

THE ROLE OF INSTITUTIONS IN THE LATIN AMERICA SHADOW ECONOMY.  
EMPIRICAL ANALYSIS AND POLICY IMPLICATIONS

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# The Role of Institutions in the Latin America Shadow Economy.

## Empirical analysis and Policy implications

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### Abstract

*The objective of this study is to estimate the causes of the Shadow Economy (SE) in Latin American countries and its effect on the economic development. By including in panel regressions some indicators of Institutional context together to marginal tax rate and unemployment, we find empirical evidence to state that the institutional background is essential to explain the size of SE in these countries. By ranking countries according to the degree of economic development, measured by GDP per capita, we find that the correlation between SE and official economy is positive and the magnitude of correlation is greater for countries with higher GDP. Policy implications are provided.*

**JEL Classification:** O17, K42, O54, N16

**Keywords:** shadow economy, institutions, Latin America.

## 1. Introduction

There are several reasons why economic research should take the Shadow Economy<sup>1</sup> (SE) into deep consideration: on one hand: SE is one of the causes of the inefficient functioning of the goods and labour markets. It introduces a distortion of competition within countries and among States; a growing SE may attract workers away from the official economy and create competition for official firms; it harms involved workers by depriving them of their rights and guarantees; the decision by entrepreneurs to work outside the fiscal regulatory framework produces a vicious circle, as their exit from the formal economy reduces State revenues and consequently decreases public expenditures (e.g. on infrastructure, education, research, etc.). Moreover, an increase in the tax burden increases tax evaders' incentive to remain in the SE; hidden activities favour corruption and links between criminal and illegal activities; SE hampers policy making as it questions the reliability of the national account aggregates; SE increases lack of trust in the Institutions and feeds resentment among citizens; it causes distortions concerning the internal consistency of national accounts<sup>2</sup>.

On the other hand: it creates an extra added value that can be spent in the official economy. Schneider and Enste (2000) for instance state that at least two-thirds of the income earned in SE is immediately spent in the official economy, thus having a positive effect on the latter; usually people with low personal income are involved in informal production activities. Therefore, underground production modifies (improves) the distribution of income in society; for countries with a high unemployment rate, the informal sector represents a type of social buffer.

Ample literature<sup>3</sup> analyses the causes and consequences of SE on citizens, firms and government. According to Enste (2003) most studies focus on the influence on allocation of resources and the loss of revenue for the State but the impact on the official Institutions, norms and rules is even more important. The SE can be seen also as an indicator of a serious deficit of legitimacy of the present social order and the existing rules of official economic activities.

In this research, we devote specific attention (1) on the role of Institutions to explain the size of SE in Latin American countries and (2) on the relationship between official and unofficial economy.

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<sup>1</sup> The shadow economy has been characterized with confusion with regard to its meaning. Each definition draws out a different set of attributes that describe it. The shadow economy is also referred to as underground, informal, hidden, parallel, clandestine, second, irregular or household economy. The confusion appears to originate from the work of different fields (economics, sociology, statistics etc.) who define the shadow economy based on the "criteria" that lead to its development. Regarding to the definition, a good benchmark is worked out in 1993 by the System of National Accounts (SNA): the underground economy is the value-added activities that the official statistics do not register although they should (OECD, 2002). This definition seems to be sufficiently close to the kind of underground activity here studied, although there is no need for them to be equal given the different targets between the present work and the SNA.

<sup>2</sup> The national accounts are an integrated system, which requires that related flows be recorded consistently. Recording one part of a certain activity (expenditure on goods and services from household production) but excluding the other part of the activity (production of goods and services) introduces inconsistencies in the accounts and errors in the balancing items. Bloem and Shrestha (2000).

<sup>3</sup> For an overall survey see Schneider and Enste (2000).

Until few years ago, determining the impact of economic policies on cross-country shadow performance has been virtually impossible because of the inherent difficulties in measuring both the institutional performances and the size of SE across countries.

Fortunately, the recent availability of data on the scope of Institutions performance and SE now makes such a study possible. In particular, we refer of recent releases of the Fraser Institute's *Economic Freedom of the World* annual report (Gwartney and Lawson, 2005) include data on the institutional environment in a large number of Latin American countries and Schneider's (2005a, 2005b) articles where we extract the estimates of the SE as percentage of official GDP.

Further aim of this study is to investigate the relationship between official and unofficial economy ever with reference to Latin American countries. As Enste (2003) points, there are contrasting empirical evidences to support either positive or negative correlation between these variables.

In this paper, we attempt to find some plausible answers to the following questions: (1) which are the main causes of SE across Latin American countries? (2) What is the relationship between unofficial and official economy? (3) How the policy maker should be adapt his economic policy according to institutional and /or economic context? To find some rejoinders to these queries, we applied a panel data analysis for 18 countries and over a period from 1990 to 2003.

The outline of the paper is as follows. The section 2 provides an overview of the literature concerning the role of Institutions on the SE. Section 3 and 4 describe, respectively, the dataset and the panel data model applied. Outcomes are discussed in section 5. Section 6 presents a brief overview of the empirical literature relating to the relationship between official and unofficial economy around the world as well as our own results for Latin American countries. The paper ends with policy implications and general conclusions. Two appendixes are provided.

## **2. Institutions and Shadow economy**

Numerous studies have explored the relationship between SE and Institutions<sup>4</sup>. According to Feige (1998) the Institutions represent the rules that constrain human behaviors by affecting the expected payoffs for economic actors. However, there are many types of Institutions, spanning formal legal systems and informal norms. Notwithstanding is widely accepted that Institutions affect economic performance, it is not always obvious which institutional rules dominate.

Distinguishing between formal and informal Institutions, when both are coherent and consistent, the incentives produced by the formal rules will affect economic outcomes. At the contrary, in regimes of discretionary authority where formal Institutions conflict with informal norms, noncompliance with the formal rules becomes pervasive, and SE is consequential for economic outcomes (Feige, 1998).

