

## GLOBAL ECONOMIC GOVERNANCE INITIATIVE



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# The Fiscal Impacts of Trade and Investment Treaties

DEVIKA DUTT AND KEVIN P. GALLAGHER

## ABSTRACT

Building on previous work, this paper examines the extent to which the latest wave of trade and investment treaties have impacted the fiscal stability of the world's nations. By definition, trade liberalization reduces the amount of tariff revenue, which is a non-trivial component of the fiscal balance of many developing countries. We confirm this to be the case, but contrary to the assumptions in standard trade models, trade liberalization does not appear to be correlated with an automatic compensation for lost tariff revenue through other taxation measures. In fact, we find numerous situations where trade and investment treaties are correlated with a reduction in total fiscal revenues and an increase in government debt. These results suggest that analysts and policy-makers alike need to take the fiscal impacts of trade and investment liberalization into better account when making decisions about trade and investment policy.

## INTRODUCTION

There is a renewed global push to mobilize resources to meet glaring global infrastructure gaps, the Sustainable Development Goals, the commitments under the Paris Climate Agreement, and to generally improve standards of living. A core component of such resource mobilization will be the generation of domestic resources through domestic taxation. Whereas external taxes, or tariffs, form a miniscule share of public revenue in industrialized countries, tariffs can be the largest source of public revenue in large parts of the developing world. But of course, trade liberalization by definition reduces those tariffs—with the hope that liberalization will trigger new levels of efficiency that will bring productivity benefits that can support a broader domestic tax base. *Ex-ante* studies that estimate gains from trade liberalization do not typically examine its impact

on the fiscal stability of governments and/or assume that any revenue losses can be made up by the imposition of other forms of domestic taxation.

A significant literature arose after the establishment of the World Trade Organization (WTO) to examine the fiscal impacts of the Uruguay Round negotiations and the subsequent establishment of the WTO. That literature consistently showed that low-income countries suffered significant declines in trade tax and total tax revenue as a result of trade liberalization, whereas the impacts on higher and middle income countries were more mixed. Since the WTO's inception over 25 years ago, however, over 2000 regional and bilateral trade and investment treaties, as well as unilateral tariff cuts have been put in place. This wave of global trade and investment liberalization has yet to be analyzed. Building on previous work, this paper examines the fiscal impacts of this second wave of trade and investment liberalization across the global economy.

We build on the previous literature to examine the more recent wave of trade and investment liberalization in a number of ways. First, we expand the set of outcome or dependent variables analyzed in past studies. In addition to examining the impact of liberalization on tariff and total tax revenues, we examine the impact on government expenditure, fiscal balances, government debt, and debt service. Second, we expand the measures of trade liberalization beyond those used in previous studies. In addition to measuring liberalization by trade (exports + imports) as a percent of GDP, and calculating the effective tariff rate, both conventional measures of trade openness, we construct two new measures. One calculates the number of bilateral treaty links for each country, while the other measures how much a country acts as a “hub” between two or more other countries (“hub connectedness”).

Using these new measures of trade openness, we examine the relationship between tax revenue, government expenditure, and government debt. We find a few notable results.

**Table 1: Summary of Results: Relationship to Trade Openness**

	Total Sample	LICs	LMICs	UMICs	LDCs
Tariff Revenue	Decline	Higher Decline	No robust relation	Higher Decline	No robust relation
Goods and Services Tax Revenue	Some evidence of increase	No robust relation	Increase	No robust relation	Decline
Direct Tax Revenue	Mixed	Mixed	Increase	No robust relation	No robust relation
Total Tax Revenue	Mixed	Mixed	Increase	Decline	Decline
Total Expenditure	Some evidence of decrease	Higher Decline	No robust relation	Decline	No robust relation
Gross Operating Balance	Mixed	No robust relation	Some evidence of increase	Decline	Decline
Government Debt	Increase	Decline	No robust relation	Increase	Increase
Government Debt Service	Decline	No robust relation	Decline	No robust relation	No robust relation

Regardless of how we measure trade openness (number of bilateral treaty links or hub connectedness), trade liberalization is associated with a decrease in trade tax revenue. A one percent increase in trade as a share of GDP, for example, is associated with a 0.35-2.25 percent decline in trade tax revenue. Measured by effective tariff rate, a one percent increase in openness (a decrease in the effective tariff rate) is associated with 9.42-31.56 percent decline in trade tax revenue. A one percent increase in the number of bilateral treaty links is associated with a

0.11 – 0.20 percent decline in trade tax revenue, while a one percent increase in hub connectedness is associated with a 0.014 percent decline in the same. When we disaggregate the result by country group, we find that Upper-Middle Income Countries (UMICs) experienced the biggest decline in trade tax revenue.

On the other hand, there does not appear to be a robust relationship between the increase in trade liberalization and the revenue from other indirect taxes, like Value Added Taxes (VATs). This contradicts the general consensus in the literature on the fiscal revenue implications of trade liberalization, that any loss in trade tax revenue can be replaced by an increase in indirect taxation like VATs. However, Lower-Middle Income Countries (LMICs) have, on average, gained revenue from goods and services taxes, while goods and services tax revenue in Least Developed Countries (LDCs) has declined. Across countries groups, we do not find a robust relationship between trade liberalization and total tax revenue. However, when we disaggregate this result, we find that LMICs have recouped their trade tax losses, while UMICs and LDCs have not.

This trend continues as we look at other outcomes from trade liberalization. Often there is mixed or weak evidence of a relationship when looking at the total sample of countries, but when disaggregated, new patterns emerge. While we find some limited evidence of a decline in government expenditure due to trade liberalization, we find evidence of a higher decline in government expenditure in Low Income Countries (LICs) and UMICs. As regards government budget deficit, we find mixed results of the impact of trade liberalization over the whole sample, but government budget deficit clearly increases for UMICs and LDCs.

Notably, we find that trade liberalization is almost universally associated with an increase in government debt: a one percent decline in effective tariff rate (an increase in liberalization) is associated with a 0.91 percent increase in the public debt/GDP ratio, while a one percent increase in the number of bilateral treaty links is associated with a 0.04–0.16 percent increase in the same. Furthermore, the increase in debt in our model is negatively related to the per-capita GDP: this suggests that the increase in debt is higher in poorer countries. The increase in debt is specifically pronounced for UMICs and LDCs. However, somewhat counterintuitively, trade liberalization is not associated with higher debt *service*: in fact, an increase in hub connectedness is associated with a decline in debt service, especially in LMICs. These results are summarized in Table 1.

The rest of this paper is structured as follows: Section II reviews the discussion of the topic in the existing literature. Section III describes the data used in this study, its sources, and the descriptive statistics of these data. It also described the methodology used in this study to investigate our question. Section IV presents our results, while Section V discusses the implications of our study and concludes.

## LITERATURE REVIEW

A complete survey of the literature that examines the link between trade liberalization and fiscal stability can be found in Dutt, Gallagher, and Thrasher (2020). The findings of this study are summarized here. The literature can be categorized into theoretical and empirical literature.

In general, the theoretical literature on the effects of trade liberalization does not consider its impacts on government tax revenues, government expenditure, and government debt, and is primarily concerned with potential efficiency gains or changes in economic growth. Insofar as canonical Computable General Equilibrium or CGE models are used in the theoretical analyses of the impacts of trade liberalization, they are mostly silent on the impacts on tax revenues and government expenditures. If the government is considered in these models, it is typically

considered a passive agent that collects taxes and disburses subsidies as per a predefined rule of “budgetary balance” set out by the analyst (UNCTAD Virtual Institute, 2008). Therefore, while the technical details may vary, these models typically assume that the government budgetary balance or a key component thereof is fixed when considering the impacts of trade liberalization (Devarajan and Rodrik 1989, Konan and Maskus 1996, Hosoe 2001, Thurlow 2004, Taylor and Von Arnim, 2006). When CGE models do consider the impact of trade liberalization on government tax revenue, the theoretical literature finds that the budgetary balance is adversely affected. Significantly, Das (2014) and Tröster *et al.* (2019) explicitly include the government in their models and find, among other things, that government revenue and budget deficit are worsened in all scenarios of trade liberalization considered in these studies.

There is limited theoretical literature that directly examines the link between trade liberalization and fiscal stability. Some of this literature relies on the concept of the Laffer curve, which suggests that a reduction in a tax or tariff rate would initially be associated with an increase in the revenue from that tax or tariff, especially if the original rate of taxation is high enough to substantially discourage the activity being taxed (Ebrill, Stotsky and Gropp, 1999; Longoni, 2009). Therefore, this strand of literature argues that trade liberalization would be associated with an increase in tariff revenue, at least initially (Blinder 1981, Fullerton 1982, Mirowski 1982). However, several studies have questioned the theoretical and empirical validity of the concept of the Laffer curve, and it has largely fallen out of favor outside of the trade literature. On the other hand, Devarajan, Go and Li (1999), find that the effect of trade liberalization on tax revenue depends on the elasticities of substitution and transformation between foreign goods and domestic goods. They estimate these elasticities for 60 countries and find that the values are not nearly high enough for tax revenue to not be negatively affected by trade liberalization.

Therefore, insofar as the theoretical literature engages with the question of fiscal stability, it finds that trade liberalization is likely to lead to a decline in tariff revenue. The resultant policy advice is that trade liberalization should be accompanied by the imposition of an efficient VAT, the revenue from which can recoup lost tariff and other trade-related revenue. However, Emram and Stiglitz (2005) argue that this strategy is unlikely to work to make trade liberalization revenue neutral, especially in developing economies, due to the presence of a large informal sector, which is, by definition, outside the formal tax net.

The empirical literature that examines the relationship between tax mobilization and trade openness presents mixed results. Considering trade reform in 27 countries from 1980 to 1992, Ebrill, Stotsky, and Gropp (1999) find an overall increase in tariff revenue in some countries as a result of trade reform (liberalization) due to increased import volume. However, Keen and Mansour (2010) study trade liberalization in 40 African countries and show a decline in average collected tariff rate from 20 percent in 1980 to 13 percent in 2005, resulting in a 20–30 percent decline in trade tax revenue. Nevertheless, trade tax revenue continued to be a major source of tax revenue in many of these countries in 2005. These results are also consistent with those of Longoni (2009) who finds a decline in trade tax revenue in 53 African countries between 1970 and 2000 as a result of trade reform.

Does the literature find that this loss in tax revenue has been made up through other forms of taxation, so that the trade reform is revenue neutral? In general, the literature finds that whether a country is able to recoup lost tariff revenue through the imposition of VATs, or profit taxes depends on the level of income. By examining the trade liberalization in 117 countries from 1975 to 2006, Baunsgaard and Keen (2010) find that, while High Income Countries (HICs) have, on average, recovered the revenue lost from trade liberalization, this is not the case for

middle-income and low-income countries. They find that middle-income countries have only been able to recover 35 cents for each dollar lost in tariff revenue, and LICs recovered almost none of their lost revenue. Similarly, IMF research (2005) finds that, in LICs, total tax revenue has fallen with trade tax revenue between 1975 and 2000. This study also finds that some middle-income countries have been able to make up the lost revenue, while HICs actually increased their total tax revenue in this period. Others, however, have fared worse.

Khattry and Rao (2002) find a decline in total tax revenue in response to trade liberalization in LICs and UMICs in the period 1980–1998, but not in LMICs or in HICs. Cagé and Gadenne (2018) examine episodes of trade liberalization in 130 countries between 1792 and 2006, and find that, after 1970, trade liberalization has been accompanied by longer-lived declines in total tax revenue in modern developing countries as compared to modern rich countries. However, Keen and Mansour (2010) show that most of the 20 LICs in sub-Saharan Africa that lost trade tax revenue were able to recoup and even marginally increase their total tax revenue, with some notable exceptions.

The examination of the impact of trade liberalization on government expenditure and debt is far sparser, and also presents mixed results. Khattry (2003) examines the structures of government expenditure in 80 countries between 1970 and 1998, and how they are affected by trade reform. They find evidence of a “fiscal squeeze” in LICs in the form of declining tax revenues but increasing government expenditures. Specifically, they found governments to be unable to reduce politically sensitive expenditure, while tax revenue declined. This study also shows that in other country groups, governments have either had to reduce government expenditure or face declining tax revenue or both. Consequently, Zafar and Butt (2008) investigate the relationship between public debt and trade liberalization in Pakistan between 1972 and 2006, and find that trade liberalization has significantly added to Pakistan’s external debt burden.

The literature to date shows that the assumption made in standard trade models, that trade liberalization will be revenue neutral, does not hold. That literature largely covered the impact of WTO commitments and not the 2000+ trade and investment treaties signed since the WTO went into effect in 1994. This paper builds on the past literature in part by updating the research for these new treaty commitments. Moreover, we improve upon measures of trade liberalization, and examine not only tariff and total tax revenue, but sovereign debt as well.

## DATA AND METHODOLOGY

The methodology used in this paper to estimate the impact of trade openness on our dependent variables is as follows:

$$DV_{it} = \beta_{0i} + \beta_1 Openness_{it} + \beta_2 X_{it} + u_{it}$$

Here,  $DV$  is the dependent variable,  $Openness$  is the trade openness indicator,  $X$  is the vector of control variables mentioned above,  $u$  is the error term,  $i$  indexes the country, while  $t$  indexes the year. Deeper discussion and descriptive statistics can be found in the appendix. As noted earlier, we examine the effect of trade liberalization on a variety of fiscal indicators, creating and examining a variety of dependent variables related to a country’s fiscal stability. These include total tax revenue, trade tax revenue, goods and services tax revenue, direct tax revenue, government expenditure, gross operating balance, government debt, and government debt service. In all cases, the revenue, expenditure, balance, and debt of the central government is considered, and all variables are scaled by the GDP of the country. While we would have liked to consider the

fiscal stability of general government, that is, to include data from state and local governments as well, we have only considered data for the central government due to its greater availability.

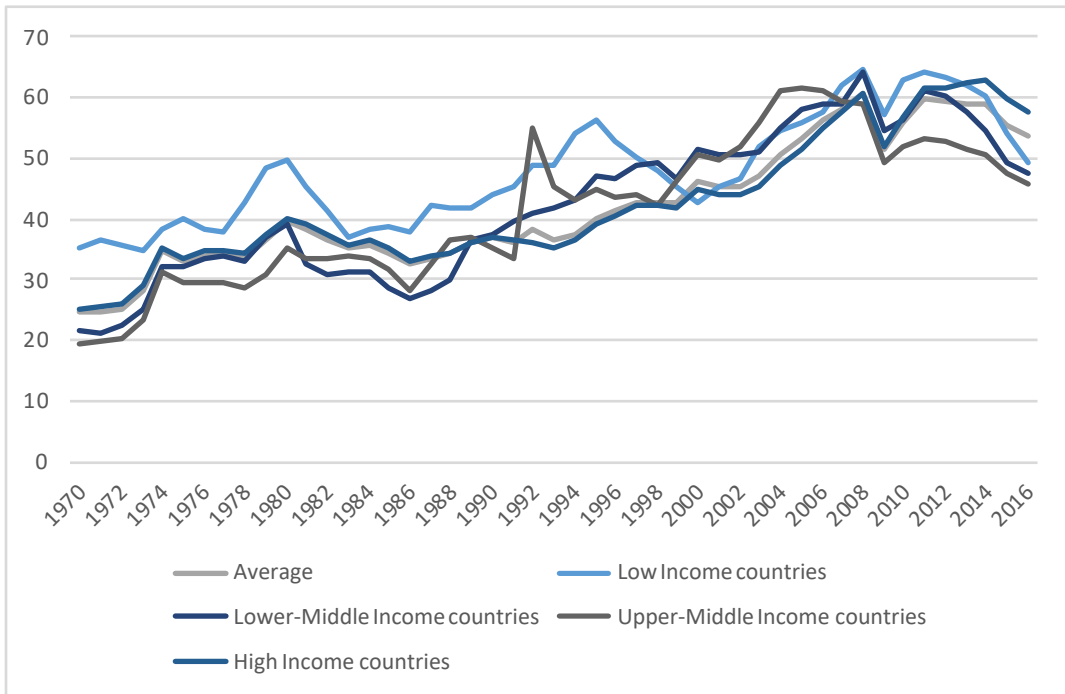
1. Total Tax Revenue: We examine whether total tax revenue is affected. As mentioned previously, this measure calculates whether the overall fiscal revenue is affected, for the central government. We obtained this data from the IMF Government Finance Statistics.
2. Trade Tax Revenue: This is one of the components of the total tax revenue of governments, and we examine the impact of trade liberalization on revenue from taxes on international trade. We obtained this data from the IMF Government Finance Statistics.
3. Goods and Services Tax Revenue: This is also one of the components of the total tax revenue of governments, and we examine the impact of trade liberalization on revenues from indirect taxes such as VATs. This is of interest in particular because the theoretical literature suggests that any decline in revenue from trade liberalization should be recovered through the imposition of indirect taxes like a VAT. We obtained this data from the IMF Government Finance Statistics.
4. Direct Tax Revenue: This is the final component of the total tax revenue that we consider. This includes revenue raised from the imposition of direct taxes like income taxes, corporate profit taxes, and capital gains taxes. We obtained this data from the IMF Government Finance Statistics.
5. Government Expenditure: Government expenditure is defined in the IMF Government Finance Statistics as the sum of government expenses, which is the decline in net worth of the government, and the net investment by the government in nonfinancial assets. This includes expenditure on economic affairs, social affairs, interest expenditure, and expenditure on environmental protection. Expenditure on economic affairs includes items such as administration of general economic and commercial affairs, regulation or support of general economic and commercial activities, and grants, loans, and subsidies to promote general economic and commercial policies and programs. Expenditure on social affairs is the sum of government expenditure on health, education, recreation, culture, religion, and social protection. We obtained this data from the IMF Government Finance Statistics.
6. Fiscal Balance: This measure is used in order to examine whether there is an overall effect on government budget deficit as a result of trade liberalization. In the IMF Government Finance Statistics, the closest measure of budget deficit is the Gross Operating Balance, which is defined as Revenue minus Expense, but the expense does not include the consumption of fixed capital. Therefore, our measure is a conservative measure of budget deficit.
7. Government Debt: This measures the total debt of the central government scaled by GDP. We obtained this data from the IMF Global Debt Database.
8. Debt Service: This variable examines another component of government expenditure, which is the interest payments on existing central government debt. This variable is also scaled by GDP.

## Explanatory Variables: Measures of Trade Openness

### TRADE AS A SHARE OF GDP

In the literature, trade openness is often measured by trade (exports + imports) as a share of GDP (Agbeyegbe et al, 2006; Baunsgaard and Keen, 2010; Combes and Saadi-Sedik, 2006). As is evident from Figure 1, using this measure, openness increases on average over time, and is, in general, higher for HICs as compared to LICs.

**Figure 1. Trade as a Share of GDP (%)**



Although the goal in much of the existing literature is to look at the impact of trade policies, trade as a share of GDP is not an indicator of trade policy, but of trade volumes (Rodriguez and Rodrik, 2001). Furthermore, this index also systematically underestimates the trade openness of large economies such as the US and UK.

