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# **STRUCTURAL DETERMINANTS OF TAX REVENUE IN LATIN AMERICA AND THE CARIBBEAN, 1990-2009**

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**ABSTRACT**

In recent years many studies have been conducted worldwide in order to investigate the structural or long-term determinants of tax revenue (see inter alia Gupta, 2007; Mahdavi, 2007; Profeta and Scabrosetti, 2010). The aim of this study is to extend the empirical literature on this issue by applying standard models to the case of Latin America and the Caribbean. Through panel econometric methodologies, the paper assesses the statistical significance of a number of potential determinants of tax revenue as a share of GDP, using data from 32 Latin American countries over the period 1990-2009. The empirical analysis pays particular attention to examine the relevance of political and historical variables to understand regional differences in tax revenue. The results indicate that, among the variables that exert a statistically significant influence on tax revenue are the following ones: civil liberties, female labor force participation, the age composition of the population, the degree of political stability, the level of education, the population density as well as the size of the shadow economy.



## INTRODUCTION

The level of taxation in Latin America, in particular in Central America, is very low compared with other regions in the world. This is worrying given that an insufficient level of fiscal revenue makes it extremely difficult for any government to adequately provide public services and to meet the basic needs of the population in terms of health, education and security, not to mention to put in place a development agenda to carry out a structural transformation of the economy to boost growth. Low fiscal revenues are in many countries a main cause of poor public services and infrastructure as well an important constraint on social expenditure.

The aim of this paper is to identify the main long-run determinants of tax revenue, both its major items as well as its aggregate total. To do so, the empirical analysis considers three groups of exogenous variables: economic, political and socio-demographic ones. The empirical analysis is based on the application of panel regressions models. The underlying assumption is that by knowing the long-run determinants of tax revenues, policy makers in the region may be better equipped to identify some of the obstacles that fiscal reforms face and, therefore, to identify policy instruments that may help to remove them.

The paper is organized as follows. After this introduction, chapter I presents a brief review of recent studies on the structural determinants of tax revenues in developing countries. Chapter II shows the stylized facts of tax revenues in the samples selected, and chapter III introduces, both, the econometric specification that is used for the empirical analysis and the list of exogenous variables typically considered in the relevant literature on this issue. The results of the econometric analysis are discussed in chapter IV. Finally, chapter V puts forward the conclusions and points to further research on this important topic for the region.





## I. RECENT SELECTED STUDIES OF THE STRUCTURE OF TAXATION ON DEVELOPING COUNTRIES

In the last five to ten years there have been a considerable number of studies devoted to identify the historical determinants factors behind the regional and national differences in taxation structure. Their conclusions are rather diverse, in part due to the heterogeneity in methodologies, the set of countries covered, the specific variables and the periods considered for the empirical analysis.

According to a study of Abhijit Sen Gupta (2007), that covers 105 developing countries over 25 years, the following variables have a positive and statistically significant association with tax revenue per capita: size of the economy as reflected by GDP at purchasing power parity, trade openness, foreign aid, and a number of indicators of political and economic stability. On the other hand, the study concludes that the share of agriculture in GDP, and an indicator of corruption exert a statistically significant negative influence on the level of tax revenues. Dividing his sample in three groups according to the level of income, the study finds that foreign aid has a significant and positive effect on tax revenues in low income countries but not in middle or high income ones. Moreover, he finds a strong, negative relationship between tax revenue and corruption only for the middle and low income countries. Political stability is negatively associated with tax revenue only in high income countries; in the others the association is positive. Finally, he identifies a negative relation between indirect taxes and revenue performance, in the sense that overall tax revenue as a share of GDP tends to be lower in the presence of a relatively high level of taxes on goods and services.

Bird, Martinez-Velasquez and Torgler (2004) analyze data on tax revenues and their determinants in a sample of 110 developing countries for 1990-1999. Among their main conclusions stand out the following ones: i) per capita GDP is positively associated with tax revenue, but trade openness does not have a statistically significant influence, and ii) demographic growth and the share of agriculture in GDP are associated with lower levels of tax revenue. Their results also suggest that the degree of inequality, the size of the shadow economy and the regulation of entry are negatively associated with tax revenue. The indices of civil liberties and political rights, political stability, rule of law and relative absence of corruption have a statically significant positive association with tax revenue. One of their conclusions is that better and more efficient institutions lead to a higher level of tax revenue. However, one could also argue the causality in the opposite direction, i.e. higher levels of taxation make it possible to have efficient institutions. Finally, their study does some regional comparisons and finds that the lower level of tax revenue in Latin America relative to other developing countries is mainly due to the lower quality of its institutions, higher corruption, larger shadow economy and lower tax rates.

Mahdavi (2007), in his analysis of data of 43 developing countries over the period 1973-2002, finds a positive correlation between tax revenue and openness of the economy, the literacy rate and GDP per capita growth rate. On the other hand, he concludes that an increase in foreign aid, in aging of population, in population density and in inflation has a negative relationship with tax revenue, whereas variables such as the share of agriculture on GDP, female labor force participation, economic volatility, civil liberties and political rights are statically insignificant. He also finds a positive correlation between tax revenue obtained from income, profits and capital gains and the level of political rights. However the index of civil liberties he uses is negatively associated with value added tax, property taxes and social security revenues.

Piancastrelli (2001), based on data of 75 developed and developing countries over the period 1985-1995, identifies per capita GDP, the share of industry in GDP and trade openness as the most

important determinants of tax revenue. The share of agriculture on GDP is negatively associated with tax revenue, in line with other studies. Profeta and Scabrosetti (2010) analyzed determinants of tax revenue of 39 developing countries over the period 1990–2004, including 11 Asian, 19 Latin American and 9 recent members of the EU. They identify statistically significant differences in the regional determinants of tax revenue. For instance, GDP per capita and the debt/GDP ratio were not statically significant determinants of tax revenues in the Asian economies included in the sample, but were positive statistically significantly for Latin American countries. But for the whole sample both indicators appear to have a positive but not always significant influence. The share of agriculture over GDP influences tax revenue negatively in Latin America but is not significant in Asia, openness of the economy has a positive impact on tax revenue in Asia and in Europe, but a negative one in Latin America. The index of democratization seems to be positively linked to tax revenue and a higher level of civil liberties and political rights is associated with increased tax performance. For Latin American countries education, the share of population over 65 years old, female labor force participation and the size of the shadow economy are positive and significantly related to tax revenue, whereas population density is not. For Asia variables such as secondary school attainment and urban population are not significant, whereas the share of population over 65 years old is negatively associated with tax revenue.

As highlighted by the above analyses of recent econometric studies, there is no clear pattern of the significance of all the various potential determinants of tax performance in developing countries. However, although some results do vary according to the period analyzed and the sample of countries chosen, in general, indicators like GDP per capita, the share of non-agricultural activities on GDP—which may be interpreted as proxies of a country’s stage of development—have a positive, significant influence on tax revenue. A higher degree of openness and an increasing debt are usually associated with a higher level of taxation. Moreover, democratization, better institutions, less corruption, political stability and the rule of law are usually associated with increased tax revenue.

On the other hand, the association between foreign aid and the shadow economy on tax performance is not clear cut. According to Mahdavi foreign aid tends to be linked with lower tax revenue, whereas Gupta points to a direct effect in the case of low income countries but a non-significant one in the case of richer countries. The size of the shadow economy is positively associated with tax revenue according to Profeta and Scabrosetti (2010), whereas Bird, Martinez Vasquez and Torgler (2004) find a negative correlation. Other factors that, according to the reviewed literature could have an effect on taxation are conflicts, both internal and external. Besley and Persson (2007) analyzed the effects of wars on the fiscal capacity with data of 180 countries from 1945 to 1997. They found that armed conflicts affect the capacity of a government to collect tax revenues: external wars may boost fiscal capacity as governments carry out investments financed by taxes, whereas internal wars decrease tax revenue as conflicts among different groups weaken state institutions. In another study, covering 188 countries over the period 1975-2004, Cárdenas, Eslava and Ramirez (2010) find a negative correlation between internal conflicts and fiscal capacity measured in two different ways: i) as total tax revenue as a percentage of GDP, following Besley and Persson (2007), and ii) as income tax revenue as share of GDP. They partly confirm the results of the previous study; in fact, whereas internal conflicts weaken state capacity, the authors state that external conflicts are not associated with higher levels of tax revenue, in contrast with Besley and Persson (2007). They point out that major international wars shaped fiscal capacity and in part contributed to the formation of the modern state. External conflicts can have a positive impact on fiscal capacity only if the period analyzed is long enough (for instance Besley and Persson analyzed five decades) and if many countries are involved in it. In addition, their study also indicates that the intensity of the internal conflict has an influence on the State’s capacity to collect tax. They find that in Colombia, in 1994-2002, kidnappings and forced displacements tended to decrease tax revenue as a share of GDP as they weakened the capacity to collect taxes. Other variables that, according to the reviewed literature,

affect tax revenue are the level of education, the density of the population, rate of urbanization, female labor force participation and the age composition of the population. The present paper has the aim of providing recent additional econometric evidence on the determinants of the structure of taxation in Latin America, with a special focus on the Caribbean and Central America.

## II. THE TAX STRUCTURE IN LATIN AMERICA: STYLIZED FACTS

The empirical analysis of this paper is based on data for 32 countries in Latin America and the Caribbean<sup>1</sup> over the period 1990–2009. As mentioned in the introduction, the level of tax revenue in Latin American countries is low. In 2009, it stood on average at 19% of GDP, notwithstanding it had increased more than four percentage points since 1990. In comparison, in Europe and in the OECD countries the tax burden was 39.7%<sup>2</sup> and 28.4% of GDP.<sup>3</sup>

Tax revenue certainly did not grow at the same pace in all countries in the region in 1990-2009, and neither the economies expanded at the same pace. On the one hand, some Caribbean countries like St Kitts and Nevis, Haiti, Trinidad and Tobago, as well as Nicaragua in Central America, and Colombia, Ecuador, Argentina, Plurinational State of Bolivia and Brazil in South America increased their tax revenues at an annual average rate of growth over and above 2%. On the other hand, in other countries it decreased—Suriname, Guyana, Belize—and in other it augmented at very a slow pace. In any case, in general the overall tax burden remains very small especially in Central America and—to a lesser extent—in South America. Moreover, it is worrying that in Mexico, Haiti, Guatemala and Panama, the Central Government collects less than 12 percent of the GDP from taxes, in contrast to 23.5% in Brazil or 18.2% in Argentina<sup>4</sup> (see table 1).

As table 2 shows, in the region tax revenues depend more on indirect taxes than direct ones. In fact, the revenue collected from the former is twice as high as that coming from the latter. In addition, another characteristic of the structure of taxation in the region is the high level of evasion and the presence of so called special regimes that imply a significant loss of fiscal revenue to groups of interest. In the next chapter we present the functional specification of the econometric model—and discuss its results—used here to assess the relevance of a series of economic and political variables as determinants of tax revenue in Latin American countries. The results of the empirical analysis may serve as an input not only for the academic debate but, hopefully, also for policy makers.

Among the economic variables that is a priori expected to have an impact on tax revenue stand out the rate of growth and the level of GDP per capita. The growth performance of countries in the region has been uneven, with periods of high growth followed by others of slow and in some countries on occasion even negative growth. Moreover, as is well known in the last three decades Latin America grew, on average, at a slower pace than East Asian counterparts despite having applied radical market reforms in the 1980s and 1990s. Focusing on the period 1990-2010 one can distinguish two broad groups of countries in Central America and the Caribbean. The first one formed by countries that experienced, in general, high growth rates of real GDP, and includes Panama, the Dominican Republic, Trinidad and Tobago, Costa Rica and Antigua and Barbuda. The second conformed by Grenada, the Bahamas, Jamaica, Barbados, St Lucia and Haiti had weak economic growth. Interesting enough, for this sample and period, it seems that countries that have always had, for historical reasons, high level of tax revenue—such as the former British colonies—, had a weak growth performance these years compared to countries with relative low tax revenues level (see table I-1 in annex I).

