tax (VAT) are growth-

enhancing, while corporate income tax reduces growth, highlighting the importance of tax design in economic planning.

2.3 – *Gaps in literature to be covered by the study*

The study fills several important gaps in the existing literature while providing innovative insights into the impact of fiscal policy on economic growth in both developed and developing countries. An important gap addressed by this study is the comparative analysis of fiscal policy dynamics in developed and developing countries. While numerous studies examine fiscal policy in individual countries, few offer a direct comparison of how fiscal policies-such as taxes on international trade, tax revenue as a percentage of GDP, and applied tariff rates-affect economic growth in both types of economies. By analyzing Zambia, China, South Africa, and the United States, this study provides a comprehensive comparative perspective that explores the different fiscal structures and growth dynamics in each country, thereby filling a significant gap in the literature.

Another critical gap addressed is the limited focus on the fiscal challenges specific to developing countries, particularly their reliance on trade taxes. Many studies of fiscal policy focus on advanced economies, but few provide an in-depth analysis of the unique fiscal structures in developing countries. This study fills this gap by focusing on Zambia and South Africa, providing insights into how these countries rely heavily on international trade taxes and how this reliance affects their economic growth.

In addition, the study innovatively examines the relationship between trade taxes, tariff rates, and economic growth in a coherent manner. While trade taxes and tariffs are often studied separately, this study examines how these fiscal instruments interact with domestic tax revenues to affect economic growth. This integrated approach is relatively novel and provides new insights into how trade taxes and tariffs can shape economic performance.

The role of tariff rates in economic growth is another area where the study makes a notable contribution. Although the impact of tariffs on economic growth has been widely debated, empirical studies often lack conclusive findings, especially with respect to the long-term effects of tariff policies in different economic contexts.

In conclusion, this study addresses important gaps in the literature by providing a detailed comparative analysis of tariff policies in developed and developing economies. Its innovative approach, which includes a focus on the interrelationship between trade taxes, domestic taxes, and tariff rates, as well as the use of both correlation and regression analysis, contributes new insights into how fiscal policy affects economic growth in different national contexts. By highlighting the unique fiscal challenges and opportunities in different countries, the study provides valuable recommendations for improving fiscal policy design and promoting sustainable economic growth.

3 – Methodology

This study adopts a quantitative comparative research design supported by a cross-country analytical approach. The primary objective is to assess how key fiscal policy variables-taxes on international trade, tax revenue as a percentage of GDP, and applied tariff rates-influence economic growth (GDP growth) in four countries: Zambia, China, South Africa, and the United States.

The methodology integrates descriptive, inferential, and econometric techniques using Jamovi statistical software, chosen for its intuitive interface and ability to support both traditional and advanced statistical analyses, including regression modeling, correlation analysis, ANOVA, and post hoc testing.

3.1 – *Data Collection*

The data used in the analysis come from the World Bank's World Development Indicators (WDI) database. The period covered is 2005 to 2022, ensuring a robust longitudinal dataset for meaningful cross-country comparisons. The selected indicators include:

a – *GDP growth* (annual %) – the dependent variable representing economic performance.

b – *Taxes on international trade* (% of revenue) – one of the key independent fiscal policy variables.

c – *Tax revenue* (% of GDP) – indicating the efficiency and extent of domestic tax mobilization.

d – *Applied tariff rate* (%) – reflecting trade policy orientation and its potential economic impact.

The countries selected - Zambia, China, South Africa and the United States - were chosen for their different fiscal structures and economic contexts. Zambia and South Africa represent developing economies, while China and the United States represent emerging and advanced economies, respectively.

3.2 – *Analytical Instrument and Statistical Techniques*

All statistical analyses were performed using the Jamovi software platform, which is well suited for applied research involving regression analysis, variance testing, and exploratory data analysis. Jamovi's integration with R was particularly useful for customizing outputs and ensuring statistical robustness through additional scripting support where needed.

(A) – *Descriptive Statistics*: Descriptive summaries were calculated for each variable across the four countries to explore data patterns and dispersion (mean, standard deviation, minimum and maximum values). These findings provided an essential overview of fiscal policy structures and economic performance trends.

(B) – *Correlation Analysis*: A Pearson correlation matrix was constructed to assess the strength and direction of linear relationships between variables. This analysis helped to identify initial relationships between fiscal indicators and GDP growth, such as the potential trade-offs between tax revenue generation and economic efficiency.

(C) – *Regression Analysis*: Multiple linear regression models were constructed in Jamovi to assess the explanatory power of fiscal policy variables on GDP growth. Separate models were run for each country to reveal country-specific dynamics, as well as a pooled regression for comparative assessment. Each model includes:

– Taxes on international trade

– Tax revenue (% of GDP)

– Applied tariff rates

Model fit was assessed using R-squared values, standardized beta coefficients, and p-values for hypothesis testing.

(D) – *ANOVA (Analysis of Variance):* One-way ANOVA was used to assess cross-country differences in key variables. Given the violation of the homogeneity of variance assumption (confirmed by Levene's test), Welch's ANOVA was used to ensure a more reliable significance test.

(E) – *Post-hoc Comparisons*: Where significant differences were found in the ANOVA, post-hoc tests (such as Games-Howell) were used to determine which countries differed significantly in terms of fiscal policy measures and GDP growth rates.

In short, descriptive and inferential statistics were performed using Jamovi. Tests for normality and homogeneity of variance were conducted using Shapiro-Wilk and Levene's tests, respectively, in line with Field's (2024) recommendations. To examine linear relationships, regression models, using variance inflation factors (VIFs <5) to detect and control for multicollinearity (Wooldridge, 2016).

