Does Double Taxation Agreement Promote More FDI ? Evidence from a New Database

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Abstract

Double Taxation Agreements (DTAs) are intended to reduce fiscal barriers to cross-border investment. Yet, their effectiveness in promoting foreign direct investment (FDI) and supporting domestic revenue mobilization remains contested. This paper leverages the newly released Tax Treaties Explorer dataset to examine the impact of tax treaties, distinguishing between those aligned with the OECD versus the UN Model. Using staggered Difference-in-Differences methods and dynamic treatment estimators, we analyze treaty effects on FDI and tax revenue outcomes across developing countries. Our findings suggest that while UN-aligned treaties may theoretically favor source countries, their effectiveness hinges on governance quality and enforcement capacity. The study informs the policy debate on optimal treaty design, balancing investment incentives with fiscal sustainability.

Introduction

Taxation remains the primary instrument for financing government activities. Whereas many developing countries have historically relied on international trade taxes, advanced economies place heavier emphasis on income taxes (Figure 13). In many developing countries, however, the share of revenue derived from international trade has declined markedly over time (Figure 20), largely due to trade liberalization and the proliferation of trade agreements. Tax treaties constitute an additional factor influencing domestic revenue mobilization, especially given their potential to erode the tax base in developing economies. Although these treaties aim to prevent double taxation and promote foreign direct investment (FDI), they often raise concerns about possible revenue losses. Hamada (1966) presents one of the earliest theoretical frameworks illustrating how tax treaties can enhance FDI by mitigating double taxation and reducing investment uncertainty, yet they may also compromise the tax revenues of source countries.

Double Taxation Avoidance Agreements (DTAs) are typically adopted to eliminate duplicate taxation and promote cross-border investments, and they are frequently deployed as policy tools to attract foreign capital and enhance economic stability. These agreements can boost technology transfer, skills development, and broader economic growth, albeit at the possible cost of reduced tax revenues. Empirical findings on the effectiveness of DTAs remain mixed. Some studies highlight a positive association between these treaties and FDI flows, while others posit minimal or even adverse outcomes, pointing to the complexity developing countries face in fully capitalizing on treaty provisions.

Several works, including Blonigen and Davies (2004), Blonigen and Davies (2005), Neumayer and Spess (2005), and Barthel et al. (2010), suggest that bilateral tax treaties can foster favorable tax environments, enhance investor confidence, and lead to greater inflows of FDI. More recently, Egger and Merlo (2012) finds that while tax treaties may initially stimulate investment, the long-term effect on sustained investment growth is less definitive. Conversely, a burgeoning body of research focuses on the detrimental outcomes of DTAs in relation to profit shifting and tax base erosion. Crivelli et al. (2016) provides evidence that multinational firms exploit treaty structures to report profits in lower-tax jurisdictions, resulting in significant revenue shortfalls for developing countries. Cobham and Janský (2017) estimates worldwide corporate tax avoidance losses at approximately $500 billion annually, with low-income countries disproportionately affected. Johannesen et al. (2020) and Millán-Narotzky et al. (2021) similarly argue that tax treaties can entrench advantages for multinational enterprises, diminishing tax revenues and draining foreign exchange reserves in developing economies. KINDA and Tagem (2024) finds that resource-rich nations with extensive treaty networks face especially pronounced revenue losses, as treaty shopping and profit-shifting amplify the challenges inherent in mobilizing domestic resources (see also van 't Riet and Lejour (2018) and van't Riet and Lejour (2020)).

A salient debate concerns whether developing countries benefit more from tax treaties aligned with the OECD Model, which favors residence-based taxation, or from the UN Model, which allo-

cates greater taxing authority to source countries. The literature generally indicates that residence-based taxation leads to revenue losses for developing countries, whereas the UN Model provides a more equitable distribution of taxing rights. Nevertheless, no study to date has explicitly tested whether the UN Model indeed yields superior revenue outcomes. Recent trends in treaty drafting suggest a shift toward UN-like provisions (Figure 11), warranting an empirical comparison against the more traditional, OECD-oriented framework.

In this paper, we investigate whether increased source-country taxing rights under UN-aligned tax treaties enhance domestic revenue mobilization in developing countries. We hypothesize that although the UN Model is theoretically better suited to preserve source-country revenues, institutional weaknesses and corruption may impede its real-world efficacy. Weak enforcement capacity within tax administrations and corruption can facilitate tax evasion, negating potential gains from treaties that ostensibly grant broader taxing rights to source countries.