In the context of empirical cross-countries analyses, the studies of Johnson *et al.* (1998, 1999), Friedman *et al.* (2000), Schneider (2005a), Dreher *et al.* (2005), Dreher and Schneider (2006), Torgler and

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<sup>4</sup> See among others: Brennan and Buchanan (1980, 1985); Feige (1998); Belev (2003); Bovi and Dell'Anno (2007).

Schneider (2007), Bovi and Dell'Anno (2007) point out how the size of SE is affected by fiscal (e.g. tax burden), labour market factors (e.g. unemployment, subsidiaries, etc.) and by institutional environment (e.g. rule of law, regulation, economic freedom, corruption, etc.).

Following what suggested by Friedman *et al.* (2000) and Bovi and Dell'Anno (2007), it can be said that only governments with a relatively good level of institutional background can sustain high tax rates.

One particular aspect of SE that has received relatively little attention in the empirical literature, however, is how different institutional contexts affect the effectiveness of policy maker's actions.

The main difficulty for empirical researches on this field is the availability and reliability of data. It is because, when several measures of unobservable variables (e.g. regulation, rule of law, SE estimates) and low time frequency are put together then the trustworthiness of econometric outcomes can be gravely questionable. Aware of these limitations, we collect accurately the dataset as explained in the next section.

### 3. Data Issues

In this section we discuss the data used for the estimation. The collected data set consists of five data points of time (1990, 1995, 2000, 2002, 2003) of 18 Latin American countries. We limit the data set to selected Latin American and Caribbean countries owing to data limitations for smaller economies and available estimates of SE.

Since many Latin American countries had or still have a tradition of excessive regulations and weak government Institutions, these countries can be an interesting test bench for the hypotheses of this research. Further, considering this group of countries, we aim to reduce the sources of heterogeneity among the economies under observation. It should increase the reliability of the data analysis.

The panel data includes eight variables: the Shadow Economy as percentage of declared GDP (**SE**); the Gross Domestic Product per capita at constant 1990 price (**GDP\_cap**); an index of the Rule of Law (**RoL**); an index of Regulation (**Reg**); an index of access to sound Money (**Money**); an index of top marginal tax rate that considers also the income threshold to which it applies (**Top-tax**); the unemployment rate as percentage of labour force (**Un\_rate**).

Table 1 shows the averages over time for each country. The countries are put into decreasing order respect to the size of SE as percentage of official GDP.

**Table 1: Database - Averages over time 1990-2003**

	<b>Countries</b>	<b>SE</b>	<b>GDP_cap</b>	<b>RoL</b>	<b>Reg</b>	<b>Money</b>	<b>Top-tax</b>	<b>Un_rate</b>
1	Bolivia	63.9%	813.5	3.6	5.9	8.2	9.9	5.3%
2	Panama	60.8%	3127.0	4.7	6.5	9.7	6.7	13.8%
3	Peru	56.1%	1616.1	3.9	5.7	6.9	5.8	8.6%
4	Guatemala	48.6%	973.2	3.2	5.5	8.1	7.1	2.5%
5	Uruguay	48.2%	3010.6	5.9	5.9	6.6	9.5	13.2%
6	Honduras	47.4%	647.7	3.7	5.6	8.4	7.8	4.2%
7	Nicaragua	44.7%	965.9	3.7	5.5	6.4	6.0	11.6%
8	Colombia	38.8%	1470.9	3.3	5.4	6.2	6.5	13.9%
9	Brazil	38.4%	3185.1	5.4	5.1	4.1	5.3	7.2%
10	Jamaica	35.5%	1918.7	4.9	6.2	7.5	7.7	14.5%
11	Ecuador	33.3%	1102.1	3.7	4.8	5.5	8.0	8.5%
12	Venezuela	32.6%	2336.1	3.3	4.5	4.7	7.1	13.4%
13	Dominican Republic	31.7%	1836.7	4.6	6.2	5.5	6.8	14.6%
14	Mexico	29.3%	3422.0	4.9	5.5	6.2	6.6	3.2%
15	Paraguay	28.8%	1186.3	3.4	4.9	8.1	9.6	6.6%
16	Argentina	25.7%	5117.3	4.7	5.6	6.4	6.5	12.8%
17	Costa Rica	25.4%	2879.9	6.2	6.4	8.2	7.2	5.6%
18	Chile	18.2%	3705.2	6.5	6.5	8.8	5.0	6.8%
	<b><i>Unweight Averages</i></b>	<b>39.3%</b>	<b>2184.1</b>	<b>4.4</b>	<b>5.6</b>	<b>7.0</b>	<b>7.2</b>	<b>9.2%</b>

Data on the “Shadow Economy” for these countries are available from different sources and different methods. Considering that it is difficult to evaluate the SE estimates, because full scope information for these types of estimates is never available, any evaluation of reliability of SE estimates is incomplete. Needless to say, no method has imposed itself as being clearly superior to the others. This work uses the estimates published by Schneider (2005a) for the 1990, 1995, 2000 and Schneider (2005b) for the 2002 and 2003. These articles collect different sources and consider the currency demand approach and (Dynamic) Multiple Indicators Multiple Causes method to estimate SE as percentage of official GDP. For a fuller treatment of estimation method of SE, we refer the reader to Schneider and Enste (2000), Giles and Tedds (2002).

Data on “Gross Domestic Product per capita at constant 1990 price” are available from United Nation Statistical on-line database. We include this variable as control variable. It is quite common procedure for cross-countries studies (Schneider and Enste, 2000; Schneider, 2005a) to grouping countries according to degree of economic development (e.g. developed, OECD, developing, transition, etc.). In Latin America it has mean because we note huge differences in economic development. The annual GDP per capita at constant US dollar price ranges from \$ 5117.30 (average over 1990-2003 in Argentina) to \$ 647.70 (in Honduras).

