Master Analyse et Politique Economiques
Paris School of Economics

-Masters Dissertation-

Ecuadorian Personal Income Tax Compliance and its Level of Progressivity. 2001-2005

Eugenio PALADINES C.

Under the direction of Thomas PIKETTY

Paris, France, 2007

Dedicatory:

Especially to God.

To my parents, my brothers and all my family.

To the memory of my friend Marcelo Rubio.

To Barbara Schmeiser for all her support and to my friends for their patience.

Finally, to those who for structural reasons, were not able to accomplish their desire of studying.

Acknowledgements:

Abstract

This research presents some principal characteristics of the Ecuadorian personal income tax using micro data from individuals' tax returns during the period from 2001 to 2005. In doing so, high levels of income inequality and important differences in taxpayers' sources of income were identified. Our results suggest that these characteristics considerably affect the personal income tax law compliance as well as its level of progressivity. We were able to identify that, in 2004, merely 50% of the individuals who should pay income tax, actually did so and that the actual tax receipts were about 80% of the theoretical tax receipts between 2001 and 2005. The resulting effective tax rate was 4.9%, explaining, in part, why individual income taxes represented only 1% of the Ecuadorian government receipts. Additionally, with important consequences on the personal income tax level of progressivity, Ecuadorian top 1% income share varied from 22% to 26% as compared from 19% to 22% in Argentina during the period from 2001 to 2004. The Ecuadorian top 1% income share in 2002 was 2.6 times larger than the respective one in Spain. In such a context, to foster personal income tax law compliance, to raise the effective tax rate and to increase the level of progressivity could be considered as a priority in order to improve personal income tax policy. That process requires replacing traditional measures of progressivity, based on income tax "nominal rates", by wider analyses which take into account the effective tax rate or "real tax rate", the whole of the total control population and the whole of the total control income.

Table of Contents

List of Tables

I.   INTRODUCTION

Regarding the international division of work, Ecuador has fulfilled the role of primary commodity supplier almost from the beginning of its independence from Spain in 1830. Its economic history was marked by a continuous coming and going of different commodity booms with cyclical repercussions as a result of the ups and downs of commodity prices (principally cacao from 1866 to 1925, banana from 1946 to 1968, and oil since 1972 until present day[1]). The "cacao crisis" of 1925, one of Ecuador´s major crises, was the scenario for a progressive revolution called "*Revolución Juliana*"[2]. Organized by a group of young military officials, the Revolution of July successfully seized the abusive manner of how landowners' oligarchy had managed the financial system. A new monetary law was promulgated, major institutions such as the Central Bank and the Superintendence of Banks were created and crucial reforms on the health care national system as well as workers' rights, and so forth were implemented. In other terms, the Revolution of July was the advancement from a state answerable to "particular interests" towards a state answerable to "national interests"[3].

One of the twelve main objectives of the Julian Revolution was "to create a national income tax"[4]. The tax went into effect in 1926 replacing many minor taxes such as those on gambling activities, consumption of alcohol, issue of passports, to name but a few.[5] Since then, the Ecuadorian income tax has experienced many reforms and even almost completely disappeared in 1999[6], when it was replaced by a tax on capital movements. Despite these numerous reforms, the main purpose of the income tax, to finance the government's budget progressively, remains unchanged in the law[7]. Therefore, it is of great interest to analyze to which extent the Ecuadorian income tax is still carrying out its revolutionary and legal duty.

In order to evaluate the Ecuadorian personal income compliance and its level of progressivity, our research was organized as follows: Section 2 briefly justifies the interest of the Ecuadorian case, as an example of a Latin American country with a high level of inequality and a typical tax structure common to developing countries. Additionally, according to an international tax burden comparison, the need for improving tax compliance and increasing direct taxes on developing

---

[1] Cfr. Acosta (2001).

[2] The Revolution of July in Spanish.

[3] Paz y Miño (2002). P.72.

[4] El Ejercito Nacional (1925), Revista de Estudios Histórico-Militares, Quito, Año IV, No.26, p.495. In Paz y Miño (2002). P.26.

[5] Decreto del 19 de diciembre de 1925; R.O. No. 137 del 23/12/25. Cfr: In Paz y Miño (2002). P.42.

[6] Law No.1998-17/RO.No.78/1th of December 1998.

[7] Justification of the internal taxes law, last amendment: law No.1989-56/RO.No.341/22th of December 1989.

countries could be perceived. Section 3 focuses on theoretical optimal tax structure, tax burden and income tax progressivity. Section 4 describes the data and methodology used to evaluate the level of compliance and progressivity of the Ecuadorian personal income tax as well as some particularities of Ecuadorian personal income tax system. Section 5 presents main findings and section 6 offers a conclusion based on findings presented.