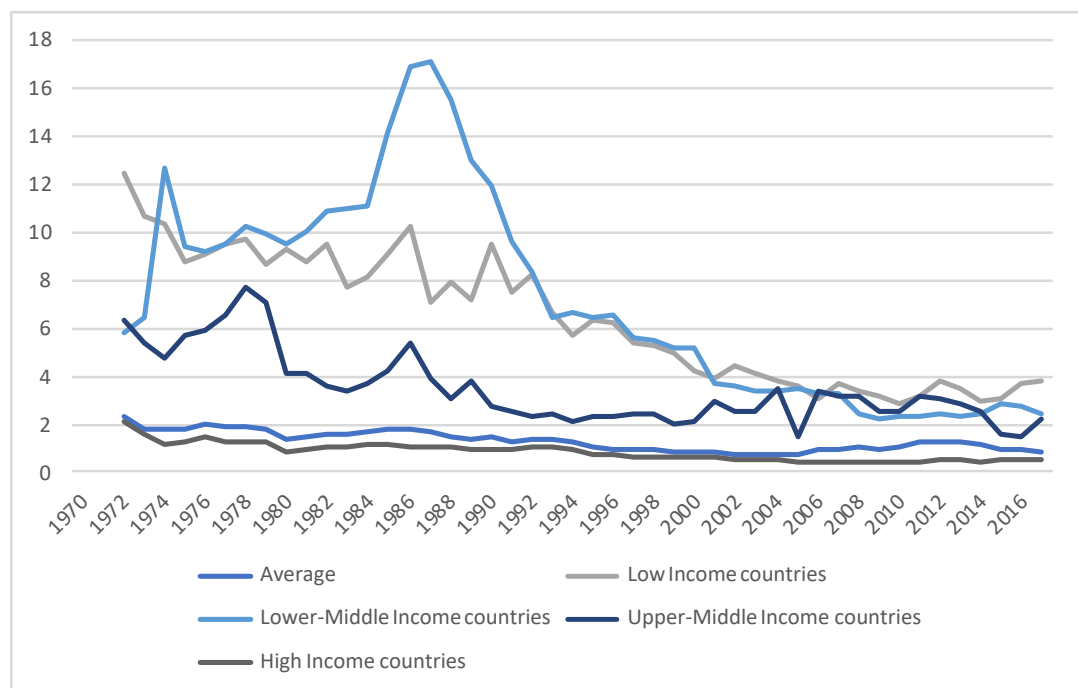
**Table 2: Descriptive statistics for Trade as a share of GDP**

Year	Low income countries			Lower-middle income countries			Upper-middle income countries			High income countries		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
1990	0.48	0.20	19	0.64	0.29	33	0.75	0.43	38	0.89	0.7	44
2000	0.49	0.16	21	0.83	0.4	43	0.82	0.36	39	1.06	0.68	53
2010	0.63	0.19	22	0.85	0.33	44	0.84	0.31	45	1.16	0.83	54
2017	0.6	0.22	18	0.79	0.37	38	0.82	0.28	40	1.24	0.88	50

## COLLECTED AND EFFECTIVE TARIFF RATES

The other widely used measures of trade openness are (1) collected tariff rate, calculated as the sum of all import duties divided by the total value of imports (Agbeyegbe et al, 2006; Ebrill et al, 1999; IMF, 2005; and Karimi et al, 2016), and (2) the effective rate of trade taxation, calculated as the sum of all trade taxes divided by the total value of trade (Khattry and Rao, 2002 and Longoni, 2009). Figure 2 shows the trajectory of the effective tariff rates over time, disaggregated by income-based classification of countries. Over time, the effective tariff rate decreases over time for all country classifications except for LICs. In LICs in our dataset, the effective tariff rate increases in the mid-1990s and decreases thereafter. This coincides with accession of many countries into the WTO.

**Figure 2. Effective Tariff Rate (%)**



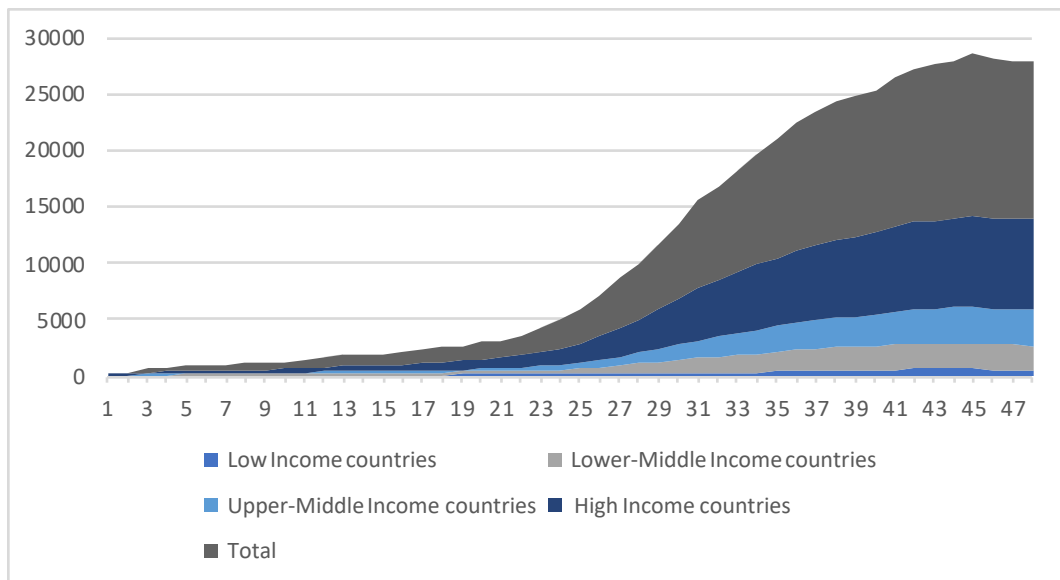
However, these simple tariff averages typically underweight high tariff rates since the corresponding trade levels tend to be low. Furthermore, in our context, using this measure for trade openness may be problematic as it measures what it seeks to explain. Tax revenues from trade would be measured by *multiplying* the trade tax rate by the volume of trade, while the effective tariff rate openness measure is collected trade tax *divided* by the volume of trade. Therefore, there may be a correlation between government revenue, at least from trade, and the independent variable.

## NUMBER OF TRADE AND INVESTMENT TREATIES

Another possible measure of openness is by tallying the total number of trade and investment treaties signed over time. By that measure, openness increases over time, as is expected. Figure 3 shows the breakdown of the treaties signed by country classification, disaggregated into



**Figure 3. Number of Bilateral Treaty Links**



bilateral treaty links. We calculate bilateral treaty links by taking each treaty to which a country is a party and breaking it up into bilateral links between the parties. This allows us to calculate how many individual treaty relationships are represented by each treaty. Here, the biggest increase in the number of treaties is seen in HICs, while the total number of treaties signed by countries in other income groups has stagnated.

Comparing the trade share openness measure with the number of bilateral treaty links reveals that the latter may be more suitable, especially given the underestimation of openness in large economies like the United States using the trade share measure.

### HUBS IN A NETWORK OF TRADE TREATIES

In an effort to better account for true openness to trade, we created another measure, called 'hub connectedness'. To calculate how connected a treaty makes a trading partner to a hub of economic activity, we mapped the network of trade treaties for each year in our dataset and counted how many times a country acts as "bridge" on the shortest path between all other country pairs. It represents the extent to which a country stands as a link between other countries in the trade network.<sup>1</sup> Theoretically, a country with a high hub connectedness will have greater importance in the network as more trade would flow through this country in their trade path between other countries. This measure is important because the traditional measures of openness and the number of treaties is likely to still underestimate the openness of some countries that are large and have few, but important, plurilateral trade treaties, such as the United States or countries that have trade deals with the United States.

Figure 4 shows the trend in openness measured by hub connectedness over time. The vertical axis measures the number of times a country acts as a bridge, roughly ranging from 0 to 2000, over time.

<sup>1</sup> This is also called betweenness centrality in the network analysis literature.

**Figure 4. Hub Connectedness**

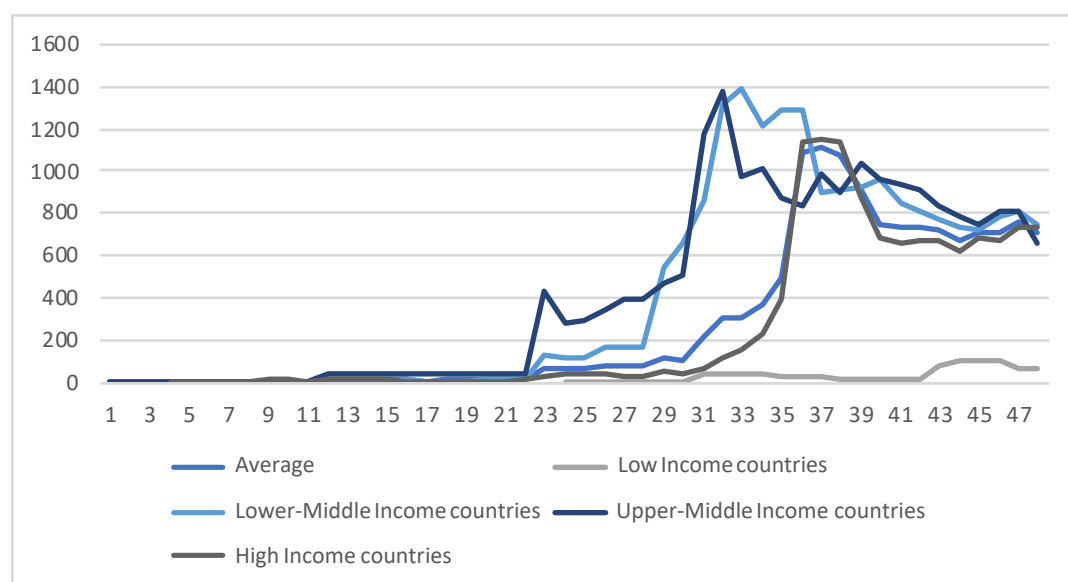


Table 3 lists the countries that were most open in 2017, 2005, and 1995 according to trade as a share of GDP, the number of bilateral treaty links, and hub connectedness. It is important to note that large economies such as the UK and Germany feature as some of the most open economies according to our treaty measures. The importance of our measures are also reflected by the ranking of the United States: in 2005, the US was the 11<sup>th</sup> and 31<sup>st</sup> most open economy according to our treaty and connectedness measures respectively, while being ranked 160<sup>th</sup> according to the conventionally used trade as a share of GDP measure.

**Table 3: Countries ranked by Openness**

	2017			2005			1995		
	Trade	Treaty	Connectedness	Trade	Treaty	Connectedness	Trade	Treaty	Connectedness
1	Luxembourg	Germany	Egypt	Singapore	Germany	Egypt	Singapore	Germany	Turkey
2	Hong Kong	France	South Korea	Hong Kong	UK	Macedonia	Hong Kong	Switzerland	Philippines
3	Singapore	UK	Cameroon	Luxembourg	France	Chile	Malta	UK	Iceland
4	Malta	Netherlands	Chile	Liberia	Romania	Ukraine	Malaysia	France	Israel
5	Ireland	Switzerland	Papua New Guinea	Malta	Netherlands	Singapore	Luxembourg	Poland	Switzerland
6	Vietnam	Romania	Fiji	Malaysia	Czech Republic	Australia	Bahrain	Netherlands	Norway
7	Seychelles	Czech Republic	Ukraine	Seychelles	Italy	Philippines	Antigua and Barbuda	China	Mexico
8	Slovakia	China	Moldova	Slovakia	Switzerland	Mexico	Estonia	Belgium	Pakistan
9	UAE	Luxembourg	Pakistan	Bahrain	Spain	Jordan	Tajikistan	Sweden	Bangladesh
10	Belgium	Belgium	Singapore	Ireland	Poland	Turkey	Ireland	Romania	Uruguay

Table 4 shows the correlation coefficients between our four measures of trade openness. The correlation coefficients between the different measures is low in general. Interestingly, trade share and connectedness have the lowest correlation among our measures, while effective tariff rate and number of treaties exhibit the highest correlation.

**Table 4: Correlation between Measures of Trade Openness**

	Trade Share	Tariff Rate	Treaties	Connectedness
Trade Share	1			
Tariff Rate	-0.26	1		
Treaties	0.22	-0.39	1	
Connectedness	0.10	-0.13	0.25	1

We employ both a Fixed Effects estimator and a GMM estimator. The parameter of interest here is  $\beta_1$  which gives us the average effect of trade liberalization on the dependent variables. We also relied on a Two-Stage Least Squares (2SLS) Estimator, with lagged values of the dependent variable as the instrumental variables. However, due to low values of the R-squared and large differences in estimates from the other two estimates, a 2SLS estimation did not appear to be a good fit, and therefore, the results are not shown.

The vector of control variables includes: the share of e-commerce and trade in digitizable products in GDP, inflation, the presence of an IMF program, WTO membership, GDP per capita, inequality, real effective exchange rate, and the volatility index.

1. **E-commerce and Trade in Digitizable Products:** The growing importance of digital trade may have compromised the revenue raising capability of governments. We measure e-commerce using the method used in Banga (2019). Banga (2019) identifies 49 commodities that are digitizable such as photographic films, music, media and software. Thereafter, the physical trade in these 49 products is estimated in the period under consideration. The online imports of these goods are estimated based on the difference between the physical imports of these goods and projections of what the physical imports would have been without digitization. The details of this variable are in the Appendix.
2. **Inflation:** The level of inflation may affect tax collection, through tax systems unindexed for inflation systems or seignorage, according to Baunsgaard and Keen (2010).
3. **IMF program:** The presence of an IMF program is proxied by a dummy variable that takes a value 1 if there is an IMF program and 0 otherwise. We include this since the presence of an IMF program in the aftermath of an economic crisis can affect tax policy and therefore tax revenue. We can also expect IMF programs to have an impact on government expenditure, and government debt since they are typically accompanied by policy conditionalities that seek to limit government expenditure and remove other forms of government interventions in the economy. We used the lagged value of this variable in order to control for possible reverse causation.
4. **WTO Membership:** Whether a country is a member of the WTO is measured by a dummy variable that takes a value 1 if the country is a member of the WTO in the year after its accession, and 0 otherwise. Since membership of the WTO has furthered trade liberalization in countries, which may affect the fiscal stability of governments, controlling for

WTO membership is important, independent of the effect of WTO membership on our measures of trade openness.

5. GDP per capita: This is used to control for the level of development of the economies under consideration.
6. Inequality: The level of inequality in the country may also affect collection of tax revenue, especially total tax revenue, since high levels of inequality may have implications for the share of the population with an income high enough to be taxable. Similarly, a very high share of income made by the top 1 or 10 percent of the population may affect tax collections, expenditure, and levels of government debt. Therefore, we control for the level of inequality by the Gini coefficient. Due to the low data coverage for the Gini coefficient in our sample and because the Gini coefficient does not change rapidly, we use decadal averages of the Gini coefficient to control for inequality.
7. Real Effective Exchange Rate (REER): We include this as a control variable for our regression models on trade tax revenue since it may affect the value of imports that are subject to taxation. Similarly, it may affect the value and volume of the government's external debt and debt service.
8. Global Liquidity Conditions: We add this variable when we examine the effects of trade liberalization on government debt, as it is used to measure global liquidity conditions like the volatility index of the US Stock markets (VIX). We include this because the literature on capital flows and debt suggests that global factors play a significant role in determining the flow of capital and therefore the undertaking of debt.

All dependent and independent variables, except the binary variables, are considered in natural logarithmic form. In all our regressions, we also interact the openness indicator with our binary variable that identifies LICs, LMICs, UMICs and LDCs. A full list of these countries are listed in the Appendix. This interaction term is included to determine whether there is any variation in our results based on the country classification by the World Bank income classification.

## RESULTS

Table 5 summarizes the results of our regression analysis on the impact of the effects of trade liberalization, measured by our openness variables of interest, on the various indicators of fiscal balance: tax revenue, government expenditure, government deficit, and government debt. The full tables of the regression results are in the Appendix, including the coefficients on the control variables used. Here, columns (1) and (2) use trade as a share of GDP as the openness indicator and columns (3) and (4) use the effective tariff rate as the openness indicator; this is done in order to establish a benchmark comparison with the existing literature. Columns (5) and (6) show the results using our measure of the number of bilateral treaty links, and Columns (7) and (8) show the results using our measure of the hub connectedness of a country in the network of trade treaties.

### Effects on Tax Revenue

Our results indicate that, across different indicators of trade liberalization and different model specifications, greater trade liberalization is associated with a decline in trade tax revenue. Note that an increase in effective tariff rate means increased trade protectionism. Therefore, the positive and significant coefficients also suggest that increased trade liberalization is associated with a decline in trade tax revenue, like the negative coefficients in other columns. With the exception

of column (7), all the coefficients are significant. Therefore, a one percent increase in the number of bilateral treaty links and connectedness is associated with a decline of 0.11-0.20 percent and 0.01 percent in trade tax revenue, respectively.

**Table 5: Summary of Regression Results**

Dependent Variable	Trade as a share of GDP		Effective Tariff Rate		Number of Treaties		Connectedness	
	Fixed Effects (1)	System GMM (2)	Fixed Effects (3)	System GMM (4)	Fixed Effects (5)	System GMM (6)	Fixed Effects (7)	System GMM (8)
Trade Tax Revenue	-2.251** (0.979)	-0.343*** (0.118)	31.555*** (5.932)	9.417*** (1.631)	-0.203** (0.100)	-0.105*** (0.035)	-0.014 (0.010)	-0.014*** (0.004)
Goods and Services Tax Revenue	-0.000 (0.105)	0.007 (0.027)	-2.692** (1.285)	-0.050 (0.304)	0.009 (0.039)	0.018* (0.010)	0.004 (0.006)	0.004** (0.002)
Direct Tax Revenue	0.052 (0.149)	0.202** (0.083)	0.657 (1.309)	4.454*** (1.101)	0.021 (0.062)	-0.033 (0.027)	0.004 (0.007)	0.007 (0.004)
Total Tax Revenue	0.069 (0.061)	0.059*** (0.018)	1.861*** (0.599)	1.601*** (0.223)	-0.001 (0.018)	0.001 (0.006)	0.000 (0.003)	0.000 (0.001)
Government Expenditure	1.447 (1.793)	-1.051 (1.647)	36.809 (28.529)	11.669 (22.701)	0.063 (0.805)	-1.385** (0.552)	0.016 (0.134)	-0.208** (0.094)
Government Gross Operating Balance	0.027*** (0.006)	0.028*** (0.004)	-0.002 (0.061)	0.038 (0.057)	0.003 (0.002)	-0.002* (0.001)	0.000 (0.000)	-0.000 (0.000)
Government Debt	0.060 (0.220)	-0.132*** (0.046)	-4.193 (2.774)	-0.951* (0.524)	0.159** (0.067)	0.044** (0.018)	0.009 (0.009)	0.002 (0.002)
Government Debt Service	-0.153 (0.617)	-0.771*** (0.254)	-0.569 (6.610)	9.341*** (2.230)	-0.105 (0.155)	-0.217** (0.106)	-0.029 (0.018)	-0.023** (0.010)

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

When we consider the impact of trade liberalization on goods and services tax revenue, it is interesting to note that the coefficients on our openness indicators suggest that there is no consistent relationship between trade liberalization and goods and services tax revenue. In columns (3) and (8), the coefficient on the openness indicator (effective tariff rate and connectedness, respectively) indicates that an increase in trade liberalization is associated with an increase in goods and service tax revenue, but this result is not robust across specifications. Therefore, our results do not indicate a robust relationship between the revenue of goods and services taxes and trade openness. This contradicts the general consensus in the literature on fiscal revenue implications of trade liberalization, that any loss in trade tax revenue can be replaced by an increase in indirect taxes like VATs. Notably, across indicators and specifications, WTO membership has a positive and significant effect on goods and services tax revenue.