<sup>1</sup> Data for Cuba with the desired disaggregation was not available.

<sup>2</sup> Source: EUROSTAT, webpage [http://epp.eurostat.ec.europa.eu/cache/ITY\\_OFFPUB/KS-SF-11-026/EN/KS-SF-11-026-EN.PDF](http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-11-026/EN/KS-SF-11-026-EN.PDF); data related to tax revenue including social contributions of the general government.

<sup>3</sup> Source: OECD, Centre for Tax Policy and Administration, webpage <http://stats.oecd.org/Index.aspx>.

<sup>4</sup> Source: CEPALSTAT, related to fiscal revenue of Central Government excluding grants and donations.

**TABLE 1**  
**LATIN AMERICA AND THE CARIBBEAN: TAX REVENUE, 1990-2009**  
*(Percentages of GDP)*

Country	Tax revenue as % of GDP			
	1990	2000	2005	2009
<b>Total</b>	<b>13.8</b>	<b>16.0</b>	<b>18.3</b>	<b>19.0</b>
<b>Caribbean</b>	<b>18.8</b>	<b>20.1</b>	<b>22.6</b>	<b>23.7</b>
<b>Spanish colonies</b>	<b>8.9</b>	<b>10.2</b>	<b>12.1</b>	<b>12.4</b>
Dominican Republic	10.5	12.5	14.6	13.1
Haiti	7.3	7.9	9.7	11.7
<b>British and Dutch colonies</b>	<b>21.6</b>	<b>21.9</b>	<b>24.2</b>	<b>25.4</b>
Antigua and Barbuda	18.4	15.8	19.4	19.3
Bahamas		15.6	16.7	16.8
Barbados		31.1	31.4	32.3
Belize			20.5	21.6
Dominica		24.9	28.4	31.6
Granada	22.3	22.7	23.0	22.9
Guyana	22.9	18.3	20.2	21.6
Jamaica	20.7	22.6	23.4	26.7
St Kitts	16.7	21.2	29.0	26.8
St Vincent and the Grenadines	24.0	23.7	25.5	27.1
St Lucia	26.0	22.6	23.3	28.1
Suriname			27.8	31.1
Trinidad y Tobago		22.1	26.4	24.7
<b>Central America</b>	<b>9.8</b>	<b>12.0</b>	<b>12.9</b>	<b>13.3</b>
Costa Rica	11.0	12.3	13.6	13.8
El Salvador	9.3	10.2	12.4	12.4
Guatemala	7.7	11.5	11.5	10.7
Honduras	12.4	13.7	14.5	14.4
Nicaragua	8.1	14.5	16.7	17.7
Panama	10.3	9.6	8.7	10.9
<b>South America and Mexico</b>	<b>11.7</b>	<b>13.5</b>	<b>15.3</b>	<b>15.4</b>
Argentina	10.2	12.9	15.8	18.2
Bolivia (Plurinational State of)	14.5	15.3	20.5	
Brazil		19.9	22.7	23.5
Chile	14.7	17.9	18.3	16.1
Colombia	7.0	9.4	12.4	12.9
Ecuador	7.8	10.0	10.1	13.9
Mexico	9.8	9.7	8.8	9.6
Paraguay	10.0	12.0	13.0	14.5
Peru	10.8	12.2	13.6	13.4
Uruguay	14.1	16.4	18.3	18.0
Venezuela (Bolivarian Republic of)	17.8	12.9	15.3	13.5

Source: ECLAC.

**TABLE 2**  
**LATIN AMERICA: DIRECT, INDIRECT AND TOTAL TAX REVENUE, 1990-2009**  
*(Percentages of GDP)*

	Tax revenue as share of GDP			
	1990	2000	2005	2009
Central America	9.8	12.0	12.9	13.3
Caribbean	18.8	20.1	22.6	23.7
South America and Mexico	11.7	13.5	15.3	15.4
Direct tax revenue as share of GDP				
Central America	2.7	3.1	4.0	4.9
Caribbean	5.7	6.1	6.8	7.8
South America and Mexico	3.8	4.0	5.1	5.3
Indirect tax revenue as share of GDP				
Central America	6.5	8.4	8.8	8.2
Caribbean	11.0	11.6	14.7	14.7
South America and Mexico	6.0	8.2	8.6	8.5

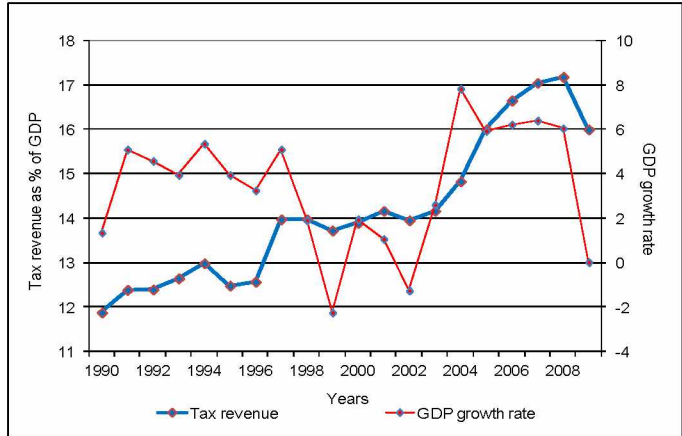
Source: ECLAC, elaborated by the author on the basis of a simple average.

Note: The sum of direct and indirect tax revenue does not coincide with total tax revenue because other taxes and tax devolutions are not classifiable as direct and indirect taxes.

Analyzing the economic performance of the South American economies and Mexico, the pattern in this regard is somewhat similar to the one mentioned above of the Caribbean and Central America. During 1990-2009 Chile, Argentina, Peru and Uruguay registered an average annual rate of growth of real GDP higher than 2.5%. On the other hand Bolivarian Republic of Venezuela, Mexico and Paraguay had an even less dynamic performance with an average annual GDP growth rate around 1%. In addition it should be mentioned that for the region the average rate of economic expansion post 1990 has been lower than the one that characterized its growth path during 1950-1980. In addition, the region's economic expansion in recent decades has been marked by episodes of high volatility and not infrequent financial or balance of payments crisis.

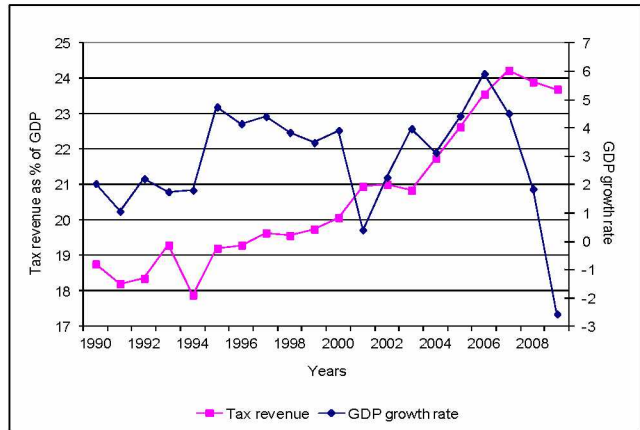
In general for the whole region the evolution of tax revenue does not exactly mirror that of the rate of growth of GDP. There appears to be some correlation on their cyclical fluctuations, but the long-term trend of tax revenue as a share of GDP in the subregions follows different patterns from the corresponding long-term rate of economic expansion (see figures 1 to 4). The empirical analysis, reported in the following chapter, explores for Latin America the statistical significance of the ample set of variables —suggested by the specialized literature— that may have a persistent influence on tax revenues and capture key economic, political, historical, demographic and even geographic characteristics of the countries in the region.

**FIGURE 1**  
**TAX REVENUE AND GDP GROWTH RATE IN**  
**CENTRAL AMERICA, 1990-2008**



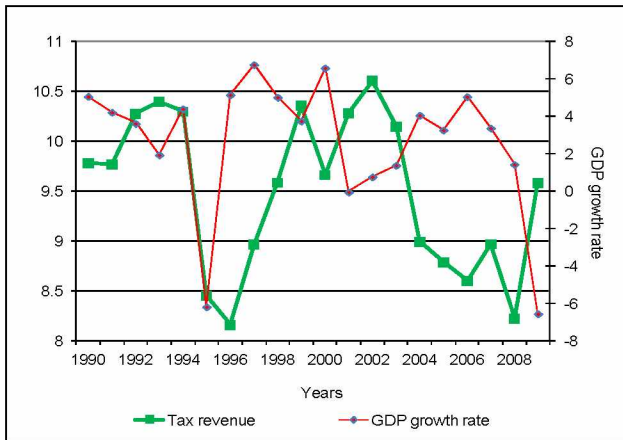
Source: ECLAC.

**FIGURE 3**  
**TAX REVENUE AND GDP GROWTH RATE**  
**IN MEXICO, 1990-2008**



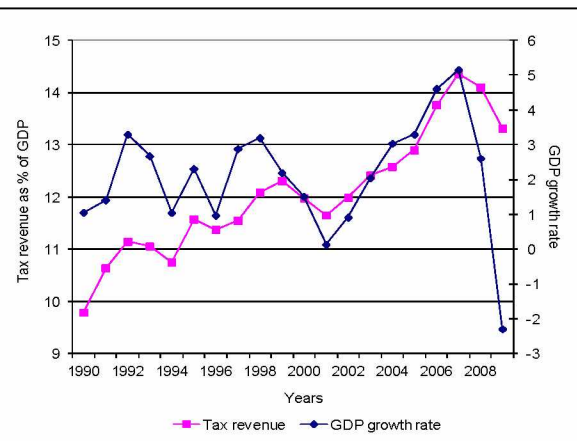
Source: ECLAC.

**FIGURE 2**  
**TAX REVENUE AND GDP GROWTH RATE IN**  
**SOUTH AMERICA, 1990-2008**



Source: ECLAC.

**FIGURE 4**  
**TAX REVENUE AND GDP GROWTH RATE**  
**IN THE CARIBBEAN, 1990-2008**



Source: ECLAC.



### III. ECONOMETRIC METHODOLOGY

The empirical analysis is based on an application of panel data econometric methods with a balanced panel dataset and random effect regressions utilizing a sample of 32 countries over the period 1990-2009. Following the standard methodology, the individual effects in the random effects model are specified through a variable that is uncorrelated with the independent variables. In the fixed effects models a correlation between the individual error term and the predictor variables is assumed. According to the relevant literature, random effects models are preferred when differences between countries are assumed to influence the dependent variable (see *inter alia* Torres-Reyna, 2010). Random effects models tend to be preferred if the number of individual observations  $N$  is large relative to the time dimensions, so that the individual effects can be considered random (Hsiao, 2004). In fact, random effects models have been widely used in the empirical studies on the topic of the present paper (Profeta, Scabrosetti 2010; Gupta, 2007; Ranjan, 2011), though sometimes combined with other models. We ran regressions using fixed effect specifications but the results obtained tended not to be significantly different from those derived through random effects models.<sup>5</sup>

In the adopted model specification, the dependent variable is tax revenue as a share of GDP. It includes all revenues of the Central Government collected through taxes, but excludes grants, donations and revenue coming from petroleum and natural resources.<sup>6</sup> Data was derived from CEPALSTAT.<sup>7</sup> It is important to point out that we also ran regressions taking the dependent variable either as revenue collected through direct taxes or as revenue collected through indirect ones. The procedure for the inclusion of exogenous variables in the model specification was the following one: First, were considered the key variables that, according to the empirical results of the literature, may a priori play a role in explaining tax revenue. Second, control variables were added with the double purpose to evaluate their effect on tax revenue and to strengthen the model through a robustness check (table 3).

