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ESTRUCTURA IMPOSITIVA EN AMÉRICA LATINA: SU IMPACTO SOBRE LA
ECONOMÍA REAL Y CUMPLIMIENTO

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RESUMEN

En este trabajo se evalúa la estructura de los sistemas impositivos en América Latina y se analiza su impacto en la economía real tomando en cuenta variables como el crecimiento económico, la estabilidad macroeconómica, la redistribución del ingreso y la inversión extranjera directa. Asimismo, se evalúa su impacto sobre la extensión de la informalidad y la moral impositiva.

Palabras clave: sistema impositivo, crecimiento, estabilidad, desigualdad, informalidad, moralidad impositiva

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ABSTRACT

In this paper we review the structure of tax systems in Latin America and analyze their impact on the real economy-- economic growth, macro-economic stability, income redistribution and foreign direct investment--, and on the extent of informality --the size of the shadow economy—and 'tax morale.'

Keywords: tax structure, growth, stability, inequality, informality, tax morale

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Tax Structure in Latin American: Its Impact on the Real Economy and Compliance

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***“Desafortunadamente, los países de América Latina tributan poco y mal”
Alicia Bárcena, Executive Secretary, CEPAL (2010)***

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I. Introduction

One of the most researched questions about tax systems in Latin America is the relatively low, with some minor exceptions, tax revenue-to-GDP ratio. The interest in this issue emanates from the likely linkage between low tax levels and inadequate public spending on public infrastructure and human capital (health and education) improvements necessary for sustained economic growth, as well as the impact on income distribution and other economic policy objectives.² Less research has been carried out on the structural composition of tax systems in Latin America and its consequence vis-à-vis the real economy.³

The choice between direct and indirect taxes has contributed to a long political and academic debate regarding advantages and defects of those two forms of taxation. The choice of direct versus indirect taxes is fundamental to the optimal design of tax structures since those forms of taxation may affect differently the goals of efficiency and equity. While some early contributions drove to demonstrate the superiority of direct over indirect taxes under specific conditions (Hicks, 1939),⁴ most of the focus early on in the optimal tax literature was on separate forms of taxation (e.g., Ramsey, 1927; Diamond and Mirrlees, 1971).

A key development in the optimal tax literature from the perspective of the optimal tax mix was Atkinson and Stiglitz's (1976) seminal paper, who for the first time considered the interaction of direct and indirect taxes in the attainment of efficiency and equity goals. The Atkinson and Stiglitz theorem states that, in an economy where individuals differ only in their earning abilities, government can impose a general income tax, and where the utility function is separable between labor and all commodities, then in the optimum tax design there is no need to employ indirect taxation. This important result was followed by a significant number of other theoretical contributions showing how important aspects of the economy (e.g., the scope

² See, for example, Jimenez et al. (2010), Bernardi et al. (2007), Bird et al. (2006).

³ This has been also a less researched question in general; this literature is reviewed in Martinez-Vazquez et al. (2011).

⁴ Essentially Hicks (1939) assumed identical individuals with perfectly inelastic labor supply (Atkinson, 1977).

of tax evasion) and heterogeneity among taxpayers would justify the existence side by side of direct and indirect forms of taxation.

The mix of direct and indirect taxes⁵ can have important consequences in the relative efficiency of economic systems and on their overall performance in terms of economic growth, macro-economic stability (via built-in stabilizers), and the overall ability to redistribute income. The structure of tax systems in Latin America is also likely to affect and be affected by the extent of informality – the size of the underground economy—and attitudes toward voluntary compliance—or what has become known as ‘tax morale.’

These phenomena, also present in other regions of the world, have taken center stage in the evolution and performance of Latin-American tax systems. And despite their importance, little research has been conducted on these issues in a systematic fashion. This paper has as direct focus the structure and composition of tax systems in Latin America and their impact on economic growth, macro-economic stability, income distribution, and foreign direct investment flows. The paper also explores the interactions between tax structure and the underground economy and tax morale. The organization of the rest of the paper is as follows. Section II provides general background on taxation in Latin America, while section III discusses the trends in tax structure in Latin America. Section IV investigates the determinants of the direct-indirect tax mix. Section V evaluates the impact of tax structure on four important measures of macroeconomic performance: economic growth, macroeconomic stability, income distribution, and foreign direct investment flows. Section VI, investigates the interaction between tax structure and the extent of the informal economy and the level of tax morale. Section VII concludes.

⁵ Although different definitions exist, we will follow Atkinson (1977) defining as direct taxes those that may be adjusted to the individual characteristics of the taxpayer and as indirect taxes those that are levied on transactions irrespective of the circumstances of buyer or seller.

II. Some general background on taxation in Latin America

Although it is frequently addressed in fiscal matters as a homogeneous block of countries, the Latin America region shows considerable diversity in economic structure as well as tax systems (Gomez Sabaini and Martner, 2007; Tanzi, 2007). The diversity in tax systems is induced by diversity in per capita income with low, low-medium and medium-high income countries in the region; in the availability of natural resources and therefore the relative ease of obtaining alternative revenues to taxes; and in size, with three large federations (Argentina, Brazil and Mexico) representing over two-thirds of the region's gross product. This all means that we should expect also considerable diversity in tax systems across countries in the region. Of particular relevance for tax systems is the importance of non-tax revenue in some countries in the region; for example in recent years, non-tax revenues in Ecuador comprised close to half of total revenues, over one-third in Mexico, and over one-fourth in Chile.

From one perspective, Latin American country tax structures look like those of countries in other regions of the world, including income taxes (Personal and Corporate – PIT/CIT), some social security taxes, and value added taxes (VAT) or other consumption taxes—excises and those on imports. From another perspective, Latin American country tax structures do not look like those of most other countries in that it is frequent to observe the use of what has been called “heterodox” taxes,⁶ including taxes on financial transactions, on business assets, and even exports.

Main features of ‘traditional’ taxes

Personal income taxes traditionally have raised relatively low revenues in most Latin American countries.⁷ The reasons for this appear to be multiple (Tanzi, 2007; Profeta and Scabrosetti, 2007). They include: (i) the presence of larger than usual informal economies; (ii) the low share of workers compensation in the composition of national incomes-- less than 30 percent in many countries in the regions versus over 70 percent in most industrial countries—and therefore a

⁶ See Gonazalez (2009).

⁷ Some countries, like Brazil and Chile, and more recently Argentina, are somewhat of an exception, but even in these countries the actual use of the PIT is limited by international standards.

lower role played by withholding and automatic reporting mechanisms; (iii) political economy considerations related to the pronouncedly uneven distributions of income-- with Gini coefficients approaching 0.60—and the successful opposition of the best-off groups to significantly progressive taxation opposition⁸; (iv) not unrelated to political economy considerations, the structure of the tax is typically riddled with high exemption levels and other provisions narrowing the base;⁹ (v) in particular, the low taxation of capital income, often taxed at lower rates if not exempted combined with considerable capital flight.¹⁰

The story with the enterprise income taxation (the corporate income tax, CIT) is different. The experience and performance of Latin American countries with the CIT is similar to that in other countries, and in some ways comparable to that in OECD countries. The CIT is not as diverse regarding its structure but tax rates differ markedly-- from about 10 percent to about 38 percent. The region has joined the worldwide trend toward lower CIT rates, with the difference that tax bases have not been broadened as much as in other places due to the continuation of exemptions and special tax advantages and incentives.¹¹ Tax revenues from the CIT nevertheless have improved in recent times because tax bases are now better adapted to deal with inflation than in the past and the sharp increases in international prices and profits of companies exploiting natural resources. To address the problem of the 'hard to tax' almost every country has introduced a simplified taxation system for small enterprises, often based on presumptive methods of defining the tax bases. Social security taxes are not as important or as

⁸ As Tanzi (2007) points out, this outcome contradicts the prediction in public choice theory that political majorities would use their power to redistribute income in their favor. Profeta and Scabrosetti (2007) explain the political economy puzzle for the lack of tax redistribution in Latin America by the role played by "vested interests, financial sector, and populist economic policies." These authors argue that Latin American political parties only weakly represent voters' political preferences and that they are more influenced by elites and interest groups. Profeta and Scabrosetti (2007) also make an argument for weaker tax administration in Latin America due to disintermediation and lower penetration of financial institutions in the economy-- an argument originally made by Gordon and Li (2005).

⁹ Castelletti (2008) points out that in the vast majority of countries in Latin America (over 90 percent in Brazil, Chile, Colombia, and Costa Rica) most earnings are below the minimum exempt threshold.

¹⁰ For example, Peru exempts interest and capital gains. The fear of capital flight has been a real one; for example, capital still flows to the U.S. in large amounts, in part due to the fact that there deposits by "nonresident aliens" enjoy tax free status (Tanzi, 2007).

¹¹ Tax expenditures vary from about 1.4 percent for Brazil and 7.4 percent for Colombia (Gomez Sabaiani and Martner, 2007).

common in the region as in OECD countries, but here again there is considerable diversity. For example, Brazil raises over 15 percent of GDP to finance social security services.

On the side of consumption taxes, the VAT is generally a success in the region, and the most important form of indirect taxation in some countries, like Brazil, Chile and Uruguay, raising over 8 percent of GDP in tax revenues— comparable to other successful experiences in OECD countries (Tanzi, 2007). Rates, which have been increasing, vary considerably— Panama at 5 percent versus Uruguay at 23 percent, and on average are almost 5 percentage points below those of the EU. Most countries operate on a single general rate. The productivity of the VAT— the ratio of actual collections to GDP times the standard rate— is low in some countries (for example, less than 25 percent in Mexico) due to the application of multiple rates and the narrowing of the base through the use of exemptions. Like in other regions of the world, the operation of the VAT in the region has suffered from fraud with fake credits and delays in paying the legitimate refunds to exporters and other taxpayers. Overall, even though the VAT has been performing well, there is ample fiscal space in the region to increase the yield of the VAT. Excise taxation has been declining in importance in part due to the lack of indexation of specific rates. Finally, customs revenues have also declined as the result of international trade reforms, although revenues from export taxes are quite significant at least in Argentina.

Main features of 'heterodox' taxes: In search of Eldorado?

A feature that separately defines tax systems in the Latin American region vis-à-vis those in other parts of the world is the use of innovative if 'heterodox' forms of taxation (Gonzalez, 2009) in a persistent search for the "Eldorado of the tax world" (Tanzi, 2007). These are approaches to provide for tax revenues in more administratively effective and politically less painful ways but that potentially can impose far more severe distortions and excess burdens in the economy, and supposedly be induced by the relative failure of many countries in the region in applying the 'traditional tax model'.¹² Often introduced in times of crisis, they have become

¹² This is the general argument used in Gonzalez (2009) and Tanzi (2007). On the other hand, other regions of the world, such as Africa and South and Southeast Asia, have faced similar problems in implementing the 'traditional tax model,' but there the adoption of heterodox forms of taxation has been much less common.

permanent fixes of tax structures; besides providing easy tax handles they also have been justified as providing information to improve the enforcement of traditional taxes.

The list of heterodox taxes includes: taxes on financial transactions, taxes on business assets, and export duties.¹³ Far from being “nuisance taxes”—that is, with revenues collected being less than administration costs-- heterodox taxes can be significant revenue raisers. Gonzalez (2009) reports that the tax on financial transactions represented close to 2 percent of GDP in Argentina in 2007, and that it represented up to 3.5 percent of GDP in Ecuador before it was abolished. That needs to be weighted against the large potential excess tax burdens, especially in the case of financial transactions tax and the export tax.¹⁴ The financial transactions tax initially fell on bank account withdrawals, but generally has been extended to other bank and non-bank financial transactions, and it is currently used in countries such as Argentina, Colombia, Peru, and Venezuela (Table 1.a).¹⁵ The rates actually applied varu from 0.15 percent of value to 1.5 percent (Table 1.b). Baca-Campodonico et al. (2006) have investigated the performance of the “bank transaction tax” (BTT) in six Latin American countries, which at some point have used this tax. They conclude that the BTT is an unreliable source of revenue, with tax collections declining over time and with increases in tax rates narrowing the tax base leading to further revenue declines. These authors also review the literature showing that the BTT promotes considerable financial disintermediation,¹⁶ and leads to increases in the cost of government borrowing.

¹³ Gonzalez (2009) also includes presumptive income taxation and simplified tax regimes for small taxpayers as forms of heterodox taxation. However, these are common in other countries outside Latin America and they probably do not belong to the “heterodox” category. In addition Gonzalez (2009) lists also the ‘impuesto empresarial de tasa unica’ (IETU)” recently introduced in Mexico which is accompanied by a tax “impuesto a los depositos en efectivo” (IDE) on cash deposits on both local and foreign currencies in excess of \$2,300 a month (approximate amount) at a 2 percent rate. While the Mexican tax on cash deposits could be considered among the taxes on financial transactions and therefore just one more heterodox manifestation, the IETU is, however, a cash flow-based business tax (excluding wages and salaries) supplementing the regular income tax levied at a uniform tax rate of 17.5 percent which in different forms has been discussed in the tax literature and likely a desirable form of innovation (McLure et al., 1990; Shome and Schutte, 1993; and Auerbach and Bradford, 2002).

¹⁴ See Coelho (2009) for a discussion of disintermediation and other economic effects of financial transaction taxes.

¹⁵ Brazil abolished this type of tax in 2007. The tax collection had been earmarked to finance the health system. Other Latin American countries that have or have had bank or financial transactions taxes include Bolivia, Colombia, Dominican Republic, Paraguay and Venezuela.

¹⁶ Kirilenko and Perry (2004) find that the application of the BTT has led to disintermediation; for every dollar raised in revenues by the BTT, they observed disintermediation of 46 cents in Argentina, 58 cents in Brazil, 64 cents

The business assets tax was first introduced in the region by Mexico in 1989 with the goal of having a minimum creditable tax against the corporate income tax, and got to represent upwards to 1 percent of GDP in revenues. Some form of this tax, receiving different names, has been used on and off by a number of countries in the region (Table 1.c), most of the time used with the purpose of controlling evasion and, as in the case of Mexico, making it a minimum tax creditable against CIT.

Table 1. a. Usage of the financial transaction tax in the region

Country	Name
Argentina	<i>Impuesto al debito y credito bancario y otras operatories</i>
Bolivia	<i>Impuesto a las transacciones financieras</i>
Brazil *	<i>Contribucion provisoria sobre el movimiento o transmission de valores y creditos de naturaleza financiera</i>
Colombia	<i>Gravamen a los Movimientos Financieros</i>
Dominican Republic	<i>Impuesto sobre los cheques</i>
Ecuador *	<i>Impuesto a la circulacion de capitales</i>
Peru	<i>Impuesto a las transacciones financieras</i>
Venezuela	<i>Impuesto a las transacciones financieras</i>

(*) abolished

Table 1. b. Base and rate of the financial transaction tax in the region

Country	Tax Base	Tax Rate
Argentina	<i>Debits/credits on bank accounts (checking), other operations made through financial institutions, and payments made through other payment systems</i>	<i>0.60%</i>
Bolivia	<i>Debits and credits on bank accounts</i>	<i>0.15%</i>
Brazil *	<i>Debits and credits on financial system accounts, payments through other payment systems</i>	<i>0.38%</i>

in Colombia, 48 cents in Ecuador, 66 cents in Peru, and 49 cents in Venezuela. These losses alone can represent a loss of over 0.5 percent of GDP.

Colombia	<i>Debits on bank accounts , cashier checks</i>	0.40%
Dominican Republic	<i>Debits</i>	0.15%
Peru	<i>Debits and credits on bank accounts</i>	0.08%
Venezuela	<i>Debits on bank accounts and other types of accounts within the financial system</i>	1.5%

(*) abolished

Table 1. c. Usage of the business assets tax in the region

Country	Name
Argentina	<i>Impuesto Ganancia Mínima Presunta</i>
Colombia	<i>Impuesto Renta y Complementarias</i>
Ecuador*	<i>Impuesto sobre Activos</i>
Guatemala	<i>Impuesto a Empresas Mercantiles y Agropecuarias</i>
Honduras	<i>Impuesto sobre Activos Netos</i>
Mexico*	<i>Impuesto al Activo</i>
Nicaragua	<i>Impuesto al Patrimonio Neto</i>
Peru	<i>Impuesto Transitorio a los activos netos (ITAN)</i>
Dominican Republic	<i>Impuesto a los Activos</i>
Uruguay*	<i>Impuesto a los Activos de Empresas Bancarias</i>

Sources: Based on Gonzalez (2009); (*) currently abolished.

The export tax is a phenomenon nowadays exclusive to Argentina, where revenues from this source represented close to 3 percent of GDP in 2009. Decades ago, especially in the 1950s and 60s, export taxes had some prominence in many tax systems in the region.¹⁷ Typically export taxes are seen as leading to trade distortions and large excess burdens. Besides its ability to raise revenues, the Argentinean government has justified this levy as a way to capture some of the rents received by exporters after devaluation of national currency and also to pursue income redistribution goals.

The evolution of tax levels (Tax to GDP ratio)

For decades, the Latin American region has been identified as a low tax pressure region vis-à-vis other regions of the world, with average levels even below much poorer African countries (Bird, Martinez-Vazquez, and Torgler, 2006). This has changed over the past decade with average fiscal pressure increasing from an average of 12 percent in the 1990s to an average of 18

¹⁷ These countries included Argentina, Brazil, Colombia, Ecuador and Haiti and covered agricultural products and raw materials. (Tanzi, 2007).

percent in the 2000s-- but still at less than half of the average tax pressure in OECD countries (IMF, 2010; Gomez-Sabaini and Martner, 2007; Tanzi, 2007). However, these average figures mask important persistent differences in tax pressure across countries in the region with persistent underperformers like Guatemala, and Paraguay collecting less than 10 percent of GDP and countries like Mexico that has been constantly stuck at 12 percent of GDP for decades.¹⁸ Gomez Sabaini and Martner (2007) aptly classify the countries in the region into three separate groups: the relative high performers (Argentina, Brazil, Uruguay, Costa Rica) which had tax revenues (including Social Security contributions) as percent of GDP of 26.0 in 2005—with Brazil as high as 37.4 percent and Costa Rica at 20.5 percent; a middle group with most countries with an average ratio in 2005 of 17.0 percent; and a lower group with a mean value of 11.7 percent in which stands Guatemala and Haiti both at 9.7 percent of GDP. Also in this last group are countries like Venezuela and Ecuador, which have significant non-tax revenues from natural resource, and Panama also with substantial non tax revenues from exploiting the Canal.