Our analysis leverages the comprehensive **Tax Treaties Explorer dataset** Hearson et al. (2021), which compiles detailed information on global tax treaty networks. This recently released database affords a more granular exploration of the complex interplay between treaty provisions, institutional quality, and revenue outcomes than was previously feasible. Specifically, we investigate how UN-like treaties compare to OECD-based agreements and examine how corruption and enforcement capacity mediate these relationships across South-South and North-South partnerships. The results aim to guide policymakers in identifying treaty provisions and administrative reforms that fortify domestic revenue mobilization while maintaining an attractive environment for foreign investment.

First, we will examine the relationship between tax treaties and foreign direct investment (FDI). In line with the broader question of domestic revenue mobilization, we will assess whether tax treaties effectively promote FDI and whether their impact varies across different treaty models. Specifically, we will investigate whether North-South agreements or treaties modeled after the OECD or UN frameworks are more conducive to attracting foreign investment. Subsequently, we will analyze the direct impact of tax treaties on domestic revenue mobilization, considering how treaty design influences fiscal outcomes in developing economies. By disentangling these dual effects—on FDI and tax revenues—our study seeks to provide a comprehensive understanding of the trade-offs inherent in international tax treaty negotiations.

Data and Empirical Strategies

To conduct our analysis, we draw upon the newly available Tax Treaties Explorer, curated by the International Centre for Tax and Development (ICTD). This database, released in 2021, provides comprehensive and up-to-date information on international tax treaties, including agreements signed before March 15, 2023, as well as MLI positions updated to February 29, 2024. Developed in collaboration with the World Bank and the G-24, it offers unprecedented detail on treaty content, such as the distribution of taxing rights, definitions of permanent establishment (PE), withholding tax (WHT) rates, and specific anti-abuse clauses.

Table 1 presents the main variables available in the Tax Treaties Explorer, illustrating how different treaty clauses address core provisions—ranging from the scope of business profits to dividend taxation rules and anti-abuse measures. This resource permits a level of cross-treaty comparison and analysis that was infeasible with previously fragmented data sources.

TABLE 1 – Description of Variables in the Tax Treaties Dataset

Variable	Description
Type of Treaty	Specifies the type of treaty, such as Original, Pre-independence, Amended by Protocol/MLI, or Multilateral.
Treaty Status	Indicates the status of the treaty : In force, Terminated, Superseded, or Not in force.
Art. 5 (Permanent Establishment - PE)	Defines conditions for establishing a PE, including thresholds for construction/service duration and the roles of agents or brokers.
Art. 7 (Business Profits)	Specifies taxation rules for profits from a PE, including limited force of attraction and deductibility of head office payments.
Art. 8(2) (Shipping)	Determines whether profits from shipping activities may be taxed by the country of source.
Art. 10 (Dividends)	Defines WHT rates for dividends, distinguishing between qualifying and portfolio dividends, as well as thresholds for reduced rates.
Art. 11 (Interest)	Specifies WHT rates on interest payments, including general rates and those specific to financial institutions.
Art. 12 (Royalties)	Defines WHT rates for royalties, including general royalties, copyright payments, and payments for the use of equipment.
Art. 12A (Technical Services)	Specifies WHT rates for fees related to technical, managerial, or consultancy services.
Art. 13 (Capital Gains)	Addresses taxation of capital gains, such as gains from land-rich companies and other types of shares.
Art. 29 (Anti-Abuse Rules)	Details anti-abuse provisions, such as Limitation on Benefits (LOB) and Principal Purpose Test (PPT).

While the Tax Treaties Explorer underpins our principal measure of treaty provisions, we supplement it with macroeconomic and country-level governance indicators (Table 2). FDI inflows come from UNCTAD, tax revenue measures originate from UNU-WIDER, and institutional variables (including corruption indexes) derive from established sources like the World Bank's Worldwide Governance Indicators.