The study compared both country-specific and pooled models to assess contextual variation in the effects of fiscal policy. For group comparisons involving unequal variances, Welch's ANOVA was used, followed by Games–Howell post hoc tests, as appropriate, for unbalanced cross-country data. Jamovi's integration with R enabled residual diagnostics and ensured reproducibility, aligning with open science practices (Jamovi Project, 2023; Navarro & Foxcroft, 2019).

4 – Results

4.1 – *Correlation Analysis*

The correlation matrix presented in Table 1 examines the relationships between several fiscal and economic variables, including taxes on international trade as a percentage of revenue, tax revenue as a percentage of GDP, applied tariff rates, and annual GDP growth.

A moderately positive correlation ($r = 0.258$, $p = 0.028$) is observed between taxes on international trade (% of revenue) and tax revenue (% of GDP), suggesting that greater reliance on trade taxes is weakly associated with higher total tax revenue relative to GDP. However, the relationship between international trade taxes and GDP growth is not statistically significant ($r = 0.126$, $p = 0.291$), indicating no meaningful linear relationship. Meanwhile, the applied tariff rate shows a stronger positive correlation with taxes on international trade ($r = 0.367$, $p = 0.002$), implying that higher average tariffs are associated with a larger share of trade-related tax revenue.

Interestingly, tax revenue (% of GDP) shows a perfect positive correlation with its duplicate variable (tax revenue (% of GDP) (2)) ($r = 1.000$, $p < 0.001$), which is to be expected as they are likely to represent the same metric. GDP growth is significantly negatively correlated with tax revenue (% of GDP) ($r = -0.362$, $p = 0.002$), suggesting that higher tax burdens may be associated with slower economic growth. Conversely, GDP growth is positively correlated with tariff rates ($r = 0.354$, $p = 0.002$), suggesting that economies with higher average tariffs may experience slightly faster growth, although this relationship warrants further investigation to determine causality.

Table 1 – Correlation Matrix

		Taxes on international trade (% of revenue)	Tax revenue (% of GDP)	Tariff rate, applied, simple mean, all products (%)	Tax revenue (% of GDP) (2)	GDP growth (annual %)
Taxes on international trade (% of revenue)	Pearson's r	—				
	df	—				
	p-value	—				
Tax revenue (% of GDP)	Pearson's r	0.258 *	—			
	df	70	—			
	p-value	0.028	—			
Tariff rate, applied, simple mean, all products (%)	Pearson's r	0.367 **	0.136	—		
	df	70	70	—		
	p-value	0.002	0.255	—		
Tax revenue (% of GDP) (2)	Pearson's r	0.258 *	1.000 ***	0.136	—	
	df	70	70	70	—	
	p-value	0.028	< .001	0.255	—	
GDP growth (annual %)	Pearson's r	0.126	-0.362 **	0.354 **	-0.362 **	—
	df	70	70	70	70	—
	p-value	0.291	0.002	0.002	0.002	—

Note. * p < .05, ** p < .01, *** p < .001

4.2 – *ANOVA*

The Welch's ANOVA results presented in Table 2 show statistically significant differences ($p < 0.001$) among the four countries - Zambia, China, South Africa, and the United States - for all variables examined: international trade taxes as a percentage of revenue, tax revenue as a percentage of GDP, applied tariff rates, and annual GDP growth.

The remarkably high F-values, ranging from 21.3 for GDP growth to 697.1 for tax revenue, underscore the substantial variation across groups. Given that traditional ANOVA assumes homogeneity of variance, the use of Welch's adjustment was appropriate, especially since Levene's test (Table 5) confirmed violations of this assumption for taxes on international trade and tariff rates.

This methodological choice ensures the robustness of the results despite unequal variances across groups.

Table 2 – One-Way ANOVA (Welch's)

	F	df1	df2	p
Taxes on international trade (% of revenue)	103.6	3	34.1	< .001
Tax revenue (% of GDP)	697.1	3	36.3	< .001
Tariff rate, applied, simple mean, all products (%)	41.0	3	33.3	< .001
GDP growth (annual %)	21.3	3	37.0	< .001

Table 3 provides a deeper insight into each country's economic profile. Zambia has the highest dependence on international trade taxes, with an average of 6.46%, followed by South Africa (3.55%), China (2.08%), and the United States (1.32%). The large standard deviation for China (4.641) suggests considerable variation in its reliance on trade taxes over time.

Table 3 – Group Descriptive

	Country	N	Mean	SD	SE
Taxes on international trade (% of revenue)	Zambia	18	6.46	2.315	0.5457
	China	18	2.08	4.641	1.0939
	South Africa	18	3.55	0.435	0.1026
	United States	18	1.32	0.383	0.0903
Tax revenue (% of GDP)	Zambia	18	13.86	3.738	0.8811
	China	18	9.30	0.852	0.2007
	South Africa	18	24.16	1.140	0.2686
	United States	18	10.42	1.050	0.2476
Tariff rate, applied, simple mean, all products %	Zambia	18	10.25	5.126	1.2083
	China	18	6.72	2.774	0.6538
	South Africa	18	7.28	0.759	0.1789
	United States	18	3.31	1.358	0.3200
GDP growth (annual %)	Zambia	18	5.45	3.121	0.7357
	China	18	8.21	3.012	0.7100
	South Africa	18	2.00	2.805	0.6612
	United States	18	2.01	1.953	0.4602

In terms of tax revenue to GDP, South Africa stands out with the highest ratio (24.16%), well above Zambia (13.86%), the United States (10.42%) and China (9.30%). In terms of trade policy, Zambia has the highest average tariff rate (10.25%), while the United States has the lowest (3.31%).