The improvements in the tax ratio in countries like Argentina, Bolivia, Colombia, or Nicaragua have been generally attributed to policy reforms, improvements in tax administration with the incorporation of information technology, and also increases in international prices for those countries exporting natural resources; although this latter is only partially reflected in tax revenues and more so on non-tax revenues.

Typically the discussion of tax levels is accompanied by an analysis of tax effort. This latter is defined as the comparison of the taxes actually raised to those that a country may theoretically raise given its economic structure and if it were to employ certain standards (average or maximum) of diligence in collecting taxes.¹⁹ In order to control for economic structure or availability of tax bases, typically GDP per capita, openness (exports plus imports to GDP ratio), value added in agriculture, population growth, etc, are used as control variables. Table 2

¹⁸ See Martinez-Vazquez (2008a) for a discussion of the “Mexican constant” tax pressure.

¹⁹ See, for example, Bird et al. (2006) and the references therein.

reports some recent calculation of tax effort in Latin American countries by Pessino and Fenochietto (2010) estimated using a stochastic frontier approach.²⁰

Table2. Tax Ratio and Tax Effort for Selected Latin American Countries, 1991-2006

Country	Tax ratio (in % of GDP)	Estimated effort (actually collected over potential in %)
Argentina	27.4	79.3
Brazil	34.2	98.0
Bolivia	26.6	67.6
Colombia	19.6	71.6
Costa Rica	22.2	66.7
Dominican Republic	14.2	48.3
El Salvador	15.3	53.8
Guatemala	10.7	38.1
Nicaragua	21.5	65.2
Panama	14.3	48.3
Paraguay	15.3	64.5
Peru	15.3	55.3
Uruguay	25.0	87.5
Median low-income countries	13.9	77.6
Lower middle-income countries	16.5	63.2
Upper middle-income countries	26.8	77.2
High income countries	36.0	78.4

Source: Pession and Fenochietto (2010)

It is notable how effort varies across countries, with Guatemala collecting at 38.1 percent of its potential while Brazil is at 98 percent. Poor performance is generally explained by low buoyancy/elasticity of the tax system, large size of the underground economy, high levels of tax evasion, underperforming tax administration, high tax expenditures (multiple exemptions and deductions), and political reasons aiming to keep tax effort low. These are many interconnected reasons, present in many tax systems in the regions, but obviously with quite different consequences.

III. Trends in tax structure in Latin America

²⁰ This study excluded countries with over 30 percent in total revenues coming from no tax sources.

The structure of tax systems in Latin America has experienced significant changes over the past decades. As shown in Figure 1: ²¹(i) there has been a rapid increase in the relative importance of consumption taxes led by the introduction and rise of the VAT, which has more than compensated for some reductions in excise taxes; (ii) there has been a very significant decline in the relative importance of taxes on international trade, led by a decrease in customs duties following tariff reform and despite the importance of export taxes in Argentina; (iii) there has been a sustained stagnation of income taxes led by weak collections from the personal income tax only partially offset by the better performance of the corporate income tax, especially in more recent years with higher profits associated with the international prices of natural resources; (iv) there has been an increase in importance of social security contributions and payroll taxes; and (v) there has been a complete stagnation of property taxes at very low levels of taxation.

One important outcome of this evolution of tax structures in Latin America has been a direct to indirect tax ratio that is less than one, markedly tilted toward indirect taxation, especially by comparison to the tax structure of “developed” countries.²² This is shown in Figure 2 where, for comparison purposes, we show the direct to indirect tax ratio for Latin American countries and those for ‘developed’ and ‘developing’ countries, as well as for the full sample of countries. In more recent years, the direct to indirect tax ratio in Latin America shadows that of ‘developing’ countries and has remained under one because of the much larger importance of consumption taxes. In contrast, the tax ratio in ‘developed’ countries is much greater than one, reflecting the larger relative importance of income taxes,²³ especially personal income taxes, social security taxes, and also, although to a less extent, of property taxes. The direct to indirect

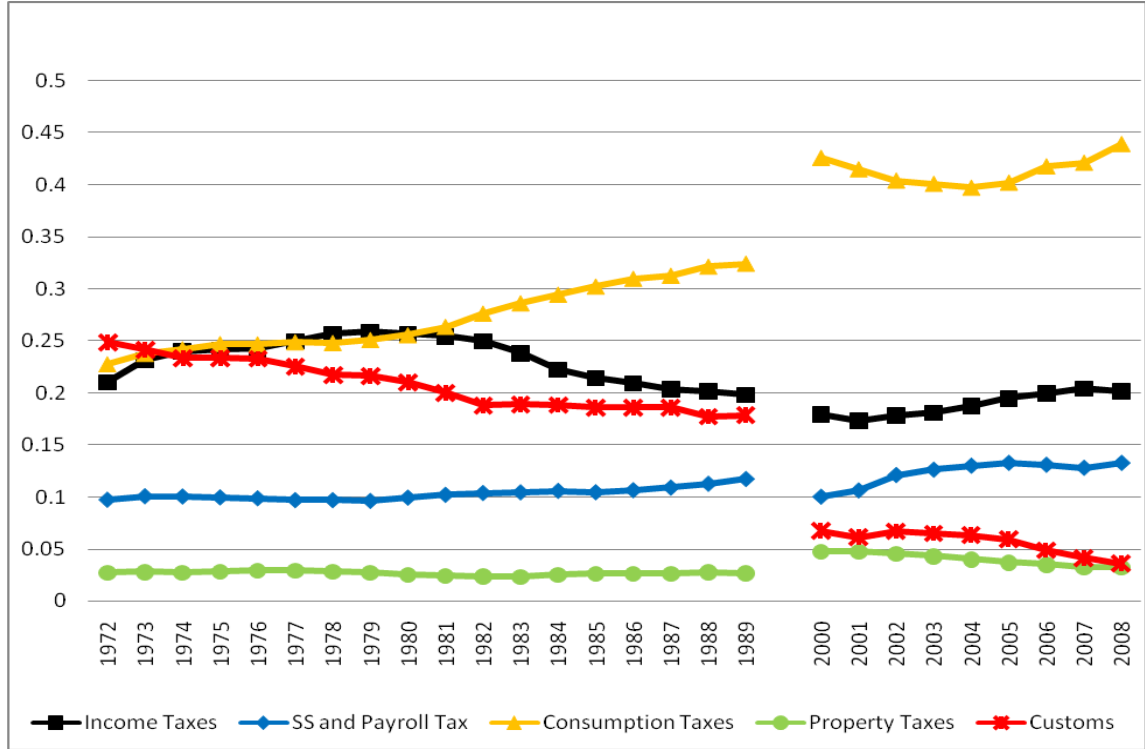
²¹ From 1990 to 1999 the data downloaded from the International Monetary Fund’s (IMF) Government Finance Statistics (GFS) were incomplete and therefore are not reported in the figures. This was due to a change in methodology from 1990 onward which led to scattered data reporting for many years.

²² Although some other classifications are possible, in this paper we will categorize as direct taxes, all income taxes, social security and payroll taxes, and property taxes. The main categories of indirect taxes are (domestic) consumption taxes, which include the VAT and excises, and customs taxes or taxes on international trade. For the “heterodox” taxes, those on financial transactions and exports fall into indirect taxes, while the taxes on enterprise assets are considered direct taxes.

²³ It is interesting to note that on average over two-thirds of income taxes in developing countries come from personal income taxes. In Latin America, this is reversed with corporate income taxes representing over two-thirds of the total.

tax ratio, of course, has important consequences for the impact of tax structure.²⁴ The predominance of indirect taxation in Latin America tends to produce less progressive and even regressive outcome on income distribution. This has been a frequently mentioned feature in the region. In addition, as we will examine below in this paper, the direct to indirect tax ratio can have important impacts on automatic stabilizers and therefore macroeconomic stability, on economic growth and foreign direct investment flows, among other potential effects.

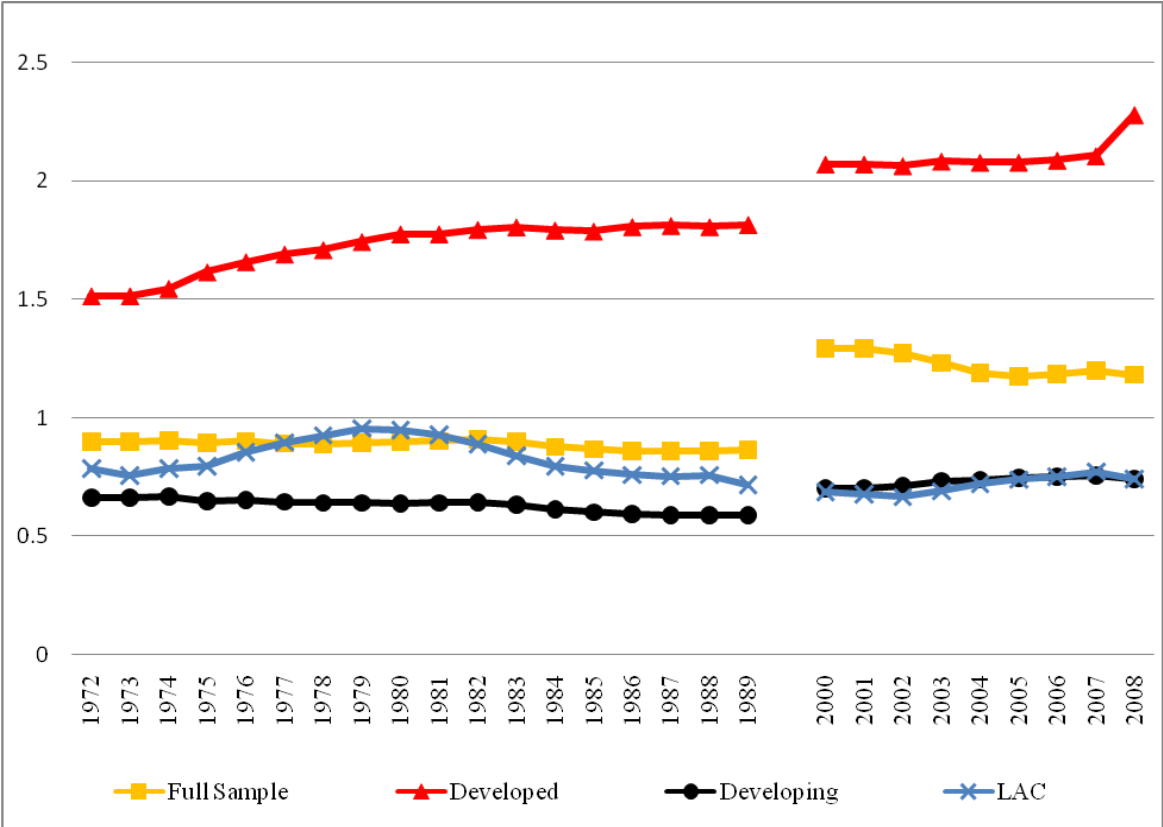
Figure1. Average annual Tax Structure as a Share of Total Taxes in Latin American Countries, 1972-2008



Source: Author's calculations, IMF GFS Database, and CEPAL; Notes: All data at the general government level

²⁴ See Martinez-Vazquez et al. (2011) for a review of the theoretical debate in public finance on the need and relevance of direct versus indirect taxation.

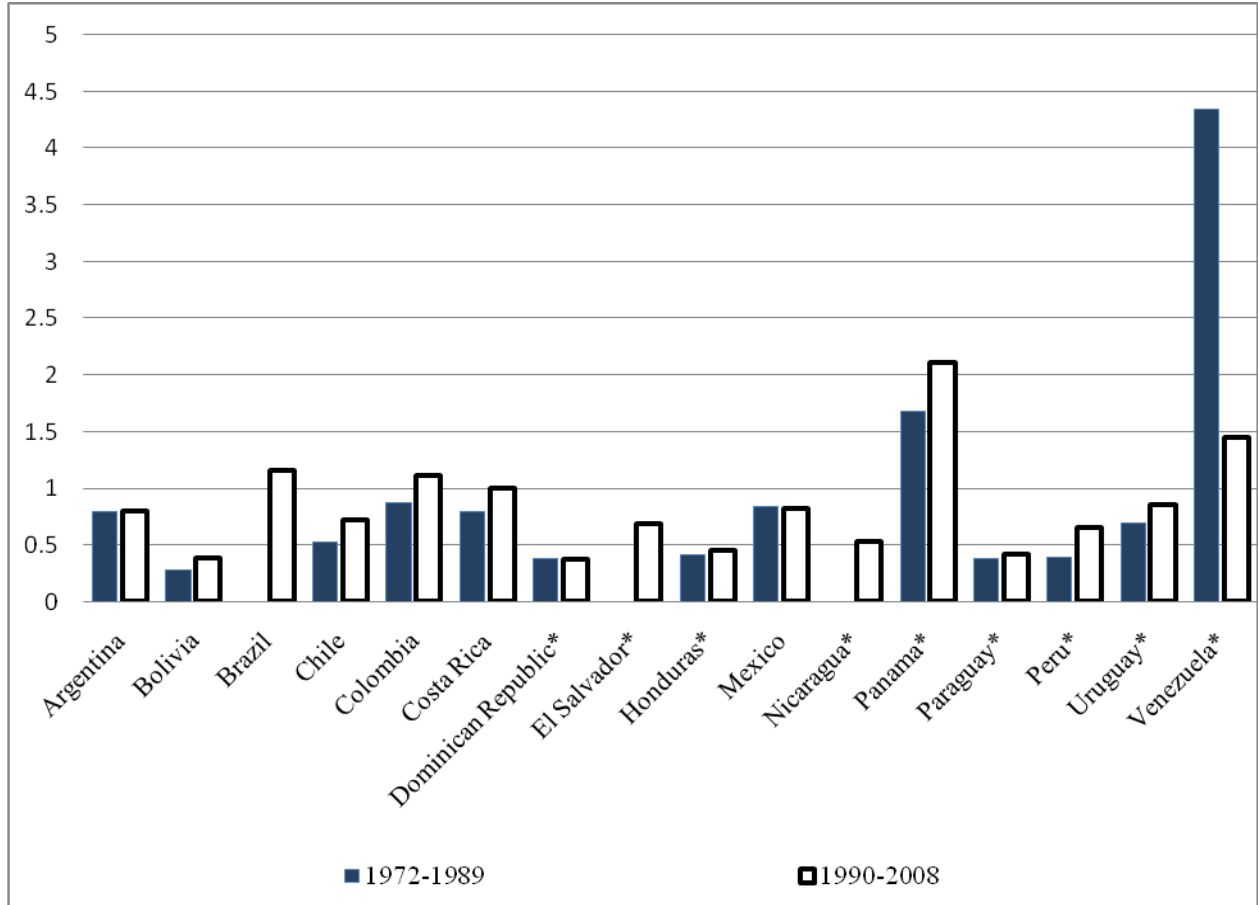
Figure2. Average annual Direct to Indirect Tax Ratio in different groups of countries, 1972-2008



Source: Author's calculations, IMF GFS Database, and CEPAL; Notes: All data at the general government level.

As usual, the average values hide considerable diversity by country. In a number of countries in the region, including Brazil, Colombia, Costa Rica, Panama and Venezuela, the direct to indirect tax ratio has been close to or has exceeded one. Often the reason is the greater importance of the CIT and the combination with the presence of natural resources.

Figure3. Average Direct to Indirect Tax Ratio in Latin America by Country, 1972-2008



Source: Author's calculations; IMF GFS Database, CEPAL; *Data for 1990-2008 at the central government level

IV. The determinants of the direct – indirect tax mix

The structure of tax systems and in particular the use of direct taxes vis-à-vis indirect taxes has been one of the most researched topics in the optimal tax literature after the well-known Atkinson-Stiglitz (1976) theorem stated that under some fairly general conditions governments need to employ only direct taxes.²⁵ Following that, several contributions have shown that indirect taxes may be justified in an optimal tax structure if some assumptions made by Atkinson-Stiglitz (1976) were relaxed. For example, indirect taxation may be justified in the presence of: taxes with different evasion characteristics (Boadway, Marchand and Pestieau, 1994), uncertainty (Cremer and Gahvari, 1995), increasing marginal costs of production (Naito,

²⁵ Specifically their theorem states that when the government may choose a general income tax function, individuals differ only on wage earning ability, and the utility functions are separable between labor and all commodities, then no indirect taxes need be employed.

1999), heterogeneity of individuals with unobservable characteristics (Cremer, Pestieau and Rochet, 2001; Saez, 2002), and endogenous human capital accumulation (Naito, 2004). Since many, if not all, of these conditions are likely to occur in real tax systems, the presence of both direct and indirect taxes is justified. However, optimal tax theory does not provide specific guidelines for what should be the combination of those forms of taxation. In reality, governments design their tax structures in the pursuit of many different objectives constrained by important political economy considerations. In this section, we briefly review the previous literature on the determinants of tax structure and examine how well those models can explain tax structure—the direct to indirect tax mix—in Latin America.