TABLE 2 – Data Sources of Principal Variables

Variables	Description	Source
FDI Inflows	Amount of foreign direct investment a country receives per year.	UNCTAD
Tax Revenue	Total tax revenue as a percentage of GDP.	UNU-WIDER
Inflation Rate	Annual percentage change in the consumer price index.	IMF
Interest Rates	Annual central bank policy interest rates.	IMF
Exchange Rate Stability	Annual measure of exchange rate variability.	BIS
Tax Treaty Network	Number, type, and specific WHT rates within a country's set of treaties.	Tax Treaties Explorer
GDP Growth	Annual GDP growth rate in percentages.	World Bank
Trade Data	Annual trade flows, including sector-specific volume.	UN Comtrade

To identify the causal impact of tax treaties on revenue and FDI outcomes, we employ advanced Difference-in-Differences (DiD) estimators that accommodate treatment heterogeneity, staggered adoption, and dynamic effects. Specifically, we draw on the methodological contributions of Callaway and Sant'Anna (2021) and De Chaisemartin and d'Haultfoeuille (2024), which address the limitations of traditional two-way fixed effects (TWFE) approaches.

A critical aspect of our research is the staggered adoption of tax treaties across countries and over time. Countries sign these treaties at different points due to varying economic, institutional, and political conditions. Traditional TWFE models are biased in this setting due to their reliance on implicit weighting schemes, which can lead to negative weights and incorrect aggregation of treatment effects. To overcome these challenges, we adopt the Callaway and Sant'Anna (2021) framework, which provides a robust and flexible approach for estimating treatment effects in staggered adoption settings.

The Callaway and Sant'Anna (2021) methodology estimates group-time average treatment effects (ATTs), enabling a granular understanding of the heterogeneity in treatment effects across countries and over time. This approach is particularly suited to our study as it allows us to capture how the impacts of tax treaties evolve over time, accounting for both immediate and delayed effects on revenue mobilization and FDI inflows. By carefully selecting control groups that have not yet adopted treaties, the methodology isolates the causal effects of treaty adoption from confounding global or regional economic trends. Formally, the group-time ATT for a country g at time t is expressed as :

$$\widehat{ATT}_{g,t} = \frac{1}{N_{g,t}} \sum_{i \in G_g} \left(Y_{it} - \frac{1}{|\mathcal{C}(g,t)|} \sum_{j \in \mathcal{C}(g,t)} Y_{jt} \right),$$

where G_g represents the set of countries that adopt a tax treaty at time g, $\mathcal{C}(g,t)$ denotes the control units at time t, Y_{it} and Y_{jt} are observed outcomes for treated and control units, respectively, and $N_{g,t}$ is the number of treated observations for group g at time t. This specification allows for a detailed analysis of the temporal and cross-sectional variation in treatment effects.

In addition to evaluating binary treatment, we also examine the intensity of treaty provisions, specifically the degree of alignment with the UN Model versus the OECD Model. This requires handling non-binary treatments and cumulative effects over time. For this purpose, we employ the framework of De Chaisemartin and d'Haultfoeuille (2024) , which accommodates treatments that vary in intensity and captures lagged effects. Unlike traditional DiD methods, this approach models dynamic treatment effects, assessing how treaty provisions influence revenue mobilization and FDI over several years. It avoids biases arising from treatment heterogeneity and provides a robust framework for analyzing the incremental impact of stronger source-country taxing rights.

The dynamic effect of a treaty provision after ℓ periods can be estimated as :

$$\widehat{\delta}_{g,\ell} = E\left[Y_{g,t+\ell}(D_{g,t+\ell}) - Y_{g,t+\ell}(D_{g,1}) \right],$$

where $D_{g,t+\ell}$ represents the treatment intensity at time $t + \ell$ and $D_{g,1}$ is the baseline treatment intensity. This allows us to disentangle the short-term and long-term impacts of treaty provisions, providing insights into the persistence of effects.

Our analysis integrates these two methodologies to address complementary dimensions of the

research question. The Callaway and Sant'Anna (2021) framework is used to estimate the causal effects of treaty adoption, accounting for staggered implementation and treatment heterogeneity. The De Chaisemartin and d'Haultfoeuille (2024) approach is applied to analyze the impact of treaty intensity, capturing cumulative and lagged effects of specific provisions. Together, these methods ensure that the analysis is robust to staggered adoption, dynamic impacts, and treatment heterogeneity.