Data on the “Rule of Law” are available from the Fraser Institute, which elaborates an index running from 0 to 10 (lower numbers mean worse legal environment). In particular, we use as proxy of RoL the Area 2 of the Index of Economic Freedom, so called “Legal Structure and Security of Property Rights” published by Gwartney and Lawson (2005)<sup>5</sup>. The key ingredients accounted by this index are: rule of law,

<sup>5</sup> Data retrieved from [www.freetheworld.com](http://www.freetheworld.com)

security of property rights, independent judiciary and impartial court system.

Data on “Regulation” are also available from the Fraser Institute. This index running from 0 to 10 (lower numbers mean worse regulation). This index considers several kinds of restrictions that entry into markets and interferes with the freedom to engage in voluntary exchange.

It is built as average of three main factors. The first component reflects conditions in the domestic credit market. The second one considers labour market regulations infringe upon the economic freedom of employees and employers. In order to earn high marks in the component rating regulation of the labor market, a country must allow market forces to determine wages and establish the conditions of dismissal, avoid excessive unemployment benefits that undermine work incentives, and refrain from the use of conscription. The third sub-component is designed to identify the extent to which regulatory restraints and bureaucratic procedures limit competition and the operation of markets (Gwartney and Lawson, 2005, p.8).

The “Sound money” is a variable that take into account the monetary policy. In this sense it is an institutional form to protect property rights and, thus, economic freedom. Inflation erodes the value of property held in monetary instruments. When governments (or central banks) create money to finance their expenditures they are, in effect, expropriating the property and violating the economic freedom of their citizens. In order to earn a high rating in this area, a country must follow policies and adopt Institutions that lead to low (and stable) rates of inflation and avoid regulations that limit the use of alternative currencies should citizens want to use them. (Gwartney and Lawson 2005, p.7).

In literature, the most popular determinant of the SE is taxation. The common hypothesis is that an increase in the tax rate is a strong incentive to work in the unofficial economy. In the econometric framework, this variable is measured by the indicator of “top marginal income tax rate” (1D in Economic Freedom Index classification). It is one of the four components of area 1 (Size of Government: Expenditures, Taxes and Enterprises). The variable 1D is based on the top marginal income tax rate and the top marginal income and payroll tax rate by considering the income threshold at which the top marginal income tax rate applies. These two sub-components are averaged to calculate 1D. Countries with high marginal tax rates and low-income thresholds are rated lower. (Gwartney and Lawson 2005, p.7). Although it might be useful to analyze the impact of three main components of tax revenue (direct, indirect, and social security contribution) separately, but the data limitations has prevented any possibility of developing a more complex econometric framework (in terms of the number and kind of potential causes of SE).

Data on “Unemployment rate” are extracted by the World Bank on-line database. According with Tanzi (1999) the effect of unemployment rate on SE is ambiguous. It is because the labor force of the SE is composed of very heterogeneous workers. One part of the hidden labor market is classified as unemployed but belongs to the official labor force. The other part of ‘hidden’ workers consists of retirees, minors, and housewives who are not part of the official workforce. Furthermore, there are persons who simultaneously hold an official and an unofficial job (Tanzi, 1999, p. 343). In this sense, the official unemployment rate

could be weakly correlated with the SE. In Latin American countries, this uncertainty is confirmed. In fact, we do not find empirical support that unemployment rate is among the relevant causes of SE.

#### 4. The Econometric Model

In this paragraph, we present the panel analysis. It provides a powerful method to test empirically the theoretical hypotheses. It allows considering the space dimension of the data. Alternative types of panel model specification can be suitable for our analysis. One type of panel model has constant coefficients, referring to both intercepts and slopes. In the event that there is not significant country effects, we could pool all of the data and run an ordinary least squares regression model. This model is sometimes called the pooled regression model.

In contexts like this one, the question usually arises whether the individual specific effects should be assumed to be fixed (Fixed effects model) or random (Random effects model). According to Baltagi (1995), the fixed effects model is the appropriate specification if the analysis is focusing on a specific set of  $N$  units and the inference is restricted to the behaviour of this set of units. The Random effects model, on the other hand, is an appropriate specification if we are drawing  $N$  individuals randomly from a large population and want to draw inferences about the entire population. In light of these arguments, a fixed effects model is the proper specification in our research.

In equation 1, we show a regression model with  $N=18$  country dummies;  $i = 1, 2, \dots, 18$ ; and  $t = '90, '95, '00, '02, '03$ .

The model could be specified as follows:

$$y_{it} = \sum_{j=1}^N \alpha_j d_{ij} + x'_{it} \beta + \varepsilon_{it} \quad (1)$$

Where  $d_{ij} = \begin{cases} 1 & \text{if } i = j \\ 0 & \text{otherwise} \end{cases}$  are used to capture the cross-country (fixed) effects. In the above model

setup,  $\beta_{OLS}$  and  $\alpha_{OLS}$  are BLUE (best linear unbiased estimator) under the following assumptions:

- i)  $E(\varepsilon_i) = 0, \forall i$ ; The unconditional mean of the error term is zero;
- ii)  $E(\varepsilon_i \varepsilon_i') = \sigma_\varepsilon^2 I, \forall i$ ; Constant  $\sigma_\varepsilon^2$  for all  $i$  means no cross-sectional heteroscedasticity and identity matrix  $I_{T \times T}$  means no autocorrelation over time within each section;
- iii)  $E(\varepsilon_i \varepsilon_j') = 0, \text{ if } i \neq j$ ; It implies no cross-sectional correlation.

Since pooling amounts to applying (linear) restrictions on the coefficients, an F-test can be used, where a restricted model is compared to an unrestricted model. We compute F-tests in order to apply a correct fixed model specification. The pooling tests reveals as the fixed country effects specification is the appropriate model specification (see appendix 2 for details). In order to verify the presence of structural breaks we compute a breakpoint Chow's test.