Specifically, we build on the recent work by Kenny and Winer (2006), Hines and Summers (2009), and Martinez-Vazquez et al. (2011) to estimate the following model:

$$TaxRatio_{it} = (X_{it}, LA_{it} * X_{it})\beta + v_i + \varepsilon_{it}, i = 1, \dots, N; t = 1, \dots, T$$

using two-stage least squares (2SLS) with panel corrected standard errors (clustered by country), and where i indexes country and t indexes year, and v_i represents the country-specific fixed effects.²⁶ The dependent variable, the *Tax Ratio* is measured as the ratio of direct taxes to indirect taxes. The tax data represent consolidated general government data and are drawn from the IMF GFS Database.²⁷ The set of observable characteristics X_{it} are run by themselves and alternatively interacted with a dummy variable $LA_{it} * X_{it}$ with LA_{it} equal to one for Latin American countries. The explanatory variables are grouped into “demand” factors—capturing preferences or the overall budget constraint of the public sector--, and “supply” factors-- the availability of tax bases or “tax handles” and institutional and structural features that facilitate tax enforcement.

²⁶ We test but find no heteroskedasticity in our model. However, we detect the existence of the first-order panel-specific autocorrelation and thus we estimate the model with Panel Corrected Standard Errors (PCSE), as suggested by Beck and Katz (1995). The Hausman (1978) test for fixed/random effects fails to reject the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator, allowing us to apply the fixed effects procedure. However, since the Hausman test may be misleading due to the presence of autocorrelation, we include a set of individual country dummies in our regression model to control for individual unobservable fixed effects.

²⁷ See Tables A.2 and A.3 in the Appendix for a description of data variables and sources.

Among the demand factors, we identify “scale effect variables,” including total revenues to GDP,²⁸ the size of the country measured by population, and the level of decentralization in a country. We also identify as part of the demand factors “political preferences,” including the existence of democratic institutions, the political color of democratic regimes (socialist governments in power), and last, per capita income, which may capture preferences for redistribution.

Among the supply factors, we identify first what Kenny and Winer (2006) call “tax base effects,” meaning that countries will be more likely to use taxes for which there are relatively larger tax bases available. These include the presence of oil resources—facilitating the heavier use of the corporate income tax--, real GDP per worker—facilitating personal income and payroll taxes--, and the extent of open economies—facilitating the use of indirect taxes. Additionally as supply factors, we attempt to capture differences in “administration costs,” by the degree of urbanization, the relative importance of agriculture, and the extent of the shadow economy.

Table 4 presents the estimated effects. In Column 1, we use the full sample of developed and developing countries without any explicit focus on Latin America.²⁹ This provides a benchmark for the more specific results pertaining to Latin America. In Column 2, we run the regression model exclusively with data for Latin American countries. In Columns 3 – 7, we use again the full sample but introduce the Latin America dummy to allow the estimated coefficient for each explanatory variable to change in the case of Latin America. And while in the regression in column 3 we use agriculture as an explanatory variable, in Column 4 we use the shadow economy. The reason for this is that these two variables may be highly correlated.³⁰ We also estimate the model by including them both as explanatory variables (column 5), and we also include tax morale as an additional explanatory variable (column 5). Due to a potential reverse causality problem between tax morale and a country’s ratio of direct to indirect taxes, we re-

²⁸ We test for the endogeneity of total revenue to GDP using the same instruments as Kenny and Winer (2006), absolute latitude of the country’s largest city, scaled to take values between 0 and 1, and voter turnout rate, but fail to detect it.

²⁹ The results in column 1 replicate to a large extent those in Martinez-Vazquez et al. (2011).

³⁰ The correlation coefficient between these two variables is 0.49.

estimate the model in column 6 using an Instrumental Variable approach.³¹ The bolded figures in columns 3–7 mean that the general estimated coefficient and that for the

Table4. Determinants of Tax Ratio, 1972-2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Full Sample	Latin America	Full Sample w/ interaction with LA				
Total revenues	2.20*** (0.50)	2.24 (1.50)	2.21*** (0.52)	1.43 (0.00)	1.48*** (0.57)	1.16 (0.73)	1.43** (0.58)
Total revenues*LA			-2.02 (1.68)	1.77 (0.00)	-3.67** (1.64)	0.00 (0.00)	-5.83*** (2.03)
Log (population)	29.39*** (9.86)	67.87 (69.61)	26.50** (11.20)	46.47 (0.00)	49.96*** (11.66)	44.21** (18.54)	49.87*** (11.53)
Log (population) *LA			79.37 (77.23)	488.35 (0.00)	-72.87*** (27.47)	0.00 (0.00)	0.00 (0.00)
Federal	-3.59*** (1.24)	0.00 (0.00)	-2.55** (1.21)	-30.58 (0.00)	-60.36*** (15.04)	-1.24 (1.86)	-7.39*** (0.69)
Decentralization	-0.01* (0.00)	0.02* (0.01)	-0.01** (0.00)	-0.00 (0.00)	-0.00 (0.01)	0.00 (0.01)	-0.00 (0.01)
Decentralization* LA			0.02 (0.01)	0.01 (0.00)	0.03*** (0.01)	-0.00 (0.02)	0.05*** (0.01)
Democracy	0.38* (0.22)	0.25 (0.32)	0.20 (0.39)	-0.02 (0.00)	0.08 (0.34)	-0.19 (0.58)	0.07 (0.34)
Democracy*LA			0.31 (0.51)	0.15 (0.00)	0.26 (0.36)	0.15 (0.71)	-0.09 (0.33)
Socialist	-0.36 (0.34)	0.00 (0.00)	-0.39 (0.37)	-0.37 (0.00)	-0.47* (0.29)	-0.31 (0.37)	-0.48* (0.29)
GDP pc	-2.26 (2.20)	-2.64 (4.87)	-2.67 (2.78)	2.68 (0.00)	4.62* (2.42)	5.49 (6.10)	3.66 (2.87)
GDP pc*LA			-5.51 (5.29)	-0.99 (0.00)	-2.31 (3.79)	0.00 (0.00)	-53.50*** (16.02)
Crude petrol	0.01 (0.01)	-0.25 (0.29)	0.01 (0.01)	-0.02 (0.00)	-0.02 (0.02)	-0.02 (0.12)	-0.01 (0.03)
Crude petrol*LA			-0.82** (0.32)	0.34 (0.00)	4.88*** (0.98)	-0.31 (0.37)	4.83*** (0.80)
Labor Force Participation (LFP)	0.01 (0.01)	0.02 (0.02)	0.01 (0.02)	0.05 (0.00)	0.05*** (0.01)	0.05*** (0.02)	0.05*** (0.01)
LFP*LA			0.04 (0.03)	0.01 (0.00)	-0.10* (0.05)	-0.06 (0.04)	-0.05 (0.03)
Openness	0.33** (0.14)	3.55*** (1.27)	0.30** (0.14)	0.13 (0.00)	0.20 (0.13)	-0.02 (0.25)	0.22 (0.14)
Openness*LA			0.96 (1.39)	-0.59 (0.00)	1.54*** (0.44)	0.04 (2.09)	2.01*** (0.52)

³¹ The instruments for tax morale represent English, French, German and Scandinavian legal origin. Correlation coefficients between the instrumental variables and tax morale are: English (-0.11), French (-0.07), German (0.29), and Scandinavian (0.08).

Agriculture	0.62	1.56	0.59		1.93	3.36	1.90
	(1.48)	(2.76)	(1.72)		(1.90)	(2.25)	(1.89)
Agriculture*LA			-2.20		1.28	0.00	-0.65
			(3.56)		(3.18)	(0.00)	(3.16)
Shadow				-0.03	-0.03	-0.02	-0.02
				(0.00)	(0.02)	(0.03)	(0.02)
Shadow*LA				0.01	0.04*	-0.00	0.13***
				(0.00)	(0.02)	(0.04)	(0.04)
Globalization	-2.77***	-2.54*	-2.71***	-0.66	-0.57	-1.00	-0.66
	(0.70)	(1.35)	(0.78)	(0.00)	(0.77)	(1.05)	(0.73)
Globalization*LA			-2.41	-0.35	-0.55	3.53	-5.29***
			(1.55)	(0.00)	(0.83)	(2.91)	(1.56)
Urbanization	-7.14***	-1.50	-7.42***	-9.81	-8.76***	-8.30***	-8.74***
	(1.76)	(3.20)	(1.93)	(0.00)	(1.82)	(2.43)	(1.83)
Urbanization*LA			-1.67	0.00	97.48***		91.15***
			(3.20)	(0.00)	(35.96)		(27.82)
Tax Morale						-1.42	-0.51
						(1.16)	(0.80)
Tax Morale*LA						0.00	-26.83***
						(0.00)	(8.31)
Constant	-19.56**	-72.30	-19.38	-560.59	0.00	-45.43***	-51.30***
	(9.21)	(73.26)	(12.00)	(0.00)	(0.00)	(17.08)	(12.00)
Observations	437	52	437	248	237	150	237
Number of id	41	5	41	40	38	30	38
R-squared	0.905	0.759	0.910	0.964	0.962	0.957	0.962
Standard errors in parentheses							
* significant at 10%; ** significant at 5%; *** significant at 1%							

interaction terms with the Latin America dummy are jointly statistically significant. Overall, the results tend to be less significant for the sub-sample of Latin American countries (column 2) than for the full sample, including Latin America with and without the dummy interaction terms. This is expected given the smaller degrees of freedom. Our discussion of the estimation results (below) concentrates on the full sample results and how they are modified by the interaction terms for Latin America.

The highly significant and positive estimated effect of total revenue to GDP ratio suggests that countries with larger government size tend to rely more on direct taxes (10 percentage points increase in total revenue to GDP leads to an increase in the direct to indirect tax ratio by between 1.4 and 2.2 percentage points). However, much of this effect or even more gets offset for the case of Latin American countries. For population size, in general, larger countries make higher use of direct taxes vis-à-vis indirect taxes. Smaller economies with smaller populations

have relatively more mobile tax bases and thus they use income taxes less intensively (Hines and Summers, 2009). The results do not differ for Latin America when we use agriculture as a control variable (column 3). However, when controlling for both the share of agriculture and the shadow economy (column 5), the interaction term for population size is negative, highly significant and larger than the general coefficient, meaning that smaller countries in the region make a more intense use of direct taxation.³² The significant coefficient for the federal country dummy indicates that federal countries tend to rely relatively less on direct taxation. The level of expenditure decentralization seems to have the same negative effect in general but it switches in sign for the Latin America region; but note that the economic effect is quite small. For factors representing political preferences, more democracy implies higher direct to indirect tax ratios, especially in the Latin America region when controlling for the shadow economy (column 4). Socialist countries tend to rely relatively less on direct taxes (columns 5 and 7). Latin American countries with higher GDP per capita tend to rely significantly less on direct taxes in relative terms (column 7). However, the estimated coefficients for democracy and GDP per capita are not robust.

On the supply side, the presence of oil has a strong overall positive impact on Latin American use of direct taxes over indirect taxes when we control for the extent of the shadow economy (columns 4, 5 and 7). Surprisingly, this effect is switched around in sign although of smaller size when only the size of the agricultural sector is controlled for (column 3). Labor force participation as expected takes a positive and significant coefficient, indicating that a larger base is available for direct taxes. But for the Latin America dummy interaction term, when controlling for the shadow economy (column 5), the coefficient is negative and larger than the general coefficient. The coefficients for the relative size of agriculture are statistically insignificant. The impact of the shadow economy is negative and insignificant for the general coefficient but switches in sign and takes a larger value with the interaction terms for Latin America. This is unexpected as we would expect in Latin America as elsewhere that larger shadow economies would make it harder to implement direct taxes vis-à-vis indirect taxes. The

³² Including tax morale variable in the regression causes the interaction term of population and Latin America dummy to be dropped.

effect of globalization on the direct to indirect tax ratio is mostly statistically significant and negative, an effect reinforced in the Latin America region; this is consistent with open economies being forced to lower their reliance on direct taxes vis-à-vis indirect taxes. Urbanization, which has been interpreted as facilitating the use of indirect taxes,³³ takes a significant negative coefficient though, except for Latin America when we control for the shadow economy (columns 4, 5 and 7). In this case the positive interaction terms overwhelm the size of the negative general coefficient. Finally, negative and significant effect on tax morale, especially in Latin America, suggests that countries with higher tax morale tend to rely relatively less on direct taxes.

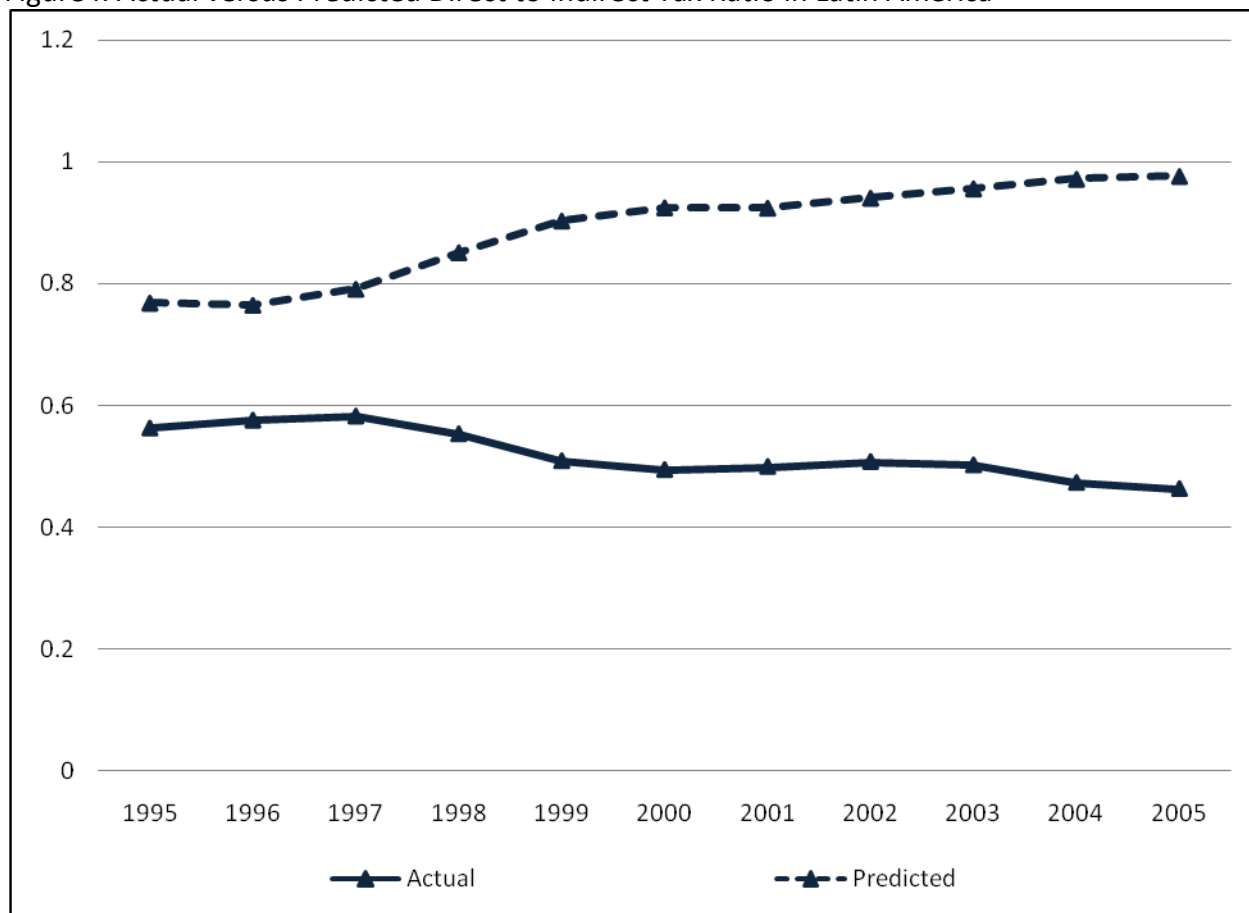
One final issue we investigate in this section is that of how far is the average actual experience with the direct to indirect tax ratio in Latin America vis-à-vis the international norm after we allow for the differences in the determinants of the ratio. We have seen that the direct to indirect tax ratio in Latin America is quite lower than the World's average (Figure 2). The question is, where should we expect Latin America be? To answer this question we use a benchmark obtained from the regression analysis above. In order to determine the benchmark we first estimate the model in column 7 of Table 4 (without the interaction terms with a dummy for Latin America), to obtain the estimated equation from which we calculate the predicted values of the tax ratios for Latin American countries. That is

$$\widehat{(\text{taxratio})}_{i,t} = 7.070 + 1.293 \cdot \text{totalrevenues}_{i,t} + 0.094 \cdot \log(\text{population})_{i,t} - 0.147 \cdot \text{L.A.}_{i,t}$$

where t represents year, $t = 1, \dots, T$. To this equation we then apply the average annual values of the corresponding explanatory variables for Latin American countries to calculate predicted values. We finally compute the expected annual average tax ratio in Latin America, the benchmark. The comparison results between actual averages and benchmark averages are shown in Figure 4, with Latin American countries being quite below where they would be expected to be and with this gap increasing over time.

³³ See Kau and Rubin (1981), who argued that urbanization facilitates taxes on goods and services because of the potential less monitoring costs on tax compliance in urban areas.

Figure4. Actual versus Predicted Direct to Indirect Tax Ratio in Latin America



Source: IMF GFS Database and Authors' calculations

V. The impact of tax structure on the real economy

Alongside the theoretical modeling on optimal tax structure and the empirical literature on its determinants, a separate literature has developed over the past several decades examining the impact of tax structure-- the direct to indirect tax ratio-- on economic activity. Generally speaking, these empirical studies have been finding increasingly significant effects of the direct versus indirect tax mix on the real economy, perhaps due, among other things, to the

estimation methodologies employed. For example, Atkinson and Stern (1980) and Poterba, Rotemberg, and Summers (1986) find small long term effects. On the other hand, the European Commission (2006), Johansson et al. (2008), Dahlby, (2003); Li and Sarte (2004), Kneller, Bleaney and Gemmell (1999), and Padovano and Galli (2001) find significant effect on income and growth.