In our baseline specification, we consider tax revenue as a percentage of GDP and net FDI inflows as outcome variables. The treatment variables include a binary indicator for treaty adoption and a continuous measure of treaty intensity reflecting alignment with the UN or OECD Models. The model incorporates country fixed effects to control for time-invariant unobserved heterogeneity and time fixed effects to account for common shocks. Additionally, we include country-level macroeconomic and governance indicators, such as GDP growth, inflation, corruption index, and trade openness, as control variables. The baseline regression for binary treatment is given by :

$$Y_{g,t} = \gamma_g + \lambda_t + \beta_1 D_{g,t} + \epsilon_{g,t},$$

while the specification for non-binary and dynamic treatment effects is :

$$Y_{g,t} = \gamma_g + \lambda_t + \beta_1 T_{g,t} + \beta_2 T_{g,t-\ell} + \epsilon_{g,t},$$

where $T_{g,t}$ represents the intensity of the treaty provisions and $T_{g,t-\ell}$ captures the lagged effects.

This dual approach offers a comprehensive understanding of how tax treaties influence domestic revenue mobilization and FDI inflows, providing insights into the efficacy of different treaty provisions in the context of developing countries.

TABLE 3 – Percentage Distribution of Treaty Types

Treaty Type	Percentage (%)
Original	58.13
Amended by MLI	24.41
Amended by Protocol	9.10
Pre-independence	8.18
Multilateral	0.18

TABLE 4 – Percentage Distribution of Treaty Status

Treaty Status	Percentage (%)
In Force	50.19
Superseded	22.29
Not In Force	18.02
Terminated	9.49

TABLE 5 – Statistical Test Summary

Test	Statistic	p-value
ANOVA	F=5.66	0.0007
Kruskal-Wallis	χ^2=19.67	0.0002
Pearson Correlation	r=0.125	<0.001
Spearman Correlation	ρ=0.118	<0.001

TABLE 6 – Regression Coefficients (Reference : High Treaty Count)

Category	Coefficient	p-value
Low (1-5)	-1.37	0.188
Moderate (6-10)	0.20	0.853
Very High (>20)	-0.13	0.919
Constant	22.09	<0.001

Interpretation Paragraph

The analysis reveals statistically significant but economically modest associations between tax treaties and FDI flows. While both parametric (ANOVA) and non-parametric (Kruskal-Wallis) tests indicate significant group differences (p<0.001), the regression model explains only 1% of FDI variance (R^2=0.0099). The categorical analysis shows no significant differences between treaty count categories, with all coefficients being statistically insignificant (p>0.05) when compared to the high treaty count reference group. The weak positive correlations (Pearson r=0.125, Spearman =0.118) suggest that while treaty counts and FDI are related, the effect size is small. These results imply that tax treaties alone have limited explanatory power for FDI patterns, potentially acting as one of many factors in investment decisions. The concentration of observations in the low treaty category (96% of sample) may limit detection of threshold effects, suggesting need for complementary analyses with additional economic variables.

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TABLE 7 – One-way ANOVA Results

Source	F-statistic	p-value	R-squared
Treaty Categories	4.51	0.0037	0.0082

TABLE 8 – Regression Coefficients

Category	Coefficient	Std. Error	p-value
Low (1-5)	-1.216	0.925	0.189
Moderate (6-10)	0.144	1.032	0.889
Very High (>20)	0.667	1.335	0.617
Constant	21.959***	0.921	0.000