We also consider the effects of trade liberalization on the revenue from direct taxes on income, profits, and capital gains. We see positive coefficients across indicators, but these coefficients are not significant, except in columns (2) and (4).

When we consider the effects of trade liberalization on total tax revenue, we do not find a consistent relationship. While, the coefficients for trade as a share of GDP show a consistent positive sign, only our system GMM coefficient is statistically significant. However, when measured by the effective tariff rate, the coefficient on total tax revenue is positive and significant. This suggests that a decrease in effective tariff rate or trade liberalization is associated with a decrease in total tax revenue across both specifications. Specifically, a one percent decrease in the effective tariff

rate is associated with a 1.571–1.841 percent decline in total tax revenue. Neither coefficients on our other indicators are significant (Columns (5)–(8)).

Table 6 shows the summary of regression results for the impact of trade liberalization on different variables of fiscal balance disaggregated by country groups. As in Table 5, Columns (1) and (2) show the results for openness measured by trade as a share of GDP, Columns (3) and (4) show the results for openness measured by effective tariff rate, Columns (5) and (6) show the results for openness measured by the number of bilateral treaty links, and Columns (7) and (8) show the results for openness measured by our connectedness measure. Here we use the interaction of these openness indicators with the classification of a country into a certain country group. Therefore, these coefficients should be interpreted as the additional impact of trade liberalization on total tax revenue in the specific country groups mentioned. The country groups included are the World Bank income classifications and the United Nations' category of LDC status.

Notably, an increase in trade liberalization is associated with a decline in trade tax revenue in UMICs which is higher than the decline in trade tax revenue in HICs. There is some evidence of a higher decline in trade tax revenue in LICs relative to HICs as the coefficients in Column (1) and (7) are negative and significant. However, this result is not robust across specifications, especially since the coefficient in column (5) is positive and significant. In column 7, we have some evidence of a higher decline in direct tax revenue in LICs relative to HICs, however, the result is not robust across specifications. There is also some evidence of a decline in total tax revenue in LICs in response to trade liberalization compared with HICs in Columns (3) and (8), but once again this result is not robust.

In contrast, the fiscal balances of LMICs have fared much better than HICs in response to trade liberalization. This is the only country group to have gained goods and services tax revenue, direct tax revenue, and total tax revenue with trade liberalization. A one percent increase in the number of bilateral treaty links is associated with a 0.12–0.19 percent increase in goods and services tax revenue, a 0.20–0.33 percent increase in direct tax revenue, and a 0.06–0.09 percent increase in total tax revenue in LMICs relative to HICs. Similarly, a one percent increase in connectedness is associated with a 0.01–0.02 percent increase in goods and service tax revenue, 0.01–0.02 percent increase in direct tax revenue, and a 0.004–0.007 percent increase in LMICs as compared to HICs.

UMICs, unlike LMICs, have not fared well in their fiscal balances relative to HICs. Specifically, the decline in trade tax revenue has been higher in UMICs relative to HICs as a result of trade liberalization. However, UMICs appear to have fared similarly to HICs when we consider other sources of tax revenue. This is also the case with LDCs, with the notable exception of goods and services tax and total tax revenue. LDCs have lost goods and services tax revenue and total tax revenue relative to HICs with trade liberalization. A one percent increase in the number of bilateral treaty links is associated with 0.31–0.60 percent decline in goods and service tax revenue and a 0.16–0.26 percent decline in total tax revenue. Meanwhile, a one percent increase in connectedness is associated with a 0.05–0.11 percent decline in goods and service tax revenue and 0.01–0.02 percent decline in total tax revenue.

**Table 6: Summary of Regression Results, disaggregated by Country Group**

Dependent Variable	Trade as a share of GDP		Effective Tariff Rate		Number of Treaties		Connectedness	
	Fixed Effects (1)	System GMM (2)	Fixed Effects (3)	System GMM (4)	Fixed Effects (5)	System GMM (6)	Fixed Effects (7)	System GMM (8)
<b>Low Income Countries</b>								
Trade Tax Revenue	-3.819** (1.739)	-0.023 (0.799)	1.647 (3.068)	9.222 (7.319)	6.133* (3.660)	-0.086 (3.832)	-1.129** (0.528)	-0.360 (0.784)
Goods and Services Tax Revenue	0.291 (0.447)	0.047 (0.195)	-0.842 (0.959)		0.654	0.149	-0.181	-0.186
Direct Tax Revenue	0.207 (0.491)	0.639 (0.526)	1.229 (1.247)	2.021 (4.505)	2.484 (2.137)	3.729 (3.026)	-0.634*** (0.198)	-0.295 (0.621)
Total Tax Revenue	0.340* (0.202)	0.128 (0.128)	1.270*** (0.475)		-0.201 (0.782)	-0.413 (0.773)	-0.075 (0.073)	-0.269* (0.159)
Government Expenditure	4.969*** (1.721)	-1.180 (4.073)	-21.846 (24.198)	1.015 (75.968)	-96.840*** (23.832)	-130.097** (57.600)		
Government Gross Operating Balance	0.026*** (0.008)		-0.302*** (0.099)	-0.468 (0.456)	-0.081 (0.078)			
Government Debt	-1.715** (0.681)	-0.572** (0.250)	2.352 (1.423)		-1.728 (1.885)	-0.340 (0.707)	-0.135*** (0.034)	-0.037** (0.019)
Government Debt Service	-1.233 (0.813)	-1.062 (0.968)	27.933 (19.011)	18.194 (20.119)				
<b>Lower-Middle Income Countries</b>								
Trade Tax Revenue	-0.884 (0.648)	-0.082 (0.246)	11.678 (8.571)	4.888 (3.140)	-0.034 (0.137)	-0.004 (0.065)	-0.009 (0.016)	-0.004 (0.007)
Goods and Services Tax Revenue	0.133 (0.175)	0.217*** (0.067)	-5.842*** (1.621)	-2.866*** (0.676)	0.187*** (0.049)	0.124*** (0.024)	0.022*** (0.005)	0.013*** (0.002)
Direct Tax Revenue	0.664** (0.290)	0.705*** (0.191)	-3.772* (2.113)	-1.637 (2.582)	0.331*** (0.107)	0.202*** (0.065)	0.022* (0.012)	0.012* (0.006)
Total Tax Revenue	0.348*** (0.122)	0.275*** (0.041)	-0.059 (1.141)	0.478 (0.507)	0.097*** (0.028)	0.064*** (0.015)	0.007* (0.004)	0.004*** (0.002)
Government Expenditure	-3.719 (5.227)	3.075 (5.429)	172.910*** (60.302)	-18.376 (163.833)	0.738 (1.270)	1.864 (1.456)	0.076 (0.200)	0.240 (0.177)
Government Gross Operating Balance	0.037* (0.020)	0.055*** (0.014)	-0.039 (0.121)	-0.023 (0.342)	0.003 (0.003)	-0.001 (0.006)	0.001** (0.001)	0.000 (0.002)
Government Debt	-0.818** (0.314)	-0.346*** (0.105)	2.063 (4.466)	-1.320 (1.309)	-0.031 (0.095)	-0.012 (0.034)	-0.018 (0.013)	-0.004 (0.004)
Government Debt Service	-0.325 (0.691)	-1.601*** (0.577)	4.185 (5.592)	5.895* (3.404)	-0.103 (0.089)	-0.246* (0.135)	-0.017 (0.011)	-0.025* (0.013)

Dependent Variable	Openness Indicator	Trade as a share of GDP		Effective Tariff Rate		Number of Treaties		Connectedness	
		Fixed Effects (1)	System GMM (2)	Fixed Effects (3)	System GMM (4)	Fixed Effects (5)	System GMM (6)	Fixed Effects (7)	System GMM (8)
<b>Upper-Middle Income Countries</b>									
Trade Tax Revenue		-2.363** (1.052)	-0.532*** (0.199)	32.296*** (7.290)	8.292*** (1.929)	-0.159 (0.123)	-0.089* (0.053)	-0.024 (0.020)	-0.021*** (0.007)
Goods and Services Tax Revenue		-0.005 (0.200)	-0.063 (0.048)	-2.093 (1.808)	0.384 (0.368)	0.051 (0.067)	0.043** (0.020)	-0.004 (0.011)	-0.003 (0.004)
Direct Tax Revenue		0.069 (0.336)	0.125 (0.159)	3.211* (1.780)	8.544*** (1.393)	0.002 (0.073)	-0.078 (0.055)	0.000 (0.010)	0.008 (0.007)
Total Tax Revenue		0.097 (0.078)	0.026 (0.032)	2.190*** (0.789)	1.665*** (0.271)	0.025 (0.022)	-0.009 (0.012)	0.001 (0.005)	-0.003 (0.002)
Government Expenditure		1.231 (3.770)	5.171* (3.030)	34.117 (28.913)	0.692 (25.221)	-1.435 (1.083)	-0.371 (1.028)	-0.259 (0.155)	-0.475*** (0.152)
Government Gross Operating Balance		0.000 (0.008)	0.029*** (0.009)	0.113*** (0.042)	0.150** (0.066)	-0.004* (0.002)	-0.006*** (0.002)	0.000 (0.000)	-0.000 (0.001)
Government Debt		-0.108 (0.338)	-0.278*** (0.082)	-5.941 (3.562)	-1.299** (0.622)	0.225*** (0.063)	0.040 (0.041)	0.019* (0.011)	-0.000 (0.005)
Government Debt Service		-0.424 (0.568)	-0.671* (0.350)	-0.129 (7.174)	9.367*** (2.711)	0.065 (0.216)	-0.020 (0.232)	-0.005 (0.026)	-0.014 (0.017)
<b>Least Developed Countries</b>									
Trade Tax Revenue		3.926*** (1.406)	0.307 (0.703)			-0.367 (0.274)	-0.283 (0.295)	-0.015 (0.019)	-0.044 (0.093)
Goods and Services Tax Revenue		0.051 (0.429)	0.049 (0.174)		-0.282 (1.295)	-0.601*** (0.179)	-0.313*** (0.092)	-0.052*** (0.006)	-0.106*** (0.031)
Direct Tax Revenue		-0.211 (0.465)	-0.522 (0.464)			-0.122 (0.100)	-0.217 (0.236)	-0.017* (0.010)	0.017 (0.076)
Total Tax Revenue		-0.097 (0.176)	-0.028 (0.113)		2.585*** (0.981)	-0.255*** (0.085)	-0.155** (0.060)	-0.019*** (0.004)	-0.014 (0.019)
Government Expenditure									
Government Gross Operating Balance			0.043** (0.021)					-0.053*** (0.008)	0.227** (0.107)
Government Debt		0.902 (0.659)	0.595** (0.247)		3.608 (2.450)	0.514 (1.052)	0.058 (0.167)	0.128*** (0.017)	0.036*** (0.009)
Government Debt Service								-1.316** (0.625)	3.101 (4.945)

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01



## Effects on Government Expenditure

While most studies in the literature only examine the impact of trade liberalization on tax revenues, very few examine whether there has been an impact on government expenditure. We find that there is some evidence of a decline in government expenditure with trade liberalization when we measure it by our new openness indicators. Specifically, an increase in number of bilateral treaty links by one percent is associated with a 1.39 percent decline in government expenditure, and a one percent increase in connectedness is associated with a 0.21 percent decline in government expenditure. However, this result is not robust across specifications. Specifically, it appears that government expenditure in LICs experienced a large decline with trade liberalization.

## Effects on Government Deficit and Debt

We examine the impact of trade liberalization on government budget deficit by studying the gross operating balance of the government. A decline in the government operating balance would reflect a worsening of the government budget deficit. We do not find a consistent relationship between trade liberalization and government budget deficit. The coefficient on trade as a share of GDP in columns (1) and (2) are positive and significant, suggesting a 0.027-0.028 percent improvement in gross operating balance in response to a one percent increase in trade as a share of GDP. However, when we measure openness using other indicators, we do not observe this relationship. Examining the coefficients of our interaction terms, it appears that when we measure openness as trade as a share of GDP, increased liberalization improved gross operating balance in LICs, LMICs, UMICs, and LDCs relative to HICs. However, when we measure trade liberalization as the number of bilateral treaty links and connectedness, our evidence shows that UMICs and LDCs actually experience worsening government operating balances with trade liberalization relative to HICs.

Next, we examine the impact of trade liberalization on government debt. In addition to the control variables used so far, we also control for global liquidity conditions using the volatility in the S&P 500 index. As before, the full regression results are in the appendix. The coefficients on the old measures of trade liberalization do not have a consistent sign across indicators and specifications: the relationship between increase in trade as a share of GDP and government debt is negative and significant in Column (2), which means a decline in government debt with trade liberalization. However, the coefficient in Column (4) is negative and significant, which suggests an *increase* in government debt with trade liberalization. On the other hand, the coefficients on the new measures of trade liberalization are all positive, but only significant in Columns (5) and (6). This suggests that a one percent increase in the number of bilateral treaty links is associated with a 0.04–0.16 percent increase in government debt to GDP ratio. It is also interesting to note that across all indicators and specification, the coefficient on per capita GDP is negative and significantly associated with government debt (except Column (4)). This means that higher per capita income is associated with a lower government debt to GDP ratio. When we disaggregate the results by country groups, we find some interesting effects. Specifically, there is some evidence that an increase in trade liberalization led to a decline in government debt in LICs. Specifically, a one percent increase in connectedness is associated with a 0.04–0.14 percent decline in government debt compared to HICs. However, in UMICs, an increase in trade liberalization (except when measured as an increase in trade share of GDP) is associated with an increase in government debt compared to HICs. Furthermore, an increase in trade liberalization is associated with an increase in government debt in LDCs as compared to other countries.

We also examine whether trade liberalization is associated with an increase in debt service by the government. Our results are counterintuitive: even though trade liberalization is associated with a higher level of government debt, it is associated with a lower level of government debt service. This is because the coefficients on the openness indicator are negative and significant in our system GMM model (columns (2), (4), (6), and (8)). When we disaggregate the results by country groups, several estimates could not be reported due to collinearity. But it appears that, in LMICs, government debt service is lower as a result of trade liberalization relative to HICs.

## CONCLUSIONS AND IMPLICATIONS

Our study comprehensively examines the impact of trade liberalization on the fiscal stability of governments around the world. We explore whether an increase in trade liberalization affects the total tax revenue, trade tax revenue, goods and services tax revenue, and direct tax revenue of governments. In order to do so, we also develop new indicators of trade liberalization. In addition to measuring trade liberalization by trade as a share of GDP and the effective tariff rate, as is traditionally done in the literature, we measure trade liberalization using the number of bilateral treaty links and the connectedness of a country in the network of trade treaties.

We find that there is evidence of trade liberalization being associated with a decline in tariff revenue, which we should expect, given that the goal of trade liberalization is typically the reduction of barriers to trade in the form of tariff and non-tariff barriers. This result is robust to each indicator used to measure trade liberalization and the econometric model used in the study. However, we find that there is no corresponding increase in the goods and services tax revenue associated with trade liberalization. This is interesting given that the policy recommendation for recovering the tax revenue lost due to trade liberalization is to impose indirect taxes, such as VATs. While in LMICs, there is some evidence of an increase in the collection of goods and services taxes, we find that recovery from these indirect taxes is even poorer in LDCs. This can be for a variety of reasons, including, but not limited to, poor implementation of the VAT and political economy factors that prevent or delay the implementation of a VAT. It does not appear that a decline in trade tax revenue is made up by an increase in direct tax revenue, on average, except for some evidence of recovery in LMICs. However, when we consider total tax revenue, there is some evidence of a decline in total tax revenue in response to an increase in trade liberalization in UMICs and LDCs, especially when we measure it by the effective tariff rate. LMICs, however, have increased their total tax revenue. This is consistent with the results in Baunsgaard and Keen (2010) who also find that LICs and middle-income countries have not been able to recover tax revenue lost due to trade liberalization.

As compared to the trend in tax revenue, we do not observe a change in government expenditure as a result of trade liberalization. However, it appears that, as compared to HICs, there is a decline in government expenditure in UMICs. When considering the government budget deficit, we observe mixed results. When trade liberalization is measured as trade as a share of GDP, trade liberalization is associated with an improvement in government operating balance as a percent of GDP. However, when measured by our new measures of trade liberalization, we do not observe this same result. In UMICs and LDCs, trade liberalization is associated with a worsening of the budget deficit as compared to HICs and non-LDCs.

Even though we do not find strong evidence of increasing government budget deficit with trade liberalization, we do find evidence of an increase in government debt with trade liberalization. Specifically, a one percent increase in trade liberalization is associated with a 0.05-0.91 percent increase in government debt as a percent of GDP, especially in UMICs and LDCs. However,

counterintuitively, we find that some trade liberalization is also associated with declining debt service. This could be a result of the low-interest rate environment that has prevailed globally for at least a decade.

What is clear from this analysis, and the literature before it, is that emerging market and developing countries need to be mindful of the potential impacts of trade and investment liberalization on the ability to mobilize domestic resources for development. While the overall results are mixed across different kinds of liberalization and resource mobilization, it is clear that trade liberalization has the potential to decrease overall levels of fiscal revenue and increase external debt levels at a time when mobilizing resources for development is one of the utmost goals in the international system.

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## Appendix I: Data and Descriptive Statistics

### Dependent Variables

The dataset used in this study has been constructed from various publicly available sources. The most important variables in this study are government tax revenues, expenditures, government budget deficit, and debt. Data on government tax revenue and expenditures is obtained from the IMF Government Finance Statistics. We obtained data for both central governments and (more broadly) general government revenue and expenditure. Data on general government would be more desirable as a dependent variable since it includes the revenues of the central, state, provincial, regional, and local governments, and social security funds. However, data coverage is better for central governments (including social security funds) in the dataset over time. The full set of variables used and data sources are listed below.