In this section we use panel data for Latin American countries plus a large number of other developing and developed countries to explore the impact of tax structure, measured by the direct to indirect tax ratio, on the real economy. We do this along four important dimensions of macroeconomic performance: economic growth, macro stability, income distribution, and foreign direct investment flows.

The tax data represents consolidated general government data and are drawn from the IMF GFS Database covering the period 1972-2005. As in the previous section we will use the full sample without identifying Latin American countries to establish general benchmark results.³⁴

a. Tax structure and economic growth

There has been a continued interest in the economics literature on the determinants of economic growth and more in particular on the impact of taxes on growth. Much of the past research has focused on the potential negative long-term growth effects of direct taxes, particularly corporate income taxes and progressive personal income taxes.³⁵ The most recent empirical results would suggest that higher direct tax to indirect tax ratios should lead to lower rates of economic growth all other things being equal. Our interest here is to test this conjecture in the context of the Latin America region. To do so we will build on Lee and Gordon (2005) and Martinez-Vazquez et al. (2011).

The sample period covers 1972-2005, and the data are divided it into seven subsample periods: one 3-year period (1972-74), five 5-year periods (1975-79, 1980-84, 1985-89, 1990-94, 1995-99), and one 6-year period (2000-05); following Lee and Gordon we regress the average

³⁴ See Martinez-Vazquez et al. (2011).

³⁵ See, for example, Jones et al. (1993); Mendoza et al. (1997); Kim (1998); Dahlby (2003); and Lee and Gordon, 2005.

subsample real GDP per capita growth rate on the direct to indirect tax ratio and a vector of other control variables which have proven to be robust in previous empirical analyses. The estimating equation is given by:

$$GDPg_{it} = \alpha TaxRatio_{it} + X_{it}\beta + v_i + \varepsilon_{it}, i = 1, \dots, n, t = 1, \dots, T$$

where i indicates country and t denotes subsample period, $GDPg$ represents average subsample real GDP per capita growth rate, $TaxRatio$ is the average subsample direct to indirect tax ratio, and X_{it} represents the vector of other control variables, including: GDP per capita in the initial subsample year in US\$ 10,000, the initial subsample year top marginal corporate tax rate, the initial subsample year of the primary school enrollment, average subsample openness (measured as sum of import and export to GDP), the average subsample International Country Risk Guide (ICRG) index, the average subsample population growth rate, and average subsample inflation rate.

In the estimation we address the potential endogeneity of the direct to indirect tax ratio. We use an instrumental variable approach. Following Lee and Gordon (2005), we instrument each direct to indirect tax ratio observation with the weighted average of the tax ratios for all other countries in the corresponding year, where the weights are the inverse of the distance between the two countries.³⁶ The instrumental variable for country i in year t , $TaxRatioIV_{it}$ is, therefore, calculated as:

$$TaxRatioIV_{it} = \frac{1}{\sum_{j=1}^n \frac{1}{d_j}} \sum_{j=1}^n \frac{1}{d_j} TaxRatio_{jt}; i \neq j$$

³⁶ The smaller the size of country i , the relatively shorter the distance between its largest city and largest cities in neighboring countries, implying relatively stronger effect of their tax ratios on the tax ratio in country i . The source for the distance measure between two countries is CEPPII (Centre D'Etudes Prospectives Et D'Informations Internationales, <http://www.cepii.fr/>). Geodesic distances are calculated following the great circle formula, which uses latitudes and longitudes of the most important cities/agglomerations in terms of population. The underlying intuition for using this particular instrument is that economic growth in a country relative to others generally should not have an effect on the design of the tax mix of those other countries, so the dependent variable should not be correlated with the instrument. On the other hand, the design of the tax mix in a country should be affected by the design of the tax mix in the neighboring countries, this effect being especially strong in the case of small countries.

where d_j is the distance between the largest cities in country i and country j , and $TaxRatio_{jt}$ is the tax ratio in country j in year t . Because we also use the corporate tax rate in our regressions, which as in Lee and Gordon (2005) may be endogenous, we also instrument this variable.³⁷ Also following Lee and Gordon (2005) we use a battery of estimation approaches: first, we employ ordinary least squares regression, robust regression and median regression to check for the robustness to the outliers; second, we use panel estimation including fixed effects regression and the instrumental variable regression with country dummies.³⁸ In the last set of regressions we run separate regressions for the full sample of countries, for developing countries, for Latin American countries, and the full sample with interaction terms including a Latin American dummy to allow for the full sample coefficients to vary in the region.

The estimation results are shown in Table 5. The results with most interest for this paper are those pertaining to the direct to indirect tax ratio. Higher direct to indirect tax ratios appear to have a significant and negative impact on economic growth in all regressions, although the coefficient is not always statistically significant, as in the case of the Latin America regression with country dummies using instrumental variables. Also note that the interaction term of the tax mix variable with the Latin America dummy (column 8) is positive and jointly significant with the general coefficient. However, since it is smaller in size than the general coefficient for the tax ratio variable (5.6 versus 4.6), we can conclude that the effect of higher reliance on direct taxes (vis-à-vis indirect taxes) in Latin American countries has slowed down economic growth. The overall effect would appear to be smaller than for the full sample of countries; this is likely due to the less variation in the tax ratio in the region and that the ratio is hardly ever bigger than one.

Table5. The impact of the direct to indirect tax mix on economic growth, 1972-2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	Robust	Median	Fixed Effect	Country Dummies+IV			
					Full Sample	Developing	Latin America	Full Sample +

³⁷ Hausman tests for endogeneity concerning the direct to indirect tax ratio variable and the corporate tax rate rejects the null hypothesis that OLS is a consistent estimator, providing support for using instrumental variables methodology.

³⁸ The Hausman test signaled the appropriateness of fixed effects estimation approach. Some of these results replicate those in Martinez-Vazquez et al. (2011).

							a	LA
Tax Ratio	-0.248	-0.323**	-0.338*	-0.872** *	-3.910**	-4.620	-2.429	-5.632**
	(0.179)	(0.147)	(0.178)	(0.284)	(1.575)	(4.155)	(2.791)	(2.197)
Tax Ratio*LA								4.645
								(3.264)
TopMarg CTR	-0.028*	-0.03**	-0.031*	-0.05***	-0.09***	-0.207	0.057	-0.10***
	(0.015)	(0.014)	(0.017)	(0.019)	(0.033)	(0.163)	(0.099)	(0.035)
TopMargCTR*LA								-0.219
								(0.155)
Initial GDP pc	-0.89***	-0.77***	-0.92***	-1.924***	-1.654***	-23.964*	-11.247*	-1.504**
	(0.243)	(0.246)	(0.319)	(0.549)	(0.559)	(13.269)	(6.304)	(0.611)
Primary enrollment	0.026	0.016	0.041**	-0.035	-0.089**	0.058	-0.076	-0.132***
	(0.017)	(0.016)	(0.020)	(0.030)	(0.045)	(0.138)	(0.052)	(0.049)
Openness	0.672**	0.641**	0.569	3.825***	4.475***	14.291	3.880	5.185***
	(0.332)	(0.285)	(0.375)	(1.156)	(1.327)	(18.180)	(4.101)	(1.424)
Openness*LA								-26.499** *
								(10.109)
Corruption	0.316	0.319*	0.499**	0.417	0.826*	1.314	1.018	1.327**
	(0.195)	(0.170)	(0.221)	(0.393)	(0.449)	(3.889)	(0.887)	(0.552)
Corruption*LA								-6.246**
								(2.389)
Population growth	-0.007** *	-0.006** *	-0.006** *	-0.003**	-0.002**	-0.006*	-0.002	-0.018***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)	(0.005)
Population growth*LA								0.014***
								(0.005)
Inflation	-1.21***	-1.11***	-1.06***	-1.084**	-1.461***	5.236	-4.34***	-1.774***
	(0.227)	(0.177)	(0.231)	(0.425)	(0.518)	(6.039)	(1.585)	(0.662)
Inflation*LA								-2.021
								(2.986)
Constant	2.337	3.325*	0.302	8.288**	14.446** *	10.443	17.142*	47.958** *
	(1.924)	(1.722)	(2.230)	(3.471)	(5.395)	(31.639)	(9.300)	(14.541)
Observations	197	197	197	197	197	38	77	197
R-squared	0.37	0.34		0.28	0.73	0.77	0.87	0.76
Number of id				64				
Robust standard errors in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%; bolded figures denote jointly significant								

For the other control variables, the results are generally similar to those in the previous empirical literature. The coefficient of the corporate tax rate is negative and significant in most of the equations, although for the Latin America regression it is not significant and positive. However, in the full sample regression with the Latin America interaction dummy (column 8) the coefficient for the interaction term for the corporate tax rate is negative and jointly significant, thus reinforcing the negative and significant general coefficient for this variable. A similar set of results holds for the inflation rate, except that in this case the coefficient in the Latin America alone regression is also negative and significant. The negative effect of inflation on economic growth supports the hypothesis that inflation creates uncertainty and reduces investment.³⁹ The coefficient for the initial period GDP per capita is negative and significant, supporting the conditional convergence of growth rates reported in previous studies.⁴⁰ For trade openness the estimated coefficients are generally positive and significant, and strongly so for the full sample with Latin America interaction terms (column 8). Thus openness has a positive and significant effect on the growth rate of Latin American countries, a finding consistent with those in the previous literature.⁴¹ The coefficient for corruption is generally positive and sometimes significant in most of the equations, meaning that lower levels of corruption (the value of the index decreases with the level of corruption) appear to lead to higher growth. However, the important exception is for the full sample equation with interaction dummies for Latin America (column 8). There, the coefficient for the interaction term is negative and highly significant and also quite a bit larger (-6.24) than the general coefficient for this variable (1.32). This means that Latin America seems again to be somewhat of an exception, with higher levels of corruption leading to faster growth, other things equal. This is also a plausible result from the perspective of the past literature.⁴² Last, higher population growth appears to lead to slower economic growth, although this effect would appear to be quite a bit smaller in Latin American countries.

³⁹ See, for example, Padovano and Galli (2001, 2002) and Romero-Ávila and Strauch (2008).

⁴⁰ See Barro (1991); Mankiw, Romer and Weil (1992); and Kneller, Bleaney and Gemmell (1999).

⁴¹ See, for example, Dollar (1992); Edward (1998); Frankel and Romer (1999); and Dollar and Kraay (2003).

⁴² Acemoglu and Verdier (1998) argue that corruption facilitates economic growth because it helps government officials become more efficient in approving projects, etc. On the other hand, Mauro (1995) and Knack and Keefer (1995) argue that corruption leads to uncertainty and higher costs of conducting business, and, therefore, lower economic growth.

b. Tax structure and macroeconomic stability

The form of taxation can have an effect on the ability of governments to manage macroeconomic stability. An extensive literature covering many decades has examined the role of direct taxes as automatic stabilizers.⁴³ The corporate income tax yields higher revenues when profits are high in the expansion phase of the business cycle but they drop considerably in recessions. The personal income tax with progressive rate schedules has the same effect on disposable income during the business cycle, while social security contributions and payroll taxes also tend to act in a countercyclical manner. On the other hand, property taxes tend to remain more constant over the business cycle but their size is very small vis-à-vis other direct taxes. In contrast, indirect taxes, including the VAT and excises lack those stabilizing features.

In this section we analyze the impact of the direct to indirect tax composition on macroeconomic stability in Latin America in the context of a larger sample of countries. We regress the volatility of economic growth, measured by the standard deviation of GDP growth rate within each subsample period, on the direct to indirect tax ratio—which captures the effect of automatic stabilizers on economic stability—, and a vector of other explanatory variables following the work by Easterly, Islam and Stiglitz (2000) and Beck, Lundberg and Majnoni (2001). The vector of other control variables includes the “volatility of inflation” (measured by the standard deviation of the subsample M1 annual growth rate,⁴⁴) which attempts to capture exposure to monetary shocks, openness, and GDP per capita.

As for the previous section, the sample period is 1972-2005, which is divided into seven subsample periods (one 3-year period (1972-74), five 5-year periods (1975-79, 1980-84, 1985-89, 1990-94, 1995, 1999), and one 6-year period (2000-05). We proceed to estimate two

⁴³This literature goes back to Musgrave and Miller (1948), Brown (1955), Musgrave (1959), and Pearse (1962).

⁴⁴ Money is the sum of currency outside banks and demand deposits other than those of central government. This series, frequently referred to as M1 is a narrower definition of money than M2. Data are in current local currency. For more information, see Table: WDI 4.15.

versions of the following equation, with one version introducing an interaction term with a dummy for Latin America:

$$SD_GDPg_{it} = \alpha_1 TaxRatio_{it} + \alpha_2 TaxRatio_{it}^2 + \alpha_3 TotalTax_{it} + \alpha_4 TaxRatio_{it} * TotalTax_{it} + X_{it}\beta + \varepsilon_{it}; \quad i = 1, \dots, n, t = 1, \dots, T$$

where i indicates country and t denotes subsample period. The dependent variable, SD_GDPg , is the subsample standard deviation of annual GDP (real) per capita growth rate, $Tax Ratio$ is the average subsample direct to indirect tax ratio, $Total Tax$ is the average subsample total tax to GDP, and X_{it} represents all other control variables.

To identify the correct panel data estimation procedure, we perform a Hausman test which fails to reject the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator. Therefore, we will present the random effects estimates. To correct for the potential endogeneity of “openness” we perform the random effects estimations, without and with an instrumental variable. The instrumental variable is built using an identical methodology to the one used in the previous section on economic growth. Note that to allow for a nonlinear relationship between the tax ratio variable and economic stability, we introduce a squared term for the tax ratio. Because the effectiveness of fiscal stabilizers in helping control the business cycle depends on the size of government, we introduce an interaction term between the tax ratio variable and total revenues to GDP.

Table6. The direct to indirect tax ratio and macro stability, 1972-2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Random Effects				Random Effects IV		
	Full Sample	Developing	Latin America	Full Sample + LA	Full Sample	Developing	Full Sample + LA
Tax ratio	-0.934	-1.186**	-0.999	-0.305	-1.556*	-3.383**	-2.126
	(0.663)	(0.543)	(1.105)	(0.897)	(0.841)	(1.651)	(4.954)
Tax ratio*LA				-0.727			1.349
				(1.554)			(8.318)
Tax ratio sq	0.246**	0.004	0.080	0.111	0.240*	0.201	0.388

	(0.110)	(0.095)	(0.228)	(0.166)	(0.130)	(0.210)	(0.850)
Tax ratio sq*LA				-0.000			-0.013
				(0.003)			(0.072)
Total Rev to GDP	1.445	-1.076	3.210	0.850	-4.449	-19.281	-3.434
	(3.693)	(2.977)	(8.373)	(4.193)	(5.245)	(12.496)	(25.434)
Total Rev to GDP*LA				1.901			-182.917
				(10.461)			(1,409.321)
Tax ratio*Total Rev to GDP	-0.028	0.033	0.016	-0.040	0.006	0.091	0.000
	(0.021)	(0.020)	(0.040)	(0.025)	(0.028)	(0.055)	(0.141)
Tax ratio*Total Rev to GDP*LA				0.058			0.463
				(0.053)			(3.305)
StandDev(M1)	1.909	-3.915	0.969	129.619	5.428	16.403	84.464
	(11.644)	(9.405)	(10.389)	(120.942)	(12.329)	(19.007)	(537.489)
StandDev(M1)*LA				-128.721			-15.458
				(121.549)			(723.967)
Openness	1.061**	0.091	0.229	1.126**	3.902***	8.664*	3.753
	(0.422)	(0.369)	(0.768)	(0.496)	(1.331)	(4.887)	(5.804)
Openness*LA				-0.875			77.298
				(1.000)			(582.752)
GDP pc	0.042***	0.080***	0.047***	0.044***	0.039***	0.025	0.039*
	(0.003)	(0.005)	(0.013)	(0.004)	(0.004)	(0.031)	(0.023)
GDP pc*LA				0.005			-0.132
				(0.015)			(0.785)
Constant	60.346	36.391	8.559	39.718	-50.070	-131.435	-16.704
	(71.999)	(53.486)	(127.278)	(88.290)	(106.041)	(151.119)	(575.803)
Observations	256	197	66	256	256	197	256
Number of id	89	72	20	89	89	72	89
R-squared	0.64	0.78	0.75	0.64	0.52	0.20	0.47
Standard errors in parentheses							
* significant at 10%; ** significant at 5%; *** significant at 1%; bolded figures denote jointly significant							

The estimation results are shown in Table 6. Overall, the results indicate that the direct to indirect tax ratio plays a significant role in dampening economic volatility. All the estimated coefficients for the tax ratio are negative and most of them statistically significant. However, there does not appear to be any separate significant effects for the Latin American region, which again may be due to the lack of variation and depth of the direct to indirect tax ratio in those countries. There is also only weak evidence that the direct to indirect tax ratio and economic volatility may be quadratic. Interestingly, for the subsample of developing countries, the direct to indirect tax ratio has more automatic stabilizing power but not so for the case of

Latin America. Note also that the coefficients for the interaction terms of the tax ratio with total revenues to GDP are not statistically significant.