TABLE 9 – Correlation Matrix

	Pearson	Spearman
log(FDI)-log(Treaties)	0.122***	0.103***

The analysis reveals statistically significant group differences in FDI flows across treaty categories (ANOVA p=0.0037, Kruskal-Wallis p=0.0004), though the regression coefficients for individual categories lack significance, suggesting non-linear or threshold effects. The "High (11-20 treaties)" reference category shows the highest mean FDI (21.96 log units). Both Pearson (r=0.122) and Spearman (=0.103) correlations indicate weak but statistically significant positive relationships (p<0.001) between tax treaty counts and FDI flows. The low R-squared (0.8%) implies treaties explain minimal FDI variation, highlighting the need to control for economic size, geographic factors, and institutional quality in future models. The robust regression results confirm these patterns persist after addressing heteroskedasticity concerns.
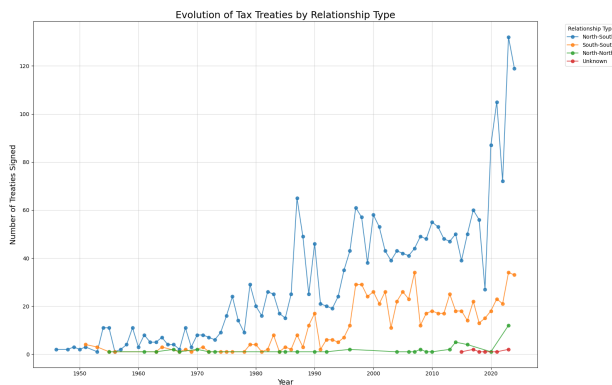
FIGURE 1 – Evolution of Tax Treaties by Relationship Type. This graph highlights trends in North-South, South-South, North-North, and Unknown treaty relationships over time.
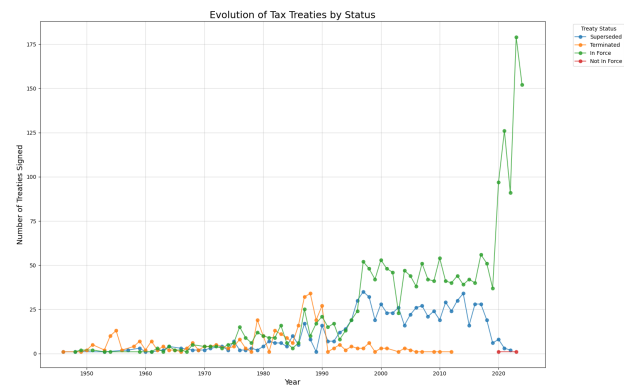
FIGURE 2 – Evolution of Tax Treaties by Status. This graph shows trends in treaty statuses such as In Force, Superseded, Terminated, and Not In Force.
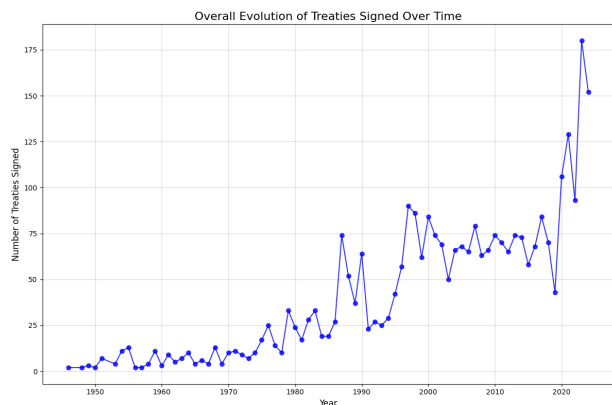
FIGURE 3 – Overall Evolution of Treaties Signed Over Time. This graph represents the total number of treaties signed annually.
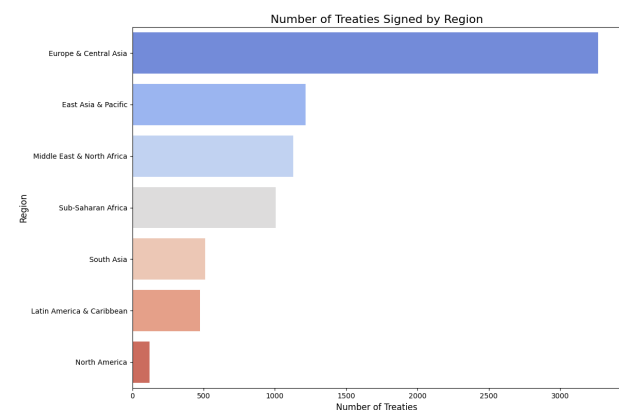
FIGURE 4 – Number of Treaties Signed by Region. Treaty counts for regions such as Europe Central Asia, East Asia Pacific, and others.
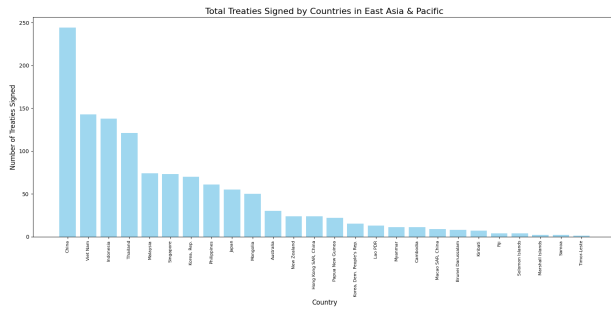
FIGURE 5 – Treaties Signed in East Asia Pacific.
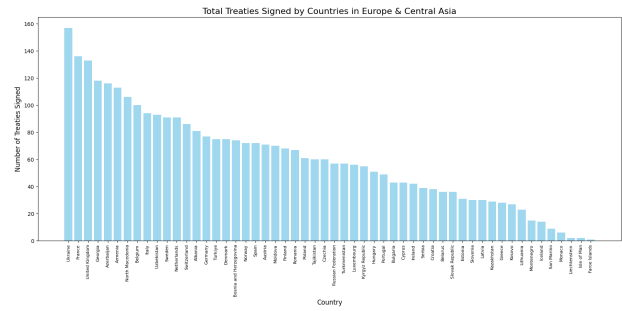Total treaties signed by countries in this region.