#### A. ECONOMIC VARIABLES INCLUDED IN THE EMPIRICAL ANALYSIS

GDP per capita, at constant US dollars of 2000 and expressed in logarithm serves as a proxy for the level of development of a country. The model tested the relation between GDP growth and tax revenue in Latin America but did not find consistent evidence (see chapter II). However there is a positive correlation between GDP per capita (expressed in logarithm) and tax revenue (see figure II-1 in annex II).<sup>8</sup> The relation between tax revenue and the level of development of a country has been studied in the literature. *Inter alia* Hinrichs (1966) and Tanzi (1992) found a positive correlation between them. Indeed, according to Wagner's law, since the demand for public services is income elastic, economic development is associated with an increased request for public goods and services which need to be financed *inter alia* by increasing tax revenue (Tanzi, 1987). Also, development is associated with greater State capacity to levy and collect taxes (Celliah, 1971).

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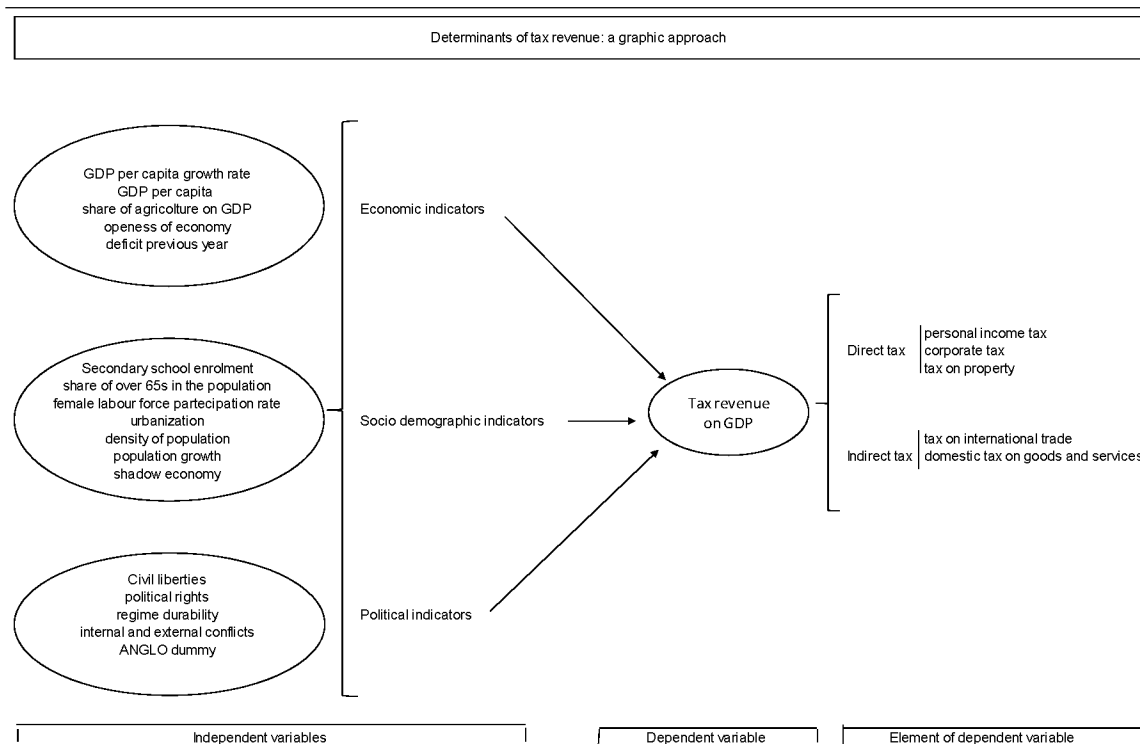
<sup>5</sup> Heteroscedasticity, common in cross sectional data, could not be ruled out and thus error terms do not have constant variance, the standard errors of the estimates are biased and the estimates may assume "wrong" values. The analysis was done using STATA and applying standard procedures to correct for this problem.

<sup>6</sup> Revenues from Panama Canal transit and from Mexican natural resources are not included. The exception is Trinidad and Tobago, where total tax revenue of the Central government includes petroleum revenue.

<sup>7</sup> Data on tax revenue was obtained from <http://www.eclac.cl/estadisticas/>. For many Caribbean countries, data was collected from other official sources by the author.

<sup>8</sup> In all graphs in this chapter, the average tax revenue is captured on the y-axis, and the average coefficient of exogenous variables is captured on the x-axis, for 1990-2009.

**TABLE 3**  
**A DIAGRAMATIC ILLUSTRATION OF THE MODEL SPECIFICATION APPROACH**  
**ADOPTED IN THE REGRESSION ANALYSIS**



Source: Elaborated by the author.

The share of agriculture over GDP is another variable used as a proxy for development. A strong negative relation between agriculture's share in GDP and tax revenue can be expected. In the developing countries it is not easy to tax the rural sector, since a large part of it consists of subsistence and small farmers, notoriously difficult to tax given the large numbers that sell their products in informal markets (Stotsky and WoldeMarian, 1997). On the other hand, since many public sector activities are urban based, a declining share of agriculture in GDP tends to be linked to an increase in demand for public expenditures and thus put pressure to raise tax revenue (Tanzi, 1992). In Latin America and Caribbean the level of tax revenue on average is low, but some countries like Guyana, Dominica and Belize have a relatively important agricultural sector and at the same time relatively high tax revenue. Due to the high collinearity between the share of agriculture in GDP and GDP per capita ( $-0.77$ ), both indicators may serve as proxies for development, we took only "agriculture" among the fixed and principal variables for the empirical analysis, and ran separate regressions to evaluate the effect of GDP per capita (expressed in logarithm) on tax revenue.

The literature identifies the openness of the economy, measured by the sum of exports and imports as a share of GDP (see figure II-2 in annex II), as a potential determinant of tax revenue even though previous analysis are not conclusive. Taxes on imports and exports are easy to impose given the easily identifiable source of collection. Furthermore, since open economies are more exposed to external risks, their governments could be expected to build better insurance systems in order to protect their citizens against these risks (Rodrik, 1998). For these reasons a positive relation between tax

revenue and trade openness could be expected. On the other hand, in many developing countries, trade liberalization reforms tended to decrease tax revenues as they lowered tariffs (Keen and Simone, 2004). Caribbean economies show a level of trade openness (108%) higher than Central America (91%) and South America (49.9%).<sup>9</sup>

Another variable considered in the empirical literature is public debt (as a percentage of GDP). Unfortunately, comparable data were not available for all Latin American countries for the chosen period. Often data were not comparable, or did not correspond to the same aggregate category of government, or had other problems that impeded its use for comparative purposes. Thus, and in order to work with not a very small sample, in the empirical analysis we considered data on the fiscal deficit as a share of GDP—of previous years— instead of data on debt.

## B. POLITICAL VARIABLES

There is no consensus in the empirical literature on the significance of political variables—such as the level of democracy and the duration of a political regime— as determinants of tax revenue. On the one hand, according to some authors (Acemoglu and Robinson, 2006; Boix, 2003), democracy is important to redistribute income from the rich to the poor, to create an enlarged welfare state, and a stronger and more efficient tax system, based more on direct taxes than on indirect taxes. In addition, an a priori assumption is that under a non democratic regime the size of the public sector would be relatively small, because a large part of citizens are excluded from the decision making process. Thus a transition towards a democratic government would coincide with an increase in taxes and public spending in accordance with the theory of the median voter, moving in the direction of a better redistribution of wealth. On the other hand, some authors, such as Barro (1979) and Wittman (1989), consider that the main drivers of public policy are not political factors, but efficiency considerations. Moreover, unlike Boix's theory, Mulligan (2004) did not find evidence that democracies spend more in public services like education, health, pension, than autocracies.

In any case, to test these hypotheses the empirical analysis relied on two variables<sup>10</sup>—civil liberties and political rights— as proxy of the state of democracy. The civil liberties index captures the degree of freedom of expression and beliefs, of organization, and of assembly. It can be considered as a measure both of the rule of law and, perhaps too, of personal autonomy without interference from the state. The range of the index varies from one, the highest level of civil liberties, and seven, the lowest. Mahdavi (2008) used it as a proxy for the level of corruption considering that an improvement of civil liberties of a country should be associated with reduced corruption, owing to more transparency and accountability within the public sector. The political rights index is a mixture that captures the legal prerogatives that enable citizens to participate freely in the political process through the right to vote and to be voted for public office, the existence of credible opposition and of political rights. It goes from one, the highest level of political rights, to seven the lowest. There is high co-linearity among these two indices (0.80). According to the literature a positive correlation between the level of democracy and tax revenue is expected and a higher level of civil liberties and political rights should be associated with higher tax revenue (see figure II-3, annex II).

The index of regime durability<sup>11</sup> reports the number of years since either a regime took office or a transition period has ended as defined by the absence of stable political institutions. The index takes the first

<sup>9</sup> The degree of openness for the subregion is calculated as the average of the corresponding national figures for 1990-2009.

<sup>10</sup> See the website from Freedom House [www.freedomhouse.org](http://www.freedomhouse.org)

<sup>11</sup> Derived from the policy IV dataset, see [www.systemicpeace.org/polity/polity4.htm](http://www.systemicpeace.org/polity/polity4.htm)

year in office of a new government as the zero baseline, and each additional year by the same government is counted consecutively until a new government takes office and the count is restarted from zero. Political stability may be associated with a larger capacity of the state to collect taxes through reliable institutions. Dummy variables (see summary regressions 12-15 in annex III) were introduced to investigate possible differences of regime taxation between countries due to other political or historical variables such as internal and external conflicts, or historic heritage like having been a Spanish or an English colony.

### **C. SOCIO DEMOGRAPHIC VARIABLES**

Among the important socio demographic variables considered in the empirical literature as a factor that may influence taxation is the average level of education of the population. The assumption is that a higher level of education should enable citizens to better understand and comply with tax codes, to have a better access to formal jobs and, perhaps too, to have greater conscience of the responsibility or obligation to pay taxes. In the econometric model it was captured as the average number of years of secondary school attainment of the population (see figure II-4 in annex II). Furthermore, according to literature the percentage of elderly in the population, measured by the share of people over 65, should be positively associated with tax revenue. Pensions become the main, if any at all, source of income for old people. Thus it could be argued that States, with a high or rapidly expanding proportion of elderly people, face the pressure to create a pension system and this can only be done in a sustainable way by increasing taxes. Another common indicator is female labor force participation. It is expected to be positively correlated with tax revenue, as more women employed in the formal market enlarge the tax base.

Urbanization should also be positively correlated with tax revenue. On the one hand, it increases citizens' demand for public goods and services. On the other it tends to facilitate tax administration (Tanzi, 1987). The density of population should be positively linked with tax revenue as it tends to reduce the administrative costs of tax collection and of controlling for tax evasion (Ansari, 1982). Another demographic indicator that may be important in explaining tax revenue is population growth. Rapidly growing populations put additional pressure on the tax system in order to register and monitor new taxpayers (Bahl, 2003). Thus a negative correlation among tax revenue and the population growth rate is expected.