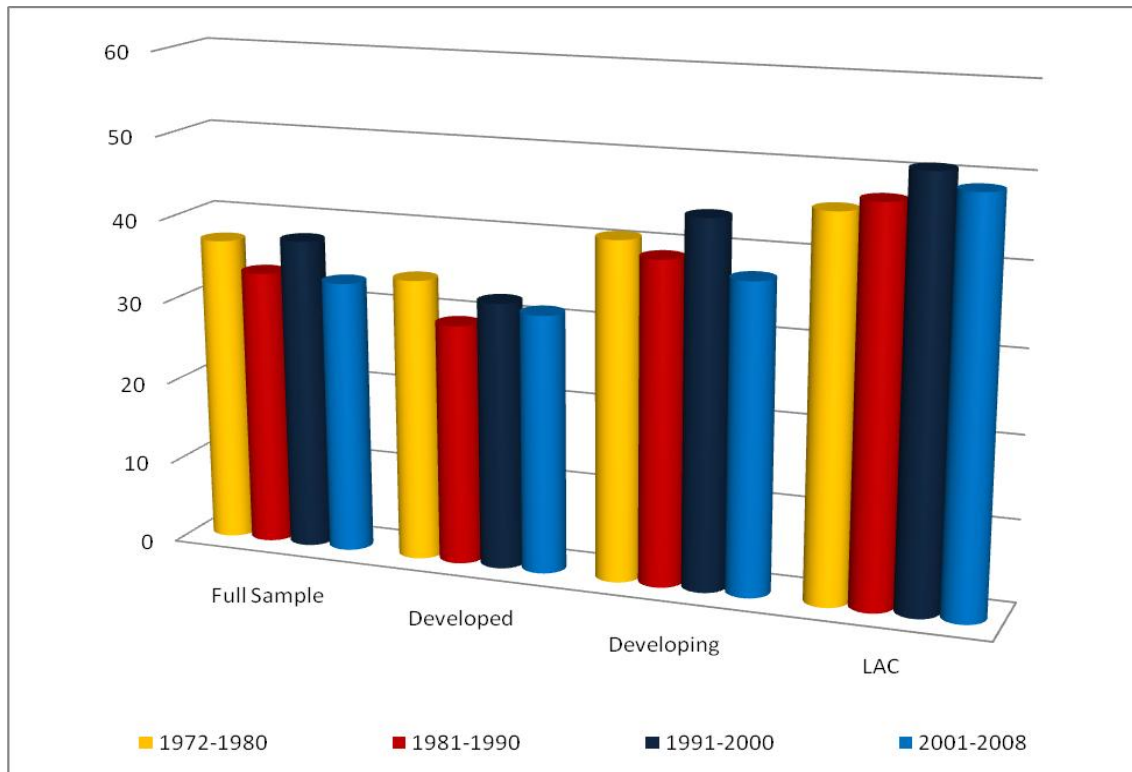
For the other control variables, it appears that the volatility of M1 has no significant effect on economic stability. On the other hand, trade openness appears to be positively correlated with economic volatility in most of the regression. But this link also appears to be less strong for the case of Latin America; in the regression for the full sample with interaction terms for Latin America (column 4) the general coefficient is positive and the interaction coefficient is negative and both jointly significant; this suggests that the exposure of Latin America economies to outside shocks is less pronounced for any degree of openness. Last, average GDP per capita has a positive effect on economic volatility, even for the subsample of Latin American countries (column 3).

c. Tax structure and income inequality

The general presumption in tax and income distribution literatures is that more equal distributions of income require a more progressive tax system. In turn, this would generally mean that direct taxes (generally expected to be progressive) would need to be relatively more important than indirect taxes (typically expected to be regressive or much less progressive) in tax systems. These assumptions are generally met for many tax systems around the world with the estimated overall incidence of tax systems ranging from being progressive to mildly progressive or proportional.⁴⁵ However, the Latin America region seems to be an exception. Not only are income distributions in Latin America more unequal than in other regions of the world but, not unrelated, tax systems in Latin America for the most part have been found to be regressive and therefore adding to the inequality in income distribution (Gomez Sabaini et al., 2010). Nevertheless, as we saw in Figure 3, the direct to indirect tax ratio even though low in the Latin America region, varies significantly across countries.

Figure5. Average Gini Coefficients by sample group

⁴⁵ See, for example, Martinez-Vazquez (2008b).



Source: World Income Inequality Database May 2008; Note: No distinction between the concepts in measuring income inequality was made.

Our interest in this section is to investigate the importance of the direct to indirect tax ratio as a determinant of income inequality in Latin American countries in the context of a larger number of other developed and developing countries. The evidence in the empirical literature on this issue is mixed,⁴⁶ and our own empirical findings in this section do not offer strong support to the conjecture that the direct versus indirect composition of taxes plays an important role in observed inequality in distribution of income. However, this conclusion is subject to the important caveat of the difficulties involved in measuring inequality in income distribution across countries and over time through Gini coefficients, our dependent variable.⁴⁷

⁴⁶ The evidence on redistributive effects of taxes is especially weak for developing countries (Bird and Zolt, 2005; Martinez-Vazquez, 2007; and Harberger, 2008).

⁴⁷ Gini coefficients are computed on the basis of income distributions using different concepts of income, including gross income, net income and consumption. This presents important measurement and comparability issues, which are difficult to control for in regression analysis.

The following empirical model is estimated for the full sample of developed and developing countries with and without interaction terms with a Latin America dummy to allow the estimated coefficient to vary, and for developing countries and Latin American countries alone:

$$Gini_{it} = \alpha_1 TaxRatio_{it} + \alpha_2 TotalTax_{it} + \alpha_3 TaxRatio_{it} * TotalTax_{it} + X_{it}\beta + GiniConcept_{it} + \varepsilon_{it}; \quad i = 1, \dots, n, t = 1, \dots, T$$

where i indicates country and t denotes years. *Gini* is the Gini coefficient as a measure of income inequality⁴⁸ over time and across countries; X_{it} is the set of observable characteristics that affect income inequality, which represent a consensus specification in the empirical literature on aggregate income distribution. Besides our main variable of interest, the direct-indirect tax ratio, they include the initial Gini coefficient, total tax collection to GDP, GDP per capita growth rate, private credit as a percentage of GDP, labor force participation, openness (measured by the ratio of import plus export to GDP) dependency ratio, and dummy for the EU15 countries.

For the estimation we use annual data for a large sample of developed and developing countries covering the period 1972-2005. We employ 2SLS to address the potential endogeneity of the financial system (measured by the share of private credit in GDP) and the direct to indirect tax mix.⁴⁹ For example, Beck et al. (2004) suggest that reductions in inequality may lead to higher demand for more efficient financial systems. Following La Porta et al. (1999) and Beck et al. (2004), we use as instrumental variables for the financial system, latitude (the scaled absolute value of) as well as legal origin (English, French, and German). The potential endogeneity of the tax mix variable may arise from the fact that countries with higher income inequality may attempt to rely more on direct taxes in order to reduce it—although this would appear to be exactly the reverse of what has been occurring in Latin America in reality, if not in intent. We instrument the direct-indirect tax ratio using the same approach described in the

⁴⁸ To control for the fact that income distributions across countries are based on different measurements of income, including gross income, net income and consumption, we include in our empirical model a set of dummies for net income and consumption definitions, and use gross income as the base category.

⁴⁹ The Hausman test for endogeneity rejects the null hypothesis that OLS is a consistent estimator for both explanatory variables.

section on tax structure and economic growth above. Finally, for the panel estimation, the Hausman test allows us to use the random effects procedure.

The estimation results are presented in Table 7. Our main interest is in the relationship between income inequality and the direct to indirect tax structure with the expectation of a negative relationship between the direct to indirect tax mix and the Gini coefficient for income distribution. The results provide weak support for the conjecture. The coefficient for the tax mix variable is negative but not significant in the Latin America regression (column 3) and the full sample with interaction terms with the Latin America dummy (column 4). In the case of the full sample without interaction terms (column 1) the coefficient for the tax ratio is positive and mildly significant but once we also take into account the negative and significant coefficient for the interaction between tax ratio and total revenues, the overall effect is the expected one (equalizing) for countries with high tax levels relative to GDP

For the other control variables, some results coincide with those in the previous empirical literature on the determinants of aggregate income distribution. The initial level of the Gini coefficient captures the country's initial conditions and it has a strong positive effect for all samples except for the Latin America regression (column 3). The coefficient for the level of financial development takes a negative and significant sign, as expected, but only for the full sample. Age dependency, GDP per capita growth and labor force participation fail to be significant in any of the equations. However, the coefficient for openness is positive and significant but only for the full sample without interaction variables.⁵⁰ The control variables for differences in the measurement of the Gini coefficient generally performed as expected, with income inequality being smaller when Gini net income or consumption measures are used vis-à-

Table 7. Tax Mix and Inequality, Random Effects, 1972-2005

	(1)	(2)	(3)	(4)
	Full Sample	Developing	Latin America	Full Sample + LA
Initial Gini	0.74***	0.65***	0.40	0.51**
	(0.09)	(0.13)	(0.83)	(0.26)
Tax ratio	10.04*	1.17	-0.82	-9.72
	(5.95)	(6.67)	(16.11)	(20.75)

⁵⁰ The evidence in the literature on the effect of trade openness on income inequality is inconclusive. Barro (2000) finds a positive relationship between trade openness and income inequality, while Calderon and Chong (2001) and Dollar and Kray (2002) do not find any significant relationship.

Tax ratio*LA				3.46
				(46.84)
Total revenues to GDP	60.28*	8.74	-71.88	-36.79
	(33.84)	(25.84)	(221.97)	(105.49)
Total revenues to GDP*LA				-156.81
				(383.04)
Tax ratio*Total revenues to GDP	-35.21*	-5.95	4.37	26.23
	(19.58)	(24.48)	(62.86)	(59.13)
Tax ratio*Total revenues to GDP *LA				1.52
				(160.75)
Private credit	-4.73*	0.60	90.49	-2.42
	(2.53)	(4.69)	(214.54)	(8.05)
Private credit*LA				141.22
				(157.30)
GDP pc growth	-0.02	-0.04	0.57	-0.03
	(0.11)	(0.12)	(1.58)	(0.20)
GDP pc growth*LA				0.64
				(0.84)
Labor Force Participation	0.06	-0.11	-0.29	-0.17
	(0.08)	(0.09)	(0.51)	(0.18)
LFP*LA				-0.62
				(0.66)
Age dependency	3.55	-9.66	3.87	-2.54
	(6.29)	(8.20)	(84.33)	(22.32)
Age dependency*LA				-14.80
				(35.64)
Openness	2.04**	0.57	-6.46	1.37
	(0.80)	(1.74)	(21.93)	(3.23)
Openness*LA				-15.14
				(17.58)
Gini Concept: Net	-2.11***	0.10	9.54	0.40
	(0.77)	(0.77)	(18.93)	(2.14)
Gini Concept: Consumption	-3.69***	-2.82***	-7.06	-2.23*
	(0.88)	(0.71)	(13.71)	(1.24)
EU15	-3.48**	0.00	0.00	-6.83*
	(1.48)	(0.00)	(0.00)	(3.97)
Constant	-7.18	29.49**	29.15	46.14
	(17.42)	(12.58)	(106.03)	(57.71)
Observations	447	173	53	447
Number of id	62	37	14	62
R-squared	0.506	0.647	0.050	0.437
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

vis gross income. The dummy for the 15 old European Union members controlling for the generally higher social welfare expenditures in those countries is as expected negative and statistically significant in the full sample regressions (and of course it does not appear in the developing and Latin American regressions.)

d. Tax structure and foreign direct investment (FDI)

One of the most important effects of tax structure on the economy is on how it affects FDI flows. Given the increasing international mobility of capital, there has been increasing interest in the literature on FDI: how corporate income taxes and other direct taxes may affect these flows.⁵¹ In this section we explore how the choice of tax structure, and in particular the direct to indirect tax ratio, in Latin American countries potentially affects FDI flows. As in the previous sections we do this in the context of a larger panel data set containing other developed and developing countries.

Because of the more limited data availability for FDI, we are limited to using an annual panel data set for 53 developed and developing, including Latin American countries covering the period 1984-2005. In the estimation we employ two different measures of FDI as dependent variables: global net FDI inflows to GDP ratio from UNCTAD, and the ratio of net FDI inflow from the United States to GDP from the Bureau of Economic Analysis (BEA). Our estimation strategy is to build on a general specification commonly used in the empirical literature on the determinants of FDI,⁵² and include on the right hand side as an additional explanatory variable the direct to indirect tax ratio.

The empirical model we estimate is

$$FDI_{it} = (X_{it}, X_{it} * LA_{it})\beta + v_i + \varepsilon_{it}; \quad i = 1, \dots, n, \quad t = 1, \dots, T$$

where i is an index for country and t one for year, v_i represents time-invariant individual country effects, FDI is the net foreign direct investments inflow (total or from the US) to GDP over time and across countries, X_{it} is the set of exogenous variables that affect FDI inflows, and LA_{it} is a dummy variable equal to one for Latin American countries. Besides the direct to indirect tax ratio, the other control variables include⁵³: GDP per capita, labor costs, average effective tax rate (AETR) computed from the Bureau of Economic Analysis data for U.S. firms,

⁵¹ See, for example, Devereux and Griffith (1998, 2002), Buttner (2002), De Mooij and Ederveen (2003, 2005), Bénassy-Quéré et al. (2005), Razin and Sadka (2006), Bénassy-Quéré et al. (2007), and Goodspeed et al. (2011a, 2011b).

⁵² See the previous footnote.

⁵³ See the Appendix for the description of the variables and data sources.

infrastructure (proxied by the number of telephone lines), education attainment (at the secondary level), and political and institutional variables (democracy,⁵⁴ corruption,⁵⁵ and bureaucracy⁵⁶).

For the panel estimation we conduct the Hausman test for fixed versus random effects, which rejects the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator, indicating the need to apply the fixed effects procedure. In addition, in order to account for individual country effects, we include a set of country dummies in our estimation model. Because we detect the existence of panel specific autocorrelation, we use throughout the Panel Corrected Standard Errors (PCSE) as recommended by Beck and Katz (1995).

On the whole we run 8 different regressions, four each for the two different definitions of the dependent variable (Total FDI from UNCTAD, and FDI from the U.S.) In each set of four regressions we include the full sample, developing countries, Latin America countries, and the full sample with interaction terms to allow the general coefficients to vary for Latin America. Table 8 presents the results. The direct to indirect tax ratio, our variable of interest, as expected, affects both total FDI and FDI from the United States inflows negatively with the coefficients being statistically significant for the full sample, for Latin American countries, and for the full sample with interaction terms with the Latin America dummy. However, the coefficients are statistically insignificant for developing countries.⁵⁷

Table 8. Tax Mix and FDI, 1984-2005

	Total FDI				FDI from the US			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full Sample	Developing	Latin America	Full Sample +LA	Full Sample	Developing	Latin America	Full Sample +LA
Tax ratio	-0.057*	0.002	-0.16**	-0.089*	-0.033**	-0.014	-0.06**	-0.038**
	(0.034)	(0.002)	(0.073)	(0.050)	(0.014)	(0.012)	(0.027)	(0.017)

⁵⁴ The democracy variable measures the existence of civil rights and liberties and is calculated as (14 minus civil liberties minus political rights) / 12, where both “civil liberties” and “political rights” are scaled from 1 (most free) to 7 (least free).

⁵⁵ Corruption is measured by an index from 0 to 6, with 6 denoting least corruption.

⁵⁶ Bureaucracy is also measured by an index from 0 to 6, with 6 denoting the highest quality.

⁵⁷ This results are similar to those in Goodspeed et al (2011a).

Tax ratio*LA				0.092*				0.002
				(0.050)				(0.029)
GDP pc	-0.010	0.003	-0.015	-0.014	0.013*	-0.020**	0.015*	0.014*
	(0.016)	(0.003)	(0.018)	(0.016)	(0.008)	(0.009)	(0.008)	(0.008)
GDP pc*LA				0.021				-0.04***
				(0.016)				(0.014)
Labor cost	0.002	0.001	0.004	0.004	-0.007	-0.001	-0.009*	-0.008*
	(0.010)	(0.000)	(0.012)	(0.010)	(0.004)	(0.001)	(0.005)	(0.005)
Labor cost*LA				-0.002				0.006
				(0.010)				(0.006)
AETR	-0.84**	0.016	-1.148*	-1.071*	-0.294**	-0.275	-0.44**	-0.382**
	(0.406)	(0.040)	(0.600)	(0.564)	(0.125)	(0.193)	(0.181)	(0.160)
AETR*LA				1.064*				-0.204
				(0.565)				(0.322)
AETRsq	0.780**	-0.024	0.957*	0.927*	0.302**	0.269	0.406**	0.352**
	(0.374)	(0.038)	(0.539)	(0.499)	(0.122)	(0.186)	(0.172)	(0.148)
AETRsq*LA				-0.922*				0.246
				(0.499)				(0.323)
Telephone lines	0.165*	0.004	0.197**	0.180*	0.068**	0.079***	0.072**	0.068**
	(0.095)	(0.007)	(0.090)	(0.095)	(0.027)	(0.021)	(0.030)	(0.029)
Telephone lines*LA				-0.183*				0.038
				(0.095)				(0.041)
Secondary	-0.001	0.000*	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.000)	(0.001)	(0.002)	(0.000)	(0.001)	(0.001)	(0.001)
Secondary*LA				0.001				-0.001
				(0.002)				(0.001)
Democracy	-0.040	0.012	-0.292	0.003	-0.113*	-0.100	-0.173	-0.009
	(0.073)	(0.021)	(0.353)	(0.091)	(0.062)	(0.067)	(0.145)	(0.033)
Democracy*LA				-0.002				-0.199
				(0.098)				(0.132)
Corruption	0.007	-0.000	0.032	0.008	0.008	0.014	0.005	0.005
	(0.021)	(0.003)	(0.031)	(0.029)	(0.007)	(0.009)	(0.009)	(0.007)
Corruption*LA				-0.009				0.013
				(0.029)				(0.015)
Bureaucracy	0.124**	-0.001	0.295**	0.173**	-0.032	0.019***	-0.075	-0.065*
	(0.062)	(0.003)	(0.121)	(0.085)	(0.029)	(0.006)	(0.047)	(0.038)
Bureaucracy *LA				-				0.132***
				0.176**				(0.040)
Constant	-0.200	-0.048**	0.000	-0.034	0.295***	0.117	0.000	0.281**
	(0.231)	(0.020)	(0.000)	(0.031)	(0.107)	(0.073)	(0.000)	(0.138)
Observations	379	122	257	379	374	121	253	374
Number of id	42	17	25	42	42	17	25	42
R-squared	0.30	0.58	0.33	0.32	0.47	0.07	0.57	0.53
Standard errors in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%; bolded figures denote jointly significant								

For the other control variables, the results in Table 7 are generally similar to those in the previous empirical literature on the determinants of FDI. The coefficient for GDP per capita is positive and significant for the FDI from the U.S. equations in the cases of the full sample, Latin American countries, and the full sample with interaction terms for Latin America. However, in this last case, the negative and significant coefficient for the interaction term more than offsets the general coefficient. Also note that the coefficient for the developing country equation is negative and significant. Interestingly, the coefficient for labor costs is negative and significant, as expected, only for the Latin American and full sample with interaction terms for Latin America in the FDI from the U.S. equations (columns 7 and 8, respectively). For the average effective tax rate, we find a statistically significant and robust nonlinear relationship in the case of the full sample, Latin American countries, and the full sample with interaction terms for Latin America. The effective average tax rates discourage FDI but at a decreasing rate. The results also show the level of development in infrastructure proxied by the number of telephone lines also has a positive significant effect on FDI in Latin America and elsewhere. Among the other control variables secondary education achievement is not statistically significant—the only exception being the developing country regression for total FDI (column 2), nor are the institutional control variables of “democracy” and “corruption.” On the other hand, “bureaucracy”, which we remember is measured by an index from 0 to 6, with 6 denoting the highest quality, takes the expected positive sign and it is significant for the full sample, Latin America, and full sample with interaction terms for total FDI as the dependent variable. For FDI from the U.S. as dependent variable, quality of bureaucracy is positive and significant for developing countries and also for Latin American countries in the full sample with interaction terms.