#### TAX REVENUE

Data on government tax revenue is disaggregated into tax revenue raised from trade taxes, such as tariffs and export taxes, tax revenue raised from good and services taxes, like VATs, and tax revenue raised from direct taxes, like taxes on income, profits, and capital gains. Figure 5 shows the trends in tax revenue as a share of GDP for all countries in the dataset. For the total sample, total tax revenue as a share of GDP has increased over time, but has declined marginally in the last decade. At the same time, the revenue from trade taxes has declined over time, and the share of revenue from VAT has gradually increased. Direct tax revenue has been quite stable over time, but has marginally declined to be less than 5 percent of the GDP.

**Figure 5. Tax Revenue Over Time (% of GDP)**

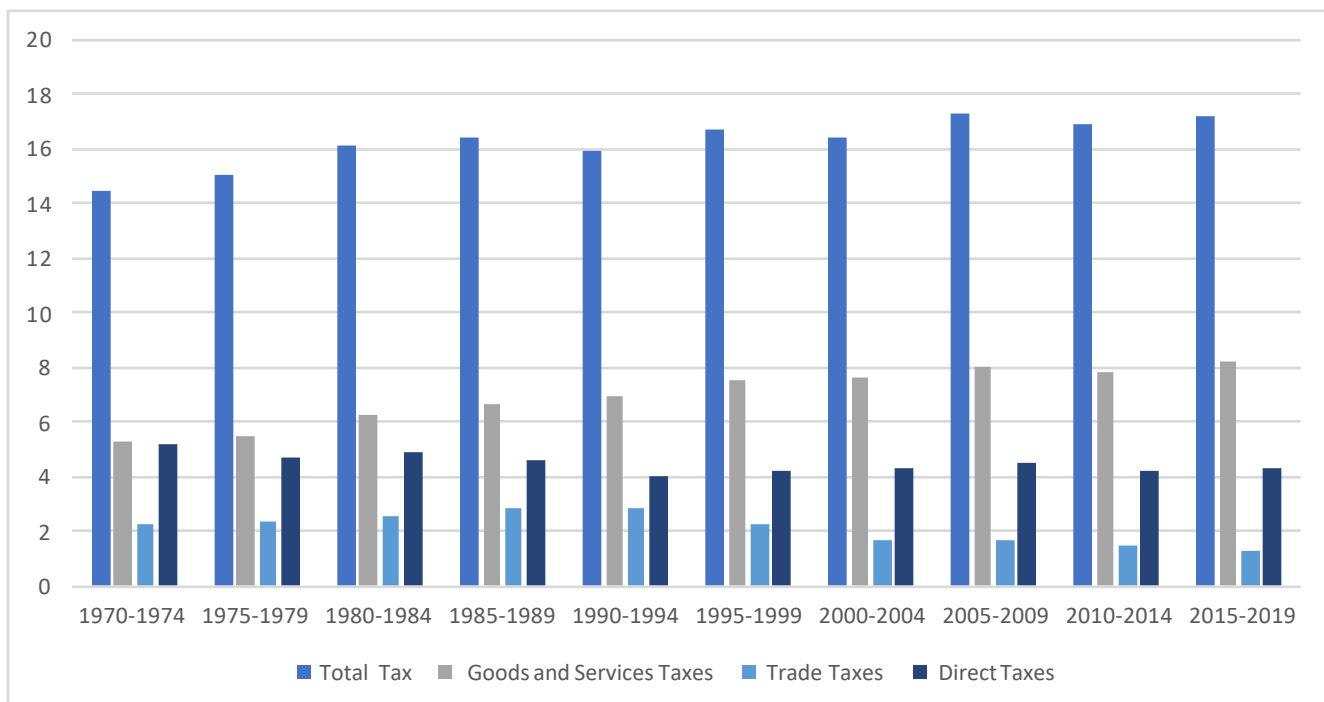
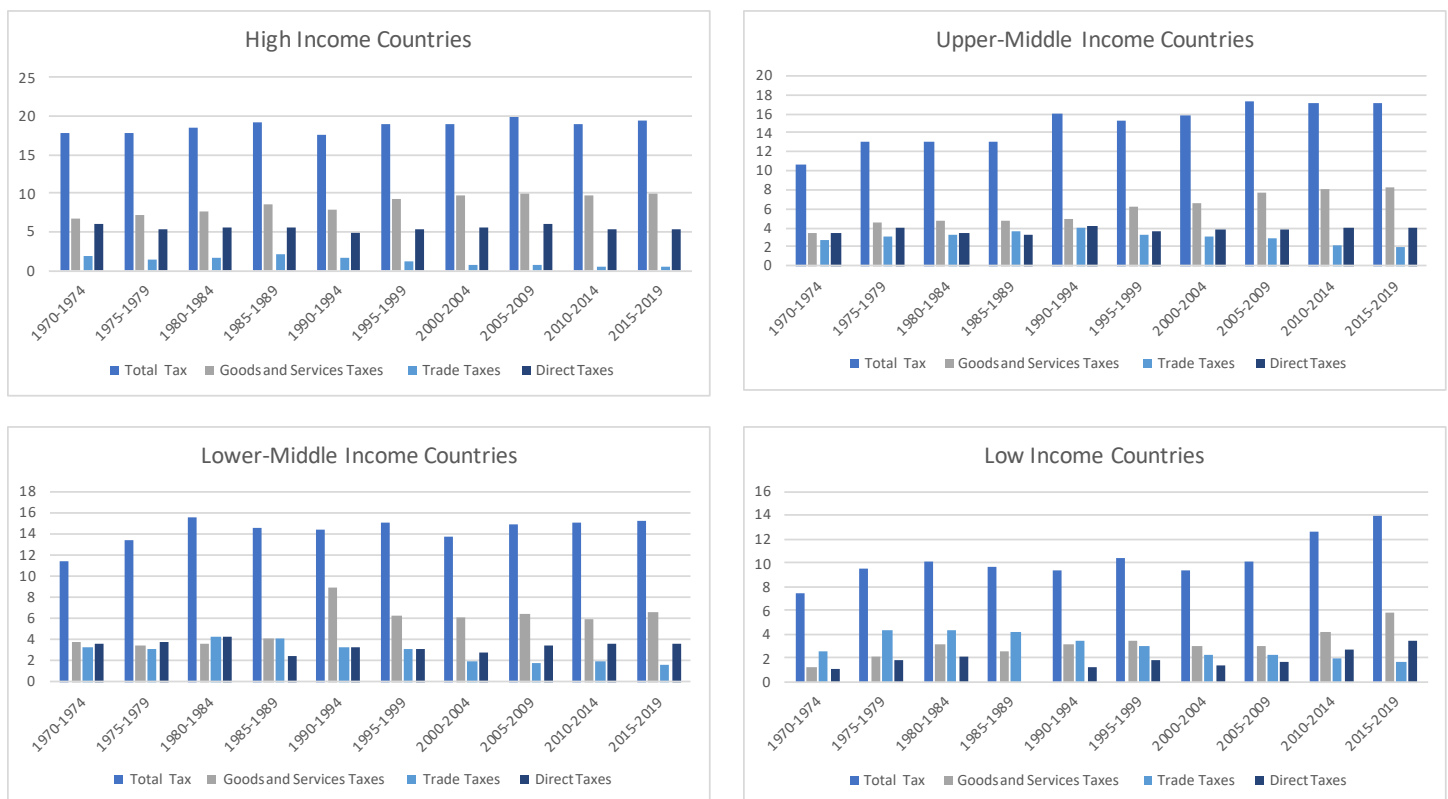


Figure 6 shows the trend in tax revenue disaggregated by country groups based on the World Bank income classification. It reveals some interesting trends. First, it appears that total tax revenue, on average, increases with countries' level of income: the average total tax to GDP ratio is highest for HICs and lowest for LICs. Second, trade tax revenue accounts for a far greater share of total tax revenue in LICs, LMICs, and UMICs as compared to HICs. However, in all country groups, there is a decline in the trade tax revenue to GDP ratio over time. In fact, for HICs, trade tax revenue has always made a small contribution to total tax revenue, and this contribution has declined over time to a negligible share today. Third, the contribution of goods and services taxes is different for different country groups. While revenue of goods and services taxes have been the most important part of tax revenue in UMICs and HICs, it has only become the largest contributor to total tax revenue in LICs and LMICs after 1995. However, in LICs and LMICs revenue from taxes on goods and services has remained stable since 1995, and only increased marginally in the last five years in the dataset. In LMICs, the revenue from goods and services taxes, on average, has remained stable. However, the revenue from goods and services taxes appears to have increased on average in UMICs and HICs. Finally, the direct tax revenue as a share of GDP appears to have been, on average, either stable or declining in all country groups.

Even within these country groups, not all countries exhibit a consistent trend. Table 7 summarizes the number of countries in our dataset that experienced a decline or gain in trade tax revenue, goods and service tax revenue, direct tax revenue, and total tax revenue (as a percent of GDP) and the average gain in tax revenue in percentage points between 1990–94 and 2000–04, and between 2005–09 and 2015–19, while Table 8 shows the cumulative change in tax revenue over the entire period (1985–2019) in billions of US dollars. There are a few notable features in Table 7. First, between 1990–94 and 2000–04, most countries lost trade tax revenue, regardless of country group, but the number of countries that lost trade tax revenue is highest in the

**Figure 6. Tax as % of GDP**



HIC group. Second, the percentage of countries losing goods and services tax revenue is highest in the LIC and LMIC groups, and low in the UMIC and HIC groups. Furthermore, the average revenue lost is highest in LMICs (8.635 percentage points). Third, the share of countries that lost direct tax revenue between 1990–94 and 2000–04 is comparable across country groups (around 35–42%), except in the UMIC group, with 54.54% of countries losing direct tax revenue. Finally, the percentage of countries that lost total tax revenue between 1990-94 and 2000-04 is lowest in the HIC group and highest in LMIC group. However, the average loss in total tax revenue in this time period is highest in LICs (3.265 percentage points).

On the other hand, when we consider the change in tax revenue between 2005–09 and 2015–19, we see the following trends. First, several countries have gained total tax revenue, but the lowest share of countries that gained total tax revenue is in the UMIC group. Second, in contrast to the previous period, the share of countries that lost trade tax revenue is highest in the UMIC group and lowest in the LIC group. However, the average loss in trade tax revenue was highest in LICs (1.558 percentage points). Third, the share of countries that gained goods and service tax revenue and direct tax revenue has been highest in the LIC group.

**Table 7: Gain and Loss in Government Tax Revenue 1990–2019, % of GDP**

		Between 1990–94 and 2000–04			Between 2005–09 and 2015–19		
		Number of countries	Percentage of countries	Average Gain/Loss	Number of countries	Percentage of countries	Average Gain/Loss
Low Income Countries	Lost Trade Tax Revenue	5	71.42%	2.052	4	33.33%	1.558
	Gained Trade Tax Revenue	2	28.58%	1.113	8	66.67%	0.446
Lower-Middle Income Countries	Lost Trade Tax Revenue	16	80%	1.832	16	55.17%	0.833
	Gained Trade Tax Revenue	4	20%	0.702	13	44.83%	0.262
Upper-Middle Income Countries	Lost Trade Tax Revenue	19	76%	1.802	25	71.43%	1.123
	Gained Trade Tax Revenue	6	24%	0.633	10	28.57%	0.472
High Income Countries	Lost Trade Tax Revenue	39	95.12%	1.098	22	62.86%	0.469
	Gained Trade Tax Revenue	2	4.88%	0.322	13	37.14%	0.151
Low Income Countries	Lost Goods & Service Tax Revenue	3	42.85%	0.787	1	8.33%	1.361
	Gained Goods & Service Tax Revenue	4	57.15%	1.527	11	91.67%	2.329
Lower-Middle Income Countries	Lost Goods & Service Tax Revenue	9	45%	8.635	9	45%	1.362
	Gained Goods & Service Tax Revenue	11	55%	1.732	20	55%	1.241

		Between 1990-94 and 2000-04			Between 2005-09 and 2015-19		
		Number of countries	Percentage of countries	Average Gain/Loss	Number of countries	Percentage of countries	Average Gain/Loss
Upper-Middle Income Countries	Lost Goods & Service Tax Revenue	6	24%	0.673	13	37.14%	1.342
	Gained Goods & Service Tax Revenue	19	76%	2.547	22	62.86%	1.322
High Income Countries	Lost Goods & Service Tax Revenue	11	26.19%	0.774	15	31.25%	0.994
	Gained Goods & Service Tax Revenue	31	73.81%	1.993	33	68.75%	1.101
Low Income Countries	Lost Direct Tax Revenue	2	50%	0.573	1	8.33%	0.324
	Gained Direct Tax Revenue	2	50%	0.454	11	91.67%	1.377
Lower-Middle Income Countries	Lost Direct Tax Revenue	6	35.29%	1.6	8	28.57%	1.709
	Gained Direct Tax Revenue	11	64.71%	1.062	20	71.43%	0.903
Upper-Middle Income Countries	Lost Direct Tax Revenue	12	54.54%	1.195	19	55.89%	0.577
	Gained Direct Tax Revenue	10	45.46%	1.238	15	44.11%	1.073
High Income Countries	Lost Direct Tax Revenue	14	36.84%	0.840	26	56.53%	1.608
	Gained Direct Tax Revenue	24	63.16%	1.553	20	43.47%	0.687
Low Income Countries	Lost Total Tax Revenue	3	42.85%	3.265	3	25%	0.879
	Gained Total Tax Revenue	4	57.14%	2.278	9	75%	3.711
Lower-Middle Income Countries	Lost Total Tax Revenue	13	65%	2.871	8	27.59%	4.373
	Gained Total Tax Revenue	7	35%	2.919	21	72.41%	2.475
Upper-Middle Income Countries	Lost Total Tax Revenue	11	44%	2.699	20	57.14%	2.128
	Gained Total Tax Revenue	14	56%	2.464	15	42.86%	1.924
High Income Countries	Lost Total Tax Revenue	17	39.53%	2.859	19	38.77%	1.494
	Gained Total Tax Revenue	26	60.46%	3.106	30	61.23%	1.628



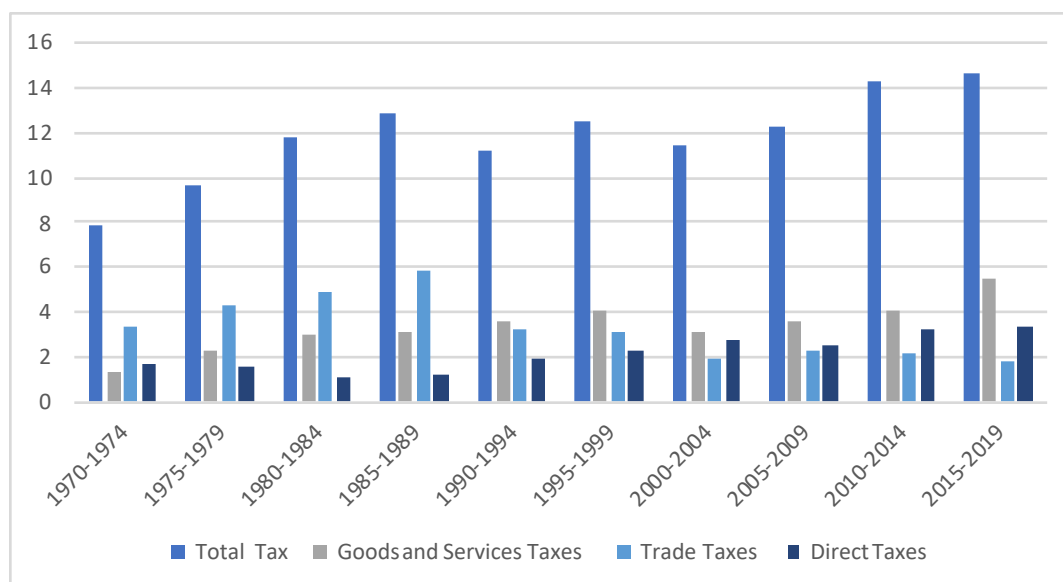
**Table 8: Cumulative Change in Tax Revenue 1985–2019, billions of USD**

		Trade Tax Revenue	Goods and Services Tax Revenue	Direct Tax Revenue	Total Tax Revenue
Low Income Countries	Total Revenue Lost	2.81	3.06	2.77	7.81
	Total Revenue Gained	27.76	13.72	9.61	33.44
	Net Total Change	24.95	10.66	6.84	25.63
Lower-Middle Income Countries	Total Revenue Lost	50.68	77.79	70.74	177.25
	Total Revenue Gained	607.35	283.55	288.39	733.22
	Net Total Change	556.67	205.76	217.65	555.97
Upper-Middle Income Countries	Total Revenue Lost	279.49	398.49	284.02	883.89
	Total Revenue Gained	2219.70	1275.38	677.54	2597.29
	Net Total Change	1940.21	876.89	393.52	1713.4
High Income Countries	Total Revenue Lost	96.31	1337.37	2028.59	3864.45
	Total Revenue Gained	5531.63	3504.52	4605.74	10866.57
	Net Total Change	5435.32	2167.15	2577.15	7002.12
Total	Total Revenue Lost	429.29	1816	2386.12	4933.39
	Total Revenue Gained	8386.45	5077.17	5581.28	14230.52
	Net Total Change	7957.16	3260.45	3195.16	9297.13

Figure 7 shows the trends in tax revenue as a percentage of GDP for LDCs. Comparing that with Figure 3, it appears that total tax revenue as a percentage of GDP is comparable to that for LICs. However, unlike LICs, LDCs seem to have witnessed an average decline in total tax revenue as a share of GDP after 1990, which only recovered after 2005. Furthermore, while trade tax revenue has consistently declined, it still constitutes a major contributor to total tax revenue in LDCs. The contribution of revenue from taxes on goods and services has remained stable, increasing only after 2015, while the revenue from direct taxes has increased steadily to become the second most important source of tax revenue in LDCs.

Table 9 examines the trends in government tax revenue over 1990-2019 for LDCs, while Table 10 shows the cumulative change in tax revenue over the entire period 1985–2019 in billions of US dollars. Between 1990–94 and 2000–04, 58.33 percent of LDCs lost total tax revenue as compared to 44.58 percent of other countries. On the other hand, between 2005–09 and 2015–19, 75 percent of LDCs gained total tax revenue, as compared to 57.14 percent of other countries. When we consider trade tax revenue, between 1990–94 and 2000–04, 75 percent of LDCs lost trade tax revenue as compared to 86.42 percent of other countries. However, between 2005–09 and 2015–19, a higher share of LDCs lost trade tax revenue than the share of other countries that lost trade tax revenues: 35 percent as compared to 65.93 percent. Between 1990–94 and 2000–04, 41.67 percent of LDCs lost goods and services tax revenue, but only 29.27 percent of other countries lost goods and services tax revenue. However, subsequently between 2005–09 and 2015–19 the opposite trend is observed with a higher percentage of non-LDCs losing goods and services tax revenue: 32.69 percent of non-LDCs lost goods and services tax revenue as compared to 20 percent of LDCs. Finally, most LDCs gained direct tax revenue in the two periods under consideration (62.5 percent and 84.21 percent of LDCs).