### **D. OTHER CONTROL VARIABLES**

The empirical analysis here carried out considered a number of additional, say control, variables. One of them is the size of the shadow economy of the informal sector. To the extent that higher taxes may induce informality, they augment the underground economy (Schneider, 2005). According to some authors, the increase of tax rates in the last decades —mainly in many developed countries— represents an important incentive for companies and individuals to work in the informal economy (Tanzi, Schuknecht, 1997). The enforced legal obligation to pay taxes is correlated with the perception of the citizens regarding the quality of public services supplied by the state. If an increase of tax rates is associated with an improvement of public goods, a tax rise probably will face less opposition. Another variable considered the GINI coefficient. The acute inequality in Latin America is partly due to the fact that taxation does not play a strong redistributive role. There are many possible explanations: the tax rates are too low, the weight of direct tax on indirect tax is too small, or evasion is high. Low levels of tax revenue are ultimately a consequence of the refusal of the elites to contribute to finance public services for the rest of the population. Moreover, lack of trust in the fairness of the tax system and in the institutions can increase the shadow economy, tax evasion and even endanger political stability (Alesina and Perotti, 1996).

#### IV. REGRESSION ANALYSIS: FUNCTIONAL SPECIFICATION AND RESULTS

The basic regression model of tax revenue as a linear function of selected economic and political indicators performed quite well in our analysis as shown by the  $R^2$  and the F-test statistics. Relevant results were derived using the following exogenous variables: the growth rate of GDP per capita, the share of agriculture, GDP per capita (expressed in logarithm), openness of economy and the fiscal deficit of the previous year and including political variables as presence of civil liberties and political rights (regressions 1 and 2 in annex III). Extended versions of the basic model included other control variables (see results of regressions 5 to 11 in annex III).

As the first column of regression 1 in annex III shows the share of agriculture in GDP is statically significant and inversely related to tax revenue. A one percent growth in the share of agriculture may decrease tax revenue by 0.18%. The impact is relatively strong and it is in line with previous findings (see chapter III). Trade openness is statically significant and has a slightly positive relationship with tax revenue: a one percent increase in the openness of the economy, calculated as a sum of imports and exports as share of GDP, may boost tax revenue by 0.04%. For Latin American countries, and, as Rodrik (1998) argues, a greater size of foreign trade relative to GDP induces an increase in tax revenues as trade tariffs are easily imposed and monitored. Per capita GDP growth rate and the fiscal deficit of the previous year were not significant in explaining the tax revenue.

Regarding political indicators, a higher level of civil liberties is associated with higher tax revenue in a statically significant way. One percentage point increase in the index of Civil Liberties is linked to an increase of 1.21 percentage points in tax revenue as a share of GDP; a result suggesting that less interference by the State in restricting civil liberties may strengthen the State's capacity to collect taxes, perhaps linked too to an increased perception of transparency and accountability in the use of fiscal resources or expenditure by the public administration. Introducing additional political variables in the model led to confirm a slightly stronger influence of agriculture and openness on tax revenue. The index of political rights, unlike that of civil liberties, was not statically significant in the regression analysis of tax revenue.

In regression 3 in annex III the relationship between tax revenue and GDP per capita, calculated in logarithm at constant US dollars of year 2000, is highly significant and positive. A 10% change in GDP per capita is associated with a change in tax revenue of 0.6 points (as a percentage of GDP). The last political variable introduced in the regression analysis was regime durability (see regression 4). It was statically significant and positively related to tax revenue suggesting that an extension of one year in the duration of a durability of a regime is associated with an increase of tax revenue by 0.1% as a percentage of GDP.

When additional control variables were included, in almost all cases their estimated coefficients showed the expected signs, as reported in the previous literature (see chapter III and regression 5-11 in annex III). The level of education is positively and statically significant.<sup>12</sup> The effect of school enrollment on tax revenue seemed, however, quite weak. One more year of average school attainment is linked to a higher tax revenue (of 0.06% as a share of GDP). Female labor force participation and the age of population are significant and positive, as well as the density of population. The other two demographics variables, population growth and urbanization, were not statically significant. The shadow

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<sup>12</sup> Source World Bank, World Development Indicators (WDI) (<http://data.worldbank.org/data-catalog/world-development-indicators>).

economy was statically significant with a negative sign. Finally we have to note that the GINI index, an indicator of inequality, is not statically significant. After the introduction of the control indicators the result of the first two regressions are perhaps reinforced. The civil liberties variable remains significant and positive; agriculture and trade openness always have the expected signs and lose significance only when the shadow economy and schooling are introduced into the model. GDP per capita growth rate remains significant only in three cases on eleven regressions, the sign is positive as expected and the effect of economic growth on taxation appears modest. The fiscal deficit of previous years becomes significant, but only at 1% and only after having introduced in the regression the shadow economy and the schooling variables, but the number of observations is lower (see table 4).

We conclude this section underlining the fact that the following variables seem to have a significant, positive impact on tax revenue: civil liberties, durability of the political regime, openness, GDP per capita, population density, education and female labor force participation. Other indicators, such as agriculture and the shadow economy, have a negative impact. Moreover, the growth of GDP per capita is usually not significant and, when it is significant, it seems to have a small impact on tax revenues. To summarize the results we point out that the share of agriculture over GDP, civil liberties, GDP per capita, female labor force participation and age of population may have a strong impact on tax revenue. The effect is more modest for: the level of openness of the economy, secondary school enrolment and density of population.

**TABLE 4**  
**SUMMARY TABLE OF REGRESSION RESULTS**

Tax revenue	Total		Direct		Indirect	
Principal variables						
Gdpvar per capita	0.0352 4/12 <sup>a</sup>		-0.0031 0/5		0.0663 5/5	***
Agriculture	-0.2411 8/11	**	-0.1208 2/4	**	-0.1169 4/4	**
Log gap per capita	6.1957 1/1	***	3.1215 1/1	***	1.7661 1/1	**
Openness	0.0605 11/12		0.0236 5/5	**	0.0254 5/5	**
Deficit previous year	-0.0014 2/12		0.0630 3/5	**	-0.0061 0/5	
Political variables						
Lack of civil liberties	-1.2792 10/10	***	-0.9490 3/3	***	-0.2242 0/3	
Lack of political rights	-0.2888 1/1		-0.4040 1/1	***	0.0720 0/1	
Durability	0.1008 1/1	***	0.0528 1/1	*	0.0669 1/1	*
Dummies						
ANGLO	7.5976 1/1	***	1.9240 1/1	*	6.2182 1/1	***
Internal conflict 1	-4.0625 1/1	**	0.3392 1/1		-4.9854 1/1	***
Internal conflict 2	-5.1053 1/1	***	-0.1898 1/1		-3.8647 1/1	***
External conflict 3	-4.3520 1/1	*	-1.5568 1/1	**	-2.7287 1/1	
Control variables						
Schooling	0.0630 1/1	**				
Female labor force	0.1147 1/1	**				
Oldness	0.8025 1/1	***				
Population growth	0.2118 1/1					
Population density	0.0264 1/1	***				
Urbanization	0.0232 1/1					
Shadow economy	-0.1122 1/1	**				

Source: Elaborated by the author.

<sup>a</sup> The GDP per capita growth rate is significant in 4 regressions over 12 and the level of significance is almost always at 10%.

Notes: The variable must be significant in the majority of regressions to become significant in the summary table, the 4 regression with dummy have been counted as one regression.

The stars \*\*\*, \*\*, \*, indicate, respectively, the statistical significance at the one, five and ten percent level, calculated as average of significant values more repeated.

The value of BETA coefficient is the highest among the significant cases.

The insignificant cases are reported in grey.

In the cells it has been reported the Beta value, the statistical significance and the number of significant regressions over the total of regressions run.

## A. STRUCTURE OF TAXATION

To extend the analysis to tax composition, we look again at the results of regressions 1 to 4, and focus on the second and third columns (see annex III). In them the dependent variables are respectively direct tax revenue (including revenue coming from personal and corporate income tax, property tax and others direct taxes) and indirect tax revenue (including revenue coming from tax on sales or consumption, taxes on trade and other indirect taxes). In these cases a higher degree of civil liberties is linked with a higher level of direct tax revenue, whereas indirect taxes are not associated with a higher level of civil liberties. Moreover, the relation between the (second) index of democratization, political rights, and direct tax is highly significant and positive, whereas it is not significant in case of indirect tax. Furthermore, the results indicate that more democratic countries tend to have a higher level of direct taxes (% of GDP), a fact that not occurs in the case of indirect taxes. Thus the view of Acemoglu (2006) and Boix (2003) seems to prevail regarding direct taxation. First, democratic countries tend to carry out redistributive policies from the rich to the poor, building up a welfare state and a stronger and more efficient tax system based to a greater extent on direct taxes than on indirect taxes. Second, the transition toward a democratic government is associated with an increase of taxes and public spending (median voter theory), moving in the direction of a better redistribution of wealth. Regarding other variables, GDP per capita growth rate becomes significant if associated with indirect tax revenue. The effect is positive but quite weak.

## B. SUBREGIONAL DIFFERENCES IN TAXATION: THE PARTICULARITY OF CENTRAL AMERICA AND THE CARIBBEAN

Among the dummy variables we introduced is *ANGLO* to mark countries that have been in the past English or Dutch colonies.<sup>13</sup> As seen in table 5, former English and Dutch colonies have a higher level of tax revenue as percentage of GDP, almost 7.5 points more than the other countries of Latin America. Barbados, Jamaica, Suriname and St Kitties and Nevis show a high level of direct tax revenue (more than 10 percent as share of GDP), but Bahamas and Antigua and Barbuda have a level of direct tax revenue, below 4% of GDP. On the other hand, former English and Dutch colonies do not have a taxation structure that diverges significantly from that of the other countries of the region, regarding the prevalence of indirect tax over others. However, they diverge on the level of tax revenue, particularly when considering the capacity of the Caribbean states to collect a higher amount of tax revenue. Colonial heritages tend to be reflected in the important role in the determination of tax revenue and in the shape of public institutions. Differences between the Spanish and English colonialism are reflected in the fiscal policies of the countries of the region (Thirsk, 1997). English colonies inherited institutions able to penetrate more the countryside and create a larger formal labor market, to impose higher tax rates. All these facts in part help to explain the higher level of tax revenue of many Caribbean countries compared to Central American and South American economies, to collect tax revenue in a more efficient way. It will be interesting in a future study to investigate the impact of colonial heritage on institutional elements and to analyze how these elements interact with and perhaps jointly determine the level of tax revenue.

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<sup>13</sup> Anglo includes the following countries: Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Granada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago.



**TABLE 5**  
**TAX REVENUE, DIVIDED BETWEEN DIRECT AND INDIRECT TAXES IN**  
**THE CARIBBEAN IN 2009**

Country	Tax revenue over GDP - 2009		
	Total	Direct	Indirect
<b>Caribbean</b>	<b>23.7</b>	<b>7.8</b>	<b>14.7</b>
<b>Spanish colonies</b>	<b>12.4</b>	<b>3.1</b>	<b>8.2</b>
Dominican Republic	13.1	4.1	9.0
Haiti	11.7	2.0	7.5
<b>British and Dutch colonies</b>	<b>25.4</b>	<b>8.6</b>	<b>15.7</b>
Antigua and Barbuda	19.3	3.8	15.5
Belize	21.6	7.8	13.8
Bahamas	16.8	1.8	11.9
Barbados	32.3	15.7	16.6
Dominica	31.6	6.4	25.2
Grenada	22.9	6.4	16.5
Guyana	21.6	8.4	13.0
Jamaica	26.7	10.9	15.8
St Kitts and Nevis	26.8	10.1	16.7
St Vincent and the Grenadines	27.1	7.2	19.9
St Lucia	28.1	8.9	19.2
Suriname	31.1	16.1	14.5
Trinidad y Tobago *	24.7	7.9	6.2
<b>Central America</b>	<b>13.3</b>	<b>4.9</b>	<b>8.2</b>
Costa Rica	13.8	4.8	8.6
El Salvador	12.4	4.6	7.4
Guatemala	10.7	3.2	7.1
Honduras	14.4	4.8	9.7
Nicaragua	17.7	6.3	11.4
Panama	10.9	6.0	5.1

Source: ECLAC, elaborated by the author on the basis of a simple average.