Economic growth patterns are also very different, with China leading the way with annual GDP growth of 8.21%, followed by Zambia (5.45%), while South Africa and the United States have slower, comparable growth rates of around 2%.

4.3 – *Assumption Checks*

Assumption checks further validate the analytical approach. The Shapiro-Wilk test (Table 4) indicates strong non-normality for all variables except GDP growth ($p = 0.013$), justifying the use of robust statistical methods such as Welch's ANOVA and Games-Howell post hoc tests.

Table 4 – Normality Test (Shapiro-Wilk)

	W	p
Taxes on international trade (% of revenue)	0.531	< .001
Tax revenue (% of GDP)	0.631	< .001
Tariff rate, applied, simple mean, all products (%)	0.766	< .001
GDP growth (annual %)	0.956	0.013

Note. A low p-value suggests a violation of the assumption of normality

Levene's test (Table 5) confirms heterogeneity of variance for international trade taxes ($p = 0.021$) and tariff rates ($p < 0.001$) justifying the use of Welch's adjustment.

Table 5 – Homogeneity of Variances Test (Levene's)

	F	df1	df2	p
Taxes on international trade (% of revenue)	3.45	3	68	0.021
Tax revenue (% of GDP)	2.58	3	68	0.060
Tariff rate, applied, simple mean, all products (%)	7.15	3	68	< .001
GDP growth (annual %)	1.31	3	68	0.279

4.4 – *Post Hoc Tests*

Post-hoc comparisons using the Games-Howell test reveal specific pairwise differences between countries. For taxes on international trade (Table 6), Zambia is significantly more dependent than all other countries ($p \leq 0.007$), while there are no significant differences between China, South Africa, and the United States.

Table 6 – Games-Howell Post-Hoc Test – Taxes on international trade (% of revenue)

		Zambia	China	South Africa	United States
Zambia	Mean difference	—	4.37	2.91	5.137
	p-value	—	0.007	< .001	< .001
China	Mean difference		—	-1.47	0.762
	p-value		—	0.555	0.898
South Africa	Mean difference			—	2.228
	p-value			—	< .001
United States	Mean difference				—
	p-value				—

In terms of tax revenue (Table 7), South Africa's ratio is significantly higher than all other countries ($p < 0.001$), with Zambia also exceeding China and the United States.

Table 7 – Games-Howell Post-Hoc Test – Tax revenue (% of GDP)

		Zambia	China	South Africa	United States
Zambia	Mean difference	—	4.56	-10.3	3.44
	p-value	—	< .001	< .001	0.006
China	Mean difference		—	-14.9	-1.12
	p-value		—	< .001	0.007
South Africa	Mean difference			—	13.74
	p-value			—	< .001
United States	Mean difference				—
	p-value				—

The tariff rate analysis in Table 8 shows that Zambia's tariffs are significantly higher than those of the United States ($p < 0.001$), although not statistically different from those of China or South Africa. The United States, however, maintains significantly lower tariffs than all other countries.

Table 8 – Games-Howell Post-Hoc Test – Tariff rate, applied, simple mean, all products (%)

		Zambia	China	South Africa	United States
Zambia	Mean difference	—	3.53	2.974	6.95
	p-value	—	0.072	0.106	< .001
China	Mean difference		—	-0.559	3.41
	p-value		—	0.842	< .001
South Africa	Mean difference			—	3.97
	p-value			—	< .001
United States	Mean difference				—
	p-value				—

Finally, comparisons of GDP growth as shown in Table 9 show China's superior performance relative to all other economies ($p < 0.001$), with Zambia also outperforming South Africa and the United States ($p \leq 0.007$), which show no meaningful difference between them.

Table 9. Games-Howell Post-Hoc Test – GDP growth (annual %)

		Zambia	China	South Africa	United States
Zambia	Mean difference	—	-2.77	3.44	3.43684
	p-value	—	0.050	0.007	0.002
China	Mean difference		—	6.21	6.20204
	p-value		—	< .001	< .001
South Africa	Mean difference			—	-0.00667
	p-value			—	1.000
United States	Mean difference				—
	p-value				—

4.5 – *Regression Analysis*

4.5.1 – Zambia

The *linear regression analysis* conducted in the Zambian context provides valuable insights into the relationship between GDP growth (annual %) and three key predictors: taxes on

international trade (% of revenue), tax revenue (% of GDP), and the applied tariff rate (simple average, all products %). The overall model fit, as shown in Table 10, indicates moderate to strong explanatory power, with an R^2 value of 0.596, suggesting that about 59.6% of the variance in GDP growth is explained by the predictors. The adjusted R^2 of 0.509 further refines this estimate, taking into account the number of predictors in the model. The F-statistic of 6.88, with a significant p-value of 0.004, confirms that the model is statistically significant and fits the data better than a null model with no predictors.

Table 10. Model Fit Measures

				Overall Model Test			
Model	**R**	**R^2**	**Adjusted R^2**	**F**	**df 1**	**df 2**	**p**
1	0.772	0.596	0.509	6.88	3	14	0.004

The coefficients in Table 11 show the individual contributions of each predictor to GDP growth. International trade taxes (% of revenue) have a strong positive relationship with GDP growth, with a standardized estimate of 0.8239 and a highly significant p-value of 0.002. This suggests that an increase in trade taxes is associated with higher GDP growth in Zambia. Conversely, tax revenue (% of GDP) shows a negative relationship with a standardized estimate of -0.6303 and a p-value of 0.010, indicating that higher domestic tax revenue may be correlated with lower GDP growth. However, the applied tariff rate does not appear to be a significant predictor, as evidenced by its low standardized estimate (0.0578) and insignificant p-value (0.764). The intercept term, while marginally insignificant (p = 0.060), suggests a baseline GDP growth rate of about 5.2054% when all predictors are zero.