**Figure 7. Tax trends for LDCs (% of GDP)**



**Table 9: Gain and Loss in Government Tax Revenue in LDCs, 1990-2019, % of GDP**

		Between 1990-94 and 2000-04			Between 2005-09 and 2015-19		
		Number of countries	Percentage of countries	Average Gain/Loss	Number of countries	Percentage of countries	Average Gain/Loss
Least Developed Countries	Lost Trade Tax Revenue	9	75%	2.009	7	35%	1.557
	Gained Trade Tax Revenue	3	25%	0.770	13	65%	0.346
Other Countries	Lost Trade Tax Revenue	70	86.42%	1.407	60	65.93%	0.784
	Gained Trade Tax Revenue	11	13.58%	0.651	31	34.07%	0.296
Least Developed Countries	Lost Goods & Service Tax Revenue	5	41.67%	0.646	4	20%	1.814
	Gained Goods & Service Tax Revenue	7	58.33%	1.221	16	80%	1.899
Other Countries	Lost Goods & Service Tax Revenue	24	29.27%	3.727	34	32.69%	1.139
	Gained Goods & Service Tax Revenue	58	70.73%	2.186	70	67.31%	1.221

		Between 1990–94 and 2000–04			Between 2005–09 and 2015–19		
		Number of countries	Percentage of countries	Average Gain/Loss	Number of countries	Percentage of countries	Average Gain/Loss
Least Developed Countries	Lost Direct Tax Revenue	3	37.5%	0.492	3	15.79%	2.197
	Gained Direct Tax Revenue	5	62.5%	0.599	16	84.21%	1.133
Other Countries	Lost Direct Tax Revenue	31	42.47%	1.141	51	51.50%	1.179
	Gained Direct Tax Revenue	42	57.53%	1.411	50	49.50%	0.898
Least Developed Countries	Lost Total Tax Revenue	7	58.33%	2.819	5	25%	4.103
	Gained Total Tax Revenue	5	41.67%	2.553	15	75%	2.391
Other Countries	Lost Total Tax Revenue	37	44.58%	2.859	45	42.86%	1.957
	Gained Total Tax Revenue	46	55.42%	2.871	60	57.14%	2.022

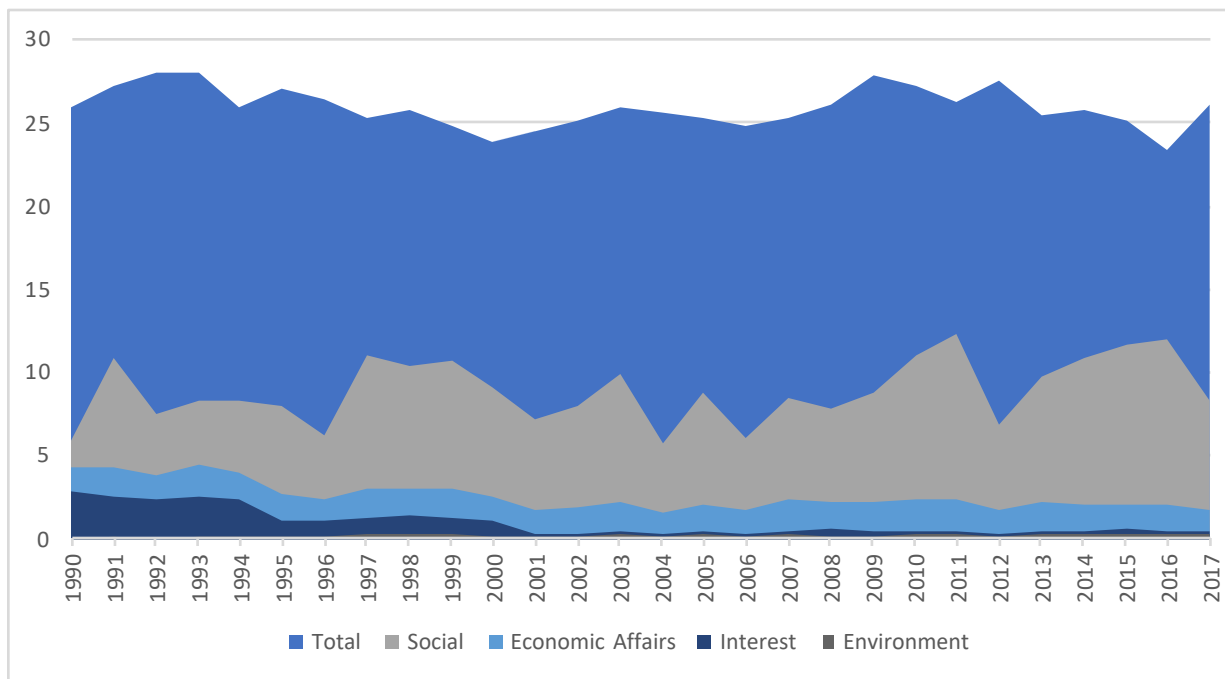
**Table 10: Cumulative Change in Tax Revenue in LDCs, 1985–2019, billions of USD**

		Trade Tax Revenue	Goods and Services Tax Revenue	Direct Tax Revenue	Total Tax Revenue
Least Developed Countries	Total Revenue Lost	5.73	7.38	13.45	33.81
	Total Revenue Gained	66.88	30.87	30.35	95.33
	Net Total Change	61.15	23.49	16.9	61.52
Other Countries	Total Revenue Lost	423.57	1809.34	2372.67	4899.59
	Total Revenue Gained	8319.57	5046.3	5550.92	14135.19
	Net Total Change	7896	3236.96	3178.25	9235.6

## GOVERNMENT EXPENDITURE

In the IMF Government Finance Statistics, government expenditure is defined as the sum of government expense, which is the decline in net worth of the government, and the net investment by the government on nonfinancial assets. Data on government expenditure is disaggregated into expenditure on economic affairs, social affairs, interest expenditure, and expenditure on environmental protection. Expenditure on economic affairs includes items such as administration of general economic and commercial affairs, regulation or support of general economic and commercial activities, and grants, loans, and subsidies to promote general economic and commercial policies and programs. Expenditure on social affairs is the sum of government expenditure on health, education, recreation, culture, and religion, and on social protection. Expenditure on environmental protection includes waste management, pollution abatement, protection of

**Figure 8. Components of Government Expenditure (% of GDP)**



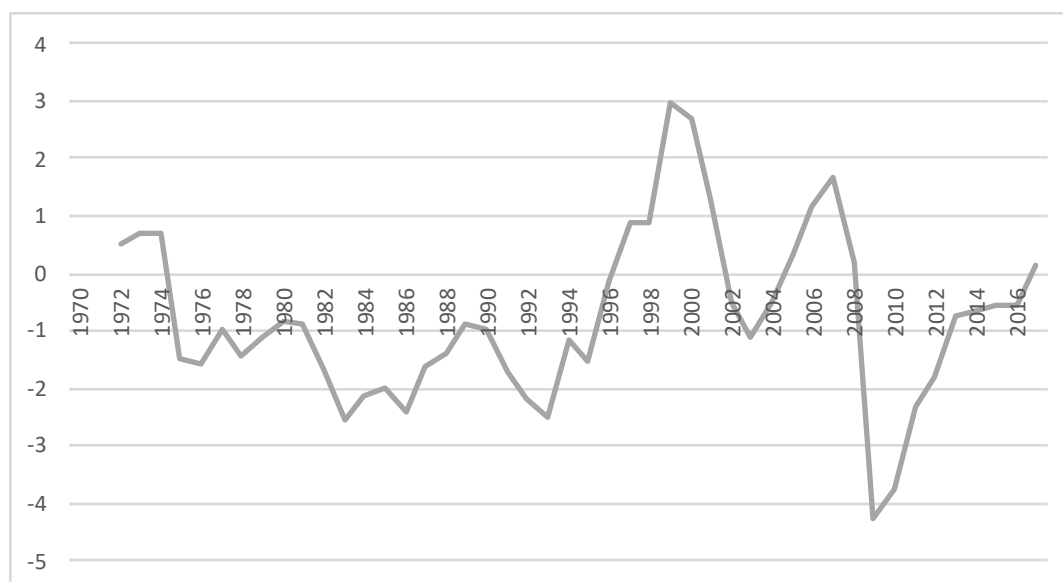
biodiversity and landscape, and research and development on environmental protection. Availability of data on expenditure is poor prior to 1990, therefore we focus on expenditures only after 1990. Figure 8 shows the trend in government expenditure as a percentage of GDP over time. Total government expenditure as a percentage of GDP exhibits a declining trend since 1990, even though it appears to have increased marginally between 2000 and 2010. In contrast, the share of government social expenditure as a percentage of GDP displays a consistent upward trend after 2000 until about 2016, after which it declines. Another marked trend in figure 8 is the consistent decline in interest expenditure incurred on average by governments. The share of government expenditure on economic affairs appears to have been stable between after 1990.

#### BUDGET DEFICIT

Given that our primary interest is in the fiscal stability of governments, it is imperative that we examine the trends in the budget deficit of governments. In the IMF Government Finance Statistics, the closest measure of budget deficit is Gross Operating Balance, which is defined as Revenue minus Expense, but the expense does not include the consumption of fixed capital. Therefore, our measure is a conservative measure of budget deficit. Figure 9 shows us the trend in average budget deficit for governments for the period under consideration. On average, it appears that governments have been incurring a budget deficit, with the gross operating balance improving in the 1990s, and then worsening sharply after 2000. It appears to have been at its lowest point on average during the most recent global financial crisis, with gross operating balance improving thereafter.

Table 11 shows the trends in the gross operating balance by country group between 1990 and 2019. Between 1990–94 and 2000–04 and between 2005–09 and 2015–19, the majority of LICs, LMICs, and UMICs experienced a decline in gross operating balance. In contrast, a larger share of HICs saw an increase in gross operating balance.

**Figure 9. Gross Operating Balance (% of GDP)**



**Table 11: Increase and Decline in Government Gross Operating Balance, 1990–2019**

		Between 1990–94 and 2000–04			Between 2005–09 and 2015–19		
		Number of countries	Percentage of countries	Average Gain/Loss	Number of countries	Percentage of countries	Average Gain/Loss
Low Income Countries	Decline in Gross Operating Balance	2	66.67%	44.575	3	100%	6.366
	Increase in Gross Operating Balance	1	33.33%	136.281	0	0%	0
Lower-Middle Income Countries	Decline in Gross Operating Balance	7	77.78%	3.544	14	70%	6.129
	Increase in Gross Operating Balance	2	22.22%	10.252	6	30%	5.267
Upper-Middle Income Countries	Decline in Gross Operating Balance	7	77.78%	2.438	18	72%	3.786
	Increase in Gross Operating Balance	2	22.22%	10.252	7	28%	1.719
High Income Countries	Decline in Gross Operating Balance	14	36.84%	3.018	19	43.18%	2.737
	Increase in Gross Operating Balance	24	63.16%	7.056	25	56.82%	1.789

**Table 11: Increase and Decline in Government Gross Operating Balance, 1990–2019**

		Between 1990–94 and 2000–04			Between 2005–09 and 2015–19		
		Number of countries	Percentage of countries	Average Gain/Loss	Number of countries	Percentage of countries	Average Gain/Loss
Low Income Countries	Decline in Gross Operating Balance	2	66.67%	44.575	3	100%	6.366
	Increase in Gross Operating Balance	1	33.33%	136.281	0	0%	0
Lower-Middle Income Countries	Decline in Gross Operating Balance	7	77.78%	3.544	14	70%	6.129
	Increase in Gross Operating Balance	2	22.22%	10.252	6	30%	5.267
Upper-Middle Income Countries	Decline in Gross Operating Balance	7	77.78%	2.438	18	72%	3.786
	Increase in Gross Operating Balance	2	22.22%	10.252	7	28%	1.719
High Income Countries	Decline in Gross Operating Balance	14	36.84%	3.018	19	43.18%	2.737
	Increase in Gross Operating Balance	24	63.16%	7.056	25	56.82%	1.789

Table 12 shows the trends in the gross operating balance by LDC status between 1990 and 2019. Between 1990–94 and 2000–04 and between 2005–09 and 2015–19, a higher share of LDCs, experienced a decline in gross operating balance than other countries.

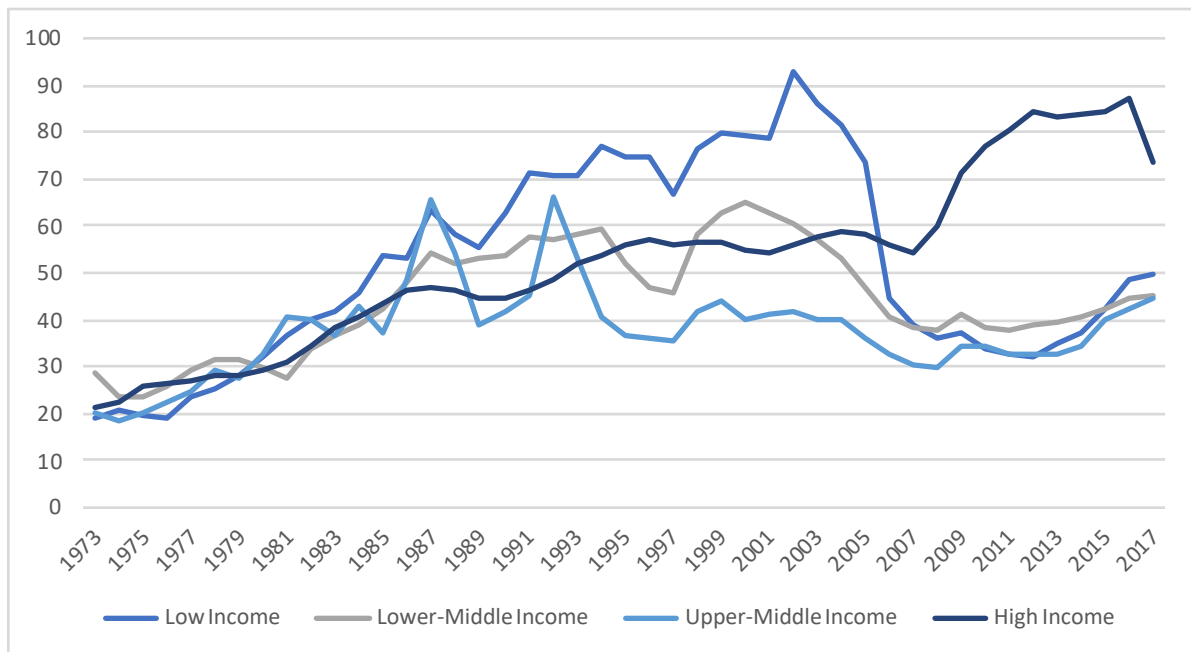
**Table 12: Increase and Decline in Gross Operating Balance in LDCs, 1990–2019**

		Between 1990–94 and 2000–04			Between 2005–09 and 2015–19		
		Number of countries	Percentage of countries	Average Gain/Loss	Number of countries	Percentage of countries	Average Gain/Loss
Least Developed Countries	Decline in Gross Operating Balance	2	66.67%	3.384	5	83.33%	13.682
	Increase in Gross Operating Balance	1	33.33%	136.281	1	16.67%	17.667
Other Countries	Decline in Gross Operating Balance	28	45.16%	4.379	49	56.98%	3.197
	Increase in Gross Operating Balance	34	54.84%	6.244	37	43.02%	1.911

## GOVERNMENT DEBT

While the IMF Government Finance Statistics also has data on government debt, the coverage is not quite as comprehensive as that in the IMF Global Debt Database (GDD). For that reason, data on central government debt, nonfinancial public sector debt, and public sector debt is obtained from the IMF GDD and used in this study. The IMF GDD also best covers the variables related to central government debt, which is fortunate given that data coverage on revenue and expenditure is also highest for the central government. Over the period under consideration, the average level of debt of governments in HICs and UMICs has steadily increased (after a temporary decline for debt of UMIC governments). At the same time, the debt level of governments in LICs has been on a declining trend, but has witnessed a recent increase. This trend is more clearly evident in Figure 10.

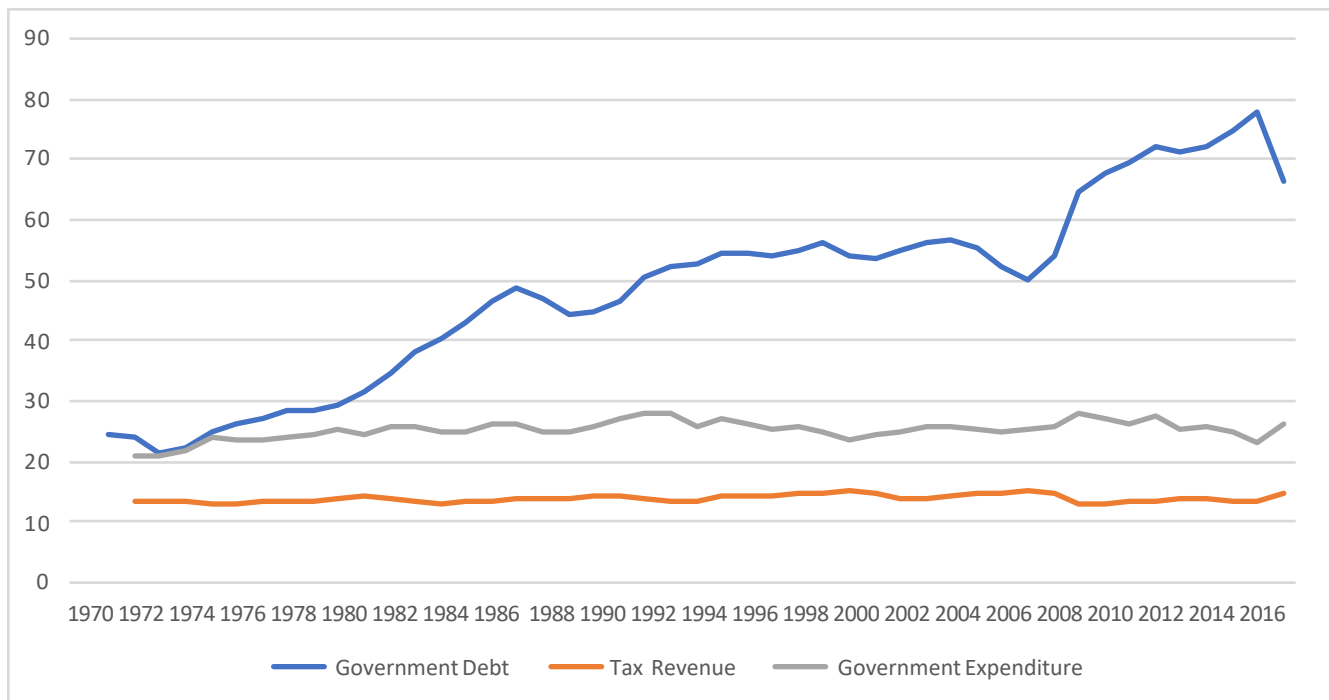
**Figure 10. Central Government Debt (% of GDP)**



If we consider average levels of government revenue, average expenditure, and average debt as percentages of GDP over time, it is apparent that government expenditure has been consistently higher than government tax revenue. At first glance, this is consistent with the gradual increase in government debt over time. This can be seen in Figure 11.