\* In total tax revenue, the petroleum revenue is included.

We also analyzed the effect of internal and external conflicts on tax revenue by introducing three dummy variables; conflict 1 represents the group of countries involved in an internal conflict of at least one year duration since 1980, whereas conflict 2 indicates countries involved in conflicts of at least two year duration. Finally, conflict 3 refers to those countries involved in external conflict since 1980.<sup>14</sup> Both

<sup>14</sup> The data come from the UCDP/PRIO Armed conflict Dataset built as a result of the collaboration between the Uppsala Conflict Data Program (UCDP) and the Centre for study of Civil Wars of the International Peace Research Institute of Oslo (PRIO). Conflict 2 dummy includes the following countries: Colombia, El Salvador Guatemala, Haiti, Mexico, Nicaragua, Peru, Bolivarian Republic of Venezuela, whereas dummy 1 includes Panama, Paraguay, Suriname, Trinidad and Tobago, in addition to countries already included in dummy 2. Dummy 3 covers countries involved in external conflict since 1980 such as Argentina, Ecuador, Grenada, Panama and Peru.

internal conflict variables (conflict 1 and conflict 2) were highly significant and negative. Countries involved in conflicts of at least one year tend to have a lower level of tax revenue, losing mainly revenue coming from indirect taxes; moreover in case of conflicts that last more than one year, the capacity of the state to collect taxes decreases even further, reducing the tax revenue by up to 5%. These results support the view of Bailey and Persson (2008). Such conflicts reduce the capacity of the state to collect taxes; competition among internal groups with divergent aims and opposite interests weakens institutions—mainly the State—by undermining its fiscal capacity. On the other hand, contrary to some of their predictions, in Latin America external conflicts do not seem neither to foster fiscal capacity nor to induce the states to collect more resources in order to face the external threats and the war. On the contrary, external wars, like internal ones, weaken the State's capacity to collect taxes and thus reduce the tax revenue. The dummy variable conflict 3 was not highly significant—only at 10%—with an inverse relation to direct tax revenue. To summarize, internal conflicts in Latin American tended to weaken fiscal pressure, and reduce revenues from indirect taxes. In case of external conflict the result is similar, but the impact is felt more on direct ones.

The level of taxation as a percentage of GDP in Central American countries increased in the last two decades by an average 3.5 points. Nevertheless, it stood at only 13.3% of GDP in 2009, much lower than in other countries of the region and among the lowest in the world. In fact, in that period, tax revenue increased significantly only in Nicaragua, by 10 points of GDP. It augmented between two and three points of GDP in El Salvador, Guatemala, Honduras and Costa Rica, and remained rather constant in Panama. On the other hand, both as reflected by the change in the share of agriculture in GDP and in the level GDP per capita, Central American countries have in the last two decades (1990-2009) gone through an important transformation and development (see table 6). Except in Nicaragua, where it increased by 3 points, in the other countries of the region the share of agriculture considerably diminished. It decreased more than 10 points in Honduras and Guatemala, but less in Costa Rica, Panama and El Salvador, where agriculture's share in GDP was already much lower. During the period covered, GDP per capita rose at an annual rate of 2.6%, almost one point above the regional average thus reducing the gap. In fact, Panama's, Costa Rica's and El Salvador's GDP per capita is definitely higher than that in Nicaragua, Honduras and Guatemala.

Hinrichs, 1966; Tanzi, 1992 and 1987, and Celliah, 1971 found a positive correlation between the level of development and tax revenue (see chapter III). However, the tax burden in Central America increased only modestly in the last two decades. Why does tax revenue remain so modest relative to other countries in the region? First, Central America's colonial heritage shaped in special ways the institutions that have adversely influenced, undermined its fiscal capacities. British colonialism left behind relatively efficient institutions able to collect taxes, with a formal labor market and a modern fiscal system in the Caribbean. Secondly, except for Honduras and Costa Rica, the countries in the region were involved in internal conflicts after 1980. These conflicts weakened the institutional capacity and fiscal capacity of the states to collect taxes. The only country of the region involved in an external war has been Panama. According to Cardenas, Eslava and Ramirez (2010), external conflicts do not increase the fiscal capacity of the states if the duration of the conflict is short or if the conflict does not involve many countries, as occurred in the case of the US invasion of Panama in 1989.

**TABLE 6**  
**SHARE OF AGRICULTURE IN GDP AND GDP PER CAPITA, 1990-2009**

Country	1990	2000	2005	2009	Change 1990 to 2009
Share of agriculture in GDP					
Central America	17.6	14.5	12.0	11.5	-6.0
Caribbean	13.7	9.4	8.3	6.9	-6.7
South America and Mexico	11.7	8.1	8.7	8.6	-3.1
<b>Average</b>	<b>14.3</b>	<b>10.7</b>	<b>9.7</b>	<b>9.0</b>	<b>-5.3</b>
Costa Rica	12.3	9.5	8.7	7.1	-5.2
El Salvador	17.4	10.5	10.5	12.5	-4.9
Guatemala	25.9	22.8	13.4	12.4	-13.5
Honduras	22.4	15.9	13.7	12.5	-10.0
Nicaragua *	na	20.9	19.0	18.8	3.3
Panama	9.8	7.2	7.0	6.0	-3.8
<b>Average</b>	<b>17.6</b>	<b>14.5</b>	<b>12.0</b>	<b>11.5</b>	<b>-6.0</b>
Country	1990	2000	2005	2009	Annual growth rate (%)
GDP per capita					
Central America	1 800	2 306	2 544	2 911	2.6
Caribbean	4 711	5 274	5 769	5 828	1.1
South America and Mexico	3 147	3 830	4 095	4 653	2.1
<b>Average</b>	<b>3 219</b>	<b>3 803</b>	<b>4 136</b>	<b>4 464</b>	<b>1.7</b>
Costa Rica	3 111	4 057	4 501	5 043	2.6
El Salvador	1 571	2 209	2 424	2 566	2.6
Guatemala	1 446	1 718	1 762	1 857	1.3
Honduras	1 049	1 141	1 294	1 380	1.5
Nicaragua	682	772	843	875	1.3
Panama	2 940	3 938	4 440	5 744	3.6
<b>Average</b>	<b>1 800</b>	<b>2 306</b>	<b>2 544</b>	<b>2 911</b>	<b>2.6</b>

Source: World Bank, World development indicators.

Note: GDP per capita annual growth rate calculated at constant US Dollars off 2000.

Finally, a third reason for the low level of taxation in Central America is the weakness of democracy. In fact, in Central America the civil liberties and the political rights index have not improved, on average, from 1990 until 2009 (see table 7). The first one has worsened, whereas the second one has remained unchanged. In particular, although there has been, during the period analyzed, a high level of civil liberties in Costa Rica and Panama, in Nicaragua, Honduras and Guatemala the indicator of civil liberties did not improve. Although it improved in El Salvador, it did not reach a satisfactory level. Regarding the indicator of political rights, Costa Rica, Panama and El Salvador show a higher level, but in Nicaragua, Honduras and Guatemala the index deteriorated in the last two decades.

**TABLE 7**  
**CIVIL LIBERTIES AND POLITICAL RIGHTS INDEXES**

Index of civil liberties				
	1990	2000	2005	2009
Central America	2.8	2.8	2.7	3.0
Caribbean	2.3	1.9	2.0	1.9
South America and Mexico	3.0	3.0	2.5	2.6
<b>Average</b>	<b>2.7</b>	<b>2.6</b>	<b>2.4</b>	<b>2.5</b>
Costa Rica	1.0	2.0	1.0	1.0
El Salvador	4.0	3.0	3.0	3.0
Guatemala	4.0	4.0	4.0	4.0
Honduras	3.0	3.0	3.0	4.0
Nicaragua	3.0	3.0	3.0	4.0
Panama	2.0	2.0	2.0	2.0
<b>Average</b>	<b>2.8</b>	<b>2.8</b>	<b>2.7</b>	<b>3.0</b>
Index of political rights				
	1990	2000	2005	2009
Central America	2.7	2.2	2.3	2.7
Caribbean	2.3	1.9	2.0	1.7
South America and Mexico	2.3	2.5	2.4	2.5
<b>Average</b>	<b>2.4</b>	<b>2.2</b>	<b>2.2</b>	<b>2.3</b>
Costa Rica	1.0	1.0	1.0	1.0
El Salvador	3.0	2.0	2.0	2.0
Guatemala	3.0	3.0	4.0	4.0
Honduras	2.0	3.0	3.0	4.0
Nicaragua	3.0	3.0	3.0	4.0
Panama	4.0	1.0	1.0	1.0
<b>Average</b>	<b>2.7</b>	<b>2.2</b>	<b>2.3</b>	<b>2.7</b>

Source: Freedom House.

As seen in chapter III, in countries where the index suggests a, say, low level of democracy, large part of the citizens may be excluded from the key decision making process. And perhaps there are few or practically no political parties that represent the interests of the electorate, being largely influenced by the vested interests of lobbies and elites (Grossman and Helpman, 1994). According to this view, elites exert power and pressure on political parties in order to defend their interests, and in particular to prevent taxes from rising and keep their special privileges and exemptions. There is a perception that in many Latin American countries powerful landowners —and other privileged classes— has been able to block tax reforms that intend to raise direct taxes on land and income (The World Bank Group, 2008).

Summarizing, the low level of taxes in Central America is mainly due to a poorly working or ineffective democracy linked to a weak representativeness of political parties, to historical heritage —the Spanish colonialism— and to the sequels of internal conflicts that hit the region during the 1980s and 1990s. On the other hand, the in general higher level of the tax revenues relative to GDP in the Caribbean,

mainly in the former British and Dutch colonies, reflects a more effective democracy, a lower number and less intense conflicts, and somewhat better institutions due to the colonial legacy.

### C. THE TAX EFFORT INDEX

In line with Chelliah (1971), Bahl (1971), Chelliah, Bass, Kelly (1975) and Gupta (2007) we estimated the tax effort (as percentage of GDP) as the ratio of actual tax revenue to potential revenue. The potential revenue was calculated by using the regression 1 (see annex III), dropping the not statically significant variables. If the index of tax effort is greater than one, it means that the countries are collecting a higher amount of tax revenue than the amount that is predicted, estimated by the regression analysis of the long-term determinants of tax revenue considering the countries' specific economic, social and institutional conditions (Piancastelli, 2001).

We inserted in the regression for each country, the average value of the three indicators for the periods 1990-1994 and 2005-2009, in order to calculate the potential tax burden. The average value of five years was used in order to minimize the possible effect of extraordinary events. Table 8 reports the tax effort index for the countries of the region. For the period of analysis, the results suggest that countries that exhibit a higher tax effort also have a higher tax burden. The tax effort is on average higher in the Caribbean than in the rest of the region. In the Caribbean, with the exception of Bahamas and Dominican Republic, the index is over one, thus indicating that these countries have been able to increase their capacity to collect tax revenue over and above what it would have been predicted by the long-term structural determinants. Central American economies have an index of tax effort lower than one, with Nicaragua being the exception that in the last decades considerably increased its tax burden. Thus, this subregion faces key obstacles that impede her to even achieve the, actually low, level of taxation given by its revenue potential. Mexico and South American countries show on average a level of tax effort close to one but with large variance. For instance, Mexico and Ecuador have a level of tax revenue rather modest compared with their structural potential, unlike Brazil and Plurinational State of Bolivia, which show a high value.