In our model, all variables are taken in logarithmic transformation.  $y_{it}$  = [Shadow Economy as percentage of official GDP] and  $x_{it}$  = [GDP per capita at constant 1990 price; Index of legal system and property right (Rule of Law); Index of Regulation; Index of monetary institutions behaviour; Top marginal tax rate; Unemployment rate as percentage of total labor force].

## 5. The Empirical Evidence

Hereinafter, we aim to verify earlier statements about the importance of institutional failures and taxation for the understanding of SE. In the following tables, each regression is modelled including fixed effects. We omit to report the dummies for the sake of brevity.

Once controlled for unobservable differences across countries, the first econometric exercise (table 3- first column) is to estimate the  $\beta_{it}$  for the whole data set (model I). Subsequently we divide in two clusters the sample according to the relative magnitude of SE (High-SE versus Low-SE). Table 3 lists the results.

**Table 3:** Shadow Economy and its causes.

Dependent Variable: share of Shadow economy on GDP			
MODELS			
Regressors	I	H-SE	L-SE
GDP per cap.	0.55***	0.75***	0.59***
Rule of Law	-0.11***	0.04	-0.17***
Regulation	-0.34***	-0.52**	-0.32**
Money	0.13***	0.12**	0.10*
Top tax	0.10*	0.20*	0.07
Unemploym.	0.05*	0.09*	0.05
<b>Adjusted R<sup>2</sup></b>	0.977	0.918	0.946
<b># Observ.</b>	74	37	37

\*\*\* Denotes significant at 1% level; \*\* Denotes significant at 5% level; \* Denotes significant at 10% level. All variables are defined in logarithms. The columns H-SE and L-SE show the estimates obtained by sharing the sample respectively in two sub-samples: the first includes countries with higher size of SE; the second one includes countries with lower SE.

A general evaluation of the estimated model confirms some of the results of existing studies. With exception of the coefficients associated to the top marginal tax rate (top-tax), the variables have the expected sign<sup>6</sup>. It is easily noted by table 3 that, the elasticities of the GDP per capita and of the Regulation

<sup>6</sup> To anticipate the sign of the coefficient associated to “money” index is a complicated question. In general, the inflation rate is often considered as one of the determinant of SE because it increases both lack of trust in the State and the tax burden through the fiscal drag phenomenon. With reference to Latin America, the role of inflation rate in the economy has distinctive characteristics. We have to consider the hyperinflation experience that characterized the region up to the first half of 1990s. In nine major Latin American countries averaged nearly 235 percent per year in the first half nineties averaged only 13 percent per year in 1995-99 and less than 8 percent in 2000-04 despite the spike in Argentina inflation that followed that country's crisis in 2002 (Bernanke, 2005). The rapid succession of monetary reforms needs to reach the price stability makes challenging any prediction of the effect of Inflation on SE for these countries. Again, the “Money” index is not just a proxy of inflation. It accounts also the institutional improvement (independence of the central bank, banking regulation, rules to support price stability, etc.) According with these arguments becomes problematic predict the sign of this variable.

index are statistically different from zero over three model specifications. According with de Soto's (1989) view, we find the strong reaction of the SE to the social-institutional context ("Rule of law", "Regulation" and "Money") may be tentatively explained by thinking of these variables as a "special" cause of SE, (almost) eclipsing any other determinant (e.g. tax rate and unemployment). According with outcomes of model I, to improve rule of law and regulation will be the most effective policies to reduce SE.

Further indications are extracted by outcomes shown in columns H-SE and L-SE of table 3. As first, we find that the estimated elasticities of "rule of law" and "top marginal tax rate" with respect to the SE depend on the size of SE. In particular, by comparing the pooled case with H-SE and L-SE clusters<sup>7</sup>, we find that the elasticity of the "top marginal tax rate" is double (0.20) respect to the pooled case (0.10) while it is not statistically significant for lower SE countries. According to Friedman *et al.* (2000) and Bovi and Dell'Anno (2007), one should expect lower elasticities of SE to taxation in the countries with low SE and fair rule of law and/or regulation. It is because only governments with a relatively good institutional setting can sustain high tax rates without bear a large size of SE. This conjecture seems to be corroborated by data.

Second, the estimated coefficient of the index of "rule of law" is not statistically different from zero for the group of countries with higher SE (H-SE). At the contrary, for Latin countries where the size SE is lower, then much more important is the role played by institutional setting in determining the size of SE.

Finally, by comparing H-SE and L-SE clusters, we conclude that if the SE is high, the rule of law is not a significant cause of SE while the marginal tax rate it is. In the opposite cluster, (low SE), the citizens feel as crucial issue the institutional setting while they are neutral to changes of top marginal tax rate.

The second econometric exercise (table 4) assesses if there are differences over time in estimated elasticities between SE and its causes. To determine whether the subsamples are different enough that they merit being examined separately, we perform the Chow's test for a structural break between the two subsamples. The Chow's test statistics<sup>8</sup>, confirming that the relationships among the variables differ across the subsamples. Consequently, we analyze each subsample separately and table 4 reports the results of this analysis.

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<sup>7</sup> See appendix 1 for the country cluster aggregation.

<sup>8</sup> Significant at 1% level, see appendix 2.

**Table 4:** Shadow Economy and its causes. Structural breakpoint analysis

Dependent Variable: share of Shadow economy on GDP		
Regressors	Sub-sample: 1990-95	Sub-sample: 2000-03
GDP per cap.	0.63***	0.39**
Rule of Law	-0.02	-0.13***
Regulation	0.13	-0.25**
Money	-0.05	0.00
Top tax	-0.04	0.13**
Unemploym.	-0.08	0.00
<b>Adjusted R<sup>2</sup></b>	<i>0.995</i>	<i>0.995</i>
<b># Observ.</b>	28	46

\*\*\* Denotes significant at 1% level; \*\* Denotes significant at 5% level;

\* Denotes significant at 10% level. All variables are defined in logarithms.