If we disaggregate this by income-level, it is clear that the increase in total average government debt is driven by the increase of debt in HICs. Average government debt increased until the early 2000s in LICs and declined dramatically thereafter. For LMICs, average government debt peaked in the late 1990s, coinciding with the East Asian Financial Crises, and has steadily declined thereafter. This is despite the fact that, similar to the trend in HICs, government expenditure has remained consistently higher than government tax revenue. It is interesting to note that the declining trend of government debt in LICs, LMICs, and UMICs appears to be reversing, with government debt beginning to increase again after 2010.

**Figure 11. Tax Revenue, Government Expenditures, and Government Debt (% of GDP)**



**Figure 12. Tax Revenue, Government Expenditure and Government Debt (% of GDP, by country group)**

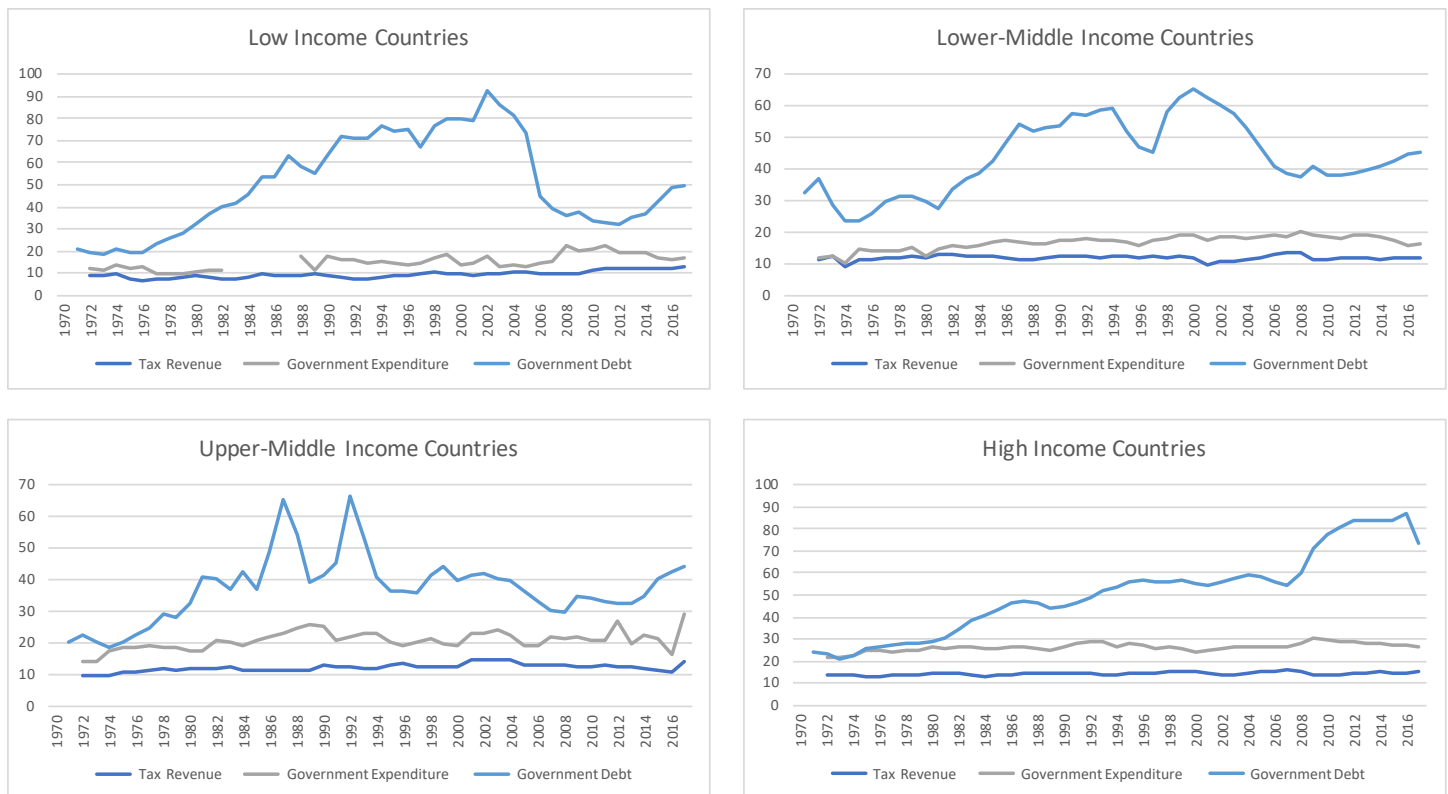




Table 13 gives us the descriptive statistics for our dependent variables, namely tax revenue, government expenditure, gross operating balance, and government debt, as a percentage of GDP for the years 1990, 2000, 2010, and 2017. It is clear that the data coverage for LICs is lower than that of other country groups.

**Table 13: Descriptive statistics for Dependent Variables (% of GDP)**

Year	Low-income countries			Lower-middle income countries			Upper-middle income countries			High-income countries		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
<i>Central Government Tax Revenue</i>												
1990	9.26	1.85	5	14.65	6.09	17	16.76	6.52	22	17.39	6.95	34
2000	10.28	1.37	3	18.01	20.18	18	15.19	4.77	23	19.58	6.27	43
2010	12.05	3.03	13	14.29	5.68	29	16.57	4.86	36	18.80	6.98	50
2017	14.76	4.38	13	15.56	5.51	30	17.74	5.59	35	19.55	6.72	46
<i>Central Government Expenditure</i>												
1990	28.37	19.39	6	26.14	13.47	13	24.18	10.69	20	31.54	11.77	35
2000	13.43	5.53	2	27.55	31.09	18	21.87	5.58	24	32.58	11.04	42
2010	19.74	19.54	13	22.41	9.28	29	26.79	8.97	36	35.27	11.09	49
2017	18.82	8.97	13	24.86	13.29	30	27.56	8.68	34	31.69	9.71	46
<i>Central Government Gross Operating Balance</i>												
1990	5.11	5.18	4	2.18	2.83	7	-0.48	6.31	9	1.49	3.37	28
2000	0.74	5.58	2	5.30	11.64	8	1.86	2.53	14	2.58	4.84	36
2010	17.33	23.28	2	7.73	17.82	14	1.44	6.05	23	-1.68	6.19	42
2017	5.51	3.18	3	3.48	6.45	16	1.42	4.13	22	2.55	2.70	40
<i>Central Government Debt</i>												
1990	68.82	28.91	17	67.34	44.87	28	55.52	45.04	30	40.97	30.93	42
2000	103.76	82.19	19	87.35	82.71	37	44.47	27.76	40	47.51	33.27	49
2010	34.54	14.73	20	39.38	19.17	38	40.74	30.84	43	54.26	36.59	51
2017	51.19	23.22	17	54.67	31.42	36	52.88	27.20	38	61.22	38.96	47

## Appendix II: Regression Results

**Table 14: Regression Results for Trade Tax Revenue**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness	-2.251** (0.979)	-0.343*** (0.118)	31.555*** (5.932)	9.417*** (1.631)	-0.203** (0.100)	-0.105*** (0.035)	-0.014 (0.010)	-0.014*** (0.004)
Online	-0.044 (0.272)	-0.052 (0.090)	-0.184 (0.383)	-0.010 (0.106)	-0.232* (0.133)	-0.185*** (0.069)	-0.228 (0.139)	-0.205*** (0.070)
Per Capita GDP	-0.798 (0.534)	-0.173*** (0.057)	-0.353 (0.613)	-0.240*** (0.061)	0.177 (0.245)	-0.111** (0.049)	0.232 (0.248)	-0.110** (0.049)
Inflation	0.045 (0.070)	0.035 (0.024)	0.135** (0.058)	0.027 (0.027)	0.003 (0.058)	0.033 (0.021)	0.010 (0.059)	0.040* (0.021)
IMF Program	-0.068 (0.118)	0.018 (0.048)	0.070 (0.146)	-0.040 (0.059)	-0.170** (0.075)	-0.093** (0.041)	-0.165** (0.072)	-0.093** (0.041)
WTO	0.182 (0.285)	-0.039 (0.060)	0.376 (0.286)	0.153** (0.067)	0.339* (0.187)	-0.142*** (0.051)	0.281 (0.181)	-0.107** (0.053)
REER	-1.577 (1.386)	-0.125 (0.145)	-2.012 (1.613)	-0.329** (0.156)	-0.113 (0.295)	0.156 (0.113)	-0.105 (0.303)	0.133 (0.114)
Gini	-0.033 (0.035)	0.000 (0.008)	-0.083** (0.035)	-0.020** (0.010)	0.034 (0.025)	0.025*** (0.008)	0.038 (0.025)	0.026*** (0.008)
Constant	13.672*** (5.033)	1.497* (0.834)	12.854*** (4.354)	3.786*** (0.868)	-2.598 (1.991)	-1.593** (0.705)	-3.839* (2.070)	-1.945*** (0.737)
N	943	782	769	634	842	688	842	688
R <sup>2</sup>	0.400		0.445		0.244		0.235	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 15: Regression Results for Trade Tax Revenue disaggregated by Country Groups**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness LIC	-3.819** (1.739)	-0.023 (0.799)	1.647 (3.068)	9.222 (7.319)	6.133* (3.660)	-0.086 (3.832)	-1.129** (0.528)	-0.360 (0.784)
Openness LMIC	-0.884 (0.648)	-0.082 (0.246)	11.678 (8.571)	4.888 (3.140)	-0.034 (0.137)	-0.004 (0.065)	-0.009 (0.016)	-0.004 (0.007)
Openness UMIC	-2.363** (1.052)	-0.532*** (0.199)	32.296*** (7.290)	8.292*** (1.929)	-0.159 (0.123)	-0.089* (0.053)	-0.024 (0.020)	-0.021*** (0.007)
Openness LDC	3.926*** (1.406)	0.307 (0.703)			-0.367 (0.274)	-0.283 (0.295)	-0.015 (0.019)	-0.044 (0.093)
Online	-0.158 (0.219)	-0.023 (0.090)	-0.157 (0.388)	-0.000 (0.107)	-0.227 (0.147)	-0.147** (0.074)	-0.249 (0.151)	-0.184*** (0.068)
Per Capita GDP	-0.450 (0.590)	-0.191*** (0.056)	-0.309 (0.601)	-0.258*** (0.062)	0.258 (0.254)	-0.145*** (0.047)	0.272 (0.246)	-0.140*** (0.047)

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Inflation	0.057 (0.073)	0.037 (0.024)	0.135** (0.067)	0.037 (0.027)	-0.003 (0.060)	0.030 (0.021)	0.002 (0.059)	0.031 (0.021)
IMF Program	0.018 (0.117)	0.014 (0.048)	0.152 (0.151)	-0.021 (0.060)	-0.160** (0.076)	-0.094** (0.042)	-0.158** (0.074)	-0.089** (0.041)
WTO	0.169 (0.283)	-0.031 (0.060)	0.297 (0.301)	0.078 (0.066)	0.267* (0.139)	-0.162*** (0.052)	0.254 (0.159)	-0.147*** (0.052)
REER	-1.585 (1.429)	-0.096 (0.144)	-2.037 (1.623)	-0.289* (0.157)	-0.156 (0.307)	0.196* (0.113)	-0.136 (0.297)	0.180 (0.114)
Gini	-0.056 (0.034)	-0.003 (0.008)	-0.077* (0.043)	-0.018* (0.010)	0.037 (0.027)	0.026*** (0.008)	0.037 (0.026)	0.029*** (0.008)
Constant	12.261** (4.622)	1.818** (0.827)	13.262*** (4.342)	3.859*** (0.888)	-4.188* (2.305)	-1.475 (0.897)	-4.266* (2.166)	-1.983** (0.772)
N	943	782	769	634	842	688	842	688
R <sup>2</sup>	0.374		0.423		0.236		0.238	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 16: Regression Results for Goods and Services Tax Revenue**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness	-0.000 (0.105)	0.007 (0.027)	-2.692** (1.285)	-0.050 (0.304)	0.009 (0.039)	0.018* (0.010)	0.004 (0.006)	0.004** (0.002)
Online	0.008 (0.041)	-0.003 (0.022)	0.053 (0.036)	0.044** (0.019)	0.007 (0.042)	-0.008 (0.023)	0.009 (0.041)	-0.001 (0.023)
Per Capita GDP	-0.087 (0.100)	-0.023* (0.012)	-0.016 (0.119)	-0.005 (0.009)	-0.127 (0.113)	-0.055*** (0.016)	-0.135 (0.113)	-0.055*** (0.015)
Inflation	-0.012 (0.013)	-0.003 (0.005)	-0.000 (0.015)	0.003 (0.004)	-0.005 (0.014)	-0.003 (0.005)	-0.007 (0.014)	-0.004 (0.005)
IMF Program	0.034 (0.031)	0.045*** (0.011)	0.072** (0.030)	0.059*** (0.010)	0.034 (0.034)	0.039*** (0.013)	0.033 (0.034)	0.039*** (0.013)
WTO	0.187** (0.090)	0.028** (0.014)	0.147 (0.094)	0.027** (0.012)	0.243** (0.109)	0.046*** (0.017)	0.242** (0.111)	0.041** (0.017)
REER	0.236 (0.197)	0.134*** (0.033)	0.236 (0.221)	0.094*** (0.027)	0.218 (0.211)	0.148*** (0.038)	0.209 (0.213)	0.145*** (0.037)
Gini	0.004 (0.007)	0.003 (0.002)	0.003 (0.006)	0.005** (0.002)	-0.003 (0.009)	0.001 (0.003)	-0.004 (0.009)	0.001 (0.003)
Constant	1.630** (0.729)	0.254 (0.188)	1.389** (0.647)	0.404*** (0.144)	2.233*** (0.768)	0.402 (0.253)	2.421*** (0.774)	0.520** (0.257)
N	1152	987	966	830	1055	895	1055	895
R <sup>2</sup>	0.106		0.193		0.097		0.101	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 17: Regression Results for Goods and Services Tax Revenue disaggregated across Country Groups**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness LIC	0.291 (0.447)	0.047 (0.195)	0.842 (0.959)		0.654 (1.054)	0.149 (1.179)	-0.181 (0.124)	-0.186 (0.243)
Openness LMIC	0.133 (0.175)	0.217*** (0.067)	-5.842*** (1.621)	-2.866*** (0.676)	0.187*** (0.049)	0.124*** (0.024)	0.022*** (0.005)	0.013*** (0.002)
Openness UMIC	-0.005 (0.200)	-0.063 (0.048)	-2.093 (1.808)	0.384 (0.368)	0.051 (0.067)	0.043** (0.020)	-0.004 (0.011)	-0.003 (0.004)
Openness LDC	0.051 (0.429)	0.049 (0.174)		-0.282 (1.295)	-0.601*** (0.179)	-0.313*** (0.092)	-0.052*** (0.006)	-0.106*** (0.031)
Online	0.004 (0.040)	-0.002 (0.022)	0.052 (0.034)	0.049** (0.019)	0.035 (0.041)	0.018 (0.025)	0.026 (0.039)	0.010 (0.023)
Per Capita GDP	-0.082 (0.099)	-0.023** (0.011)	-0.012 (0.113)	-0.006 (0.009)	-0.164 (0.115)	-0.062*** (0.014)	-0.132 (0.109)	-0.052*** (0.014)
Inflation	-0.013 (0.012)	-0.004 (0.005)	-0.002 (0.015)	0.003 (0.004)	-0.010 (0.015)	-0.004 (0.005)	-0.006 (0.015)	-0.004 (0.005)
IMF Program	0.034 (0.031)	0.047*** (0.011)	0.074** (0.029)	0.061*** (0.010)	0.048 (0.030)	0.053*** (0.013)	0.055* (0.031)	0.048*** (0.013)
WTO	0.192** (0.089)	0.033** (0.014)	0.152* (0.089)	0.022* (0.011)	0.144 (0.092)	0.037** (0.016)	0.182 (0.126)	0.039** (0.016)
REER	0.254 (0.194)	0.136*** (0.034)	0.260 (0.205)	0.102*** (0.027)	0.243 (0.193)	0.153*** (0.037)	0.266 (0.192)	0.153*** (0.037)
Gini	0.003 (0.007)	0.002 (0.002)	0.004 (0.006)	0.006*** (0.002)	0.004 (0.009)	0.004 (0.003)	0.002 (0.009)	0.003 (0.003)
Constant	1.538** (0.743)	0.288 (0.181)	1.127* (0.668)	0.397*** (0.142)	2.203*** (0.780)	0.520* (0.289)	1.913** (0.757)	0.461* (0.266)
N	1152	987	966	830	1055	895	1055	895
R <sup>2</sup>	0.115		0.220		0.163		0.175	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 18: Regression Results for Direct Tax Revenue**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness	0.052 (0.149)	0.202** (0.083)	0.657 (1.309)	4.454*** (1.101)	0.021 (0.062)	-0.033 (0.027)	0.004 (0.007)	0.007 (0.004)
Online	0.056 (0.068)	-0.039 (0.062)	0.046 (0.075)	-0.013 (0.079)	0.060 (0.067)	-0.005 (0.063)	0.061 (0.064)	-0.010 (0.063)
Per Capita GDP	0.086 (0.123)	0.037 (0.032)	0.102 (0.129)	0.075** (0.035)	0.122 (0.124)	0.127*** (0.041)	0.108 (0.128)	0.079** (0.037)