Comparing the periods 1990-1994 and 2005-2009, the fiscal effort index has increased in the three sub-regions, with some exceptions. In Central America the index decreased in Panama and Honduras, in the Caribbean it diminished in Bahamas, Guyana and Santa Lucia, and in the rest of the region it decreased in Mexico and Chile. In addition it seems that the Caribbean countries, in particular those that have been in the past English or Dutch colonies, show a relatively strong fiscal capacity, with more efficiency to collect tax revenue. Central American economies have a reduced capacity to collect tax revenue. Thus, the analysis of the tax effort confirms or even reinforces the findings of the previously developed study.

**TABLE 8**  
**TAX EFFORT INDEX**

The effort index calculation								
Country	1990-1994				2005-2009			
	Tax revenue (% of GDP)		Index of tax effort	Variance between real and potential tax revenue	Tax revenue (% of GDP)		Index of tax effort	Variance between real and potential tax revenue
	Real	Potential			Real	Potential		
Dominica	24.1	18.1	1.33	5.97	30.0	18.5	1.62	11.50
Suriname	na	15.2	na	na	29.0	18.5	1.57	10.5
Barbados	28.2	20.2	1.40	8.03	32.8	21.8	1.51	11.06
Trinidad y Tobago	na	19.8	na	na	28.3	20.2	1.40	8.04
Jamaica	20.6	18.6	1.11	2.01	24.6	18.0	1.36	6.55
St Vincent and the Grenadines	22.8	18.8	1.21	4.01	27.0	20.3	1.33	6.68
St Kitts and Nevis	16.4	21.0	0.78	-4.60	28.1	21.2	1.33	6.90
Granada	22.6	18.4	1.23	4.20	23.5	19.1	1.23	4.46
St Lucia	26.7	19.8	1.35	6.97	25.6	21.5	1.19	4.18
Belize	na	18.4	na	na	21.7	18.7	1.16	3.0
Guyana	22.2	17.3	1.28	4.91	20.8	18.7	1.11	2.12
Antigua and Barbuda	17.6	21.1	0.84	-3.47	20.6	20.6	1.00	0.03
Dominican Republic	10.5	16.3	0.64	-5.84	14.7	17.7	0.83	-3.03
Bahamas	15.8	19.4	0.81	-3.62	16.7	21.0	0.79	-4.34
Haiti	5.3	na	na	na	10.6	na	na	na
<b>Average</b>	<b>20.7</b>	<b>19.0</b>	<b>1.09</b>	<b>1.69</b>	<b>24.5</b>	<b>19.7</b>	<b>1.25</b>	<b>4.83</b>
Nicaragua	10.9	13.3	0.82	-2.44	17.7	15.5	1.14	2.18
Honduras	12.9	14.6	0.88	-1.72	15.3	17.7	0.87	-2.38
El Salvador	9.8	14.2	0.69	-4.40	12.9	16.1	0.80	-3.18
Guatemala	8.4	10.9	0.77	-2.46	11.6	14.6	0.80	-2.97
Costa Rica	11.6	17.7	0.65	-6.15	14.4	19.9	0.73	-5.45
Panama	10.6	21.2	0.50	-10.59	10.2	20.8	0.49	-10.64
<b>Average</b>	<b>10.7</b>	<b>15.3</b>	<b>0.70</b>	<b>-4.63</b>	<b>13.7</b>	<b>17.4</b>	<b>0.79</b>	<b>-3.74</b>
Plurinational State of Bolivia	15.8	14.4	1.09	1.31	23.0	15.9	1.45	7.10
Brazil	na	14.3	na	na	23.2	16.6	1.40	6.6
Argentina	12.1	15.0	0.81	-2.86	17.1	16.7	1.03	0.42
Uruguay	14.4	16.6	0.87	-2.23	18.2	18.1	1.01	0.10
Bolivarian Republic of Venezuela	15.4	16.6	0.93	-1.18	14.9	15.6	0.95	-0.75
Chile	16.6	17.1	0.97	-0.51	18.6	19.8	0.94	-1.26
Peru	12.0	13.3	0.90	-1.32	14.6	16.0	0.91	-1.42
Colombia	8.2	13.0	0.63	-4.83	13.1	15.1	0.87	-1.93
Paraguay	10.5	14.3	0.73	-3.87	13.2	15.7	0.84	-2.48
Ecuador	7.3	na	na	na	11.4	17.0	0.67	-5.6
Mexico	10.1	14.8	0.68	-4.67	8.8	17.1	0.52	-8.28
<b>Average</b>	<b>12.8</b>	<b>15.0</b>	<b>0.85</b>	<b>-2.24</b>	<b>16.0</b>	<b>16.7</b>	<b>0.96</b>	<b>-0.68</b>

Source: ECLAC, elaborated by the author.  
na: not available.

## V. CONCLUSIONS

As is well known, in panel data regressions the sample of countries chosen and the period covered for the analysis may affect the results on the significance of some of the, say, exogenous variables considered as is the case on such studies on taxation. Taking account these considerations, this paper focus on taxation exclusively in Latin America and Caribbean countries. Due to reasons related to data availability and comparability, we restricted the analysis to the period 1990-2009. The main purpose of the study was to identify the long-term variables —including historical, economic, social and political factors— that significantly influence taxation in the countries of the region. A second purpose of the study was to have a better understanding of the potential regional differences in the tax effort of each country, measured by the gap between its actual and its potential tax revenue.

The empirical results of the panel models here built and econometrically tested indicate that GDP per capita and openness of the economy are positively related to tax revenue in a statically significant way. The share of agriculture over GDP and the size of the shadow economy are also statically significant, but negatively associated with tax revenue. On the other hand, per capita GDP growth rate and lagged fiscal deficits of the previous year were almost always not statically significant. However, the estimated models that focused exclusively on indirect taxes identified GDP growth as a significant influence with a positive sign. In line with previous literature, our works indicates that in Latin America the level of development, as proxy by the inverse of the share of agriculture in GDP and by GDP per capita, has a strong and positive influence on the tax burden. Moving to socio demographics determinants the study found out that the level of education, female labor force participation and the population density have a positive and significant impact on tax revenue, but the level of urbanization and the rate of population growth were not significant. Among other indicators analyzed, an especially strong positive association was found between taxation and the share of women employed in the formal market and by the share of people over 65 years old. With the exception of urbanization, that is usually significant and positively associated with tax revenue, the others socio demographics variables are in line with previous, recent studies.

Concerning the political variables, a higher degree of civil liberties and more political stability, as measured by the durability of the political regime, are associated with higher tax revenue. The political rights index is not statically significant, unlike Profeta and Scabrosetti (2010) that find a positive correlation between them. However, if we deepen the analysis on the structure of taxation, we find that the level of political rights becomes highly significant and positive as a determinant of direct tax revenues, but not of indirect taxes. It was also suggested that in the region the indicators associated with a say more democratic governments usually register a higher level of direct tax revenues, perhaps due to their commitment to redistributive policies. On the contrary, a higher level of indirect taxes is not usually linked with an increased degree of civil liberties and political rights. This result on the positive correlation between level of democracy and structure of taxation diverges from Profeta and Scabrosetti (2010), who find no evidence of that. We must underline that their study covers less countries (19 with only the Dominican Republic among the Caribbean) over a shorter period of time (1990-2004).

We found that the structure of taxation does not diverge significantly among the three regions analyzed (South America plus Mexico, Central America and the Caribbean); all have a predominance of indirect taxes over direct ones. Moreover, we have identified historical and political factors which help to explain regional differences on taxation: the colonial heritage, the internal conflicts that have hit the region from the beginning of the eighties until the end of the last century, and a number of indicators of the extent of democracy. These factors, in different ways, shape the fiscal capacity of the countries and

their different tax burdens and composition. The Caribbean region, in particular the former British and Dutch colonies, shows a higher level of tax revenue, which is closer to the western standards. This is due to their colonial legacy, a higher level of civil liberties and political rights and a reduced presence of conflicts. On the contrary, Central American countries have one of the lowest levels of tax revenue in the world, representing only 13.3% of GDP in 2009. The tax effort model calculations here carried out, confirm our findings.

In addition, despite the increased tax revenue, the improvement in the level of development and the economic growth observed in the period analyzed (1990-2009), the tax burden in Latin America and in the Caribbean has remained too modest compared with other world regions. Consequently, public expenditures are very limited and the level of inequality is acute as the fiscal system does not exert a relevant redistributive impact. One of the main challenges of the Latin American countries in the near future is to strengthen their taxation capacity in order to improve public services, reduce inequalities and promote sustainable economic growth. In fact, this may be the only way to reconcile economic growth and equality. Fiscal policy is a key tool. A fiscal reform that enlarges the tax basis, creates an efficient fiscal system and eliminates special tax regimes and exemptions is a necessary step for most countries in the region, and in particular Central America, to have sufficient fiscal resources that may help to push forward an effective agenda for development that does promote growth, ensures a major reduction in poverty and inequality.





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## ANNEXES

## ANNEX I: ECONOMIC VARIABLES

**TABLE I-1**  
**ECONOMIC VARIABLES**

Economic data country	Tax revenue as % of GDP		GDP per capita growth rate		GDP per capita USD costant 2000		Share of agriculture over GDP		Trade openness	
	Average 1990-1999	Average 2000-2009	Average 1990-1999	Average 2000-2009	Average 1990-1999	Average 2000-2009	Average 1990-1999	Average 2000-2009	Average 1990-1999	Average 2000-2009
<b>Total</b>	<b>15.4</b>	<b>18.0</b>	<b>1.9</b>	<b>1.8</b>	<b>3 781</b>	<b>4 556</b>	<b>12.4</b>	<b>9.1</b>	<b>84.5</b>	<b>87.2</b>
<b>Caribbean</b>	<b>19.5</b>	<b>22.3</b>	<b>2.0</b>	<b>1.5</b>	<b>4 625</b>	<b>5 677</b>	<b>11.7</b>	<b>8.1</b>	<b>113.0</b>	<b>107.3</b>
<b>Spanish colonies</b>	<b>8.7</b>	<b>11.7</b>	<b>1.0</b>	<b>1.3</b>	<b>1 289</b>	<b>1 743</b>	<b>10.6</b>	<b>6.9</b>	<b>58.4</b>	<b>63.4</b>
Dominican Republic	11.0	13.9	4.2	3.5	2 142	3 091	10.6	6.9	78.3	71.8
Haiti	6.5	9.4	-2.3	-0.9	436	394			38.4	54.9
<b>British and Dutch colonies</b>	<b>21.4</b>	<b>24.0</b>	<b>2.1</b>	<b>1.5</b>	<b>5 139</b>	<b>6 283</b>	<b>11.8</b>	<b>8.2</b>	<b>121.4</b>	<b>114.0</b>
Antigua and Barbuda	17.7	19.2	1.1	2.0	8 205	9 879	4.0	3.6	167.1	129.5
Bahamas	15.8	15.7	0.3	-1.3	16 022	17 845	2.8	1.8	101.8	95.1
Barbados	29.2	32.3	1.8	-0.3	8 623	9 969	6.8	3.7	108.4	119.2
Belize		21.9	2.3	0.8	2 840	3 596	17.6	14.9	108.1	120.9
Dominica	23.7	27.3	2.1	1.6	3 398	3 954	21.0	18.1	119.9	108.6
Grenada	22.2	23.0	2.7	0.3	3 133	4 430	10.2	6.9	110.2	102.7
Guyana	20.4	19.6	5.5	1.0	793	981	37.5	27.8	217.3	201.0
Jamaica	20.8	23.7	1.0	1.0	3 488	3 705	8.2	6.1	105.0	97.5
St Kitts and Nevis	19.1	25.5	4.2	0.6	6 336	7 815	5.6	2.9	126.9	113.2
St Vincent and the Grenadines	23.1	26.2	3.2	3.6	2 583	3 771	14.3	8.5	125.5	108.2
St Lucia	24.2	23.8	1.9	0.4	4 245	4 648	10.3	5.1	137.1	118.7
Suriname		28.6	-0.6	3.8	1 964	2 289	12.8	7.0	62.9	67.4
Trinidad y Tobago	19.4	24.7	2.2	5.8	5 175	8 792	2.4	0.8	87.8	100.2
<b>Central America</b>	<b>11.2</b>	<b>12.9</b>	<b>2.2</b>	<b>2.1</b>	<b>2 038</b>	<b>2 570</b>	<b>17.3</b>	<b>12.3</b>	<b>85.1</b>	<b>97.1</b>
Costa Rica	12.0	13.8	3.0	2.4	3 531	4 534	12.8	8.5	80.8	95.8
El Salvador	10.1	11.9	3.7	1.7	1 884	2 421	14.6	10.6	55.7	69.9
Guatemala	9.4	11.7	1.8	0.9	1 567	1 786	24.5	14.4	43.4	64.1
Honduras	13.1	14.5	0.5	2.1	1 097	1 277	21.2	13.6	87.2	125.6
Nicaragua	12.2	16.0	1.1	1.4	679	831	22.8	19.3	66.3	86.0
Panama	10.5	9.5	3.2	4.3	3 471	4 573	8.0	7.1	177.1	141.0