As first, we realize a relevant limitation to assign full reliability to these estimates. The small size of the first sub-sample (28 observations) reduces significantly the statistical reliability of these estimates. Consequently, the numerical outcomes of table 4 should be interpreted cautiously. That being stated, we find that, in the first half of 1990s, the SE was associated exclusively with the development of official GDP per capita. The rationale for that may lie in the structural changes that in those years are strongly involved Latin American countries (e.g. overcoming hyperinflation phenomenon, increasing of international competitiveness, financial market liberalization, etc.). In the subsequent period (2000-03) the institutional environment becomes relevant to explain the development of SE. Unexpected is the positive sign of elasticities between “top marginal tax rate” and SE (low marginal tax rate and high-income thresholds, more and more the SE increases).

The third econometric exercise deals with the role of institutional setting to explain the size of the SE across countries. To this end, we perform a twofold sets of regressions to compare estimates obtained by considering, separately, the countries with fairer degree of index of rule of law (Fair-RoL) and index of regulation (Fair-Reg) against the groups of countries with lower degree of institutional setting (Unf-RoL and Unf-Reg). Table 5 shows these results. Appendix 1 lists which countries are included in each cluster.

**Table 5:** Shadow Economy and its causes. Rule of Law and Regulation clusters.

Dependent Variable: share of Shadow economy on GDP				
MODELS				
Regressors	Fair-RoL	Fair-Reg	Unf-RoL	Unf-Reg
GDP per cap.	0.61***	0.59***	0.55**	0.66**
Rule of Law	-0.02	0.00	-0.14**	-0.14**
Regulation	-0.50***	-0.48***	-0.22	-0.23
Money	0.10**	0.12***	0.12**	0.16**
Top tax	0.12	0.14*	0.10	0.14
Unemploym.	0.06*	0.05	0.05	0.08
<b>Adjusted R<sup>2</sup></b>	<i>0.985</i>	<i>0.990</i>	<i>0.940</i>	<i>0.902</i>
<b># Observ.</b>	37	40	37	34

\*\*\* Denotes significant at 1% level; \*\* Denotes significant at 5% level; \* Denotes significant at 10% level. All variables are defined in logarithms.

Table 5 reveals that there is a structural change of the relationship between regressors and SE if the rule of law is lacking (Unfair-Rol). For these countries, bettering rule of law is an effective policy to reduce SE. In the opposite case, countries where better is the rule of law (Fair-RoL) then the degree of economic development (GDP per capita) and the index of monetary policies (Money) are positively correlated to SE. For over-regulated economies (Unfair-Reg), we find that degree of development, rule of law and index of monetary policies are statistically different from zero. For the other countries (Fair-Reg) in addition to “GDP per capita” and “money” also regulation affects the SE.

From this analysis, we conclude that if restrictions to entry into markets and interferes with the freedom to engage involuntary exchange are excessive (Unfair-Reg cluster) then SE tends to be unrelated to the fairness of regulation. Otherwise, if the efficiency of bureaucracies and the rule of law are fine (Fair-RoL and Fair-Reg) then, irregular activities decrease if market restrictions diminishing.

The empirical investigation of relationship between official and unofficial economy is presented in the paragraph 6.

## **6. Shadow Economy and Official economy**

Much of what we know today about the effects of SE on official economy, and vice versa, has been learned both from comparative and single country studies. Although these investigations have unearthed significant information on economic policies practices in a score of countries, they have been subject to two limitations. First, invariably the authors have found it extremely difficult to compute reliable SE estimates, and second, these studies have not been able to provide unambiguous results on the relationship between official to unofficial economy. In this section, we present a summary of several empirical studies and discuss some of the most prominent comparative cross-country studies with special reference to Latin American countries. The question usually stressed by literature is about the relationship between growth rate of official GDP and dynamics of SE as percentage of official GDP.

Can a downturn in the economic official activities lead to a loss of jobs and thus drive more individuals into the hidden economy or, on the contrary, if a contraction in the GDP, reduce the demand for underground products and thus offset the first effect? The SE represents a “life jacket” for firms and individuals in financial trouble and for that reason, it increases when the GDP decreases, or does more growth mean more opportunity to evade? Answers to these questions are contrasting.

From a theoretical point of view, several studies attempt to integrate the SE into macroeconomic models in order to study their effects on the allocation of resources. Unfortunately, from these theoretical models, no common view emerges about the expected sign of the implications of the SE on official economy. A review of this wide literature is out of the interest for this research, in the following, we restrict our attention on empirical studies. Following Dell’Anno (2003), in table 6, we summarize empirical literature on relationship between official GDP and size of SE.