FIGURE 6 – Treaties Signed in Europe Central Asia.
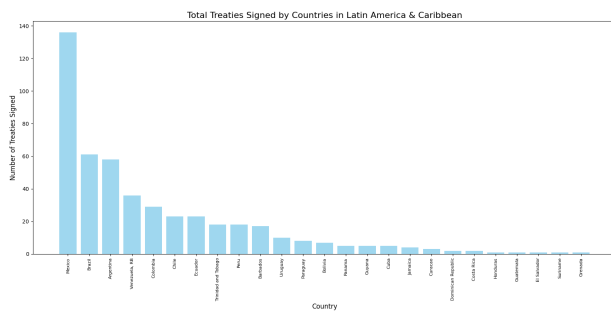Total treaties signed by countries in this region.

FIGURE 7 – Treaties Signed in Latin America Caribbean.
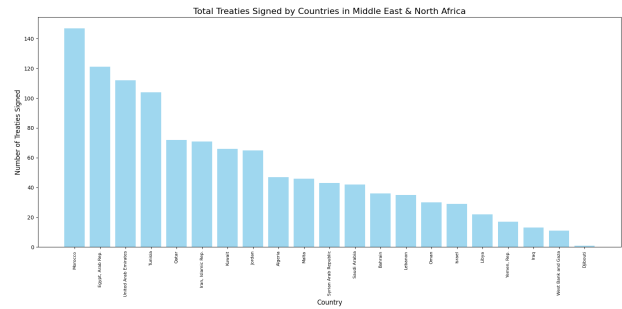Total treaties signed by countries in this region.

FIGURE 8 – Treaties Signed in the Middle East North Africa.
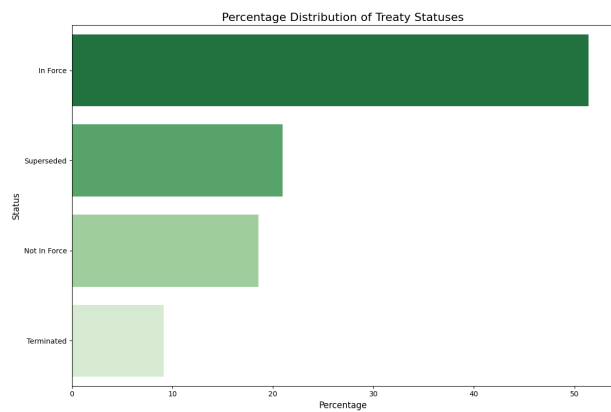Total treaties signed by countries in this region.

FIGURE 9 – Percentage Distribution of Treaty Statuses.
In force, superseded, terminated, or not in force.
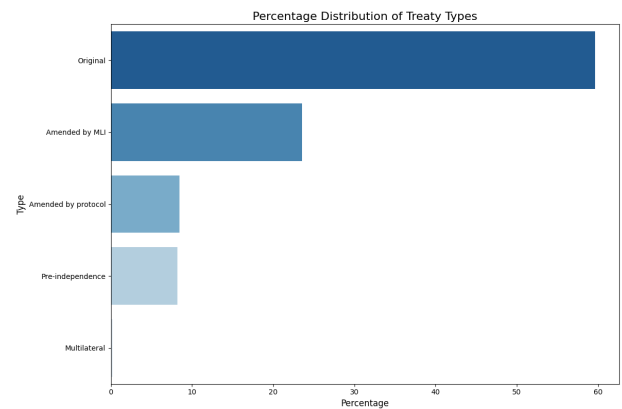
FIGURE 10 – Percentage Distribution of Treaty Types.
Highlights treaty types such as amended, multilateral, and others.