Table I-1 (concluded)

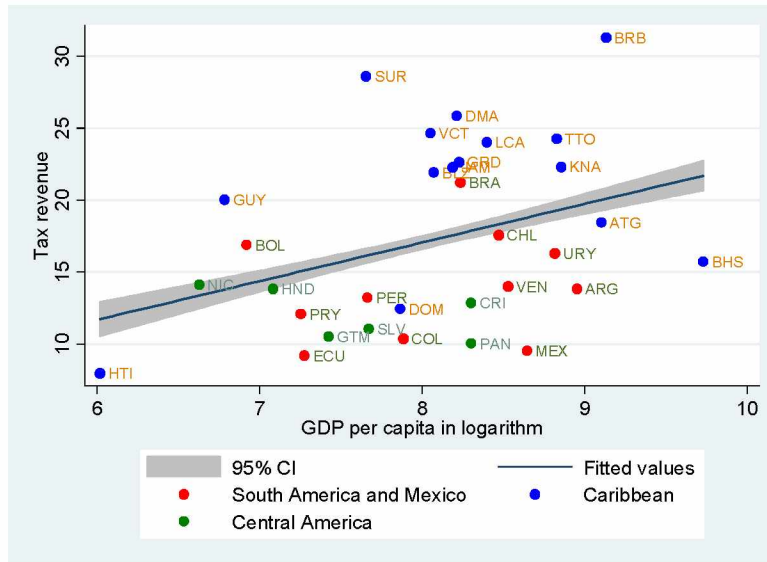
Economic data country	Tax revenue as % of GDP		GDP per capita growth rate		GDP per capita USD constant 2000		Share of agriculture over GDP		Trade openness	
	Average 1990-1999	Average 2000-2009	Average 1990-1999	Average 2000-2009	Average 1990-1999	Average 2000-2009	Average 1990-1999	Average 2000-2009	Average 1990-1999	Average 2000-2009
<b>South America and Mexico</b>	<b>13.0</b>	<b>14.9</b>	<b>1.7</b>	<b>2.2</b>	<b>3 581</b>	<b>4 111</b>	<b>10.3</b>	<b>8.6</b>	<b>45.4</b>	<b>54.5</b>
Argentina	12.3	15.3	3.8	2.8	7 216	8 174	5.9	8.6	18.7	38.3
Plurinational State of Bolivia	15.4	18.6	1.6	1.9	942	1 073	16.4	14.4	48.7	61.9
Brazil	18.4	22.2	0.8	2.0	3 503	4 002	6.9	6.1	17.2	25.7
Chile	17.0	18.1	4.9	2.5	4 063	5 543	8.1	4.6	57.4	72.0
Colombia	8.7	12.0	0.6	2.5	2 488	2 798	15.1	8.3	35.4	35.8
Ecuador	7.5	10.9	-0.2	3.5	1 330	1 545		7.0	56.5	66.2
Mexico	9.6	9.4	1.4	0.4	5 214	6 149	6.2	3.9	49.0	56.9
Paraguay	11.6	12.6	0.1	0.3	1 432	1 376	21.9	19.9	95.3	98.1
Peru	12.8	13.6	2.2	2.0	1 854	2 393	8.8	7.6	30.1	41.9
Uruguay	14.8	17.8	3.4	2.4	6 259	7 131	8.1	9.8	38.3	51.9
Bolivarian Republic of Venezuela	14.6	13.3	-0.2	1.8	5 087	5 037	5.2	4.2	52.3	50.9

Source: ECLAC and World Bank.

ANNEX II

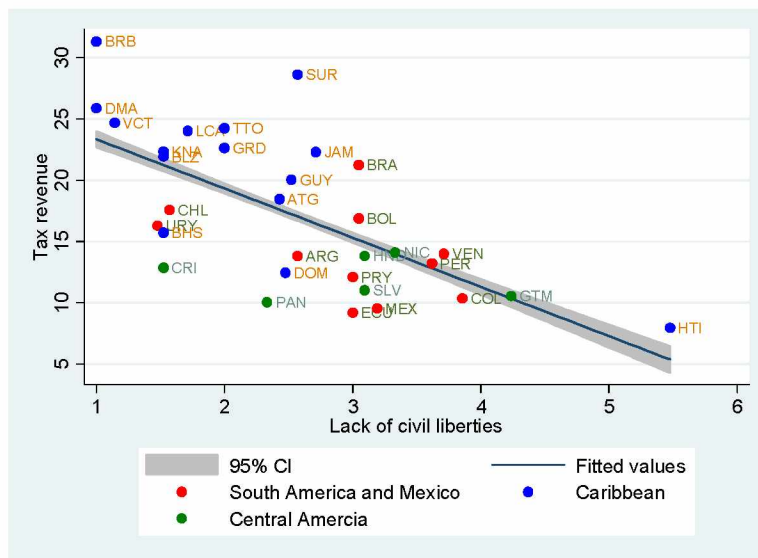
ECONOMIC VARIABLES FIGURES

**FIGURE II-1  
CORRELATION BETWEEN TAX REVENUE AND GDP PER CAPITA**



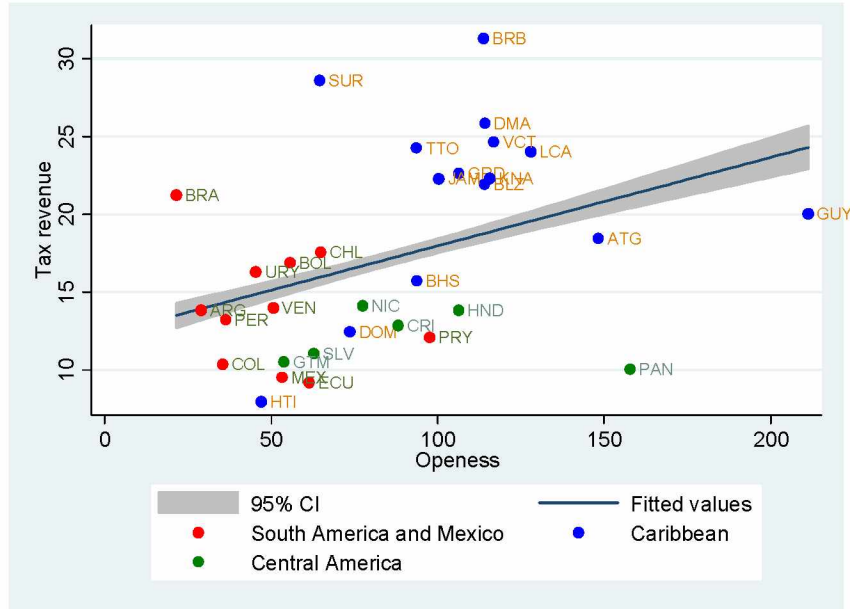
Source: ECLAC.

**FIGURE II-2  
CORRELATION BETWEEN TAX REVENUE AND TRADE OPENNESS OF AN ECONOMY**



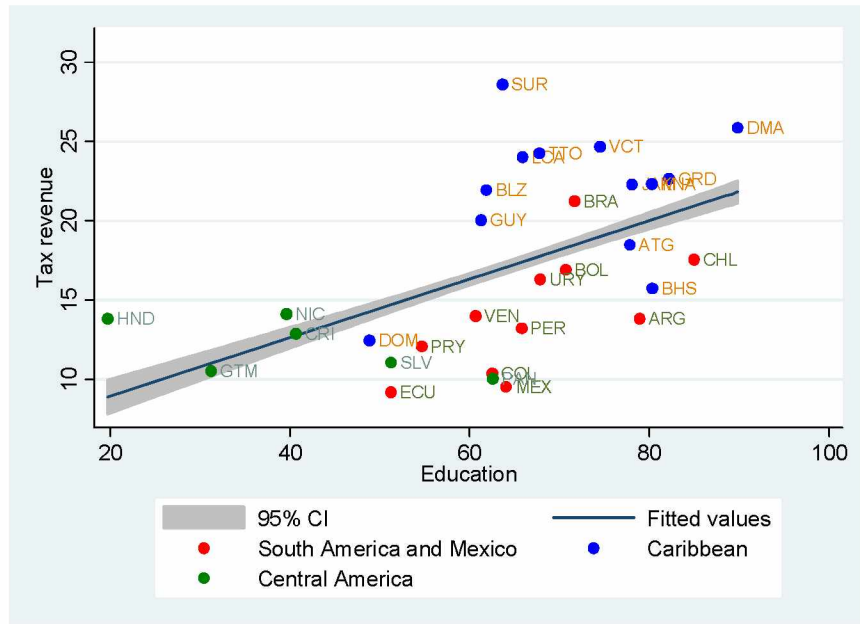
Source: ECLAC.

**FIGURE II-3  
CORRELATION BETWEEN TAX REVENUE AND CIVIL LIBERTIES INDEX**



Source: ECLAC and Freedom House, Inc.

**FIGURE II-4  
CORRELATION BETWEEN TAX REVENUE AND LEVEL OF EDUCATION**



Source: ECLAC and World Bank.