VI. Tax structure and compliance: The interaction between tax structure and the informal economy and tax morale

In this last section we examine the effect of tax structure on “tax morale” and on the shadow economy. If data had been available, our main interest would have been to examine the impact of tax structure on tax evasion. We look instead into tax morale and the shadow economy because we can suspect that tax evasion is highly correlated with both tax morale and the

shadow economy and because cross-country data on those two variables are quite readily available. As it would have been the case for tax structure and tax evasion, we expect tax structure—measured by the direct to indirect tax ratio—to affect both tax morale and the shadow economy but, also that there should be a reverse causation of tax morale and more so of the shadow economy on tax structure. Therefore, rather than *causation* it is more proper to talk about the interaction between tax structure and the informal economy and tax morale. This means that our estimation approaches will need to address directly the endogeneity issue between those variables.

Tax morale is defined as the individual attitudes towards voluntary tax compliance and it is ascertained from surveys of individuals across countries and different time frames. For our estimation we will be using data from the World Values Survey (WVS) and the Latinobarometro covering the period 1990-2008⁵⁸. The shadow economy is the value added to GDP by illegal and legal activities that go unregistered and unreported and therefore escape taxation or any other formal sanction.⁵⁹ Although different notions of the shadow economy have been offered, the shadow economy is generally comprised of small and medium-sized firms, professionals, and farmers. The “hard to tax” (another name used for the informal sector) include taxpayers in both the formal and informal sectors. Although it has been argued that those in the informal sector may have problems in keeping records of their transactions (thus they remain unregistered) there are also economic agents that do not have such problems (professionals, small businesses) and remain unregistered just the same. Large firms and wealthy taxpayers that evade part of their taxes are also part of the shadow economy.

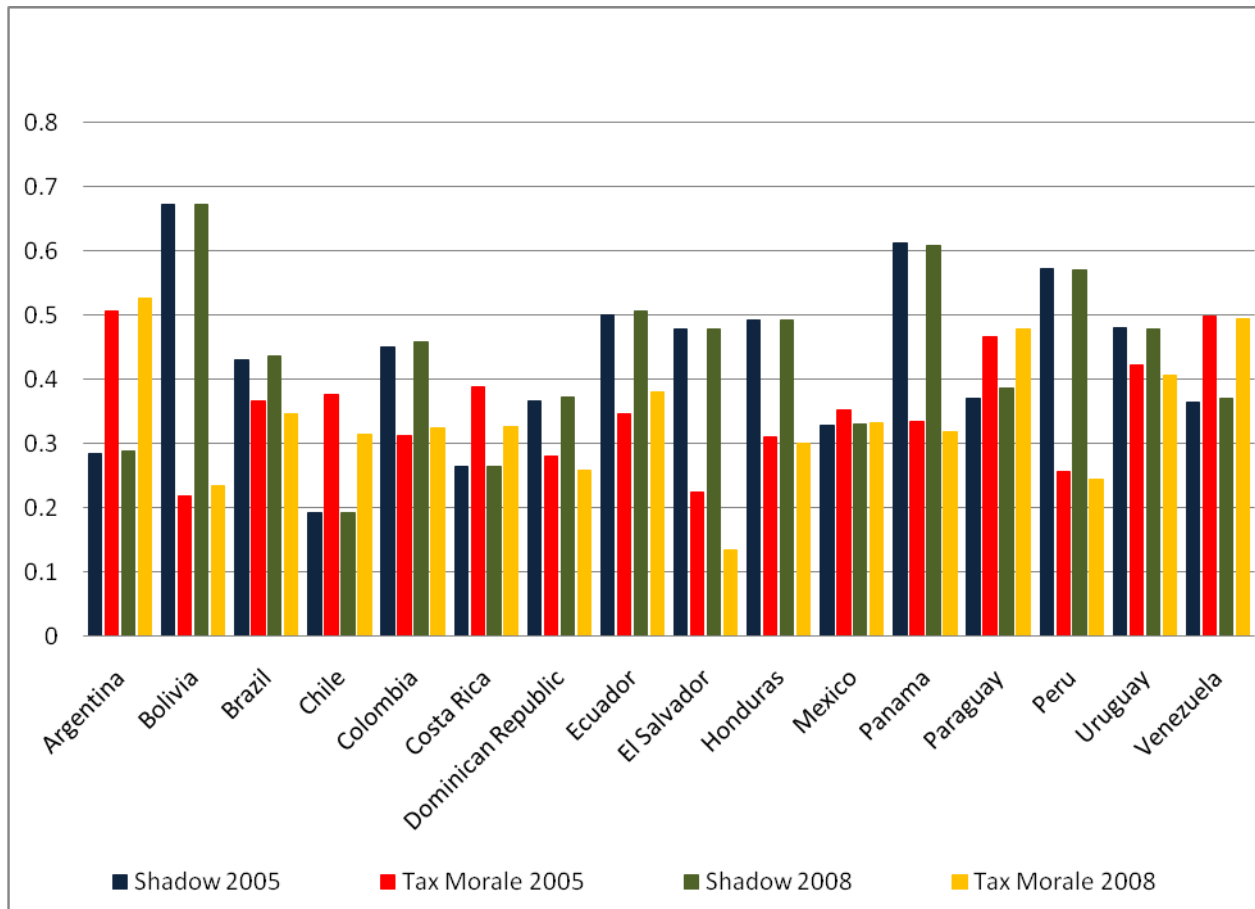
As shown in Figure 6 there is considerable variation in the measures of tax morale and the shadow economy across Latin American countries. From the values for the two years captured in the figure (2005 and 2008) it is also evident that both measures do change over time, although not in a systematic pattern; some values increase and others decrease. We would also

⁵⁸ Unlike WVS, the Latinobarometro covers certain additional questions considering tax compliance, such as tax avoidance, perception of being caught, and obeying the law. Therefore, in investigating the effect of tax structure on tax morale, we focus only on data obtained from the Latinobarometro. The Latinobarometro covers the period 1998-2008. The relationship between tax structure and the shadow economy is, on the other hand, investigated using data from both the World Values Survey and the Latinobarometro, between 1990 and 2008.

⁵⁹ See, for example, Schneider et al. (2010), and Schneider and Enste (2000).

expect tax morale and the shadow economy to be correlated. Where a larger percentage of the economy is underground, not being part of the formal economy, we would expect tax morale—the intrinsic willingness to pay taxes—to be lower, and vice versa.

Figure 6. Tax Morale and Size of the Shadow Economy in Selected Latin American Countries



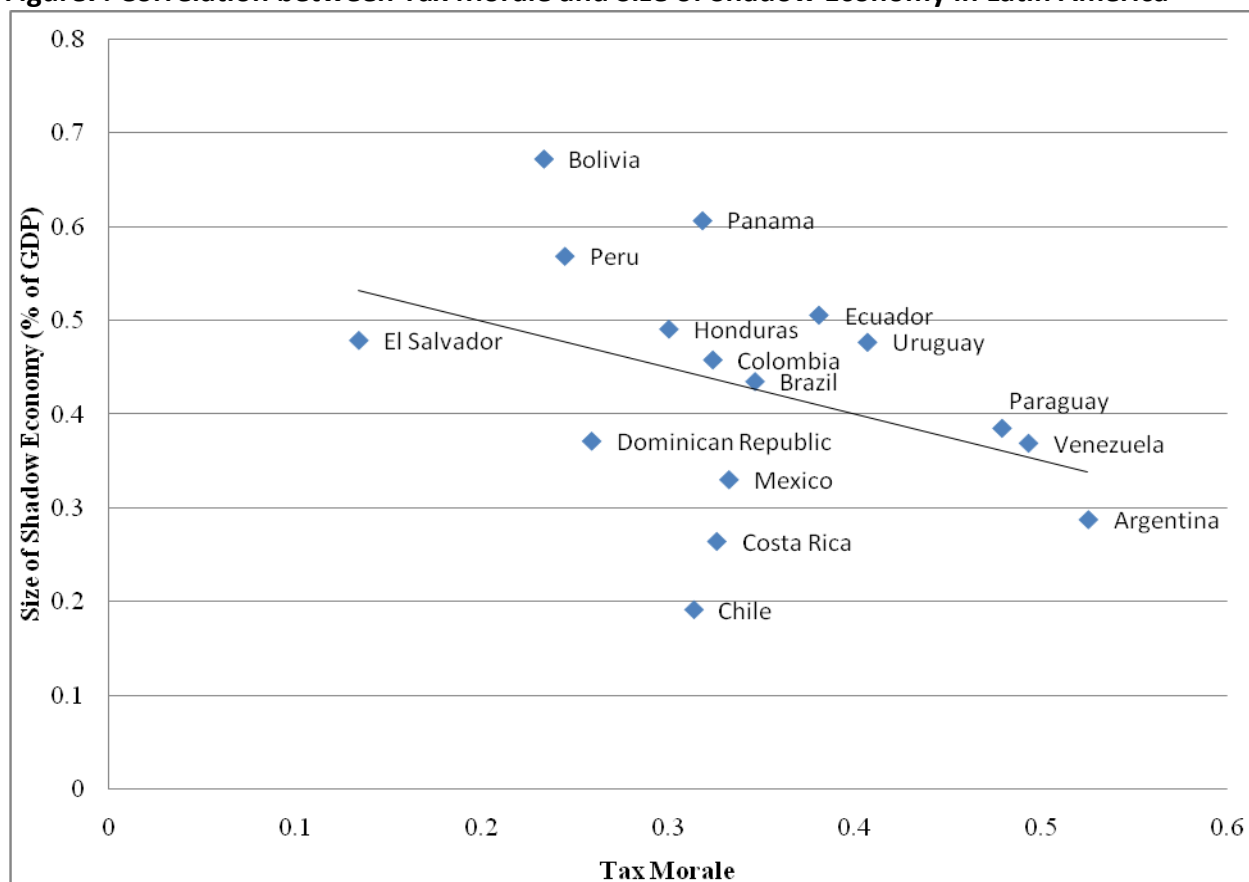
Source: Latinobarometro and Schneider et al. (2010)

This is borne out by the actual data. For the period 1998-2008 the coefficient of correlation between tax morale and size of shadow economy is 0.21 and statistically significant.⁶⁰ Across Latin American countries, as shown in Figure 6, as tax morale increases, the size of the shadow economy decreases. Similar results are reported in recent papers by Torgler and Schneider (2009) and Torgler (2005).⁶¹

⁶⁰ For individual years the negative correlation coefficient is larger in absolute terms: 2008: -0.3774; 2005: -0.6072; 2003: -0.4759; 1998: -0.1289. These are the four years for which the Latinobarometro asks the tax morale question in its survey.

⁶¹ Several previous studies (Alm and Torgler, 2006, and Alm, Martinez-Vazquez, and Torgler, 2006) also found a strong, negative correlation between tax morale and the size of the underground economy in other regions of the world.

Figure7. Correlation between Tax Morale and Size of Shadow Economy in Latin America



Source: Latinobarometro for tax morale and Schneider et al. (2010) for size of the shadow economy. Note: Data for the shadow economy is for 2007 and for tax morale, 2008.

Below we develop separate analysis for the impact of tax structure on tax morale and the shadow economy but allow also for the interaction between these last two variables.

a. Tax structure and tax morale

There is a considerable literature on the determinants of tax morale.⁶² But the literature on tax morale in Latin America is not extensive. Two recent interesting studies are those by Torgler (2005) and Torgler and Schneider (2009).⁶³ How much voluntary compliance there is depends on a number of factors. Torgler (2005) and Torgler and Schneider (2009) find that knowing someone that has evaded taxes or heard about others evading taxes and that tax revenues are badly spent have a negative impact on one's willingness to comply, while trusting that others

⁶² See, for example, Torgler (2007) and Alm et al. (2010).

⁶³ See also Torgler (2004) who compares tax morale in Costa Rica and Switzerland, and McGee and Rossi (2006) who use survey data on compliance involving law students from Argentina.

obey the law, trusting government officials, being proud of one's country, being supportive of democracy and the quality of government institutions (measured in a variety of ways) increase tax morale. Personal characteristics also play a role: younger individuals (below 30) show lower tax morale than the reference group (30-65+) ; married/living together individuals have higher tax morale than singles; individuals in charge of the household, self-employed, and salaried individuals have higher tax morale than those working for public companies. A regional dummy variable for South America indicates that individuals from those countries are likely to report lower tax morale. Interestingly, Torgler (2005) finds that the perception of being caught cheating on taxes is not statistically significant. Other determining factors could include actual compliance costs.⁶⁴

Our interest is to explore the potential role of tax structure on tax morale. The more intense use of direct taxes over indirect taxes, other things equal, could affect tax morale negatively because direct taxes are generally more visible in their collection and can bring more direct contact with the tax authorities through auditing activities. In addition, direct taxes, from property taxes to the personal income tax, tend to be much less popular among taxpayers perhaps due to perceptions of horizontal inequities. This hypothesis is tested using a data panel for 18 Latin American countries,⁶⁵ covering the period 1998-2008.

The model we estimate is given by the basic specification:

$$tmorale_{i,t} = \beta_1 taxratio_{it} + \beta_2 DEMO_{it} + \beta_3 EMPL_{it} + \beta_4 SA_{it} + \beta_5 BEH_{it} + \varepsilon_{it}, \quad i = 1, \dots, n; t = 1, \dots, T$$

where i indicates country and t denotes year. The dependent variable "tmorale" represents the percentage of population declaring that it is never justifiable to "Manage to avoid paying all his tax" and is extracted from the Latinobarometro. For the explanatory variables, our variable of interest is the 'taxratio' representing the ratio of direct to indirect taxes. The other control variables include a vector of demographic variables, DEMO, namely, age, education and gender,

⁶⁴ Taxpayer compliance costs appear to vary considerably in the Latin American region , ranging from estimates for Brazil requiring on average 2,600 hours to fill and pay taxes by businesses versus El Salvador where that is only 224 hours. See Alm and Martinez-Vazquez (2007).

⁶⁵ The countries are: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

which are measured as percentages of the total population; a vector of variables representing employment status EMPL, also measured as percentages of the total population; a vector of behavioral variables, BEH, including confidence in government, tax avoidance, perception of being caught, and attitude toward obeying the law. The variable "confidence in government" is captured by the percentage of population who declare having "a lot" of confidence in the government. The variable "tax avoidance" represents the percentage of the population declaring that they know of someone or have heard someone they know comment about somebody who has "Managed to avoid paying all his tax". The variable "perception of being caught" represents the percentage of the population declaring that it is very possible that a person who has committed an illegal act in their country gets caught. Lastly, the variable "obeying the law" represents the percentage of the population declaring that people in the country obey the law without exceptions. We also include a dummy variable for South America countries, "SA".

Before we analyze the results, we address several econometric issues. For the panel estimation, the Hausman test for selecting between the fixed and random effects rejects the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator, suggesting the importance of using the fixed effects procedure. Because of the potential endogeneity of choosing a tax structure –the direct to indirect tax ratio, and level of tax morale among the citizens, we also estimate the basic specification above by applying a 2SLS Fixed Effects procedure. In the first stage, we estimate the direct to indirect tax ratio using the model

$$taxratio = X_{it}\beta + \mu_i + v_{it}, \quad i = 1, \dots, n; t = 1, \dots, T$$

where i indicates country and t denotes year, and the vector X_{it} includes the exogenous variables employed in section 3 above: total revenues, population size, federal regime, expenditure decentralization, extent of democracy, socialist government, GDP per capita, labor force participation, openness, agriculture, globalization and urbanization. We use the predicted values for $taxratio$ in the first stage equation in the second stage to finally estimate the basic equation.

The results are presented in Table 9 for both the one stage fixed effects and the 2SLS fixed effects. Interestingly, our variable of interest in the direct to indirect tax ratio is negative and highly statistically significant in all the regressions. Even though, as we saw in section 2 of the paper, Latin American countries have relatively low direct to indirect tax ratios, those countries that rely more on direct taxes are subject to lower tax morale by their citizens.