Global Evolution of un_index Across Regions

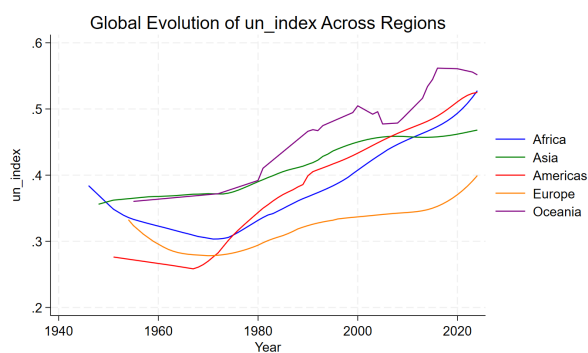
Global Evolution of whtrates Across Regions

FIGURE 11 – Global Evolution of "UN Index" Across Regions. Note : The "UN Index" measures alignment with the UN Model Tax Convention. This graph depicts its evolution across regions from 1940 to 2020.
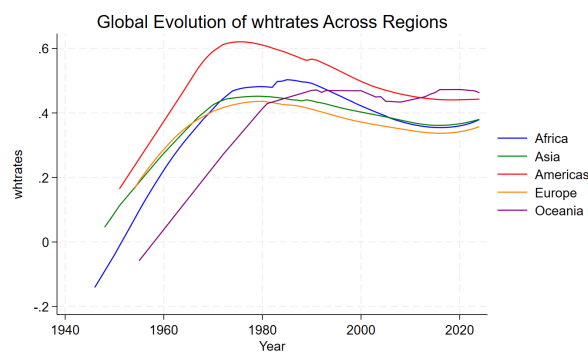
FIGURE 12 – Global Evolution of Withholding Tax Rates Across Regions. Note : This graph presents the trends in withholding tax rates across Africa, Asia, Americas, Europe, and Oceania from 1940 to 2020, showing variations in rates over time.

Direct Taxes by Region
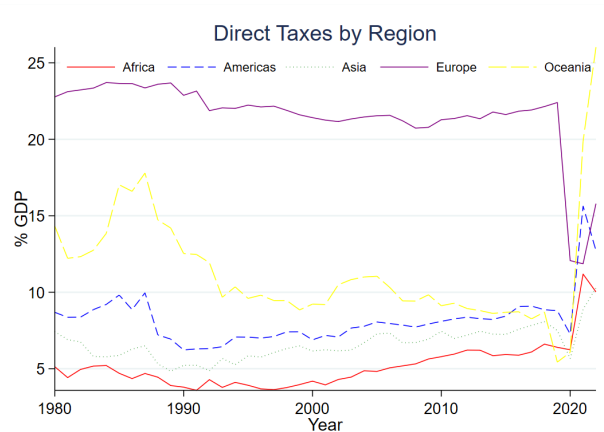

Indirect Taxes by Region

FIGURE 13 – Direct Taxes by Region (% GDP). This graph illustrates the trends in direct taxes (as a percentage of GDP) across Africa, Asia, the Americas, Europe, and Oceania from 1980 to 2020. Direct taxes include income taxes, corporate taxes, and other levies directly linked to earnings.
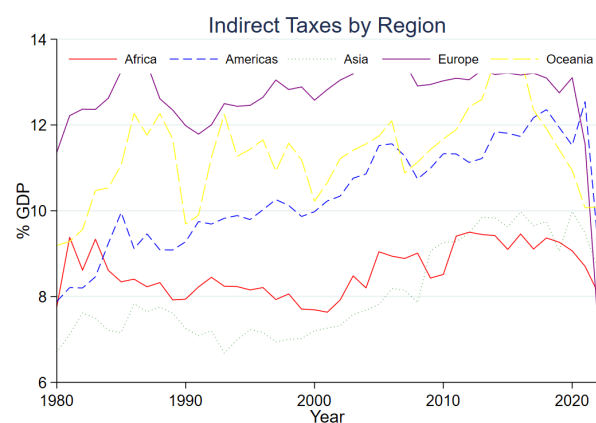
FIGURE 14 – Indirect Taxes by Region (% GDP). This graph shows the evolution of indirect taxes, including VAT and other consumption taxes, across regions from 1980 to 2020.