## ANNEX III

## RESULTS OF THE REGRESSIONS

TABLE III-1

Regression 1	Total		Direct		Indirect	
	re		re		re	
<b>Tax revenue</b>						
Const	18.9022	***	6.7685	***	10.7387	***
	2.3880	0.0000	1.0157	0.0000	1.2471	0.0000
Gdpvar per capita	0.0352		-0.0031		0.0624	***
	0.0245	0.1500	0.0195	0.8750	0.0154	0.0000
Agriculture	-0.1810	**	-0.0732		-0.0985	***
	0.0752	0.0160	0.0447	0.1020	0.0385	0.0100
Openness	0.0382	**	0.0209	**	0.0207	**
	0.0160	0.0170	0.0086	0.0150	0.0084	0.0130
Deficit previous year	-0.0014		0.0580	**	-0.0061	
	0.0608	0.9810	0.0244	0.0180	0.0345	0.8590
<b>Lack of civil liberties</b>	-1.2190	***	-0.9490	***	-0.2242	
	0.3021	0.0000	0.2072	0.0000	0.2137	0.2940
Number of observations	495		440		440	
Countries	31		30		30	
R2 within	0.216		0.298		0.144	
R2 between	0.350		0.121		0.224	
R2 overall	0.346		0.142		0.212	
<b>Regression 2</b>						
Regression 2	Total		Direct		Indirect	
	re		re		re	
<b>Tax revenue</b>						
Const	16.9030	***	5.4098	***	10.3487	***
	2.4133	0.0000	1.1904	0.0000	1.2592	0.0000
Gdpvar per capita	0.0392		0.0001		0.0668	***
	0.0254	0.1220	0.0190	0.9950	0.0156	0.0000
Agriculture	0.2337	***	-0.1109	**	-0.1151	***
	0.0806	0.0040	0.0504	0.0280	0.0374	0.0020
Openness	0.0403	**	0.0236	**	0.0189	**
	0.0173	0.0200	0.0113	0.0360	0.0092	0.0390
Deficit previous year	0.0044		0.0534	*	-0.0007	
	0.0571	0.9390	0.0307	0.0810	0.0353	0.9850
<b>Lack of political rights</b>	-0.2888		-0.4040	***	0.0720	
	0.2335	0.2160	0.1255	0.0010	0.1491	0.6290
Number of observations	495		440		440	
Countries	31		30		30	
R2 within	0.159		0.206		0.150	
R2 between	0.230		0.143		0.095	
R2 overall	0.222		0.150		0.117	



Table III-1 (continued)

<b>Regression 3</b>	Total		Direct		Indirect	
	re		re		re	
<b>Tax revenue</b>						
Const	-35.2798	***	-20.4774	***	-5.3654	
	10.3925	0.0010	4.7803	0.0000	5.5506	0.3340
Gdpvar per capita	0.0296		-0.0103		0.0625	***
	0.0272	0.2760	0.0181	0.5700	0.0154	0.0000
Openness	0.0436	***	0.0219	***	0.0254	***
	0.0141	0.0020	0.0073	0.0030	0.0077	0.0010
Deficit previous year	-0.0290		0.0306		-0.0217	
	0.0533	0.5870	0.0239	0.2000	0.0356	0.5420
Lack of civil liberties	-0.5494	**	-0.5313	***	-0.1215	
	0.2378	0.0210	0.1747	0.0020	0.1970	0.5370
<b>Log gdp per capita</b>	6.1957	***	3.1215	***	1.7661	**
	1.3501	0.0000	0.5915	0.0000	0.7285	0.0150
Number of observations	536		481		481	
Countries	32		31		31	
R2 within	0.361		0.395		0.158	
R2 between	0.269		0.133		0.265	
R2 overall	0.290		0.180		0.252	
<b>Regression 4</b>						
	Total		Direct		Indirect	
	re		re		re	
<b>Tax revenue</b>						
Const	13.7021	***	4.8296	***	6.6783	***
	2.2214	0.0000	1.5219	0.0020	1.3780	0.0000
Gdpvar per capita	0.0440		0.0240		0.0513	***
	0.0293	0.1320	0.0167	0.1510	0.0187	0.0060
Agriculture	-0.0879		-0.0507		-0.0799	**
	0.0598	0.1420	0.0452	0.2630	0.0329	0.0150
Openness	0.0341	***	0.0170	**	0.0153	**
	0.0125	0.0060	0.0077	0.0270	0.0071	0.0310
Deficit previous year	0.1402		0.0653		-0.0587	
	0.0862	0.1040	0.0448	0.1450	0.0373	0.1150
Lack of civil liberties	-0.9250	**	-0.7036	***	0.1134	
	0.3664	0.0120	0.2699	0.0090	0.1838	0.5370
<b>Durability</b>	0.1008	***	0.0528	*	0.0457	*
	0.0355	0.0050	0.0306	0.0850	0.0241	0.0570

Table III-1 (concluded)

Number of observations	329	326	326
Countries	20	20	20
R2 within	0.450	0.386	0.253
R2 between	0.121	0.095	0.008
R2 overall	0.091	0.105	0.003

Source: Elaborated by the author.

Note: The stars \*\*\*, \*\*, \* indicate respectively the statistical significance at the one, five and ten percent level. The first value below “re” is the coefficient value that indicates the slope of regression line, the value below the coefficient is the standard error, whereas the value below the star is the P value.

**TABLE III-2  
CONTROL VARIABLES REGRESSIONS**

	5		6		7		8		9		10		11	
<b>Regressions 5-11</b>	re		re		re		re		re		re		re	
<b>Tax revenue in GDP</b>														
Const	13.7119	***	8.8239	***	10.6967	***	18.6855	***	15.0133	***	17.3763	***	19.9389	***
Gdpvar per capita	2.8131	0.0000	3.0793	0.0040	2.4172	0.0000	2.2747	0.0000	2.3739	0.0000	4.7655	0.0000	3.2987	0.0000
Agriculture	0.0744	***	0.0523	**	0.0275		0.0369		0.0364		0.0345		0.0472	*
	0.0221	0.0010	0.0261	0.0450	0.0255	0.2810	0.0234	0.1150	0.0232	0.1180	0.0239	0.1490	0.0275	0.0860
Openness	-0.1224		-0.0704		-0.0975	*	-0.1831	**	-0.1279	*	-0.1693	**	-0.1111	**
	0.1019	0.2300	0.0559	0.2080	0.0544	0.0730	0.0767	0.0170	0.0743	0.0850	0.0837	0.0430	0.0541	0.0400
Deficit previous year	0.0375		0.0605	***	0.0502	***	0.0394	**	0.0379	**	0.0388	**	0.0503	***
	0.0271	0.1660	0.0137	0.0000	0.0134	0.0000	0.0154	0.0110	0.0151	0.0120	0.0160	0.0150	0.0175	0.0040
Lack of civil liberties	0.1584	*	0.0016		-0.0097		0.0005		0.0083		-0.0026		0.1968	*
	0.0818	0.0530	0.0793	0.9840	0.0618	0.8750	0.0596	0.9930	0.0577	0.8860	0.0603	0.9660	0.1167	0.0920
Schooling	-0.9392	***	-0.8082	***	-0.7473	**	-1.2792	***	-1.0602	***	-1.2193	***	-0.9900	**
	0.2989	0.0020	0.3010	0.0070	0.3112	0.0160	0.3251	0.0000	0.2932	0.0000	0.3029	0.0000	0.3951	0.0120
<b>Female labor force</b>	0.0630	**												
	0.0318	0.0480												
<b>Oldness</b>			0.1147	**										
			0.0531	0.0310										
<b>Population growth</b>					0.8025	***								
					0.2990	0.0070								
<b>Population density</b>							0.2118							
							0.4362	0.6270						
<b>Urbanization</b>									0.0264	***				
									0.0086	0.0020				
<b>Shadow economy</b>											0.0232			
											0.0498	0.6420		
													-0.1122	**
													0.0529	0.0340
Number of observations	205		401		441		495		495		495		201	
Countries	30		27		28		31		31		31		24	
R2 within	0.268		0.392		0.350		0.220		0.250		0.222		0.428	
R2 between	0.322		0.293		0.372		0.325		0.418		0.298		0.079	
R2 overall	0.316		0.335		0.399		0.324		0.449		0.297		0.081	

Table III-2 (continued)

<b>Regressions 12-13</b>		12					13					
		ANGLO					Conflict internal 1					
<b>Tax revenue</b>	Total		Direct		Indirect		Total		Direct		Indirect	
Const	13.8692	***	4.2035	***	8.0433	***	18.0537	***	4.7113	***	12.3314	***
	1.6744	0.0000	1.1215	0.0000	0.9145	0.0000	2.5417	0.0000	1.3452	0.0000	1.4256	0.0000
Gdpvar per capita	0.0462	*	0.0071		0.0650	***	0.0439	*	0.0066		0.0660	***
	0.0254	0.0680	0.0203	0.7250	0.0163	0.0000	0.0255	0.0840	0.0204	0.7460	0.0161	0.0000
Agriculture	-0.2285	***	-0.1184	**	-0.1002	***	-0.2383	***	-0.1194	**	-0.1115	***
	0.0676	0.0010	0.0506	0.0190	0.0363	0.0060	0.0801	0.0030	0.0519	0.0210	0.0379	0.0030
Openness	0.0312	*	0.0196		0.0170	*	0.0373	**	0.0213	*	0.0185	**
	0.0168	0.0640	0.0119	0.1010	0.0089	0.0540	0.0182	0.0410	0.0122	0.0820	0.0091	0.0410
Deficit previous year	0.0164		0.0630	**	-0.0009		0.0138		0.0610	**	-0.0002	
	0.0565	0.7720	0.0308	0.0410	0.0361	0.9810	0.0565	0.8070	0.0304	0.0450	0.0362	0.9950
<b>ANGLO</b>	7.5976	***	1.9240	*	6.2182	***						
	1.7280	0.0000	1.1151	0.0840	1.4321	0.0000						
<b>Conflict 1</b>							-4.0625	**	0.3392		-4.9854	***
							2.0080	0.0430	1.0700	0.7510	1.3626	0.0000
Observations	495		440		440		495		440		440	
Countries	31		30		30		31		30		30	
R2 within	0.154		0.159		0.147		0.155		0.159		0.147	
R2 between	0.579		0.227		0.536		0.279		0.110		0.370	
R2 overall	0.522		0.187		0.517		0.348		0.119		0.400	

Table III-2 (concluded)

Regressions 14-15		14					15					
		Conflict internal 2					Conflict 3 external					
Tax revenue	Total		Direct		Indirect		Total		Direct		Indirect	
Const	17.8162	***	4.8905	***	11.4856	***	17.2653	***	5.1281	***	11.0021	***
	2.5229	0.0000	1.3709	0.0000	1.4034	0.0000	2.3646	0.0000	1.2730	0.0000	1.2442	0.0000
Gdpvar per capita	0.0437	*	0.0066		0.0660	***	0.0439	*	0.0069		0.0663	***
	0.0255	0.0860	0.0204	0.7450	0.0161	0.0000	0.0256	0.0860	0.0204	0.7350	0.0163	0.0000
Agriculture	-0.2367	***	-0.1191	**	-0.1140	***	-0.2411	***	-0.1208	**	-0.1169	***
	0.0795	0.0030	0.0518	0.0210	0.0388	0.0030	0.0804	0.0030	0.0516	0.0190	0.0384	0.0020
Openness	0.0366	**	0.0211	*	0.0179	**	0.0382	**	0.0210	*	0.0186	**
	0.0183	0.0460	0.0123	0.0860	0.0091	0.0500	0.0179	0.0330	0.0120	0.0810	0.0089	0.0360
Deficit previous year	0.0129		0.0612	**	-0.0002		0.0127		0.0613	**	-0.0004	
	0.0565	0.8190	0.0304	0.0440	0.0360	0.9950	0.0563	0.8220	0.0305	0.0440	0.0359	0.9900
Conflict 2	-5.1053	***	-0.1898		-3.8647	***						
	1.6450	0.0020	0.8417	0.8220	1.3997	0.0060						
Conflict 3							-4.3520	*	-1.5568	**	-2.7287	
							2.5534	0.0880	0.7392	0.0350	2.2443	0.2240
Observations	495		440		440		495		440		440	
Countries	31		30		30		31		30		30	
R2 within	0.155		0.159		0.147		0.155		0.159		0.147	
R2 between	0.304		0.108		0.219		0.257		0.148		0.156	
R2 overall	0.293		0.118		0.235		0.207		0.132		0.194	

Source: Elaborated by the author.

Note: The stars \*\*\*, \*\*, \* indicate, respectively, the statistical significance at the one, five and ten percent level. The first value below "re" is the coefficient value that indicates the slope of regression line, the value below the coefficient is the standard error, whereas the value below the star is the P value.