Table 11. Model Coefficients - GDP growth (annual %)

Predictor	**Estimate**	**SE**	**t**	**p**	**Stand. Estimate**
Intercept	5.2054	2.539	2.050	0.060	
Taxes on international trade (% of revenue)	1.1108	0.288	3.860	0.002	0.8239
Tax revenue (% of GDP)	-0.5263	0.178	-2.958	0.010	-0.6303
Tariff rate, applied, simple mean, all products (%)	0.0352	0.115	0.306	0.764	0.0578

Assumption Checks

The assumption checks in Tables 12 confirm the robustness of the model. The collinearity statistics indicate that multicollinearity is not a problem, as all variance inflation factor (VIF) values are well below the threshold of 10, and the tolerance values are above 0.1. This suggests

that the predictors are sufficiently independent. In addition, the Shapiro-Wilk normality test (p = 0.337) fails to reject the null hypothesis of normality, indicating that the residuals are normally distributed, which is a critical assumption for the validity of the linear regression model.

Table 12 – Collinearity Statistics and Normality Test (Shapiro-Wilk)

Collinearity Statistics

	VIF	Tolerance
Taxes on international trade (% of revenue)	1.58	0.634
Tax revenue (% of GDP)	1.57	0.636
Tariff rate, applied, simple mean, all products (%)	1.24	0.807

Normality Test (Shapiro-Wilk)

Statistic	p
0.944	0.337

4.5.2 – China

The *regression analysis* presented examines the relationship between GDP growth (annual %) and three fiscal policy predictors in the Chinese context: taxes on international trade (% of revenue), tax revenue (% of GDP), and the applied tariff rate (simple average, all products %). The model fit measures in Table 13 indicate moderate explanatory power, with an R^2 of 0.458, suggesting that about 45.8% of the variance in GDP growth is accounted for by these predictors. The adjusted R^2 of 0.342 further refines this estimate, taking into account the number of predictors in the model. The F-statistic of 3.95 with a p-value of 0.031 indicates that the model is statistically significant at the 5% level, implying that the predictors collectively have a meaningful relationship with GDP growth.

Table 13 – Model Fit Measures

				Overall Model Test			
Model	**R**	**R^2**	**Adjusted R^2**	**F**	**df1**	**df2**	**p**
1	0.677	0.458	0.342	3.95	3	14	0.031

Table 14 presents the coefficients for each predictor, indicating their individual contributions to the model. The intercept is negative (-13.630) and marginally insignificant (p = 0.073), suggesting that without the influence of the predictors, GDP growth would be negative,

although this interpretation should be made with caution due to the lack of statistical significance. Tax revenue (% of GDP) emerges as a significant positive predictor (estimate = 2.127, p = 0.015), indicating that higher tax revenue as a percentage of GDP is associated with higher GDP growth. This finding is consistent with the notion that effective fiscal policy can stimulate economic expansion in China.

In contrast, taxes on international trade (% of revenue) show a negative but insignificant relationship (estimate = -0.168, p = 0.267), while the tariff rate shows a positive but also insignificant association (estimate = 0.359, p = 0.127). The standardized coefficients also show that tax revenue (% of GDP) has the strongest impact (0.601), followed by the tariff rate (0.331) and taxes on international trade (-0.258).

Table 14 – Model Coefficients - GDP growth (annual %)

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept	-13.630	7.028	-1.94	0.073	
Taxes on international trade (% of revenue)	-0.168	0.145	-1.16	0.267	-0.258
Tax revenue (% of GDP)	2.127	0.769	2.77	0.015	0.601
Tariff rate, applied, simple mean, all products (%)	0.359	0.221	1.62	0.127	0.331

Assumption Checks

The assumption checks in Table 15 assess multicollinearity among the predictors, with variance inflation factor (VIF) values all below 2 and tolerance values above 0.5, indicating no significant multicollinearity concerns. This supports the reliability of the coefficient estimates. Overall, the analysis suggests that tax revenue (% of GDP) is a key driver of GDP growth in China, while international trade taxes and tariff rates, while directionally informative, do not reach statistical significance in this model.

Policymakers may consider prioritizing domestic tax policy over trade-related fiscal measures to promote economic growth, although further research with expanded datasets could refine these findings.

Table 15 – Collinearity Statistics

	VIF	Tolerance
Taxes on international trade (% of revenue)	1.29	0.777
Tax revenue (% of GDP)	1.22	0.819
Tariff rate, applied, simple mean, all products (%)	1.07	0.933

4.5.3 – South Africa

The *regression analysis* examines the relationship between GDP growth (annual %) and three predictor variables in the South African context: taxes on international trade (% of revenue), tax revenue (% of GDP), and the applied tariff rate (simple average, all products %). The analysis evaluates the fit of the model, the significance of each predictor, and the underlying assumptions of the regression model.

Table 16 presents the overall model fit measures, which indicate that the regression model explains a moderate proportion of the variance in GDP growth. The multiple correlation coefficient (R) of 0.695 suggests a fairly strong linear relationship between the predictors and the dependent variable. The R^2 value of 0.483 indicates that approximately 48.3% of the variance in GDP growth is explained by the model, although the adjusted R^2 of 0.373 suggests that some predictors may not contribute significantly. The F-statistic of 4.37 ($p = 0.023$) confirms that the model is statistically significant, although the marginal level of significance implies that the explanatory power of the predictors is moderate.