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Inflation	0.004 (0.015)	-0.006 (0.013)	0.005 (0.016)	-0.004 (0.014)	0.004 (0.014)	-0.002 (0.014)	0.001 (0.015)	0.001 (0.013)
IMF Program	-0.029 (0.052)	0.010 (0.031)	0.001 (0.064)	-0.005 (0.037)	-0.012 (0.060)	0.022 (0.033)	-0.012 (0.059)	0.022 (0.033)
WTO	-0.458 (0.309)	0.021 (0.038)	-0.457 (0.322)	0.081* (0.045)	-0.657 (0.429)	0.065 (0.042)	-0.653 (0.425)	0.048 (0.043)
REER	-0.210 (0.219)	0.017 (0.090)	-0.221 (0.236)	-0.123 (0.095)	-0.131 (0.214)	-0.047 (0.091)	-0.139 (0.213)	0.004 (0.091)
Gini	-0.032*** (0.010)	-0.009 (0.007)	-0.036*** (0.010)	-0.009 (0.007)	-0.029** (0.013)	-0.002 (0.008)	-0.029** (0.013)	-0.000 (0.008)
Constant	2.959*** (0.881)	0.485 (0.524)	2.854*** (0.997)	0.500 (0.561)	2.143** (1.045)	-0.137 (0.612)	2.392* (1.281)	-0.106 (0.611)
N	1154	976	972	826	1070	906	1070	906
R <sup>2</sup>	0.142		0.156		0.160		0.161	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 19: Regression Results for Direct Tax Revenue disaggregated by Country Groups**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness LIC	0.207 (0.491)	0.639 (0.526)	1.229 (1.247)	2.021 (4.505)	2.484 (2.137)	3.729 (3.026)	-0.634*** (0.198)	-0.295 (0.621)
Openness LMIC	0.664** (0.290)	0.705*** (0.191)	-3.772* (2.113)	-1.637 (2.582)	0.331*** (0.107)	0.202*** (0.065)	0.022* (0.012)	0.012* (0.006)
Openness UMIC	0.069 (0.336)	0.125 (0.159)	3.211* (1.780)	8.544*** (1.393)	0.002 (0.073)	-0.078 (0.055)	0.000 (0.010)	0.008 (0.007)
Openness LDC	-0.211 (0.465)	-0.522 (0.464)			-0.122 (0.100)	-0.217 (0.236)	-0.017* (0.010)	0.017 (0.076)
Online	0.058 (0.058)	-0.005 (0.062)	0.058 (0.077)	0.008 (0.078)	0.058 (0.057)	-0.011 (0.068)	0.059 (0.059)	-0.004 (0.064)
Per Capita GDP	0.131 (0.116)	0.049 (0.031)	0.108 (0.124)	0.063* (0.034)	0.051 (0.119)	0.096*** (0.037)	0.094 (0.125)	0.082** (0.036)
Inflation	0.003 (0.016)	-0.010 (0.013)	0.005 (0.016)	0.001 (0.014)	-0.007 (0.014)	0.001 (0.013)	0.001 (0.014)	0.000 (0.013)
IMF Program	-0.024 (0.048)	0.013 (0.031)	0.016 (0.065)	0.006 (0.037)	0.016 (0.061)	0.031 (0.033)	-0.004 (0.058)	0.025 (0.033)
WTO	-0.454 (0.307)	0.031 (0.039)	-0.461 (0.308)	0.052 (0.044)	-0.830** (0.409)	0.040 (0.042)	-0.702 (0.435)	0.043 (0.042)
REER	-0.188 (0.201)	0.026 (0.090)	-0.234 (0.222)	-0.150 (0.096)	-0.080 (0.174)	0.018 (0.090)	-0.115 (0.207)	0.014 (0.090)

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Gini	-0.033*** (0.009)	-0.007 (0.007)	-0.034*** (0.010)	-0.006 (0.007)	-0.019 (0.013)	0.001 (0.008)	-0.024** (0.012)	0.000 (0.008)
Constant	2.562*** (0.917)	0.416 (0.526)	2.852*** (1.065)	0.791 (0.557)	1.777* (1.021)	-0.662 (0.698)	2.057* (1.129)	-0.207 (0.645)
N	1154	976	972	826	1070	906	1070	906
R <sup>2</sup>	0.161		0.167		0.210		0.177	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 20: Regression Results for Total Tax Revenue**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness	0.069 (0.061)	0.059*** (0.018)	1.861*** (0.599)	1.601*** (0.223)	-0.001 (0.018)	0.001 (0.006)	0.000 (0.003)	0.000 (0.001)
Online	0.021 (0.026)	-0.009 (0.015)	0.048** (0.020)	0.022 (0.015)	0.021 (0.023)	-0.018 (0.015)	0.022 (0.023)	-0.017 (0.015)
Per Capita GDP	-0.004 (0.054)	0.003 (0.008)	0.062 (0.047)	0.033*** (0.007)	0.005 (0.062)	0.015 (0.010)	0.005 (0.061)	0.015 (0.009)
Inflation	-0.011 (0.009)	0.001 (0.003)	-0.002 (0.007)	0.002 (0.003)	-0.007 (0.008)	0.001 (0.003)	-0.007 (0.008)	0.001 (0.003)
IMF Program	0.016 (0.021)	0.010 (0.007)	0.044* (0.023)	0.026*** (0.008)	0.013 (0.024)	0.010 (0.008)	0.013 (0.024)	0.010 (0.008)
WTO	0.044 (0.062)	-0.003 (0.009)	0.020 (0.052)	0.018** (0.009)	0.048 (0.092)	0.016 (0.011)	0.047 (0.091)	0.015 (0.011)
REER	0.014 (0.096)	0.011 (0.021)	-0.077 (0.097)	-0.043** (0.019)	0.009 (0.089)	-0.011 (0.023)	0.008 (0.090)	-0.011 (0.023)
Gini	-0.011*** (0.003)	-0.002 (0.002)	-0.011*** (0.002)	0.000 (0.001)	-0.008* (0.004)	0.003 (0.002)	-0.008* (0.004)	0.002 (0.002)
Constant	3.402***	1.034***	3.310***	1.047***	3.081***	0.856***	3.088***	0.866***
N	1192	1027	998	863	1091	932	1091	932
R <sup>2</sup>	0.121		0.201		0.138		0.138	

Standard errors in parentheses, \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 21: Regression Results for Total Tax Revenue disaggregated by Country Group**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness LIC	0.340* (0.202)	0.128 (0.128)	1.270*** (0.475)		-0.201 (0.782)	-0.413 (0.773)	-0.075 (0.073)	-0.269* (0.159)
Openness LMIC	0.348*** (0.122)	0.275*** (0.041)	-0.059 (1.141)	0.478 (0.507)	0.097*** (0.028)	0.064*** (0.015)	0.007* (0.004)	0.004*** (0.002)
Openness UMIC	0.097 (0.078)	0.026 (0.032)	2.190*** (0.789)	1.665*** (0.271)	0.025 (0.022)	-0.009 (0.012)	0.001 (0.005)	-0.003 (0.002)
Openness LDC	-0.097 (0.176)	-0.028 (0.113)		2.585*** (0.981)	-0.255*** (0.085)	-0.155** (0.060)	-0.019*** (0.004)	-0.014 (0.019)
Online	0.019 (0.023)	0.001 (0.014)	0.052** (0.021)	0.022 (0.015)	0.034 (0.022)	0.003 (0.016)	0.029 (0.022)	-0.015 (0.015)
Per-capita GDP	0.009 (0.050)	0.005 (0.007)	0.065 (0.046)	0.027*** (0.007)	-0.012 (0.059)	0.012 (0.009)	0.001 (0.059)	0.016* (0.009)
Inflation	-0.011 (0.009)	-0.000 (0.003)	-0.002 (0.008)	0.003 (0.003)	-0.010 (0.008)	0.000 (0.003)	-0.007 (0.008)	0.001 (0.003)
IMF Program	0.016 (0.020)	0.014* (0.007)	0.049* (0.025)	0.027*** (0.008)	0.020 (0.023)	0.018** (0.008)	0.020 (0.023)	0.012 (0.008)
WTO	0.048 (0.062)	-0.000 (0.009)	0.016 (0.051)	0.009 (0.009)	-0.006 (0.080)	0.008 (0.011)	0.029 (0.092)	0.011 (0.011)
REER	0.034 (0.089)	0.020 (0.021)	-0.081 (0.095)	-0.040** (0.019)	0.019 (0.082)	-0.007 (0.023)	0.029 (0.083)	-0.005 (0.023)
Gini	-0.011*** (0.003)	-0.001 (0.001)	-0.011*** (0.003)	-0.001 (0.001)	-0.005 (0.004)	0.004* (0.002)	-0.007 (0.004)	0.003* (0.002)
Constant	3.227*** (0.305)	1.090*** (0.135)	3.348*** (0.345)	1.094*** (0.130)	3.087*** (0.421)	1.011*** (0.186)	2.965*** (0.408)	0.789*** (0.172)
N	1192	1027	998	863	1091	932	1091	932
R <sup>2</sup>	0.168		0.199		0.180		0.159	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 22: Regression Results for Government Expenditure**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness	1.447 (1.793)	-1.051 (1.647)	36.809 (28.529)	11.669 (22.701)	0.063 (0.805)	-1.385** (0.552)	0.016 (0.134)	-0.208** (0.094)
Online	-0.211 (1.279)	0.575 (2.162)	0.221 (1.288)	-0.972 (2.692)	-0.379 (1.198)	2.173 (2.104)	-0.375 (1.189)	1.193 (2.039)
Per-capita GDP	3.309** (1.521)	1.163* (0.620)	2.575 (1.688)	1.355** (0.654)	1.943 (1.277)	2.397*** (0.787)	1.914 (1.264)	1.927*** (0.714)

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Inflation	0.010 (0.390)	-0.086 (0.226)	0.056 (0.462)	-0.300 (0.258)	-0.039 (0.385)	-0.214 (0.242)	-0.049 (0.422)	-0.116 (0.235)
IMF Program	0.484 (0.676)	0.571 (0.635)	0.506 (0.800)	0.113 (0.733)	0.038 (0.902)	0.178 (0.678)	0.050 (0.877)	0.096 (0.674)
WTO	1.344 (1.957)	0.605 (0.756)	0.786 (2.653)	1.134 (0.909)	3.475 (2.297)	-0.059 (0.870)	3.487 (2.339)	0.162 (0.866)
Gini	0.129 (0.180)	0.034 (0.152)	0.043 (0.157)	-0.152 (0.187)	0.323 (0.239)	0.032 (0.175)	0.321 (0.232)	-0.007 (0.175)
REER	2.075 (2.257)	-1.781 (2.000)	1.237 (1.910)	-1.597 (2.052)	1.265 (2.200)	-4.652** (1.857)	1.245 (2.273)	-4.155** (1.834)
Constant	-48.457*** (12.630)	-3.678 (13.455)	-37.875** (16.586)	-5.257 (15.051)	-44.813*** (12.489)	10.321 (14.506)	-44.104*** (12.248)	5.663 (14.437)
N	946	870	788	717	813	739	813	739
R2	0.096		0.096		0.111		0.111	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 23: Regression Results for Government Expenditure disaggregated by Country Groups**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness LIC	4.969*** (1.721)	-1.180 (4.073)	-21.846 (24.198)	1.015 (75.968)	-96.840*** (23.832)	-130.097** (57.600)		
Openness LMIC	-3.719 (5.227)	3.075 (5.429)	172.910*** (60.302)	-18.376 (163.833)	0.738 (1.270)	1.864 (1.456)	0.076 (0.200)	0.240 (0.177)
Openness UMIC	1.231 (3.770)	5.171* (3.030)	34.117 (28.913)	0.692 (25.221)	-1.435 (1.083)	-0.371 (1.028)	-0.259 (0.155)	-0.475*** (0.152)
Openness LDC								
Online	-0.220 (1.240)	0.208 (2.219)	0.339 (1.285)	-1.136 (2.698)	-0.206 (1.127)	0.557 (2.072)	-0.636 (1.309)	0.825 (2.032)
Per-capita GDP	2.953** (1.383)	0.795 (0.610)	2.241 (1.655)	1.306** (0.659)	2.328 (1.554)	1.222* (0.701)	2.278 (1.401)	1.572** (0.686)
Inflation	0.033 (0.399)	-0.109 (0.226)	0.077 (0.462)	-0.285 (0.258)	-0.082 (0.432)	-0.133 (0.237)	-0.043 (0.416)	-0.121 (0.234)
IMF Program	0.354 (0.687)	0.506 (0.640)	0.475 (0.832)	0.080 (0.734)	0.289 (0.901)	0.010 (0.681)	-0.032 (0.879)	0.226 (0.674)
WTO	1.209 (1.956)	0.007 (0.784)	0.650 (2.787)	0.930 (0.890)	3.057 (1.960)	0.056 (0.871)	2.736 (2.089)	-0.126 (0.865)



	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
REER	2.346 (2.443)	-0.032 (2.045)	1.069 (1.875)	-1.795 (2.045)	0.902 (2.178)	-4.129** (1.838)	1.162 (2.120)	-3.873** (1.828)
Gini	0.148 (0.171)	0.046 (0.155)	0.038 (0.161)	-0.152 (0.187)	0.341 (0.226)	-0.044 (0.179)	0.351 (0.221)	-0.017 (0.175)
Constant	-48.172*** (12.379)	-8.587 (13.825)	-33.310* (16.629)	-4.331 (15.180)	-31.256** (13.336)	28.665 (17.522)	-49.180*** (13.203)	6.465 (14.379)
N	946	870	788	717	813	739	813	739
R <sup>2</sup>	0.100		0.108		0.126		0.121	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 24: Regression Results for Government Gross Operating Balance**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness	0.027*** (0.006)	0.028*** (0.004)	-0.002 (0.061)	0.038 (0.057)	0.003 (0.002)	-0.002* (0.001)	0.000 (0.000)	-0.000 (0.000)
Online	-0.000 (0.002)	0.000 (0.003)	0.000 (0.003)	0.002 (0.003)	-0.000 (0.002)	0.001 (0.003)	-0.000 (0.002)	0.001 (0.003)
Per-capita GDP	0.014*** (0.005)	-0.006*** (0.002)	0.011** (0.005)	-0.000 (0.002)	0.015*** (0.005)	-0.000 (0.003)	0.014** (0.005)	-0.003 (0.002)
Inflation	0.000 (0.001)	0.001 (0.001)	-0.000 (0.001)	0.001* (0.001)	-0.000 (0.001)	0.001 (0.001)	-0.001 (0.001)	0.001* (0.001)
IMF Program	-0.003* (0.002)	-0.002 (0.002)	-0.004* (0.002)	-0.001 (0.002)	-0.003 (0.002)	-0.002 (0.002)	-0.004 (0.002)	-0.002 (0.002)
WTO	-0.004 (0.006)	0.000 (0.002)	-0.006 (0.007)	0.002 (0.002)	-0.009 (0.009)	0.000 (0.003)	-0.009 (0.009)	0.000 (0.003)
REER	-0.004 (0.007)	0.012** (0.006)	-0.009 (0.008)	-0.005 (0.005)	-0.015** (0.007)	-0.006 (0.007)	-0.015** (0.007)	-0.002 (0.006)
Gini	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.001)	-0.000 (0.000)	-0.000 (0.001)
Constant	0.636*** (0.038)	0.421*** (0.032)	0.656*** (0.041)	0.402*** (0.033)	0.630*** (0.052)	0.456*** (0.039)	0.660*** (0.057)	0.454*** (0.040)
N	921	719	904	715	824	648	824	648
R <sup>2</sup>	0.292		0.224		0.282		0.283	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 25: Regression Results for Government Gross Operating Balance disaggregated by Country Group**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness LIC	0.026*** (0.008)		-0.302*** (0.099)	-0.468 (0.456)	-0.081 (0.078)			
Openness LMIC	0.037* (0.020)	0.055*** (0.014)	-0.039 (0.121)	-0.023 (0.342)	0.003 (0.003)	-0.001 (0.006)	0.001** (0.001)	0.000 (0.002)
Openness UMIC	0.000 (0.008)	0.029*** (0.009)	0.113*** (0.042)	0.150** (0.066)	-0.004* (0.002)	-0.006*** (0.002)	0.000 (0.000)	-0.000 (0.001)
Openness LDC		0.043** (0.021)					-0.053*** (0.008)	0.227** (0.107)
Online	0.000 (0.003)	0.001 (0.003)	0.001 (0.003)	0.002 (0.003)	-0.000 (0.002)	0.000 (0.003)	-0.000 (0.002)	0.001 (0.003)
Per-capita GDP	0.013** (0.005)	-0.002 (0.002)	0.010** (0.005)	-0.000 (0.002)	0.015*** (0.005)	-0.002 (0.002)	0.013** (0.005)	-0.003* (0.002)
Inflation	-0.000 (0.001)	0.001 (0.001)	-0.000 (0.001)	0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)	0.001* (0.001)
IMF Program	-0.003 (0.002)	-0.002 (0.002)	-0.004* (0.002)	-0.001 (0.002)	-0.003 (0.002)	-0.002 (0.002)	-0.003 (0.002)	-0.002 (0.002)
WTO	-0.006 (0.007)	0.002 (0.002)	-0.006 (0.006)	0.002 (0.002)	-0.011 (0.010)	0.000 (0.003)	-0.011 (0.008)	0.001 (0.003)
REER	-0.007 (0.008)	0.004 (0.006)	-0.010 (0.008)	-0.007 (0.006)	-0.015** (0.007)	-0.003 (0.006)	-0.015** (0.007)	-0.002 (0.006)
Gini	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.001 (0.000)	0.000 (0.000)	-0.001 (0.001)	0.000 (0.000)	-0.000 (0.001)
Constant	0.637*** (0.043)	0.406*** (0.032)	0.659*** (0.043)	0.422*** (0.032)	0.639*** (0.048)	0.465*** (0.039)	0.646*** (0.051)	0.468*** (0.040)
N	921	719	904	715	824	648	824	648
R <sup>2</sup>	0.257		0.229		0.284		0.287	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 26: Regression Results for Government Debt**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness	0.060 (0.220)	-0.132*** (0.046)	-4.193 (2.774)	-0.951* (0.524)	0.159** (0.067)	0.044** (0.018)	0.009 (0.009)	0.002 (0.002)
Online	-0.142 (0.087)	0.113*** (0.028)	0.188 (0.115)	0.048 (0.033)	-0.135 (0.086)	0.104*** (0.028)	-0.169* (0.087)	0.105*** (0.028)
Per-capita GDP	-0.579*** (0.150)	-0.026 (0.020)	-0.539*** (0.162)	0.000 (0.018)	-0.648*** (0.142)	-0.086*** (0.023)	-0.711*** (0.140)	-0.066*** (0.022)
Inflation	-0.047** (0.020)	-0.020*** (0.007)	-0.019 (0.024)	-0.013* (0.008)	-0.040** (0.020)	-0.018** (0.008)	-0.051** (0.019)	-0.020** (0.008)