**Table 6: Relationship Underground Economy – Official GDP**

	<b>Authors</b>	<b>Country</b>	<b>Estimation methods of SE and annotations</b>
<b>POSITIVE Relation</b>	Adam, Ginsburgh (1985)	Belgium	MIMIC method
	Tedds (1998, 2005)	Canada	MIMIC method
	Giles (1999)	New Zealand	MIMIC method
	Giles, Tedds (2002)	Canada	MIMIC method
	Schneider, Chatterjee, Chaudhuri, (2003)	18 Asian Countries	MIMIC method
<b>Ambiguous Relation</b>	Schneider (2005a)	145 Countries	MIMIC method and Regression analysis. For developed countries is found a positive relation, for transition and developing countries it is negative.
<b>NEGATIVE Relation</b>	Frey, Weck-Hannemann (1984)	17 OECD countries	MIMIC method
	Helberger, Knepel (1988)	17 OECD countries	MIMIC method
	Loayza (1996)	14 Latin American countries	MIMIC method. In economies where: (1) the statutory tax burden is larger than the optimal tax burden and (2) the enforcement of compliance is too weak, thus: The increase of the relative size of the informal economy generates a reduction of official economic growth. The negative effect is due to the shadow economy's congestion effects that: (1) reduce the availability of public services to the official economy and (2) result in the existing public services being used less efficiently.
	Kaufmann, Kaliberda (1996)	Transition countries	Electric consumption method. The shadow economy mitigates the decrease in official GDP, particularly in countries that experienced a large drop. They find that for every 10 percent cumulative decline in official GDP, the share of the irregular economy in the overall increases by almost 4 percent (p. 46).
	Ihrig, Moe (2000)	32 Countries	Regression analysis. The movement in the size of the informal sector has an economically significant and negative effect on the growth of real GDP per worker (p. 341).
	Eilat, Zinnes (2000)	24 Transition countries	Modified Total Electricity method. A change in GDP is associated with an opposite change in the shadow's size and a one-dollar fall in GDP is associated with a 31percent increase in the size of the shadow economy (p. 46).
	Schneider, Enste (2000)	76 countries	MIMIC method. According to some studies, a growing shadow economy has a negative impact on official GDP growth (p. 44).
	Ott (2002)	Croatia	The results of research indicate a negative correlation between the SE and GDP growth (p. 2).
	Dell'Anno (2003)	Italy	MIMIC Method
	Dell'Anno (2007)	Portugal	MIMIC Method
	Dell'anno, Gomez, Alanon (2007)	France, Spain, Greece	MIMIC Method
	Ihrig, Moe (2004)	Sri Lanka	Regression analysis. There is a negative convex relationship between real GDP per worker and the percent of output produced in the informal sector (p. 547).
Kanniainen, Paakkonen, Schneider (2004)	21 OECD countries	MIMIC Method	

As shown above, the sign of the relationship between official and unofficial economy is puzzling.

Among the cited papers, particular relevant for our analysis is Loayza (1996). He found evidence for Latin American countries indicating that if the SE increases by 1 percentage point of GDP - ceteris paribus - the growth rate of official real GDP per capita decreases by 1.22 percentage points.

This negative correlation between the size of the informal sector and economic growth is not very surprising according with Loayza's assumptions. Loayza (1996) sets out a model based on the assumption that (a) the production technology depends on tax-financed public services that are subject to congestion and (b) the informal sector does not pay taxes but must pay penalties that are not used to finance public services.

Noteworthy are the conclusions of Schneider's (2005a) research. He finds that the effects of the SE on the official economic growth are just *prima facie* ambiguous. The sign of correlation becomes well defined if conditioned to the degree of economic development. For high-income countries the relationship is positive. Schneider's motivation is that *"people/entrepreneurs are overburdened by taxes and regulation so that an increasing shadow economy stimulates the official economy as additional value-added is created and the additional income earned in the shadow economy is spent in the official economy (Schneider, 2005a, p.613)"*. For low-income countries, an increasing SE *"erodes the tax base, with the consequence of a lower provision of public infrastructure and basic public services with the final consequence of lower official economy (Schneider, 2005a, p.613)"*.

According to Schneider's (2005a) outcomes, the effect of SE on the official GDP depends on the degree of economic development.

Since we find that the greater part of empirical studies examines the relationship between SE and the growth rate of GDP, in this research, we investigate the relationship between the level of development, measured by GDP per capita at constant 1990 US price, and the size of SE as ratio of official GDP. In this sense, we intend to contribute to fill gaps in existing literature.

This paper attempts to overcome some of the most relevant limitations of previous researches. We employ both a great number of SE estimates and a sufficiently homogeneous countries are included in the sample.

In table 7, the column H-GDP (L-GDP) shows the estimates for countries with higher (lower) level of GDP per capita. We refer to appendix 1 for the list of countries included respectively in H-GDP and L-GDP groups.

**Table 7: Official GDP per capita and its causes.**

Dependent Variable: Official GDP			
MODELS			
Regressors	All countries	H-GDP	L-GDP
Shadow Econ.	0.85***	1.07***	0.13
Rule of Law	0.14***	0.26***	-0.04
Regulation	0.26*	0.55***	-0.05
Money	-0.04	-0.16***	0.19**
Top tax	-0.06	-0.07	0.00
Unemploym.	-0.05	0.07	-0.08**
<b>Adjusted R<sup>2</sup></b>	<i>0.987</i>	<i>0.980</i>	<i>0.992</i>
<b># Observ.</b>	74	41	33

\*\*\* Denotes significant at 1% level; \*\* Denotes significant at 5% level;

\* Denotes significant at 10% level. All variables are defined in logarithms.

By splitting the panel according to the level of GDP per capita, the estimated elasticities between official GDP and its regressors change depending on the level of economic development.

First, for two of three clusters the SE has a statistically significant positive impact on the official economy, further strongly differences are in the elasticities between H-GDP and L-GDP group. There is a structural change between (relatively) rich countries and relatively poor. The SE has not a significant effect on the level of the official GDP.

Second, institutional factors have relevance only for the size of official economy in countries with higher GDP per capita. In this sense, we infer that the institutional background is, and it will be more and more, relevant to sustain the economic development for Latin American countries.

Third, the estimate of the elasticity for the unemployment rate becomes statistically different from zero only for less developed countries (L-GDP cluster).

In literature, several explanations are provided to corroborate the positive correlation between official and unofficial economy. Schneider (1998) shows that over 66 percent of the earnings in the SE are spent in the official economy immediately. Therefore, this additional expenditure has positive effects for official economy. Bhattacharyya (1993, 1999) found clear evidence for the United Kingdom (1960-1984) that the SE has a positive effect on several components of GDP (e.g. consumer expenditures, services, etc.). Consequently, SE and GDP are positively correlated. According to Asea (1996) SE may also offer significant contributions “to the creation of markets, increase financial resources, enhance entrepreneurship, and transform the legal, social, and economic institutions necessary for accumulation (p. 166)”. In this sense, SE can support higher level of GDP. Again, Enste (2003) states that the hypothesis of positive relationship between SE and level of GDP is plausible. SE provides the economy with a dynamic and entrepreneurial spirit and can lead to greater competition and limits for government activities.