Table 16 – Model Fit Measures

				Overall Model Test			
Model	**R**	**R^2**	**Adjusted R^2**	**F**	**df1**	**df2**	**p**
1	0.695	0.483	0.373	4.37	3	14	0.023

Table 17 presents the regression coefficients for each predictor. Taxes on international trade (% of revenue) emerges as a statistically significant predictor ($p = 0.017$), with a positive coefficient ($\beta = 3.462$), indicating that higher taxes on international trade are associated with higher GDP growth. In contrast, tax revenue (% of GDP) and the applied tariff rate do not reach statistical significance ($p = 0.312$ and $p = 0.176$, respectively), although both have a positive relationship with GDP growth.

Table 17. Model Coefficients - GDP growth (annual %)

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept	-30.323	13.647	-2.22	0.043	
Taxes on international trade (% of revenue)	3.462	1.284	2.70	0.017	0.537
Tax revenue (% of GDP)	0.511	0.487	1.05	0.312	0.208
Tariff rate, applied, simple mean, all products (%)	1.057	0.742	1.42	0.176	0.286

The intercept is significant (p = 0.043), indicating that baseline GDP growth is negative when all predictors are zero, which may reflect structural economic factors not captured in the model.

Assumption Checks

Table 18 assesses the assumptions of multicollinearity and normality. The variance inflation factor (VIF) values for all predictors are below 1.10 and the tolerance levels are above 0.90, confirming that multicollinearity is not a problem. The Shapiro-Wilk test for normality (p = 0.140) indicates that the residuals are normally distributed, validating the regression analysis.

Table 18 – Collinearity Statistics and Normality Test (Shapiro-Wilk

Collinearity Statistics

	VIF	Tolerance
Taxes on international trade (% of revenue)	1.58	0.634
Tax revenue (% of GDP)	1.57	0.636
Tariff rate, applied, simple mean, all products (%)	1.24	0.807

Normality Test (Shapiro-Wilk)

Statistic	p
0.922	0.140

4.5.4 – United States

The *regression analysis* examines the relationship between GDP growth (annual %) and three predictor variables in the United States: taxes on international trade (% of revenue), tax revenue (% of GDP), and the applied tariff rate (simple average, all products %). The overall model fit, as shown in Table 19, indicates moderate explanatory power, with an R^2 value of 0.277, suggesting that about 27.7% of the variance in GDP growth is accounted for by the predictors. However, the adjusted R^2 of 0.122 reflects a significant reduction when the number of predictors is taken into account, indicating that the explanatory power of the model is relatively weak. The insignificant F-statistic (p = 0.196) also suggests that the model as a whole does not significantly predict GDP growth at conventional levels of statistical significance.

Table 20 details the individual contributions of each predictor. The intercept is negative (-8.842) and marginally insignificant (p = 0.084), meaning that when all predictors are zero, GDP growth is estimated to be negative, although this relationship is not statistically robust. Among the predictors, only tax revenue (% of GDP) shows a statistically significant positive association with GDP growth (p = 0.049), with a standardized estimate of 0.5130, indicating a moderate effect size. In contrast, taxes on international trade (% of revenue) and the applied tariff rate do

not show a significant relationship with GDP growth (p = 0.855 and p = 0.645, respectively), suggesting that these variables do not significantly affect GDP growth in this model.

Table 19 – Model Fit Measures

				Overall Model Test			
Model	R	R^2	Adjusted R^2	F	df1	df2	p
1	0.526	0.277	0.122	1.78	3	14	0.196

Table 20 – Model Coefficients - GDP growth (annual %)

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept	-8.842	4.748	-1.862	0.084	
Taxes on international trade (% of revenue)	0.249	1.338	0.186	0.855	0.0489
Tax revenue (% of GDP)	0.954	0.442	2.157	0.049	0.5130
Tariff rate, applied, simple mean, all products (%)	0.177	0.376	0.471	0.645	0.1232

Assumption Checks

Table 21 assesses key regression assumptions, including multicollinearity and normality of residuals. The collinearity statistics show that all variance inflation factor (VIF) values are well below the commonly accepted threshold of 5 (ranging from 1.09 to 1.33), and the tolerance values are above 0.1, indicating no concerning multicollinearity among the predictors. In addition, the Shapiro-Wilk test for normality (statistic = 0.971, p = 0.824) suggests that the residuals are normally distributed, which is a critical assumption for valid regression inference.

Table 21 – Collinearity Statistics and Normality Test (Shapiro-Wilk)

Collinearity Statistics

	VIF	Tolerance
Taxes on international trade (% of revenue)	1.33	0.750
Tax revenue (% of GDP)	1.09	0.914
Tariff rate, applied, simple mean, all products (%)	1.32	0.756

Collinearity Statistics

	VIF	Tolerance

Normality Test (Shapiro-Wilk)

Statistic	p
0.971	0.824

4.5.5 – Across Countries

The linear regression analysis conducted for four countries-Zambia, China, South Africa, and the United States-examined the relationship between GDP growth (annual %) and several predictors, including taxes on international trade, tax revenue, tariff rates, and country-specific effects. The overall model, as shown in Table 22, shows a moderate to good fit, with an R-value of 0.737 and an R^2 of 0.543, indicating that about 54.3% of the variance in GDP growth is explained by the predictors. The adjusted R^2 of 0.500 further refines this estimate, taking into account the number of predictors in the model. The F-statistic of 12.9, with a statistically significant p-value (< .001), confirms that the model is a good fit to the data.