II.   THE INTEREST OF THE ECUADORIAN CASE

Latin America returned to a political state of democracy during the 1980s. In fact, thirteen Latin American countries put an end to their dictatorial regimes between 1979 and 1990[8]. These new democracies became embroiled in processes of "structural adjustment" in order to face the debt crises following the rise of the international interest rates in 1979. It was a period of transition from a "developmentalist" state toward a state considerably detached from the economy[9]. However, as a result of a series of financial crises, which characterized the 1990s[10], the need of fortifying governmental institutions reemerged, with the aim of guaranteeing scenarios of stability propitious for growth and development. Those institutional positions were strongly marked at the beginning of this century by the overcoming of "left-wing" governments[11]. Currently, the interest of Latin America to improve its governmental management is accompanied by the responsibility to reduce extreme poverty by half in order to fulfill and comply with the "Millennium Development Goals"[12]. Concerning this matter, Latin America still remains one of the world´s regions with the highest level of socio-economical inequalities, where almost one in four persons lives on less than two dollars per day[13].

The inequality in Latin America, typical of old "rentist" regimes based on the exploitation of commodities, is also a reality for Ecuador. The World Development Indicators 2006[14] show that even though Ecuador's Gross National

[8] Couffingal. (2002), p.174.
[9] Cfr. Ibid.. p. 174-178.
[10] It was a period of financial crises proliferation: Mexico 1994, Venezuela 1995, Ecuador 1998, Brazil 1999 and Argentina 2001.
[11] Chávez H. in Venezuela since 1999, Da Silva L. in Brazil since 2002, Kirchner N. in Argentina since 2003, Vásquez T. in Uruguay since 2004, Bachelet M. in Chile, Arias O. in Costa Rica and Morales E. in Bolivia since 2006, and Correa R. in Ecuador and Ortega D. in Nicaragua since 2007.
[12] Emanating from the agreements between the main international organizations (World Bank, International Monetary Fund, United Nations,etc…) the "Millennium Development Goals", want to reduce extreme poverty by half (which represented everyday life for one billion human beings in 1990) and, in the same time, achieve other important targets (see http://www.un.org/millenumgoals/).
[13] Chen and Ravallion. (2007). p. 22.
[14] The World Bank (2006)

Product per capita is 2,620 US dollars, its Gini coefficient on expenditure is 0.44. Forty-six percent of its population lives below the national poverty line. Moreover, according to UNICEF, approximately seventy percent of its children live in poverty[15]. In such a context, an efficient management of government revenues, expenditures and financing is the minimum requisite to persist with the struggle against poverty.

Over the last years, as with most Latin American countries, Ecuador´s fiscal efforts were directed towards reducing fiscal deficits and the level of indebtedness (especially short term debt), as well as to fortify anti-cyclical policies[16]. Consequently, during the period from 2001 to 2005, the average Ecuadorian overall fiscal surplus was 1.0% of GDP and the primary surplus 4.2% compared to -1.8% and 2.7%, respectively, during the 1990s. Regarding anti-cyclical policies, in 2002 a law of fiscal responsibility (LOREYTF[17]) was promulgated with the objective, amongst others, to create an anti-cyclical fund called FEIREP. It was designed to increase debt payments during periods of high oil prices and therefore to guarantee low level of indebtedness during periods of low oil prices. This group of policies helped to reduce the indebtedness level from 67% of GDP in 2001 to 40% in 2005.

However, those positive financial results came with social, economic and political costs, and did not solve bottom line fiscal problems. Between 2001 and 2005, non-oil balance of trade deficit doubled (from 1,952 to 3,623 millions of dollars), 0.6 million Ecuadorians emigrated[18] (emigrants' remittances represented 52% of non-oil exports and therefore the second largest source of earnings, even above all traditional exports together: banana, coffee, shrimps, cacao and tuna), high political instability reemerged (three presidents in four years[19]) and oil fiscal dependency remained (oil represented 25% of fiscal revenues, its importance is underestimated given that oil performance has an impact on the whole economy and therefore on the rest of fiscal revenues as TVA, income tax,…). To change the structure of fiscal revenues and expenditures was not a priority. Expenditure composition remained practically untouched: on average 76% were current expenditures, 14% pre-allocated capital expenditures and just 10% new capital expenditures. Ecuador´s investment in social services, at "The Social Panorama of Latin America 2006"[20], was the penultimate such move of the twenty-one Latin

---

[15] United Nations, 2007 (http://www.unicef.org/spanish/infobycountry/ecuador.html)
[16] Cfr. ECLAC. (2005).
[17] Law No.2002-72/RO.No.589/Tuesday 4th of June 2002.
[18] This number stands for legal emigration only (www.inec.gov.ec).
[19] Gustavo Noboa presidency began on January 2000, Lucio Gutierrez succeeded him on January 2003 and Alfredo Palacio substituted the latter one on April 2005.
[20] ECLAC (2007), p. 409.

American countries[21]: 5.7% of GDP, which is just above Trinidad and Tobago's 5.5% and well below the regional average of 15.1%. Regarding revenues, during the period from 2001 to 2005, oil incomes represented 25%, TVA 25%, social contributions 12%, income tax 11%, tariffs 6%, others taxes 19% and surplus of public enterprises 2%.