Authors’ explanation about the empirical evidence of positive correlation between GDP and SE shares previous cited works and support an additional “institutional” reason. The SE indicates an “exit option” to

overcome the institutional failures and lack of economic freedom. The growing needs of institutional and economic reforms make previous limitations more and more unsustainable for the People of Latin America.

To look at the SE as means for citizens to escape from an intrusive and over-regulated economic context, it is consistent with clusters analysis shown in table 7. We observe that as much developed is the capitalist structure of economy (measured by level of GDP per capita) as bigger is the coefficient of SE in that countries.

## 7. Conclusions

The SE is a persistent worldwide phenomenon. Several studies state that institutional economics and underground economics are highly complementary. In this paper, we propose an empirical analysis about the causes of SE for 18 Latin American countries from 1990 to 2003. The panel data was derived by Schneider (2005a, 2005b); Gwartney and Lawson (2005), United Nation and World Bank on-line statistical database.

In this research, we combine two strands of the empirical literature. The first deals with the role of institutional setting on the SE, the second with the influence of the official economy on the SE and vice versa.

A preliminary remark needs before to summarize policy implications and general conclusions. Whatever empirical analysis of the SE must be valued, very carefully. There does not exist any common methodology for estimating the SE, further the estimates are never very strong and absolute. That being stated, any empirical analysis that use SE estimates necessarily is subject at least at the same caveats. Again, additional limitations for the reliability of the econometric exercise can be highlighted, among these even putting aside measurement errors and the effect of omitted variables the most relevant is probably an issue of endogeneity. For instance, SE can reduce government resources and this can lead to a more inefficient bureaucracy. Thus, it is far from clear that the correlation is causal. This would suggest, finding an appropriate set of instrumental variables to deal with the simultaneity<sup>9</sup>, but the availability of the data dictates severe limitations. All that means that the empirical results are surrounded by significant margins of uncertainty that the exercises here proposed can realistically offer only some indicative correlations, and that further and deeper analyses are paramount.

On the positive side, what pointed out in this paper contributes to the ongoing debate, confirming previous empirical results and offering new insights. Bad (corrupt and inefficient) Institutions have higher levels of SE. The rationale behind is that in the case of institutional failures in no way bad bureaucracies can/want reduce underground activities, whereas the taxation, even if directly triggers the quit option, can be used to increase agents' expected penalty.

We draw the following conclusions: (1) We have demonstrated empirically strong interaction of the SE

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<sup>9</sup> Actually a potentially useful, and sometimes used, data set is that developed by La Porta *et al.* (1999). Anyway, the limited time dimension of the sample does not allow constructing proper endogeneity tests. Furthermore, the variation in the data does not seem to be enough.

with institutional indicators and official economy. (2) Less relevant than usually expected is the role played by the top marginal tax rate and the unemployment rate. (3) The outcomes convincingly demonstrate that the causes of SE differ in significance and magnitude according to the economic performances and institutional background. (4) The SE has a statistically significant and quantitatively important effect on the official economy. In unweighed average, for Latin American countries, if SE increases of one percent thus the official GDP increases of 0.85 percentage points. (5) The effectiveness of economic reforms in order to reduce SE depends on the size of hidden activities. For policy maker operating in countries with a high level of SE, to reduce the top marginal tax rate and/or the unemployment rate are effective to decrease SE, ineffective seem to be improvements of the Rule of Law. For countries characterized by a low level of SE: reducing the top marginal tax rate and unemployment rate seem to be unproductive to reduce SE. For Low-SE countries improve Rule of Law is the priority. (6) By dividing the sample in two groups of countries according to the ranking in GDP per capita, we find significant differences in elasticities. If the SE as ratio of GDP increases of one percent, thus the official GDP in more developed countries increases by 1% while in less developed countries the coefficient is not statistically significant.

In authors' opinion an overall statement should be considered when are suggested policy recommendations to reduce SE. Following the arguments of Rosser et al. (2003) the SE should be considered in a dynamic system scenario. Authors' view draws on a considerable literature, much of it in sociology, political science and economics, which emphasizes positive feedbacks and critical thresholds in systems involving social interactions. In this context, the system generates critical thresholds that produce different stable equilibrium states, some with small underground sector and others with a large SE. This belief about the existence of bad and good equilibria is in agreement also with Schneider's (2003) and Bovi and Dell'Anno (2007) arguments. Previous researches affirm that higher SE causes lower state revenues, which in turn reduce the quality and quantity of public goods and services. Consequently, it leads an increase in the tax rates for firms and individuals in the official sector therefore stronger incentives to participate in the SE (bad equilibrium). At the contrary, countries with a better rule of law, labour regulation and taxation system, have smaller shadow economies (good equilibrium)<sup>10</sup>.

This logic supports the need of structural analysis to examine the SE. It means to analyse the SE as a phenomenon integrated in a more complex socio-economic-institutional context. The consequence of this approach is that the number of equilibria, determined by the interaction between the governments' and the taxpayers' behaviour, becomes potentially infinite.

It seems clear to fight the SE is not an easy task, it needs of wider economic reforms with long term prospective. This process should include social and institutional transformation in order to move from a "bad equilibrium" (with high SE and inadequate institutional context) towards a better situation.

According with our deductions at least two kinds of actions could be useful to contrast effectively the

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<sup>10</sup> An empirical confirm of this statement is provided by Scandinavian countries where, tax rate, size of public sector are higher than Mediterranean countries (e.g. Italy, Greece, Spain) but their levels of (estimated) SE are lower (Dell'Anno and Schneider, 2003).

SE. In order to provide disincentives to informal operators: increase the efficiency of bureaucracy; to improve economic freedom and reduce the “perception” of impunity for tax evasion crimes. To provide incentives for entry in the legal market, reduce the bureaucracy and quicken the economic reforms. These kinds of actions have multiple effects as they reduce illegal activities, increase tax morality and social stigma as well as improve the citizens’ attitude toward the State.