Table 22 – Model Fit Measures

				Overall Model Test			
Model	R	R^2	Adjusted R^2	F	df1	df2	p
1	0.737	0.543	0.500	12.9	6	65	< .001

The coefficients in Table 23 show mixed results regarding the impact of individual predictors on GDP growth. The intercept, which represents the reference level (Zambia), is not statistically significant (p = 0.728), indicating that baseline GDP growth in Zambia is not significantly different from zero when all predictors are held constant. Among the tax-related variables, only the tariff rate has a significant positive relationship with GDP growth (estimate = 0.2916, p = 0.009), indicating that higher tariff rates are associated with higher GDP growth. In contrast, taxes on international trade and tax revenue do not significantly affect GDP growth (p = 0.382 and p = 0.736, respectively). The country-specific effects reveal remarkable differences: China shows a significant positive deviation from Zambia (estimate = 4.5483, p < .001), while South Africa and the United States show negative but insignificant deviations (p = 0.167 and p = 0.656, respectively).

Assumption Checks

The checks for multicollinearity, as shown in Table 24, assessed by variance inflation factor (VIF) and tolerance statistics, indicate no serious collinearity problems among the predictors. All VIF values are below the commonly accepted threshold of 5, with the highest being 3.27 for tax

revenue (% of GDP). The tolerance values further support this finding, as all values are above 0.1, suggesting that multicollinearity does not significantly bias the regression estimates.

Table 23 – Model Coefficients - GDP growth (annual %)

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept	0.9462	2.711	0.349	0.728	
Taxes on international trade (% of revenue)	0.1135	0.129	0.880	0.382	0.0974
Tax revenue (% of GDP)	0.0561	0.166	0.339	0.736	0.0931
Tariff rate, applied, simple mean, all products (%)	0.2916	0.109	2.679	0.009	0.2988
***Country*:**					
China – Zambia	4.5483	1.290	3.527	< .001	1.2083
South Africa – Zambia	-2.8243	2.022	-1.397	0.167	-0.7503
Unites States – Zambia	-0.6354	1.418	-0.448	0.656	-0.1688

[a] Represents reference level

Table 24 – Collinearity Statistics

Collinearity Statistics

	VIF	Tolerance
Taxes on international trade (% of revenue)	1.32	0.758
Tax revenue (% of GDP)	3.27	0.306
Tariff rate, applied, simple mean, all products (%)	1.33	0.752
Country	1.69	0.591

5 – Discussion

This study provides an in-depth examination of the relationships between various fiscal policy variables-such as taxes on international trade, tax revenue as a percentage of GDP, and applied tariff rates-and GDP growth in four different economies: Zambia, China, South Africa, and the United States. These findings build on and, in some cases, contrast with those of previous studies, offering both reinforcement and new perspectives on the tax-growth nexus.

The correlation matrix reveals several significant trends. First, the moderate positive correlation between taxes on international trade and total tax revenue echoes Sokolovska (2016),

who emphasized the importance of trade taxes in developing countries with less mature domestic tax systems. This suggests that countries with greater reliance on international trade taxes tend to have somewhat higher total tax revenue relative to GDP, although the relationship remains weak. This weak correlation reflects Pasichnyi's (2020) observation that while trade taxes are crucial for budget support, their volatility can undermine stable revenue planning.

However, the correlation between international trade taxes and GDP growth is not statistically significant, suggesting that reliance on these taxes does not directly promote economic growth. This supports earlier findings by Al-Saadi and Khudari (2024), who argued that trade taxes can act as a barrier to trade expansion and economic integration, especially when imposed at high rates. While trade taxes are important for revenue generation, they can increase the cost of imports and restrict foreign trade, potentially hindering long-term growth.

The applied tariff rate shows a stronger positive correlation with international trade taxes, suggesting that higher tariffs are associated with a larger share of trade-related revenue. This relationship is consistent with Adefolake and Omodero (2022), who report that tariff adjustments significantly affect revenue composition in countries with limited domestic revenue capacity.

Interestingly, tax revenue as a percentage of GDP is negatively correlated with GDP growth, raising the possibility that higher tax burdens may be associated with slower economic growth. This finding echoes concerns raised by Tilahun Mengistu (2022), who notes that excessive taxation in weak institutional environments often leads to inefficiencies and reduced investor confidence. However, this negative relationship may also reflect underlying structural problems in developing economies, where higher tax ratios may indicate inefficient systems and limited tax bases rather than effective fiscal policy.

Conversely, GDP growth shows a significant positive correlation with tariff rates, which may suggest that economies with higher tariffs experience somewhat faster economic growth. This partially contradicts Kim et al. (2021), who found that long-term growth is generally higher in countries with more liberalized trade regimes, although short-term protectionist measures can provide temporary boosts to industrial sectors. More research is needed to clarify these dynamics.

The ANOVA results reveal substantial differences in fiscal variables across the four countries, with p-values well below the conventional threshold for statistical significance. The high F-values underscore the variability in trade tax reliance, tax revenue-to-GDP ratios, tariff rates, and GDP growth. These findings support Kalbiyev and Seyfullali's (2024) contention that tax structures vary significantly across economic contexts and are shaped by historical, institutional, and political factors. The use of Welch's ANOVA was justified given the heterogeneity in variances, which ensures robustness when comparing countries with different fiscal architectures.

Post hoc tests provide specific insights. Zambia shows a significantly higher reliance on trade taxes than the other three countries. This is consistent with Yangailo (2024), who highlighted Zambia's reliance on trade taxes due to limited capacity to broaden the domestic tax base. In contrast, China, South Africa, and the United States have more diversified tax structures.