Can one surmise the Ecuadorian overall tax level as being appropriate? Would an increase on taxation improve the Ecuadorian welfare? Is the Ecuadorian revenue structure adequate? Would an increase in income taxes be better than an increase on consumption taxes? These questions cannot be answered before determining an optimal level of fiscal expenditures, objectives in income redistribution, and the role of taxes in macroeconomic policy. These concerns are dealt with in section 2 from a theoretical perspective. Empirically, Tanzi and Zee (2000) adopted an alternative approach to evaluate the level and composition of developing countries' tax revenue as well as policy issues regarding their major taxes. It consisted of assessing whether the level of the overall tax burden in a developing country is "appropriate" compared to the average tax burden of a representative group of both developing and developed countries taking into account some of these countries' characteristics[22]. Their analyses included a macroeconomic perspective (the level and composition of tax revenue) and a microeconomic perspective (design aspects of major taxes). The major differences found between developing countries and already developed countries were the level of taxation (much lower in developing countries), the structure of taxation (income tax is much more important in developed countries), the quality of the tax administration (tax law compliance is more efficient in developed countries) and the tax base (much smaller in developing countries). Tanzi and Zee´s research did not expressly include the Latin American region. However, the first two remarks, mentioned above, were confirmed by Martner and Tromben (2004). Their comparison of international tax burden, using fiscal data from 2000, showed that compared to developed countries, Latin America has a much lower level of taxation (16.5% of GDP next to 38.3% for European countries[23] and 37.2% for OECD countries) and a much smaller participation of direct taxes (3.6% of GDP against 17.3% for the United States, 15.4% for OECD countries and 14.6% for European countries).

Developing countries' tax structure responds to specific realities being very different from those of developed countries. The fiscal structure of the latter

---

[21]According to the CEPAL: Argentina, Bolivia, Bolivarian Republic of Venezuela, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Domenican Republic, Trinidad and Tobago and Uruguay.

[22] Tanzi and Zee (2000), p. 6.

[23] It includes only 15 members' states of the European Union in the period prior to enlargement in 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

countries mentioned might be considered as a result of their level of development. Correlation of high tax burden and high share of direct taxes with respect to high levels of development does not imply causality, an increase of the overall tax level or direct taxes will not necessarily increase the country's level of development. Nevertheless, comparisons are useful as a benchmark of a government's capacity to raise revenues in order to finance social expenditures in an equitable way, without abusing public indebtedness and without affecting macroeconomic equilibrium. Therefore, low fiscal burden, low levels of direct taxation, deficient tax administration and a small tax base can be considered as bottom line fiscal' problems. The priority to solve each of those problems as well as the mechanisms to be use depend on each country' specific characteristics, a good comprehension of taxes issues and political willingness.

III.   THEORETICAL CONTEXT

Economically taxes are needed in order to improve social welfare. Their main functions are to finance the supply of public goods and to resolve issues regarding externality and distributional problems[24]. Theoretically, assuming convexity on preferences, lump-sum taxes accomplish those functions without an economic cost. The second theorem of economics welfare on Arrow-Debreu model demonstrates that given an economic efficient allocation, in which it is impossible to make any person better off without making anybody else worse off, a redistribution of purchasing power without affecting the price structure can be carried out, consequently obtaining a new economic efficient allocation.

However, in practice, taxes do not completely fulfil lump-sum taxes characteristics, they affect people's utility. For instance, generally a tax on labor increases utility of leisure, while a tax on capital decreases utility of investment, as a tax on savings increases utility of consumption, whereas a tax on profits reduces utility of taking risks, and so forth. People adapt to those distortions by adjusting their behavior and, thus factor prices as they are none other than a result of aggregated individuals' will to demand and supply factors. Therefore, when a tax is implemented, it is necessary to consider with short and long term perspectives, not only partial equilibrium consequences of price changes, but also, consequently with Walras law, the repercussions on the rest of factor prices. Given an economic efficient allocation or Pareto optima, there is no other feasible allocation that would increase the well-being of one agent without decreasing the well-being of another one, hence general equilibrium after-tax is not an economic efficient allocation. This social cost, inherent to taxes, is the reason why optimal taxation

---

[24] Cfr. Mas-Colell, Whinston and Green (1995).

analysis is strictly related to an optimal level of public expenditure. Taxes are justified only if benefits from public expenditure overcome social costs or tax burden. Exclusively, in such a case, fiscal policy successfully achieves its objective of improving social welfare.

Taxation's social costs and benefits or tax incidence must be analyzed in terms of welfare or utility. It is required to start identifying who pays the tax, which individuals suffered from a utility decline after-tax. Tax payment depends on the individuals' capacity to adapt their behaviors to the new price structure without diminishing their utility. For instance, a taxpayer of a direct tax on salaries may be an entrepreneur (if his demand of labor is inelastic he is forced to pay the tax in order to continue fabricating), a worker (if his labor supply is inelastic the entrepreneur may reduce wages before-taxes), a consumer (if his demand is inelastic the entrepreneur may increase price of goods), and so on. Thus, capacity of adaptation to after-tax price structure, in other terms elasticity of substitution of demand and supply factors, essentially determines which individuals will be final taxpayers.