For the other control variables, the results do not generally replicate those in the previous empirical literature on tax morale. Older people (over 65 years of age) tend to have lower tax morale, as do those with more education (over 12 years) and females. We also find that higher tax morale is found among those employed as salaried workers in private companies, the unemployed, the retired, those in charge of the household, and among students. Interestingly, these are all groups that either have to pay little taxes or that have a greater possibility of hiding some of their income from the tax authorities. Among the behavioral variables we also find consistent results indicating higher tax morale among those believing in obeying the law and that there is a high probability of being caught in case of an infraction.

Table 9. Effect of Direct to Indirect Tax Ratio on Tax Morale in Latin American Countries, 1998-2008

	Fixed Effects					2SLS Fixed Effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Tax Ratio	-	-0.09***	-0.13***	-	-0.09***	-	-0.10***	-0.13***	-	-
	0.10***			0.06***		0.11***			0.06***	0.09***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
<i>Demographic Variables</i>										
Age 25 - 44	0.09	0.02	-0.31	0.68*	0.44	0.00	-0.02	-0.41	0.63*	0.38
	(0.43)	(0.43)	(0.40)	(0.36)	(0.38)	(0.43)	(0.43)	(0.41)	(0.36)	(0.39)
Age 45 - 64	0.71	0.73	1.44***	0.36	1.04**	0.58	0.62	1.25**	0.29	0.84*
	(0.60)	(0.56)	(0.50)	(0.46)	(0.49)	(0.57)	(0.53)	(0.48)	(0.45)	(0.46)
Age 65+	-1.93**	-1.54	-1.87*	0.56	0.32	-1.89**	-1.47	-1.78*	0.57	0.44
	(0.90)	(0.95)	(1.05)	(0.61)	(0.64)	(0.87)	(0.92)	(1.02)	(0.59)	(0.62)
Education: 8 to 12 years	0.01	0.13	0.19	0.04	0.21	-0.03	0.10	0.12	0.01	0.17
	(0.17)	(0.18)	(0.18)	(0.17)	(0.18)	(0.18)	(0.19)	(0.18)	(0.17)	(0.19)
Education: over 12 years	-	-0.59***	-0.58***	-0.36**	-0.40***	-	-0.66***	-0.66***	-	-
	0.66***					0.73***			0.41***	0.46***
	(0.17)	(0.17)	(0.16)	(0.14)	(0.14)	(0.17)	(0.17)	(0.16)	(0.15)	(0.15)
Female	-0.36	-0.72	-1.20**	-	-1.80***	-0.49	-0.82	-1.31**	-	-
				1.51***					1.57***	1.84***
	(0.58)	(0.56)	(0.60)	(0.51)	(0.55)	(0.59)	(0.56)	(0.59)	(0.51)	(0.55)
<i>Employment Status</i>										
Salaried in a private company	1.37***	1.30***	1.70***	1.85***	1.79***	1.71***	1.59***	2.08***	2.06***	2.03***
	(0.37)	(0.37)	(0.35)	(0.39)	(0.39)	(0.41)	(0.42)	(0.40)	(0.42)	(0.43)
Salaried in a public company	0.38	0.28	0.23	0.68**	0.45	0.44*	0.32	0.32	0.73***	0.49*
	(0.26)	(0.27)	(0.25)	(0.27)	(0.28)	(0.26)	(0.28)	(0.26)	(0.27)	(0.29)
Unemployed	2.27***	2.47***	2.16***	1.85***	1.82***	2.25***	2.44***	2.13***	1.82***	1.73***
	(0.54)	(0.52)	(0.48)	(0.51)	(0.49)	(0.53)	(0.51)	(0.47)	(0.49)	(0.47)
Retired	1.74**	1.24**	0.68	0.15	-0.38	1.75**	1.26*	0.70	0.17	-0.39
	(0.68)	(0.63)	(0.74)	(0.46)	(0.48)	(0.68)	(0.64)	(0.75)	(0.47)	(0.49)
In charge of the household	0.90***	0.74***	0.60**	0.70***	0.53**	0.93***	0.77***	0.64**	0.72***	0.55**
	(0.29)	(0.27)	(0.26)	(0.25)	(0.24)	(0.29)	(0.27)	(0.27)	(0.26)	(0.25)

Student	2.02*** (0.65)	1.63*** (0.57)	0.83 (0.60)	1.33*** (0.50)	0.59 (0.49)	2.04*** (0.64)	1.67*** (0.56)	0.93 (0.59)	1.36*** (0.50)	0.70 (0.49)
<i>Regional Variable</i>										
South America	0.01 (0.03)	-0.02 (0.03)	-0.01 (0.03)	0.03 (0.04)	-0.00 (0.03)	0.02 (0.04)	-0.01 (0.03)	-0.00 (0.03)	0.03 (0.04)	0.01 (0.03)
<i>Behavioral Variables</i>										
Confidence in government	-0.06 (0.08)				-0.04 (0.06)	-0.05 (0.07)				-0.02 (0.06)
Avoiding taxes		0.09 (0.15)			0.08 (0.11)		0.12 (0.15)			0.12 (0.11)
Being caught			0.45*** (0.12)		0.42*** (0.11)			0.43*** (0.11)		0.38*** (0.11)
Obeying the law				0.55*** (0.11)	0.36*** (0.12)				0.56*** (0.10)	0.38*** (0.11)
Constant	0.24 (0.39)	0.44 (0.35)	0.51* (0.28)	0.08 (0.33)	0.18 (0.35)	0.36 (0.38)	0.52 (0.35)	0.65** (0.29)	0.14 (0.33)	0.25 (0.35)
Observations	191	189	189	187	187	191	189	189	187	187
R-squared	0.67	0.70	0.72	0.77	0.79	0.68	0.70	0.72	0.77	0.79
AR(2) (p test)	0.101	0.139	0.098	0.127	0.144	0.085	0.145	0.141	0.082	0.219

Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Notes: Dependent variable: share of populating declaring avoiding taxes never justifiable; In the reference group are: Age 18-24, Male, Self employed, Central America

b. Tax structure and the shadow economy

The size of the shadow economy in general is a reflection of the activities in the economy that go unregistered and outside the formal channels of doing business, including registration, compliance with regulations, and paying taxes.⁶⁶ It is generally accepted that taxes are main driving force for businesses and professionals to operate in the shadow economy.⁶⁷ Here we hypothesize that tax systems that rely more heavily on direct taxes, including personal and corporate income taxes, property taxes, and especially social security contributions and payroll taxes than indirect taxes will have a larger positive effect on the size of the shadow economy. Considerable work has been carried out on the determinants of the shadow economy. A good summary is offered in Kanniaien et al. (2004). From this literature other potential determinants of the shadow economy include the level of tax morale, and the level of institutional quality.⁶⁸

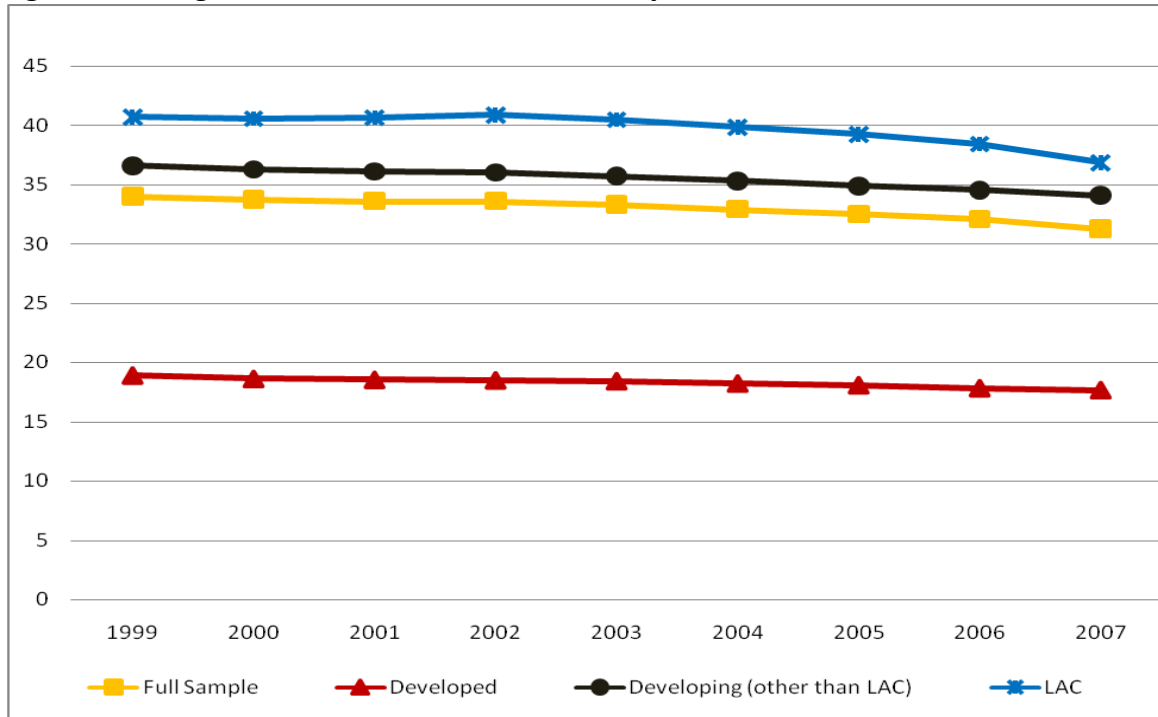
Although the size of the shadow economy expanded in all regions of the world in the last decades (Schneider, 2006), the data for more recent years, as shown in Figure 8, shows that it has become more stable with a slight downward trend. As Figure 8 also shows, the size of the shadow economy is largest in the Latin America region vis-à-vis all other developing and developed countries; in fact, the average size of the shadow economy in the Latin America region is roughly twice the average in developed countries. However, there are also significant variations among Latin American countries in their size of the shadow economy. As shown in Figure 8, Bolivia, Panama, and Peru have the largest shadow economies and Chile the lowest. We would expect that a good share of the shadow economy has to do with tax evasion. Generally, tax evasion is difficult to measure and there are little systematic data on it. But the data available shows that there may not need to be a high correlation between measures of the shadow economy and measurements of tax evasion. For example, Jimenez et al. (2010) find that income tax evasion in a group of Latin American countries ranges from 41.6% to 63.8%,

⁶⁶ There is considerable variability on the different estimates of the shadow economy and this is in part due to the different methodologies used in the estimation, which include physical input (electricity consumption), currency demand, and DYMIMIC (dynamic multiple-indicators multiple causes) approaches.

⁶⁷ See, for example, Schneider and Enste (2010).

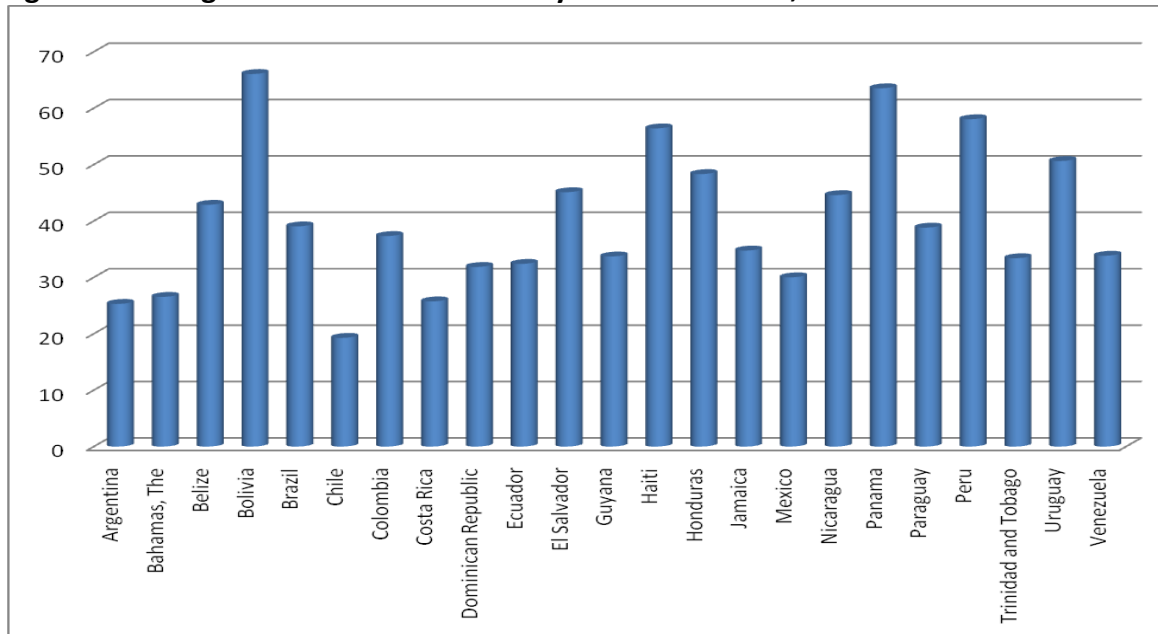
⁶⁸ Torgler and Schneider (2009) find that lower levels of tax morale and of institutional quality lead to a larger size of the shadow economy, other things equal. Bird, Martinez-Vazquez and Torgler (2006) found a strong role of institutional quality on the tax to GDP ratio in a panel of countries.

Figure 8. Average Annual Size of Shadow Economy, 1999-2007



Source: Schneider, Buehn and Montenegro (2010)

Figure 9. Average Size of Shadow Economy in Latin America, 1999-2007



Source: Schneider, Buehn and Montenegro (2010)

which is considerably less than the range in shadow economy sizes in the region (Figure 9), and for example, tax evasion in Peru is estimated at 48.5 percent and in Chile at 47.4 percent. However, the estimate of the shadow economy in Peru is more than twice that in Chile.

The equation to be estimated is given by:

$$shadow_{it} = \beta_1 taxratio_{it} + \gamma X_{it} + \varepsilon_{it}, \quad i = 1, \dots, n; t = 1, \dots, T$$

where i indicates country and t denotes year. The dependent variable *shadow* is measured as a percentage of the “official” GDP. The explanatory variable *taxratio* represents a ratio of direct to indirect taxes, and the vector X includes other control variables; namely, tax morale, measured as a share of population declaring cheating on taxes as never justifiable from the World Value Survey and the Latinobarometro, unemployment rate and GDP per capita measured as real GDP per Capita in constant (10,000) US dollars at base year 2000, both obtained from the World Development Indicators, public sector employment measured as the total number of employees (in millions) in the public sector from the International Labor Organization, and an index for the size of government obtained from Fraser Institute.^{69 70} In addition, we use six “quality of government” indicators developed by Kaufmann et al. (1999a, 1999b); namely, voice and accountability, government effectiveness, rule of law, control of corruption, regulatory quality, and political stability.

The Hausman test for selecting between the fixed and random effects rejects the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator, suggesting the importance of using the fixed effects estimator. To account for potential reverse causality

⁶⁹ Size of government is an index ranging from 0-10 where 0 corresponds to ‘large general government consumption’, ‘large transfer sector’, ‘many government enterprises’, and ‘high marginal tax rates and low income thresholds’, and 10 to ‘small general government consumption’, ‘small transfer sector’, ‘few government enterprises’, and ‘low marginal tax rates and high income thresholds’. The index consists of the following indicators: (i) General government consumption spending as a percentage of total consumption; (ii) Transfers and subsidies as a percentage of GDP; (iii) Government enterprises and investment as a percentage of total investment; and (iv) Top marginal tax rate (and income threshold to which it applies).

between direct to indirect tax ratio and size of shadow economy we apply the 2SLS estimator, where in the first stage we predict *taxratio* variable by estimating the following model:

$$taxratio = W_{it}\beta + \mu_i + v_{it}, \quad i = 1, \dots, n; t = 1, \dots, T$$

where i indicates country and t denotes year. The vector W includes the following variables: total revenues, population size, federal, expenditure decentralization, democracy, socialist, GDP per capita, labor force participation, openness, agriculture, globalization and urbanization. The predicted values of *taxratio* from this model are then used in the second stage to estimate the basic equation. The results obtained by using the 2SLS methodology are presented in columns 3 - 7 in Table 10. In columns 5 - 7 the regression includes interaction terms with a dummy variable for Latin American countries.

To address potential reverse causality problem between tax morale and size of shadow economy, and due to a lack of a good instrumental variable for tax morale, we use the lagged value of tax morale in the regression instead of its current value (columns 3 – 7). Moreover, when we use Kaufmann et al. (1999a, 1999b) quality of government indices as alternative measures of institutional quality (column 7), we detect the presence of autocorrelation, which we address by introducing the lagged value of the dependent variable in the regression.

The results for our main variable of interest show that a higher direct to indirect tax ratio increases the size of shadow economy and that this effects is a bit lower for Latin American countries (columns 5 - 7). Thus, even though the direct to indirect tax ratio in Latin American countries is relatively low on average, those countries that rely more on direct forms of taxation tend to experiment larger sizes of the shadow economy. An increase (hypothetical) in the tax ratio by 1 (100 percentage points) would lead to an increase in the size of shadow economy in Latin American countries of around 0.8 percentage points.

Tax morale always has negative sign, but in the case of Latin American countries, not always is statistically significant. The unemployment rate and GDP per capita are mostly significant and with the expected sign. Public sector employment and government size are negative but insignificant. Voice and accountability, control of corruption and political stability are

statistically significant and have expected negative sign. On the other hand, government effectiveness and the rule of law unexpectedly have a positive coefficient.