In terms of tax revenue as a percentage of GDP, South Africa is well ahead, indicating a more developed tax system. This supports Tarschys (1988) who characterized South Africa's tax system as relatively advanced among African countries. While Zambia ranks above China and

the United States, it still lags behind South Africa, suggesting potential for improvement in tax administration.

Zambia also imposes higher tariffs than the United States, although the differences with China and South Africa are not statistically significant. This reflects the protectionist stance documented by Mwale and Mulenga (2024), who argue that Zambia's industrial policy relies on tariff barriers to support infant industries. In contrast, the low tariffs of the United States reflect a commitment to open trade.

In terms of GDP growth, China outperforms the rest. This finding is consistent with Wen and Zhou (2022), who attribute China's strong growth to proactive fiscal policy, infrastructure investment, and export-oriented industrialization. Zambia's relatively better performance compared to South Africa and the United States may reflect its efforts to leverage commodity exports and public investment for growth.

5.1 – *Country-Specific Insights*

The regression analyses for each country provide deeper understanding of how fiscal policy instruments affect GDP growth in different contexts.

Zambia: The regression results show a strong positive relationship between trade taxes and GDP growth, confirming earlier conclusions by Daoudi (2023), who identified trade-based taxation as a pragmatic growth strategy in resource-exporting economies. However, the negative effect of domestic tax revenue on growth may reflect the economic drag imposed by high or inefficient tax burdens. The insignificance of tariff rates suggests that tariff policy plays a secondary role in Zambia compared to trade taxation.

China: In contrast to Zambia, China's GDP growth is positively driven by domestic tax revenue, with trade-related variables being statistically insignificant. This is consistent with the findings of Pastpipatkul and Ko (2025), who emphasize China's domestic tax reforms and efficient tax administration as key drivers of growth. It suggests that China's economic performance is less dependent on trade taxation and more influenced by effective domestic resource mobilization.

South Africa: The positive relationship between trade taxes and GDP growth in South Africa is consistent with the trends observed in Zambia, although the effect is less pronounced. This finding partially supports Hakimah (2025), who observed that South Africa's trade tax policy has historically played a dual role of revenue generation and industrial protection. The weak impact of domestic tax and tariff rates on growth may indicate limited fiscal space or structural challenges within the economy.

United States: The U.S. model provides the weakest fit, with only domestic tax revenue significantly predicting GDP growth. This is consistent with Afonso and Blanco-Arana (2025), who found that in advanced economies, broad tax bases and efficient tax systems contribute positively to macroeconomic stability. Trade-related variables do not show significant effects, reflecting the diversified U.S. economy and reduced reliance on external trade measures.

5.2 – *Cross-Country Comparison*

Across the four countries, the regression models reveal significant heterogeneity in the impact of fiscal policy on GDP growth. Tariff rates emerge as a common significant predictor,

particularly in developing economies, supporting Nguyen and Darsono's (2022) claim that tariff-based protection can be a short-term growth lever in less diversified economies. However, the impact of trade taxes and tax revenue varies. While trade taxes positively affect growth in Zambia and South Africa, they are insignificant in China and the United States, reflecting different trade structures and policy priorities.

Similarly, tax revenue boosts growth in China and the U.S. but hampers it in Zambia, highlighting the need for context-specific tax design. These divergent effects echo Vintilă et al. (2021), who emphasize that fiscal instruments must be tailored to each country's economic structure, administrative capacity, and development goals.

In a nutshell, this study reinforces some established findings while challenging others, highlighting that the impact of fiscal policy on growth is not universal, but highly context-dependent. This calls for tailored policy approaches, especially for developing countries seeking to optimize fiscal instruments for sustainable development.

5.3 – *Theoretical and Practical Implications*

5.3.1 – Theoretical Implications

This study adds to the growing body of literature emphasizing the context-dependent nature of fiscal policy and economic growth dynamics. Contrary to the assumptions of orthodox economic models that advocate universal policy prescriptions, the results reveal significant heterogeneity in how fiscal instruments-such as trade taxes, total tax revenues, and tariff rates-affect GDP growth across countries.

Fiscal policy heterogeneity and structural context: The study highlights that the impact of fiscal policy is shaped by structural and institutional contexts, including a country's level of industrialization, trade dependence, and revenue administration capacity. This lends credence to heterodox economic theories that advocate flexible, context-specific fiscal frameworks rather than one-size-fits-all solutions.

Trade taxes as development tools: The positive association between trade taxes and GDP growth in Zambia and South Africa challenges the classical and neoliberal aversion to trade taxation. In these contexts, trade taxes appear to serve as crucial development tools, supporting infant industries and revenue mobilization, reviving infant industry arguments and elements of endogenous growth theory.

Tax revenue and the growth paradox: The inverse relationship observed between total tax revenue (as a percentage of GDP) and GDP growth in countries such as Zambia highlights the well-documented tax-growth paradox. While taxation is essential to finance public goods, excessive or poorly structured tax burdens can crowd out private investment and consumption. In contrast, the positive impact of tax revenue on growth in China and the United States supports the notion that efficient, broad-based, and non-distortionary tax systems can underpin sustainable growth.

Tariff protection and strategic industrial policy: The results also contribute to the theoretical debate on strategic protectionism. The moderate positive impact of tariffs on growth in developing countries, particularly Zambia, supports arguments for protective industrial policies, where targeted tariffs can nurture emerging sectors until they achieve global competitiveness.