In order to know whether tax improved social welfare, cardinal and comparable utilities are required. A simple addition of individual costs and benefits would give us the answer. However, in this manner, there is still an important philosophical debate about the possibility of having cardinal and comparable utilities and even more about justifying policies by this methodology. Just as an example of many criticisms, the United Nations' Universal Declaration of Human Rights was built under the assumption that an individual life is irreplaceable but utilitarianism may justify its end if resulting social benefit compensates social costs. The utilitarian economic theory ignores this basic problem and assumes an individualist welfare function (Bergson-Samuelson welfare function) of the following form, which is subject of maximization:

$$W = W(U_1, U_2, ... U_n).$$
$$U = individual\ utilities.$$
$$1,2,...n = population..$$

Maximization purpose is also under theoretical discussion. Salanié (1998) does a detailed explanation of these problems: Rawls (1971)[25] described an original state of ignorance where individuals do not know about their capacities, neither about their future (Rawlsian veil of ignorance). In this state of nature, they would agree to cover themselves against the existing risk of poverty independently of their efforts, assuring to everybody a minimum allocation in order not to suffer from cold or hunger. Then, social objectives would not be to maximize the Bergson-

---

[25] Cfr: Salanié (1998), p.34; Rawls , J. (1971), <u>A theory of justice</u>, Harvard University Press.

Samuelson welfare function but equally to distribute wealth unless an unequal distribution is to the advantage of the least favored. This is the *maximin* criterion which also has been a subject of criticism as it is based on the idea that individuals are not morally responsible for their situation and society interest becomes a function of one individual' interest (the least favored one). It does not seem possible to reach a consensus about individual responsibility of an individual's place in society. Sen (1992)[26] had a wider approach by distinguishing capabilities from utilities. Society's duty would be to maximize individuals' capabilities and, in lower degree, individual´ utilities as they are, to a greater or lesser extent, the responsibility of each individual. Sen' analysis had important empirical impacts; it strongly inspired the creation of the United Nations' Index of Human Development which, compared to traditional approaches, has a richer conception of human wealth since it is not only based on monetary indicators as GDP per capita. Without getting into discussion on the justification of the utility maximization purpose, based on Salanié (2002), we shall review a simple model of optimal direct taxation in order to illustrate some of the main theoretical framework.

In the trade-off between efficiency and redistribution indirect taxation has been traditionally placed on the efficiency side and direct taxation on the redistribution side. Nevertheless, those distinctions between direct and indirect taxes are refutable and it was even found by Atkinston-Stiglitz (1976)[27] that indirect tax can be totally replaced by direct tax if the latter one is optimal.

To begin with the modelization of optimal direct taxation, it is considered that individuals have an ability, a human capital or productivity to earn a wage (w); their utility (U(C, L)) is a function of consumption (C) and labor (L); there exists a direct tax on individuals' who had the capacity to earn a wage (T(w)); and the government's objective is to maximize social welfare represented by a Bergson-Samuelson function:

$$W = \int \Psi\big(U(w)\big)\, dF(w)$$

(U(w)) is after-tax utility of individuals with a capacity to earn a wage; (F) is the distribution on the population or density function of that individual capacity (w); and (Ψ) is an increasing concave function which stands for weight given by individuals to redistributive objectives. A first condition to maximize the Bergson-Samuelson welfare function is that the government has to finance an optimal level of fiscal expenditures (R) with taxes:

---

[26] Cfr: Ibid., p.37; Sen, A. (1992), <u>Inequality Reexamined</u>, Harvard University Press.

[27] Cfr: Salarnié (2002), p.120; Atkinson, A. and Stiglitz, J. (1976), "The Design of Tax Structure: Direct versus Indirect Taxation", *Journal of Public Economics,*6.

$$Government \quad financial \quad constraint: \int T(w)\,dF(w) = R$$

A second condition is that after-tax utility (U(w)) depends on before-tax revenue (Y(w)) minus taxes (T(w)):

$$Individual \quad after-tax \quad utility \quad constraint: \quad U(w) = U(Y(w) - T(w))$$