Property Taxes by Region

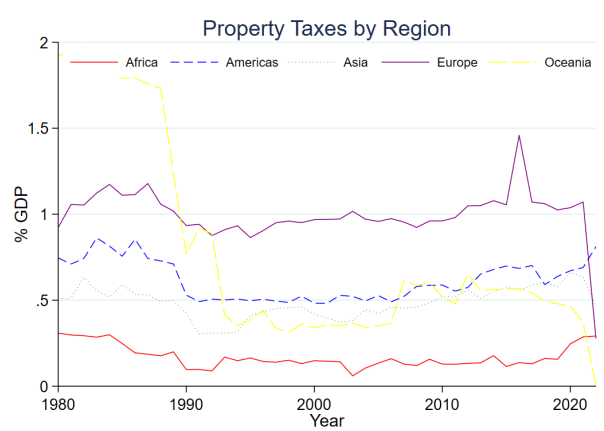Taxes on Goods and Services (VAT) by Region

FIGURE 15 – Property Taxes by Region (% GDP). This graph displays property tax revenues as a percentage of GDP across Africa, Asia, the Americas, Europe, and Oceania. The trends highlight the relatively low reliance on property taxes in most regions.
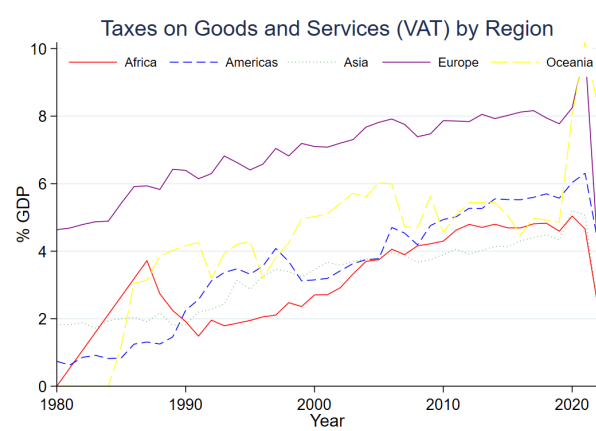
FIGURE 16 – Taxes on Goods and Services (VAT) by Region (% GDP). This graph tracks VAT and other taxes on goods and services as a percentage of GDP across regions, emphasizing differences in consumption tax structures between 1980 and 2020.
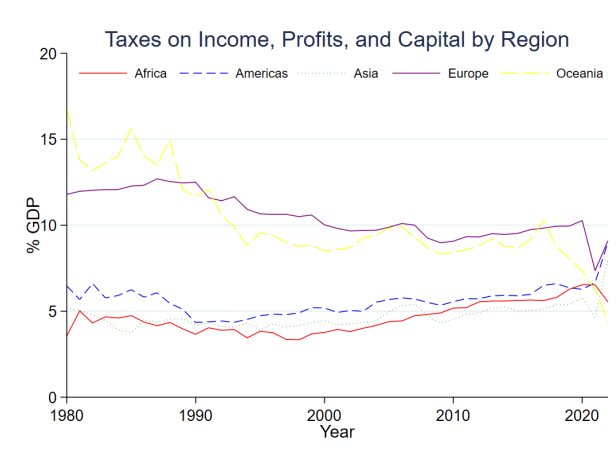
FIGURE 17 – Taxes on Income, Profits, and Capital by Region (% GDP). This graph shows the evolution of taxes on income, corporate profits, and capital gains across different regions over four decades. It highlights the relative importance of these taxes in developed versus developing regions.

FIGURE 18 – Taxes on International Trade (Imports) by Region (% GDP). This graph focuses on taxes imposed on imports across regions, showcasing their relative importance as a source of government revenue from 1980 to 2020.

FIGURE 19 – Taxes on International Trade (Exports) by Region (% GDP). This graph tracks the evolution of export taxes across different regions, highlighting the declining reliance on these taxes globally.
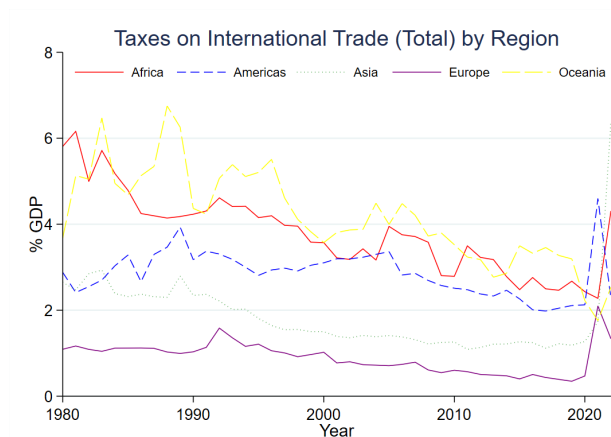

FIGURE 20 – Taxes on International Trade (Total) by Region (% GDP). This graph aggregates the total tax revenue from international trade (imports and exports) across regions from 1980 to 2020.

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