By interpreting the SE as an “exit option” for unsatisfied citizens, then it means to make governments responsible of the relevance of their economic and social role. One of the most important task for a modern State is to create favourable conditions for private business development and for the establishment of free competitions in the economy. The role of the State must not be overemphasized, but the fact is that without adequate and prompt economic reform, the goals of the transformation process become much more difficult to achieve. In this sense, the SE can be considered one of the costs for lacked, incomplete, delayed or inadequate reforms as well as an index of its government inadequacy.

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## Appendix 1: Source of data and cluster composition

The (unbalanced) panel used for estimating panel regressions consisted of a cross-section of 18 countries over 5 time periods and for 7 variables (630 obs.). However, the missing values and the log-transformation reduced the span of the sample with 16 observations (13 in “Un\_rate”, 1 in “SE”, 2 in “Top tax”).

All variables are transformed in log-values. The sources of the data are: Schneider (2005a) for SE estimates from 1990 to 2000, Schneider (2005b) to extract the SE estimates for 2002 and 2003; Gwartney and Lawson (2005)<sup>11</sup> for “rule of law”, “regulation”, “top marginal tax rate”, “Money”; the United Nation Statistical on-line database<sup>12</sup> for the “GDP per capita at constant 1990 price”; the World Bank on-line database<sup>13</sup> for Unemployment rate as percentage of Labour Force.

The clusters for the econometric exercises of paragraph 4 and 5 are composite as shown in the table 8.

**Table 8:** Clusters classification.

	<b>High-SE</b>	<b>Fair -RoL</b>	<b>Fair -Reg</b>	<b>High -GDP</b>
1	Bolivia	Chile	Chile	Argentina
2	Panama	Costa Rica	Panama	Chile
3	Peru	Uruguay	Costa Rica	Mexico
4	Guatemala	Brazil	Dominican Rep.	Brazil
5	Uruguay	Jamaica	Jamaica	Panama
6	Honduras	Mexico	Uruguay	Uruguay
7	Nicaragua	Panama	Bolivia	Costa Rica
8	Colombia	Argentina	Peru	Venezuela
9	Brazil	Dominican Rep.	Argentina	Jamaica
	<b>Low-SE</b>	<b>Unfair -RoL</b>	<b>Unfair -Reg</b>	<b>Low-GDP</b>
10	Jamaica	Peru	Honduras	Dominican Rep.
11	Ecuador	Nicaragua	Mexico	Peru
12	Venezuela	Ecuador	Guatemala	Colombia
13	Dominican Rep.	Honduras	Nicaragua	Paraguay
14	Mexico	Bolivia	Colombia	Ecuador
15	Paraguay	Paraguay	Brazil	Guatemala
16	Argentina	Colombia	Paraguay	Nicaragua
17	Costa Rica	Venezuela	Ecuador	Bolivia
18	Chile	Guatemala	Venezuela	Honduras

<sup>11</sup> <http://www.freetheworld.com/download.html>

<sup>12</sup> <http://unstats.un.org/unsd/snaama/dnllist.asp>. We divide the series of official GDP at constant price for the population.

<sup>13</sup> <http://devdata.worldbank.org/edstats/query/default.htm>.

## Appendix 2: Tests for pooling specification and Breakpoint Chow's test

The test for pool specification is:

1) F-test: Pooled OLS Vs Fixed (country) effects:

$H_0 : \alpha = \alpha_i$ ; Fully Pooled model is appropriate against

$H_1 : \alpha \neq \alpha_i$ ; Fixed (country) effects are appropriate.

We perform F-test in which we compare the sum of squared residuals of an unrestricted model ( $SSR_u$ ) to the sum of squared residuals of a restricted model ( $SSR_r$ ). The test statistic is:

$$F[(df_r - df_u), df_u] = \frac{(SSR_r - SSR_u)/(df_r - df_u)}{SSR_u/df_u}, \quad (2)$$

Where  $df_r$  and  $df_u$  are the degrees of freedom of the restricted and the unrestricted model, respectively. As usual, when the calculated F-statistic is larger than the critical value for a specific level of significance, the null hypothesis is rejected in favour of the alternative hypothesis. The statistical test [F-stat=505.14 > F(12,56) at 1%= 2.52] suggests the fixed effect specification as favourite model.

The idea of the Breakpoint Chow's test is to fit the model separately for each sub-sample and to see whether there are significant differences in the estimated equations. A significant difference indicates a structural change in the relationships among variables. To carry out the test, we partition the data into two sub-samples (1990-1995) and (2000-2003). The breakpoint test compares the sum of squared residuals obtained by fitting a single equation to the entire sample with the sum of squared residuals obtained when separate equations are fit to each sub-sample of the data. The F-statistic is based on the comparison of the restricted and unrestricted sum of squared residuals. It is computed according to the following test-statistic:

$$F[k, T - 2k] = \frac{[SSR_{s_1+s_2} - (SSR_{s_1} + SSR_{s_2})]/k}{(SSR_{s_1} + SSR_{s_2})/(T - 2k)}, \quad (3)$$

Where:  $s_1 = (1990, 1995)$ ,  $s_2 = (2000, 2002, 2003)$ ,  $SSR_{s_1+s_2}$  is the sum of restricted<sup>14</sup> squared residuals,  $SSR_u$  is the sum of squared residuals from sub-sample, T is the total number of observations and k is the number of parameters in the equation.

We perform the F-test for equality of the coefficients across sub-samples. If the calculated F value exceeds the critical value then reject pooling. That is, treatment of the data as two different sub-samples is more appropriate than assuming that the same model parameters apply equally to both groups.

The statistical test [F-stat=111.59 > F(24,63) at 1%= 2.10] suggests the treatment of the data as two different sub-samples as favourite model.

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<sup>14</sup> It is "restricted" model because the  $\beta$ -coefficients estimated on one sub-sample are restricted to be the same of  $\beta$ -coefficients estimated on the other sub-sample.