Replacing individuals´ after-tax utility constraint in the Berson-Samuelson function and having (λ) as multiplier of government financial constraint, the Lagrangian' solution for every level of (w) is the following:

$$\Psi'(U(w))U'(Y(w) - T(w)) = \lambda$$

Which means that, if $(\Psi)\,or\,(U)$ are strictly concaves, optimal after-tax utility (U(w)) is equal for all individuals since before-tax utility (U(Y(w)) is different according to each individual (w). In other terms, optimal taxation (T(w)) equalizes before-tax utility (U(Y(w)) to a same level of after-tax utility (U(w)) for all individuals. This result agrees with the rawlsianism principles. However, it is due to the assumption that people labour supply is unaffected by tax. Up to now, labour supply only depended on individual human capital, productivity or capacity to earn a wage (w) and on the number of hours of labour (which also depended on individual productivity):

$$Y(w) = wL(w)$$

A more realistic assumption is to establish that the individual chooses his labour supply in order to maximize his after-tax utility:

$$L(w) \arg \max_L U(wL - T(w), L)$$

The second term (L) is assumed constant by means of a quasilinear utility function:

$$U(C, L) = C - v(L)$$

In other terms, income effects are isolated from price effects. Whether an individual works little or a lot, the relative disutility of labour will not change (v(L)). In such a case, a tax will not have any repercussion either. Therefore, it is possible to replace the tax on human capital (T(w)) by a tax on pre-tax income (T(Y(w))) on labour supply decision:

$$L(w) \arg \max_L (wL - T(wL) - v(L))$$

This leads to the quasilinear case of seminal Mirrlees (1971) model. The new labour supply function can be replaced in the government financial constraint:

$$Government \ \ financial \ constraint: \int_0^\infty \left(wL(w) - U(w) - v(L(w))\right) dF(w) \geq R$$

Individuals' after-tax utility constraint can be re-written in a differentiable form as, by definition, after-tax utility results from labour supply maximization:

$$U(w) = \max_{L \geq 0} \left(wL - T(wL) - v(L)\right) = wL(w) - T(wL(w)) - v(L(w))$$

It is supposed that tax level is continuously differentiable, using the envelope theorem:

$$U'(w) = \left(1 - T'(wL(w))\right)L(w)$$

In order to make calculus easier it is assumed that first order condition is enough to characterize the solution. Therefore, if $(L(w) > 0)$ the first order condition gives:

$$w\left(1 - T'(wL(w))\right) = v'(L(w))$$

This can be re-written as:

$$U'(w) = \frac{L(w)v'(L(w))}{w}$$

With this result, the government´s problem is reduced to choose functions (U) and (L) which maximizes the government's program under a financial and a differentiable constraint:

$$government' \ program: \int_0^\infty \Psi(U(w)) \, f(w)dw$$

$$financial \ constraint: \int_0^\infty \left(wL(w) - U(w) - v(L(w))\right)f(w)dw = R$$

$$differentiable \ constraint: U'(w) = \frac{L(w)v'(L(w))}{w}$$

The resulting Hamiltonian has the form:

$$H = \Psi(U)f + \lambda\left(wL - U - v(L)\right)f + \mu\frac{Lv'(L)}{w}$$

(λ) is the financial constraint multiplier and (μ) the differentiable constraint multiplier. Salanié (2002), respecting Mirrlees (1971) choice, used also the Pontryagin's maximum principle to solve (H). (U(w)) is to be regarded as the state variable and (L(w)) as the control variable.[28]

Pontyagin principles:

---

[28] Cfr: Annex B in Salanié (2002), p. 205.

- (L(w)) maximize (H) in (L), then

$$\frac{\partial H}{\partial L} = \lambda\left(w - v'\right)f + \mu\frac{v' + Lv''}{w} \le 0 \left(= 0 \ if \ L(w) > 0\right)$$

- Derivate of (μ) is given by

$$\mu' = -\frac{\partial H}{\partial U} \Rightarrow \mu' = \left(\lambda - \Psi'(U)\right)f$$

- (μ) verifies transversality conditions at zero and at infinity:

$$\mu(0) = \lim_{w \to \infty} u(w) = 0$$

It is necessary to verify that $\mu' = -\frac{\partial H}{\partial U} = 0$. Using the transversality condition of (μ) at infinity it is possible to integrate (μ') from (w) to infinity:

$$\mu(w) = \int_w^\infty \left(\Psi'(U(t) - \lambda)\right)f(t)dt$$

Using (μ) transversality condition at zero it is possible to replace (w) by 0:

$$\lambda = \int_0^\infty \Psi'(U(t))f(t)dt$$

To simplify calculus and analysis Salanié (2002) defines a function (D) which is the mean value of marginal weight given to redistributive objectives on the social welfare function $\left(\Psi'(U)\right)$ in the interval $([w, +\infty[)$:

$$D(w) = \frac{1}{1 - F(w)}\int_w^\infty \Psi'(U(t))f(t)dt$$

Hence, $(D(0) = \lambda)$ so $(\mu(w))$ can be expressed as:

$$u(w) = (1 - F(w))(D(w) - D(0))$$

In this case (u(w)) is always negative or zero as $\mu(0) = \lim_{w \to \infty} u(w) = 0$, verifying optimal condition:

$$\mu' = -\frac{\partial H}{\partial U} = 0$$

Now it is necessary to verify the second condition which must be as follows for (L(w)>0):

10

$$\frac{\partial H}{\partial L} = \lambda\left(w - v'\right)f + \mu\frac{v' + Lv''}{w} = 0$$