Table 10. Effect of Direct to Indirect Tax Ratio on the Size of the Shadow Economy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FE		2SLS FE				
Shadow ₋₁							0.815*** (0.026)
Tax Ratio	0.808 (0.693)	0.268 (0.441)	1.089** (0.486)	1.002*** (0.339)	1.358*** (0.510)	1.099*** (0.336)	1.213* (1.125)
Tax Ratio*LA					-0.239 (0.971)	-0.597 (1.862)	-0.797*** (0.097)
Tax Morale	-1.519 (1.325)	-4.576*** (1.246)					
Tax Morale ₋₁			-6.517*** (1.430)	-6.191*** (2.347)	-4.959* (2.727)	-9.344*** (2.571)	-1.709*** (0.586)
Tax Morale ₋₁ *LA					-3.076 (4.807)	-5.180*** (1.818)	-0.913 (0.829)
Unemployment	0.253*** (0.040)	0.205*** (0.029)	0.154*** (0.049)	0.127*** (0.039)	0.104* (0.055)	0.095** (0.040)	0.003 (0.011)
Unemployment*LA					-0.005 (0.301)	-0.103 (0.164)	0.134* (0.077)
GDP per capita	0.739* (0.405)	2.388*** (0.337)	0.084 (0.404)	2.364*** (0.405)	-0.117 (0.451)	2.194*** (0.403)	-0.431*** (0.099)
GDP per capita*LA					-25.770 (24.300)	-18.760** (7.426)	-3.015* (1.605)
Public Empl	0.084 (0.419)		-0.314 (0.325)		-0.500 (0.336)		
Public Empl*LA					-3.307 (3.720)		
Gov't Size		-0.087 (0.136)		-0.035 (0.143)		-0.081 (0.143)	
Gov't Size*LA						0.843 (0.625)	

VA							0.208
							(0.148)
VA*LA							-2.432***
							(0.560)
CC							0.102
							(0.147)
CC*LA							-0.865*
							(0.486)
GE							-0.430***
							(0.150)
GE*LA							1.820***
							(0.650)
PS							-0.024
							(0.098)
PS*LA							-1.389***
							(0.508)
RL							0.170
							(0.237)
RL*LA							2.059**
							(0.796)
RQ							-0.322**
							(0.140)
RQ*LA							0.010
							(0.720)
Constant	22.300***	16.970***	19.130***	12.230***	23.210***	13.450***	4.594***
	(1.821)	(1.250)	(1.643)	(1.731)	(3.073)	(1.814)	(0.856)
Observations	327	540	176	243	176	243	336
R-squared	0.141	0.185	0.288	0.292	0.328	0.355	0.926
Number of id	42	54	29	43	29	43	52
AR(2) Test (P-value)	0.000	0.000	0.403	0.283	0.506	0.333	0.296
Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Note: Public Empl=Public Employment, Gov't Size=Size of the Government: VA=Voice and Accountability, CC=Control of Corruption; GE=Government Effectiveness, PS=Political Stability, RL=Rule of Law, RQ=Regulatory Quality							

VII. Conclusion

In this paper we review the structure of tax systems in Latin America and analyze their impact on the real economy-- economic growth, macro-economic stability, income redistribution and foreign direct invest--, and on the extent of informality --the size of the shadow economy--and 'tax morale.'

Frequently addressed in fiscal matters as a homogeneous block of countries, the Latin America region shows considerable diversity in tax structures. From one perspective, Latin American country tax structures look like those of countries in other regions of the world in that they use all traditional taxes, but from another perspective, they differ because of the presence of "heterodox" taxes, such as taxes on financial transactions. With traditional taxes, one of the most pronounced characteristics is the small importance of the personal income tax. Corporate income taxes have functioned well in terms of revenues, especially in association with the exploitation of natural resources, and the VAT has performed even better. As in other regions of the world, excise taxes and customs duties have been in decline, while property taxes continue to struggle to have any relevance at all.

As a result the direct tax to indirect tax ratio in Latin America is on average among the lowest in the world, although there is considerable variation in this ratio across the countries in the region. Countries that are smaller, unitary, more democratic, with large budgets, less open to international trade, and that are endowed with natural resources tend to rely more on direct taxes, the latter due to the role played by corporate income taxes.

In terms of the effect of tax structure, measured by the direct to indirect tax ratio, on the real economy we find that relatively higher reliance on direct taxes slows economic growth, even though this effect is smaller for Latin American countries than for other developed and developing countries in the sample. The direct to indirect tax ratio also appears to play a significant role in dampening economic volatility in the full sample of countries but we do not identify any separate significant effects for the Latin American region. This is not surprising given the relatively low variation and depth of the direct to indirect tax ratio in the region, and especially the lack of presence of progressive personal income taxes. For these same reasons,

we can explain the very weak evidence of a positive impact of the direct to indirect tax ratio on income distribution in the region. However, we do find that the relative higher reliance on direct taxes is quite significant in decreasing the flow of foreign direct investment in Latin American countries. When we examine the role of tax structure as measured by the direct to indirect tax ratio on tax morale and the size of the shadow economy we find strong highly significant effects. Even though the direct to indirect tax ratio is in no case high, those Latin American countries that rely more on direct taxes tend to suffer lower tax morale and relatively large shadow economies. These two effects are likely to lead to lower compliance and more tax evasion, although we do not offer any empirical evidence on that.

There appears to be ample consensus in the literature on taxation in Latin America reviewed in this paper that there is a need to reform tax structures in the region to have direct taxation, and in particular the personal income tax, play a much more important role. The clear benefits from this tax policy reform direction would be to have the tax systems play a real role in reducing income inequality in the region, which is at extraordinary heights by international standards. An additional benefit would be to have tax systems that can play a much more active role in the management of macroeconomic stability via built-in stabilizers.

However, as the findings in this paper clearly indicate, the policy move toward giving direct taxation a much bigger role in the tax systems of Latin American countries will not come without some significant tradeoff costs. Foreign direct investment flows could decrease in an important way, and the rate of economic growth could slow down too. In addition, we have found evidence that the already severe problems with the large size of the shadow economy and low tax morale could get worse.

These are all tough choices. It is interesting to note that by choosing on average a much lower direct to indirect tax ratio, Latin American countries so far would seem to have weighted economic growth, positive FDI flows, higher tax morale, and relatively smaller shadow economies more heavily than income redistribution and macroeconomic control issues.

Of course, different people will have different weights for the relative importance of the different effects considered in this paper. But, without something else changing it is not clear

that there would be considerable consensus on what is the right direction to follow. For example, if the effectiveness of governments would change in translating higher revenues from income taxes in improved infrastructure and social services like health and education to build human capital, then increased direct taxation might work for higher economic growth, higher foreign direct investment flows or even higher tax morale. This would be on top of the gains from a more equitable distribution of income and more agile fiscal instruments to manage the business cycle. Thus even though this paper has concentrated on tax structure, the expenditure side of the budget – and more specifically what can be accomplished with it-- needs to be taken into account when making decisions on how to tax and how much to tax.

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Appendix

Table A.1. Variables Description and Sources

Variable	Description	Source
AETR	Average effective tax rate = foreign income taxes/(foreign income tax + net incomes) of all affiliates for US firms operating abroad in each country	Bureau of Economic Analysis (BEA)
Age Dependency	Age dependency ratio (dependents to working-age population)	World Development Indicators (WDI)
Agriculture	Share of agriculture in GDP	World Development Indicators (WDI)
Bureaucracy	Bureaucratic quality index, ranging from 0-6, with 6 denoting the highest quality	International Country Risk Guide (ICRG) 2009
Civil Liberties	Scale from 1 (most free) to 7 (least free)	Freedom House
Corporate Tax Rate (subsample init)	Top marginal statutory corporate income tax rate in the initial year of the corresponding period	Office of Tax Policy Research (OTPR)
Corruption	Corruption index, ranging from 0-6, with 6 denoting least corruptive	International Country Risk Guide (ICRG) 2008
Democracy Index	(14-political rights-civil liberties)/12	Freedom House: Authors' calculations
Expenditure Decentralization	State and Local Expenditure to Total (Central, State, Local) Expenditure	IMF GFS: Authors' calculations
FDI from the US to GDP	Foreign direct investment flows from US firms divided by GDP	Bureau of Economic Analysis (BEA)
FDI to GDP	Total foreign direct investment flows divided by GDP	UNCTAD
Federal	= 1 if country has formal federal structure	Handbook of Federal Countries, 2005
GDP per capita	GDP per capita in 2000 US\$	World Development Indicators (WDI)
GDP per capita growth	Real per capita GDP growth rate	World Development Indicators (WDI)
Crude Petrol	Per capital crude petroleum production (in thousands of metric tons)	UN Energy Statistics Database
Gini Coefficient	Gini coefficient	UNU-WIDER World Income Inequality Database, May 2008
Globalization Index	KOF index of globalization	ETH Zürich KOF Konjunkturforschungsstelle

Labor Cost (000 \$US)	Wages of employees working in US companies' foreign affiliates (000 \$US/ year)	Bureau of Economic Analysis (BEA)
Labor Force Participation	Labor force participation rate, total (share of total population ages 15-64)	World Development Indicators (WDI)
Latitude	The absolute value of the latitude of the country, scaled to take values between 0 and 1	La Porta et al. (1999)
Legal Origin: English	The legal origin of the Company Law or Commercial Code of each country: English, French, or German Commercial Code	La Porta et al. (1999)
Legal Origin: French		
Legal Origin: German		
M1 (subsample standard deviation)	Standard deviation of the annual growth of the sum of currency outside banks and demand deposits other than those of central government.	World Development Indicators (WDI)
Openness	(Imports + Exports) / GDP	World Development Indicators (WDI)
Political Rights	Scale from 1 (most free) to 7 (least free)	Freedom House
Population	Population size	World Development Indicators (WDI)
Population Growth	Population growth rate	World Development Indicators (WDI)
Primary enrollment (subsample init)	Primary enrollment rate (%) (gross)	UNESCO Institute of Statistics
Private Credit	Private Credit by Deposit Money Banks and Other Financial Institutions to GDP	Beck, Demirgüç-Kunt and Levine (2000, 2008)
Secondary enrollment	Secondary enrollment rate (%) (gross)	UNESCO Institute of Statistics
Socialist	Countries having either a socialist economic system or a mixed socialist economic system and a socialist or communist political	Gastil (various years), Kornai (1992)
Tax Ratio	Direct (income tax, payroll tax, social security contributions, property tax) to Indirect (taxes on goods and services, taxes on int'l trade, other taxes) Tax Ratio	IMF GFS: Authors' calculations
Telephone lines (per 000 people)	Telephone landlines (per 1000 people)	World Development Indicators (WDI)
Total Revenues to GDP	Share of total (tax and non tax) revenue in GDP in current prices	IMF GFS, WDI: Authors' calculations
Urbanization	Urban population (share of total)	World Development Indicators (WDI)
Shadow Economy	Size of shadow economy, % of official GDP	Schneider et al. (2010)

Tax Morale	Percentage of population declaring cheating on taxes never justifiable	World Values Survey, Latinobarometro
Unemployment rate	Long-term unemployment (% of total unemployment)	World Development Indicators (WDI)
Voice and Accountability	Includes a number of indicators measuring: the extent to which citizens of a country are able to participate in the selection of governments and the independence of the media, which serves an important role in monitoring those in authority and holding them accountable for their actions.	Kaufmann et al. (1999a, 1999b)
Control of Corruption	Measures perceptions of corruption, conventionally defined as the exercise of public power for private gain. The particular aspect of corruption measured by the various sources differs somewhat, ranging from the frequency of “additional payments to get things done”, to the effects of corruption on the business environment, to measuring “grand corruption” in the political arena or in the tendency of elite forms to engage in “state capture”.	Kaufmann et al. (1999a, 1999b)
Government Effectiveness	Combines into a single grouping responses on the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government’s commitment to policies.	Kaufmann et al. (1999a, 1999b)
Political Stability	Combines several indicators which measure perceptions of the likelihood that the government in power will be destabilized or overthrown by possibly unconstitutional and/or violent means, including domestic violence and terrorism.	Kaufmann et al. (1999a, 1999b)

Rule of Law	Includes several indicators which measure the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts.	Kaufmann et al. (1999a, 1999b)
Regulatory Quality	Includes measures of the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development.	Kaufmann et al. (1999a, 1999b)
Government Size	The index ranges from 0-10 where 0 corresponds to 'large general government consumption', 'large transfer sector', 'many government enterprises', and 'high marginal tax rates and low income thresholds', and 10 to 'small general government consumption', 'small transfer sector', 'few government enterprises', and 'low marginal tax rates and high income thresholds'.	Fraser Institute
Public Sector Employees	Total employment of all government units, social security funds and non-market Non Profit Institutions (NPIs) that are controlled and mainly financed by public authority.	International Labour Organization
Confidence in Government	Share of interviewed population declaring to have a lot confidence in the Government.	Latinobarometro
Tax Avoidance	Share of interviewed population declaring to have heard of someone who managed to avoid paying all their tax.	Latinobarometro
Perception of Being Caught	Share of interviewed population declaring it to be very possible for someone who as committed an illegal act to be caught.	Latinobarometro
Law Obedience	Share of interviewed population declaring that people always obey the law without exceptions.	Latinobarometro

Female	Share of female interviewed population.	Latinobarometro
Age 25-44	Share of interviewed population age between 25 and 44.	Latinobarometro
Age 45-64	Share of interviewed population age between 45 and 64.	Latinobarometro
Age 65+	Share of interviewed population 65 or more years of age.	Latinobarometro
Education: 8-12 years	Share of interviewed population with between 8 and 12 years of education.	Latinobarometro
Education: over 12 years	Share of interviewed population with over 12 years of education.	Latinobarometro
Occupation: Salaried in private company	Share of interviewed population salaried in a private company.	Latinobarometro
Occupation: Salaried in public company	Share of interviewed population salaried in a public company.	Latinobarometro
Occupation: Unemployed	Share of unemployed interviewed population.	Latinobarometro
Occupation: Retired	Share of retired interviewed population.	Latinobarometro
Occupation: In charge of the household	Share of interviewed population who are in charge of the household.	Latinobarometro
Occupation: Student	Share of interviewed population who are students.	Latinobarometro

Table A.2. Variables Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
AETR	1152	0.33	0.20	-0.28	0.98
Age Dependency	4170	0.67	0.19	0.31	1.17
Agriculture	3511	0.16	0.14	0.00	0.94
Bureaucracy	1114	2.84	1.08	0.00	4.00
Civil Liberties	3394	3.14	1.86	1	7
Corporate Tax Rate (subsample init)	544	34.42	11.36	0.00	60.00
Corruption	1092	3.82	1.48	0.00	6.00
Crude Petrol per capita (000 metric tons)	1798	2.61	10.38	0.00	196.24
Democracy Index	3724	0.61	0.33	0.00	1.00
EU 15	4292	0.13	0.34	0.00	1.00
Expenditure Decentralization	1640	25.00	17.24	0.56	87.00
FDI from the US to GDP	1166	0.04	0.22	-0.16	4.97
FDI to GDP	1141	0.73	0.30	0.00	1.17
Federal	4292	0.16	0.36	0.00	1.00
GDP growth (subsample st. deviation)	828	315.77	447.99	1.03	4563.56
GDP per capita	3837	7177.76	9061.58	56.45	51673.98
GDP per capita growth	3622	1.99	3.64	-10.00	10.00
Gini Coefficient	1561	35.76	10.11	16.60	73.90
Globalization Index	3747	0.53	0.18	0.09	0.93
Labor Cost (000 \$US)	1154	25.80	17.80	2.59	89.96
Labor Force Participation	3277	69.29	8.61	46.10	93.20
Latitude	4292	0.32	0.20	0.01	0.72
Legal Origin: English	4292	0.29	0.46	0.00	1.00
Legal Origin: French	4292	0.46	0.50	0.00	1.00
Legal Origin: German	4292	0.04	0.20	0.00	1.00
M1 (subsample st. deviation)	686	0.27	1.50	0.01	29.76
Openness	3253	0.79	0.56	0.07	4.32
Political Rights	3396	3.35	2.16	1	7
Population	4281	2740000	86700000	40130	1100000000
Population Growth	925	1.46	1.30	-4.80	8.76
Primary enrollment (subsample init)	780	82.32	19.99	9.48	104.57
Private Credit	3367	0.47	0.40	0.01	3.45
Secondary enrollment	639	84.92	24.86	19.00	161.66
Socialist	4292	0.11	0.31	0.00	1.00
Tax Ratio	1967	1.37	1.14	0.02	9.01
Tax Ratio IV	4292	1.52	0.44	0.22	5.17
Telephone lines (per 000 people)	1166	2.81	2.15	0.02	7.97
Total Revenues to GDP	1865	0.29	0.13	0.03	0.64
Urbanization	4292	0.55	0.24	0.03	1.00

Shadow Economy	1901	30.18	13.36	6.70	68.30
Tax Morale	1260	0.58	0.14	0.13	0.95
Unemployment rate	1814	8.66	5.25	0.30	43.50
Voice and Accountability	1170	0.19	0.94	-2.24	1.83
Control of Corruption	1155	0.20	1.05	-1.76	2.62
Government Effectiveness	1169	0.23	1.03	-1.89	2.64
Political Stability	1161	0.07	0.91	-2.63	1.68
Rule of Law	1163	0.16	1.00	-2.28	2.12
Regulatory Quality	1170	0.23	0.94	-3.13	2.03
Government Size	2725	5.34	1.63	0.65	9.18
Public Sector Employees	1063	1.54	3.93	0.00	24.36
Confidence in Government	191	0.32	0.15	0.07	0.84
Tax Avoidance	189	0.25	0.08	0.09	0.49
Perception of Being Caught	189	0.71	0.10	0.49	0.87
Law Obediance	187	0.66	0.09	0.47	0.82
Female	191	0.51	0.02	0.47	0.62
Age 25-44	191	0.46	0.05	0.33	0.63
Age 45-64	191	0.24	0.03	0.18	0.33
Age 65+	191	0.08	0.04	0.00	0.20
Education: 8-12 years	191	0.32	0.08	0.12	0.52
Education: over 12 years	191	0.22	0.10	0.03	0.59
Occupation: Salaried in private company	191	0.08	0.03	0.03	0.21
Occupation: Salaried in public company	191	0.18	0.06	0.08	0.40
Occupation: Unemployed	191	0.06	0.02	0.02	0.13
Occupation: Retired	191	0.06	0.05	0.01	0.23
Occupation: In charge of the household	191	0.21	0.05	0.05	0.34
Occupation: Student	191	0.08	0.03	0.02	0.21