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
IMF Program	0.109 (0.081)	-0.005 (0.019)	0.126** (0.058)	-0.006 (0.020)	0.114 (0.075)	0.005 (0.020)	0.102 (0.076)	-0.000 (0.020)
WTO	0.443** (0.179)	-0.002 (0.023)	0.225 (0.174)	-0.081*** (0.023)	0.202 (0.158)	-0.000 (0.026)	0.239 (0.161)	-0.000 (0.026)
REER	0.071 (0.215)	-0.144*** (0.049)	-0.081 (0.260)	0.017 (0.051)	-0.035 (0.175)	-0.108** (0.048)	-0.021 (0.172)	-0.115** (0.048)
Gini	0.018 (0.012)	0.001 (0.003)	0.038*** (0.014)	0.001 (0.004)	-0.002 (0.008)	0.002 (0.004)	-0.001 (0.008)	0.002 (0.004)
Volatility	0.002 (0.004)	0.001*** (0.000)	0.000 (0.004)	0.001*** (0.000)	0.003 (0.004)	0.001*** (0.000)	0.005 (0.004)	0.001*** (0.000)
Constant	6.910*** (1.178)	1.912*** (0.308)	8.594*** (1.441)	0.604** (0.305)	8.237*** (1.226)	2.237*** (0.361)	8.948*** (1.306)	2.182*** (0.363)
N	1391	1251	956	846	1283	1156	1283	1156
R <sup>2</sup>	0.250		0.351		0.321		0.306	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 27: Regression Results for Government Debt disaggregated by Country Groups**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness LIC	-1.715** (0.681)	-0.572** (0.250)	2.352 (1.423)		-1.728 (1.885)	-0.340 (0.707)	-0.135*** (0.034)	-0.037** (0.019)
Openness LMIC	-0.818** (0.314)	-0.346*** (0.105)	2.063 (4.466)	-1.320 (1.309)	-0.031 (0.095)	-0.012 (0.034)	-0.018 (0.013)	-0.004 (0.004)
Openness UMIC	-0.108 (0.338)	-0.278*** (0.082)	-5.941 (3.562)	-1.299** (0.622)	0.225*** (0.063)	0.040 (0.041)	0.019* (0.011)	-0.000 (0.005)
Openness LDC	0.902 (0.659)	0.595** (0.247)		3.608 (2.450)	0.514 (1.052)	0.058 (0.167)	0.128*** (0.017)	0.036*** (0.009)
Online	-0.139 (0.086)	0.111*** (0.028)	0.175 (0.113)	0.047 (0.033)	-0.151* (0.086)	0.103*** (0.029)	-0.196** (0.086)	0.095*** (0.028)
Per-capita GDP	-0.650*** (0.144)	-0.032* (0.019)	-0.539*** (0.152)	0.004 (0.018)	-0.748*** (0.145)	-0.065*** (0.022)	-0.730*** (0.140)	-0.069*** (0.021)
Inflation	-0.045** (0.020)	-0.020*** (0.007)	-0.020 (0.024)	-0.014* (0.008)	-0.043** (0.019)	-0.019** (0.008)	-0.050** (0.019)	-0.021*** (0.008)
IMF Program	0.105 (0.076)	-0.001 (0.019)	0.112* (0.062)	-0.006 (0.020)	0.092 (0.071)	-0.003 (0.020)	0.063 (0.074)	-0.014 (0.020)
WTO	0.441** (0.177)	0.002 (0.023)	0.232 (0.189)	-0.083*** (0.023)	0.233 (0.145)	0.001 (0.026)	0.299** (0.131)	0.010 (0.026)
REER	-0.002 (0.208)	-0.163*** (0.049)	-0.072 (0.270)	0.025 (0.051)	-0.019 (0.174)	-0.120** (0.048)	-0.115 (0.169)	-0.151*** (0.048)
Gini	0.022* (0.011)	-0.002 (0.003)	0.037*** (0.014)	0.001 (0.004)	-0.008 (0.013)	0.002 (0.004)	-0.007 (0.013)	0.001 (0.004)

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Volatility	0.003 (0.004)	0.001*** (0.000)	0.001 (0.004)	0.001*** (0.000)	0.006 (0.004)	0.001*** (0.000)	0.005 (0.003)	0.001*** (0.000)
Constant	7.423*** (1.168)	2.174*** (0.307)	8.476*** (1.415)	0.512* (0.307)	9.640*** (1.758)	2.245*** (0.469)	9.594*** (1.599)	2.433*** (0.373)
N	1391	1251	956	846	1283	1156	1283	1156
R <sup>2</sup>	0.279		0.357		0.320		0.350	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 28: Regression Results for Government Debt Service**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness	-0.153 (0.617)	-0.771*** (0.254)	-0.569 (6.610)	9.341*** (2.230)	-0.105 (0.155)	-0.217** (0.106)	-0.029 (0.018)	-0.023** (0.010)
Online	0.193 (0.178)	0.226 (0.139)	0.195 (0.179)	0.227* (0.135)	0.182 (0.177)	0.224 (0.145)	0.189 (0.177)	0.219 (0.145)
Per-capita GDP	0.802 (0.764)	0.439*** (0.107)	0.927 (0.735)	0.386*** (0.102)	1.092 (0.779)	0.525*** (0.118)	1.157 (0.773)	0.498*** (0.114)
Inflation	0.035 (0.088)	-0.066 (0.042)	0.053 (0.099)	-0.118*** (0.043)	0.086 (0.092)	-0.020 (0.046)	0.115 (0.092)	-0.018 (0.046)
IMF Program	0.249*** (0.085)	0.248** (0.099)	0.233*** (0.082)	0.191** (0.095)	0.223*** (0.079)	0.180* (0.103)	0.208** (0.085)	0.167 (0.104)
WTO	-0.443 (0.417)	-0.258*** (0.096)	-0.482 (0.402)	-0.181* (0.098)	-0.429 (0.386)	-0.217** (0.104)	-0.418 (0.379)	-0.208** (0.104)
Gini	0.086*** (0.025)	0.058*** (0.018)	0.094*** (0.025)	0.048*** (0.018)	0.088*** (0.023)	0.068*** (0.021)	0.094*** (0.026)	0.075*** (0.021)
REER	-3.314** (1.520)	-2.196*** (0.231)	-3.385** (1.451)	-2.241*** (0.212)	-3.625*** (1.294)	-2.166*** (0.229)	-3.521** (1.307)	-2.153*** (0.227)
Constant	7.463* (3.812)	4.881*** (1.583)	7.177** (3.408)	6.181*** (1.587)	6.214* (3.600)	4.420** (1.738)	4.532 (3.980)	3.688** (1.728)
N	420	339	413	334	394	318	394	318
R <sup>2</sup>	0.450		0.454		0.491		0.501	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table 29: Regression Results for Government Debt Service disaggregated by Country Groups.**

	Trade as % of GDP		Effective Tariff Rate		Bilateral Treaty Links		Hub Connectedness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM
Openness LIC	-1.233 (0.813)	-1.062 (0.968)	27.933 (19.011)	18.194 (20.119)				
Openness LMIC	-0.325 (0.691)	-1.601*** (0.577)	4.185 (5.592)	5.895* (3.404)	-0.103 (0.089)	-0.246* (0.135)	-0.017 (0.011)	-0.025* (0.013)
Openness UMIC	-0.424 (0.568)	-0.671* (0.350)	-0.129 (7.174)	9.367*** (2.711)	0.065 (0.216)	-0.020 (0.232)	-0.005 (0.026)	-0.014 (0.017)
Openness LDC							-1.316** (0.625)	3.101 (4.945)
Online	0.197 (0.176)	0.245* (0.139)	0.193 (0.179)	0.245* (0.136)	0.199 (0.182)	0.228 (0.146)	0.183 (0.169)	0.218 (0.146)
Per-capita GDP	0.817 (0.796)	0.448*** (0.108)	0.957 (0.743)	0.352*** (0.101)	1.100 (0.784)	0.484*** (0.115)	1.120 (0.787)	0.481*** (0.115)
Inflation	0.033 (0.085)	-0.051 (0.044)	0.054 (0.102)	-0.094** (0.043)	0.090 (0.092)	-0.012 (0.047)	0.088 (0.092)	-0.012 (0.047)
IMF Program	0.275*** (0.096)	0.275*** (0.101)	0.233** (0.090)	0.186* (0.096)	0.221** (0.084)	0.177* (0.105)	0.225** (0.083)	0.165 (0.105)
WTO	-0.473 (0.424)	-0.293*** (0.098)	-0.485 (0.401)	-0.220** (0.099)	-0.412 (0.391)	-0.224** (0.105)	-0.426 (0.398)	-0.204* (0.106)
REER	-3.429** (1.489)	-2.149*** (0.231)	-3.449** (1.458)	-2.192*** (0.211)	-3.656*** (1.300)	-2.133*** (0.228)	-3.637*** (1.297)	-2.126*** (0.227)
Gini	0.083*** (0.027)	0.059*** (0.018)	0.093*** (0.025)	0.055*** (0.018)	0.084*** (0.025)	0.070*** (0.021)	0.086*** (0.028)	0.073*** (0.022)
Constant	7.902** (3.521)	4.759*** (1.596)	7.206** (3.385)	6.076*** (1.597)	6.252* (3.466)	4.123** (1.736)	5.770 (3.693)	3.879** (1.792)
N	420	339	413	334	394	318	394	318
R <sup>2</sup>	0.454		0.458		0.491		0.492	

Standard errors in parentheses; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

## Appendix III: Full List of Variables and Data Sources

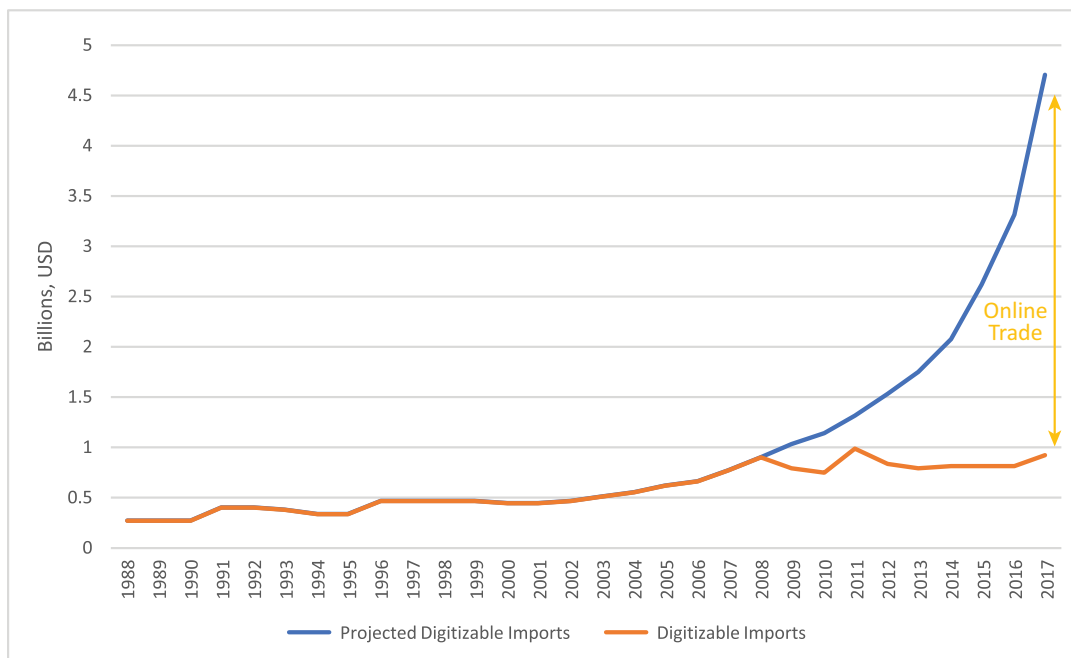
Variable	Sources	Notes
Exports	World Development Indicators	
Imports	World Development Indicators	
(Exports + Imports) /GDP	World Development Indicators	Openness indicator
Collected Tariff Rate (Tariff revenue/Value of Imports)	World Development Indicators	Openness indicator
Hub Connectedness in Trade Treaty Network	GDP center treaty database	Openness indicator
Tax Revenue	IMF Government Financial Statistics	Dependent Variable
Trade tax Revenue	IMF Government Financial Statistics	Dependent Variable
Taxes on Goods and Services	IMF Government Financial Statistics	Dependent Variable
Trade tax Revenue/(Imports + Exports)	IMF Government Financial Statistics	Dependent Variable
Fiscal Deficit	IMF Government Financial Statistics	Dependent Variable
Government Debt	IMF Government Financial Statistics	Dependent Variable
Government External Debt	IMF Government Financial Statistics	Dependent Variable
Government Expenditure	IMF Government Financial Statistics	Dependent Variable
Government Social Expenditure	IMF Government Financial Statistics	Dependent Variable
Government Interest Expenditure	IMF Government Financial Statistics	Dependent Variable
Government Investment Expenditure	IMF Government Financial Statistics	Dependent Variable
Government Expenditure on Environmental Protection	IMF Government Financial Statistics	Dependent Variable
GDP	World Development Indicators	Control Variable
GDP per capita	World Development Indicators	Control Variable
Inflation	World Development Indicators	CPI inflation; Control Variable
Share of Agriculture, forestry, and fishing value added in GDP	World Development Indicators	Control Variable
Informal employment	World Development Indicators	Control Variable
IMF Program	Monitoring of Fund Arrangements Database	Dummy variable for the countries that have an IMF program/lending facility in the relevant years: 1 for IMF program, 0 otherwise; Control Variable, and potential Instrumental Variable
Real Effective Exchange Rate	World Development Indicators	Control Variable
Gini Coefficient	World Development Indicators	Control Variable
VIX	Chicago Board Options Exchange	Volatility Index; Control Variable
World Bank Country Classification	By Income	Low income, lower middle income, upper middle income, high income
	Least Developed Countries	Developed Economy, Economy in Transition, Developing Economy, Least Developed. Classify small island developing states under developing economies

## Appendix IV: Details of Online Trade Share Variable

We calculate the share of online trade in total trade by following a method similar to that in Banga (2019). We do this in six steps, which are as follows:

First, we use the 49 digitizable commodities identified in Banga (2019), which are listed in this Appendix, and calculate the total imports of these commodities by countries and the total imports of all commodities by countries from the UN Comtrade database. Second, we calculate the average rate of growth of imports in digitizable products and the average rate of growth in total imports between 1988 and 2009 by each country. Third, using this average rate of growth of digitizable imports for each country, we project what the physical trade in these commodities would have been in the absence of their online trade. We do this for the years between 2010 and 2018. Fourth, we calculate the projected total imports in each country using the average rate of growth of total imports between 2010 and 2018, similar to in step 3.<sup>2</sup> Fifth, we calculate total online imports by subtracting the actual total physical imports of digitizable products from total projected physical imports of digitizable products, and scale it by the projected total imports calculated in step 4. This gives us the share of online trade between 2009 and 2018. Sixth, in order to not lose our sample of data prior to 2010, we replace our online trade share variable with the share of trade in digitizable products. Therefore, the value of our online trade share variable after 2010 is calculated as described in steps 3 through 5, and before 2010 the value of this variable is simply the share of imports of digitizable goods in total imports. Figure 13 shows the size of the average digitizable imports and our projections based on Steps 1 and 6. The gap between the two lines is the size of online imports.

**Figure 13 : Average Digitizable Imports, 1988-2018**



<sup>2</sup> In this step, we remove any outlier rates of growth in calculating the average rate of growth. Most rates of growth are lower than 100 percent. In fact, in our dataset, 90 percent of rates of growth of digitizable imports and 90 percent of rates of growth of total imports are less than 62.48 percent and 31.29 percent. Therefore, we do not use any rate of growth greater than 500 percent in calculating our average rates of growth. This resulted in discarding 27 rates of growth of digitizable imports and 2 rates of growth of total imports in calculating the average rate of growth of digitizable imports and average rates of growth of total imports by country.

Table 30 shows the average share of online imports in total imports by World Bank country classification based on per-capita income. It also shows the cumulative value of online trade by country classification between 2009 and 2018. By our calculations, LMICs have a high share of online imports and total imports and a high total cumulative value of online imports as well, with the latter being only second to the cumulative value of online trade in HICs.

**Table 30: Online Imports by country classification, 2009–2018**

	Share of Online Imports in Total Imports	Total Cumulative Value of Online Imports, billions USD
Low-Income Countries	1.22%	10.78
Lower-Middle Income Countries	1.66%	285.85
Upper-Middle Income Countries	0.31%	245.90
High-Income Countries	0.24%	1070.04
Total	0.69%	1612.57

## Appendix V: Latest Country Classifications by Income level in Dataset

Low Income Countries			
Afghanistan	Benin	Burkina Faso	Burundi
Central African Republic	Democratic Republic of Congo	Ethiopia	The Gambia
Guinea	Liberia	Madagascar	Malawi
Mali	Mozambique	Nepal	Niger
Rwanda	Tanzania	Togo	Uganda
Zimbabwe			
Lower-Middle Income Countries			
Angola	Bangladesh	Bhutan	Bolivia
Cambodia	Cameroon	Cape Verde	Republic of Congo
Cote d'Ivoire	Egypt	El Salvador	Georgia
Ghana	Honduras	India	Indonesia
Kenya	Kiribati	Kyrgyz Republic	Lesotho
Micronesia	Moldova	Mongolia	Morocco
Myanmar	Nicaragua	Papua New Guinea	Philippines
Solomon Islands	Sri Lanka	Tajikistan	Timor-Leste
Tunisia	Ukraine	Uzbekistan	Vanuatu
Palestinian Authority	Zambia		
Upper-Middle Income Countries			
Albania	Armenia	Azerbaijan	Belarus
Belize	Bosnia and Herzegovina	Botswana	Brazil
Bulgaria	China	Colombia	Costa Rica
Dominican Republic	Equatorial Guinea	Fiji	Guatemala
Iran	Iraq	Jamaica	Jordan
Kazakhstan	Lebanon	Macedonia	Malaysia





## GLOBAL ECONOMIC GOVERNANCE INITIATIVE

*The Global Economic Governance Initiative (GEGI) is a research initiative at Boston University's Global Development Policy Center. The GDP Center is a University wide center in partnership with the Frederick S. Pardee School for Global Studies. The Center's mission is to advance policy-oriented research for financial stability, human wellbeing, and environmental sustainability.*

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*The views expressed in this Working Paper are strictly those of the author(s) and do not represent the position of Boston University, or the Global Development Policy Center.*

Maldives	Marshall Islands	Mauritius	Mexico
Namibia	Paraguay	Peru	Romania
Russia	Samoa	Serbia	South Africa
St. Lucia	St. Vincent and the Grenadines	Thailand	Tonga
Turkey			

### High Income Countries

Argentina	Australia	Austria	The Bahamas
Bahrain	Barbados	Belgium	Canada
Chile	Croatia	Cyprus	Czech Republic
Denmark	Estonia	Finland	France
Germany	Greece	Hungary	Iceland
Ireland	Israel	Italy	Japan
South Korea	Kuwait	Latvia	Lithuania
Luxembourg	Malta	Netherlands	New Zealand
Norway	Palau	Poland	Portugal
Saudi Arabia	Seychelles	Singapore	Slovak Republic
Slovenia	Spain	St. Kitts and Nevis	Sweden
Switzerland	Trinidad and Tobago	United Arab Emirates	United Kingdom
United States	Uruguay		

### Least Developed Economies in Dataset

Afghanistan	Angola	Bangladesh	Benin
Bhutan	Burkina Faso	Burundi	Cambodia
Central African Republic	Democratic Republic of Congo	Ethiopia	The Gambia
Guinea	Kiribati	Lesotho	Liberia
Madagascar	Malawi	Mali	Mozambique
Myanmar	Nepal	Niger	Rwanda
Solomon Islands	Sudan	Tanzania	Timor-Leste
Togo	Uganda	Vanuatu	Zambia