By definition:

$$w\left(1 - T'\right) = v' \Rightarrow w - v' = wT'$$

Besides, for an after-tax income w_n, labor supply of work is:

$$v'(L) = w_n$$

Therefore, its elasticity is:

$$\varepsilon_L = \frac{\partial \log L}{\partial \log w_n} = \frac{w_n}{Lv''}$$

As the after-tax income is $\left(w_n = w(1 - T')\right)$:

$$\varepsilon_L = \frac{w(1 - T')}{Lv''}$$

Consequently:

$$v' + Lv'' = w\left(1 - T'\right)\left(1 + \frac{1}{\varepsilon_L}\right)$$

Lastly, it is possible to infer that:

$$D(0)wT'f = (1 - F)(D(0) - D(w))\left(1 - T'\right)\left(1 + \frac{1}{\varepsilon_L}\right)$$

Rearranging and defining that (Y=Y(wy)) and that (wy) increases with (Y), in every point where there is effective work (Y>0):

$$\frac{T'(Y)}{1 - T'(Y)} = \left(1 + \frac{1}{\varepsilon_L(wy)}\right)\frac{1 - F(wy)}{wy f(wy)}\left(1 - \frac{D(wy)}{D(0)}\right)$$

Finally it is possible to distinguish between three main determinants of the optimal level of direct taxation $(T(Y))$: the elasticity of labor supply $(\varepsilon_L(wy))$, the distribution of productivities on population $(f(wy))$ and the weight given to redistributive objectives on the social welfare function $(D(wy))$.

Before analyzing this final equation, it is worth noting that, controlled by after-tax utility constraint, marginal taxation is always inferior to one. An individual would not work more if it represents a disutility $(T' > 1)$ or non utility at all $(T' = 1)$. Placed on an optimal level of direct taxation some remarks can be made. With

respect to the first determinant, the optimal marginal level of taxation depends on labour elasticity and the latter one also depends on tax level. In an economy with high levels of labour elasticity, it would be recommended to have lower levels of marginal taxation. Concerning the second determinant, an increase of the marginal taxation should be lower for individuals with high levels of human capital or productivity as $\frac{1-F(wy)}{wyf(wy)}$ is decreasing on (w). Piketty (1999)[29] explained this behaviour with the fact that, in the absence of revenue effect on labour supply and with an optimal taxation, an increase on marginal tax rate increases taxes paid by those of higher productivity $(1-F(wy))$ but, at the same time, decreases tax paid by those of lower productivity as their incentive to work decreases (after-tax utility constraint). Finally, concerning the third determinant, the average marginal weight given to redistribution in the interval $([w,+\infty[)$ was supposed to be decreasing on (wy). Therefore, $\left(1-\frac{D(wy)}{D(0)}\right)$ is increasing on (wy). Economies with high need of income redistribution could then increase marginal tax rates for individuals with high productivities, on other terms increase tax level of progressivity.

This quasilinear case is a very basic application of seminal Mirrlees model but even so it illustrates the key issue of optimal taxation which is the trade-off between equity and efficiency: in this specific case between redistribution and labour supply efficiency. Modern analyses are much more complex including additional variables and richer scenarios. For instance, following Salanié's explanation, a scenario where individuals with low levels of productivity may decide to stop working when after-tax utility is too low, was not included. Neither was a situation of international tax competition where the government needs to guarantee a minimum of marginal utility after-taxes in order to avoid that people with high productivities migrate with the objective to evade taxes. Besides, the hypothesis of the quasilinear utility function excluded income effects but it is evident that the marginal utility of labour may decrease with higher revenues. Furthermore, effects of income tax on the supply side of the economy were not taken into account whereas labor taxes affect the production. Briefly, theory has developed considerably and so have simulations. Amongst the principal simulations, Diamond (1998) who expressed optimal tax rates in function of the shape of skills distribution and Saez (2001) who linked skills to realized incomes, generalizing optimal tax rates in function of the income distribution, might be mentioned.

---

[29] Ibid., p. 90; Piketty, T. (1999), "Les hauts revenus face aux modifications des taux marginaux supérieurs de l´impôt sur le revenu en France : 1970-1996", *Economie et prévision*, 138-139.

The theoretical advances on the optimal tax structure (tax burden and level of progressivity) have important consequences on tax policy since they are used as arguments to legitimate economical policy. According to Gruber and Saez (2002) several leading articles, such as Hausman (1981)[30] and Boskin (1978)[31] allowed inferring that individual labor supply and savings may be very elastic with respect to taxation. These papers were intellectual support to the United States' tax reforms of the 1980s which lowered state and federal marginal income tax rates, above all for families with higher income. The top marginal income tax rate on the federal level decreased from 70 percent in 1980 to 28 percent by 1988. Then, during the 1990s, literature such as Slemrod (1990)[32] suggested that those elasticities were rather modest. While according to the authors this was not a leading factor, the top marginal rates rose up to 40 percent in the 1990s.