5.3.2 – Practical Implications

The findings provide several actionable insights for policymakers, highlighting the need for fiscal adaptability, efficiency, and alignment with national development goals.

Contextualize fiscal policy design: Policymakers need to design fiscal frameworks that are tailored to their country's unique structural characteristics. Trade-dependent economies such as Zambia and South Africa may benefit from optimizing trade taxation in the short to medium term, while more diversified economies such as China and the United States should prioritize efficient domestic tax systems.

Revenue mobilization without growth retardation: Countries facing growth constraints under high tax burdens (e.g., Zambia) should focus on improving tax efficiency-such as broadening the base, reducing evasion, and increasing progressivity-rather than raising tax rates. Streamlining tax systems can minimize economic distortions while preserving revenue.

Strategic use of trade taxes: The role of trade taxes as transitional instruments is clear. While they can support fiscal stability and industrial development, prolonged reliance risks long-term inefficiencies and reduced global competitiveness. Gradual liberalization, complemented by domestic capacity building, offers a balanced way forward.

Revenue diversification and resilience: Over-reliance on a narrow range of fiscal instruments, especially trade taxes, increases vulnerability to external shocks. A broader revenue base-including value-added taxes, property taxes, and resource-related revenues-can enhance fiscal resilience and sustainability.

5.4 – *Country-Specific Policy Recommendations*

In *Zambia*, a strategic approach to trade tax optimization remains essential. The country should continue to use trade taxes to support key industries, while gradually reducing reliance on these taxes as domestic revenue systems are strengthened. Domestic tax reform is equally important; simplifying and restructuring both personal and corporate taxes will help minimize economic distortions and encourage greater investment. A coherent tariff policy should be maintained, with moderate, sector-specific tariffs consistent with Zambia's industrial policy objectives. Diversification is needed to further strengthen revenue resilience. This can be achieved by reforming the VAT and property tax systems to reduce over-reliance on volatile trade taxes. Institutional strengthening is also crucial. Strengthening the capacity of the tax administration will improve compliance and reduce inefficiencies within the system.

In *China*, tax efficiency remains a key focus. The government should continue to refine income and corporate tax structures to better support innovation, infrastructure development, and the growth of the domestic market. Moderate trade policies are also important; China should maintain a balanced approach by selectively reducing tariffs while continuing to protect strategic sectors. In addition, the country's long-term growth strategy should continue to shift toward stimulating domestic consumption and improving overall productivity.

For *South Africa*, the trade tax strategy plays an important role in broader export promotion efforts. The government should maintain trade taxes, but work to improve the efficiency of tax collection and better target specific sectors. It is also important to address existing tax disincentives, particularly the tax burden on small and medium-sized enterprises. To ensure

sustainable economic growth, the country needs to broaden its growth drivers by investing in innovation, infrastructure, and industrial diversification, thereby reducing reliance on trade-related revenues.

In the *United States*, improving tax progressivity is essential to promote equitable and sustainable economic growth. Reforms should aim to ensure a fair tax burden without jeopardizing fiscal stability. The U.S. should also continue to limit trade taxation, maintain its liberal trade regime, and avoid interventions that provide minimal economic benefit. Finally, tax policy stability is critical to attracting long-term investment. Tax strategies should support both domestic productivity and innovation to ensure a robust and competitive economic environment.

5 – Conclusion

The purpose of this study was to examine the complex relationships between key fiscal policy instruments - international trade taxes, domestic tax revenues, and applied tariff rates and GDP growth in four different economies: Zambia, South Africa, China, and the United States.

The results show that fiscal policy does not operate in a vacuum; its impact on growth is shaped by each country's economic structure, institutional capacity, and political priorities. In Zambia and South Africa, taxes on international trade were positively associated with GDP growth, highlighting the continued importance of trade-based revenues in some developing economies. However, this dependence also suggests vulnerability to external trade shocks and the need for more resilient revenue systems. In contrast, trade taxes had little impact on growth in China and the United States, underscoring the benefits of diversified and efficient tax systems.

Domestic tax revenue had a mixed impact in the four countries. While it supported growth in China and the United States - where robust tax administration and effective public spending enhance the developmental impact of taxation - it was negatively correlated with growth in Zambia. This suggests inefficiencies and potential distortionary effects in Zambia's tax system that could hinder rather than support economic expansion.

Applied tariff rates had a moderately positive effect on growth in developing countries, reflecting the potential of strategic protectionism to promote local industries. However, the broader effects of tariffs remain mixed and require further research, particularly in light of the long-term trade-offs between short-term industrial protection and long-term competitiveness.

This study contributes to the tariff policy discourse both empirically and theoretically. Empirically, it provides comparative, country-specific insights supported by robust statistical analysis. Theoretically, it strengthens heterodox economic perspectives by showing that the effectiveness of fiscal policy is highly context-dependent, challenging universal prescriptions and emphasizing the importance of tailoring policy strategies to institutional realities and development goals.

For policymakers, the study recommends that developing countries such as Zambia and South Africa optimize trade taxes while investing in strengthening domestic tax systems to improve efficiency, equity, and sustainability. Over time, reducing reliance on tariffs can improve global competitiveness. For advanced economies such as China and the United States, maintaining progressive tax systems and effective governance remains critical to fostering innovation and economic stability, while avoiding excessive trade interventions that may have limited growth benefits.

Future research should expand the country sample to include more emerging and frontier markets, and incorporate nonlinear and dynamic panel models to capture complex, time-varying relationships. Sectoral analysis can also reveal how fiscal instruments affect different parts of the economy, allowing for more targeted policy recommendations.

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