Actually, research on optimal tax structure is focused on the overall elasticity of taxable income. Gruber and Saez (2002) did an important research on that subject. According to the authors, elasticity of taxable income has became determinant of the optimal tax structure since Feldstein (1995)[33]. However, there was considerable ambiguity about its behavior. In particular, Feldstein found a high elasticity of the United States taxable income with respect to taxation after the Tax Reform Act of 1986, whereas Slemrod (1996)[34] and Goolsbee (2000a,b)[35] proved that Feldstein´s assumption was quite overestimated, given the fact that during the 1980s there was a general increase of taxable incomes related to other factors such as international trade and skill-biased demand shocks. In such a context, Gruber and Saez supplied a significant contribution to the dilemma by arriving to independently analyze the elasticity of taxable income with respect to changes in taxes. They found an overall elasticity of taxable income with respect to taxation equal to 0.4, which was high but well below Feldstein´s earlier estimates between 1.1 and 3.0. Bearing in mind that tax systems are not linear (different according to the levels of revenue), another important result of their research, crucial for the optimal tax structure, was their desegregation of the taxable income elasticity through income groups. Gruber and Saez (2002) obtained an overall elasticity

[30] Gruber and Saez (2002), p.2; Hausman, J. (1981), "Labor supply". In: Aaron, H., Pechman, J. (Eds.), "How Taxes Affect Economic Behavior". Brookings Institution, Washington, DC.

[31] Ibid., p.2; Boskin, M.J., (1978). "Taxation, saving and the rate of interest." *Journal of Political Economy* 86, S3-S27.

[32] Ibid., p.2.; Slemrod, J., (1990). <u>Do Taxes Matter?</u> MIT Press, Cambridge, MA.

[33] Ibid., p.4; Feldstein, M. (1995). "The effect of marginal tax rates on taxable income: a panel study of the 1986 Tax Reform Act". *Journal of Political Economy* 103 (3).

[34] Cfr. Ibid. p.2; Selmrod, J., (1996). "High income families and the tax changes of the 1980s: the anatomy of behavioral reponse. In: Feldstein, M., Poterba, J.(Eds.), Empirical Foundations of Household Taxation. University of Chicago, Chicago, MI.

[35] Cfr. Ibid. p.2; Goolsbee, A., (2000a). "What happens when you tax the rich? Evidence from executive compensation". Journal of Political Economy 108 (2); Goolsbee, A., (2000b). "It´s not about the money: why natural experiments don´t work on the rich. In: Slemrod, J. (Ed.), Does Atlas Shrug? The Economic Consequences of Taxing the Rich. Cambridge University Press, Cambridge.

largely driven by the highest income taxpayers. Taxpayers with incomes above 100,000 US dollars had an elasticity of 0.57 while those in the income range between 50,000 and 100,000 had an elasticity of 0.11. Based on those results it was possible to suggest that optimal tax structures may be progressive on average but not necessarily on the margin: "our estimates suggest that the optimal system may feature tightly targeted transfers to lower income taxpayers and a flat or even declining marginal rate structure for middle and high taxpayers"[36]. Those results could be significantly influential for the elaboration of future tax policies in a context where, according to Piketty and Saez (2006), the United States marginal tax rate on the highest incomes decreased again to 35 percent in 2003 and "(…) the decline in income tax progressivity since the 1980s and the projected repeal of the estate tax might again produce in a few decades levels of wealth concentration similar to those at the beginning of the century."[37]

At this point, it is worth noticing that besides traditional determinants of the taxable income elasticity, complementary variables have also been taken into account by the theory. Kopczuk (2004) found that the elasticity of taxable income may be altered by political decisions regarding tax base, easiness of fiscal evasion, accessibility of fiscal paradises, availability of un-taxed investments, and so forth. These variables stress that the elasticity of taxable income is to some extent a result of the existent tax policy:

> *"(…) the elasticity of income reported on personal income tax returns depends on the available deductions. This highlights that this key behavioral elasticity is not an immutable parameter but rather that it can be to some extent controlled by policy makers."[38]*

Finally, Conesa and Krueger (2005) successfully synthesized:

> *"Progressive income taxes play two potentially beneficial roles in affecting consumption, saving and labor supply allocations across households and over time. First, they help to enhance a moral equal distribution of income, and therefore, possibly, wealth, consumption and welfare. Second, in the absence of formal or informal private insurance markets against idiosyncratic uncertainty progressive taxes provide a partial substitute for these missing markets and therefore may lead to less volatile household consumption over time.*
>
> *However, progressive taxation has the undesirable effect that it distorts incentives for labor supply and saving (capital accumulation) decision of private households and firms."[39]*

---

[36] Ibid. p.1.
[37] Piketty T., Saez E. (2003), p. 24
[38] Kopczuk (2004). P.1
[39] Conesa and Krueger (2005). P.2.

IV. DATA AND METHODOLOGY

Once having appraised the significance of improving tax compliance and increasing the weight of direct taxes in developing countries, and having reviewed the main theoretical issues on optimal progressivity it was appropriate to begin the evaluation of the Ecuadorian personal income tax compliance and its level of progressivity. Regarding the choice of methodology, a tax is commonly considered as progressive when its "nominal rate" increases with income, as neutral when it remains constant and as regressive when it decreases with income. Nevertheless, this definition does not necessarily guarantee progressivity. Economically, a tax is considered as progressive when after-tax income is more equally distributed than before-tax income, as neutral if after-tax income distribution remains unchanged and as regressive if after-tax income is less equally distributed[40].

The Gini coefficients and the top shares of income are the standard indicators used to measure levels of personal income tax progressivity. The first one, by definition, determines the unequal distribution of a variable and the second ones are extremely relevant for explaining changes on overall distribution. Atkinson[41] explains that if the top richest group (considered infinitesimal in term of members) hold a finite share S of total income, then the Gini coefficient is close to $\left(G \approx S + (1-S)G*\right)$, where (G*) is the Gini coefficient for the rest of the population. In other terms $\left(dG/dS \approx (1-G*)\right)$. This means, for instance, that if the Gini coefficient for the rest of the population (G*) is 40% and the participation of the very top rich group in the total income rises of eight percentage points, the overall Gini rises by 4.8 percentage points. The higher the participation of the rich is in total income, the more relevant are the changes in their shares of income in explaining changes in overall distribution. Atkinson recalls that the increase of the overall Gini recorded in the US between the 1970s and the 1990s was of the order of five percentage points and therefore marking the top shares of income can provide a potential explanation of what had happened[42].

Thus, in order to evaluate the Ecuadorian personal income tax level of progressivity, it was required to calculate the before-tax and after-tax Gini coefficients on income and taxable income as well as the top shares of income. The problem in using this methodology arises from the difficulty of estimating the number of individuals who should pay tax (the total control population or the sum of tax units) as well as their level of income (the total control income), taxable income and generated tax. On the other hand, the results are very rich as they

---

[40] Cfr: Piketty and Saez (2006), p.3.
[41] In Atkinson and Piketty (2007).
[42] Ibid., p. 47.

allow seizing individuals' income distribution and the evolution of income inequality, as well as determining the level of personal income tax compliance, the effective personal income tax rate. Additionally, the method allows comparing the obtained results with other countries that have already applied this methodology such as France, the United Kingdom, the United States, seven others OECD countries and Argentina[43].

For that purpose, the following data bases were employed:

- The personal income tax data base or tax fillers' database.

Individual tax return micro data was requested as primary data source to the Ecuadorian National Bureau of Taxes (*Servicio de Rentas Internas or SRI*), an institution created in December 1997 to replace the obsolete General Revenue Directorate.[44]

"Administrative procedures were mostly manual and the country's tax database was stored on a handful of obsolete personal computers (…) as late as 1998"[45].

The SRI conducted important investments on human capital and technology with the aim of modernizing the administration of the Ecuadorian tax system. The results turned out to be very successful but given the fact that income tax was replaced in the fiscal year 1999 by a tax of 1% on all financial transactions, as well as the fact that in 2000 Ecuador changed its national money from *sucres* to American dollars, the SRI could only provide individual tax return micro data from the fiscal years 2001 to 2005. Finally, it is worth noting that the micro data of the personal income tax database was accessible, in part, due to the promulgation of the law "transparency and access to public information"[46]of 2004.

The database received contained the totality of tax returns handed over to the SRI from the fiscal years 2001 to 2005: 1,130,708 forms whose main statistics are presented as Appendix A. Its "tax units", with regard to the Ecuadorian tax law, are adults (aged eighteen and above) who earned a monetary income. It comprised twenty-three variables corresponding to the main types of incomes, taxable income, generated taxes, reductions, and so on. It held some traditional mistakes of tax return databases such as taxpayers' errors filling in their tax returns and typists' errors entering the data. However, those were corrected and did not exceed 0.3% of the observations in any year.

---

[43] Cfr: Adkinston and Piketty (2007)
[44] Law No.1997-41/RO.No.206/2th of December 1997.
[45]Drosdoff (2002)
[46] Law No.2004-34/RO.No.337/18th of May 2004.

- The individuals' income survey or tax units data base.

It consisted of the individual micro data, with their respective individual factors of extrapolation, of the official survey of employment, underemployment and unemployment (ENEMDU), carried out by the Ecuadorian National Institute for Statistics (INEC). The ENEMDU is a quarterly survey applied to 16,180 households. Its eighty-five socio-economical, sociodemographical and educational variables have a statistical inference or representativeness at a national and regional level. Even though the ENEMDU is a household survey, its application to analyze the income of individuals was feasible as income related questions were applied to all household members older than eighteen years (all the adults). Therefore, for instance, the ENEMDU households' sample for 2004 was converted into an individuals' sample with 136,346 urban observations, from the four terms of the year, and 90,450 rural observations from the first, third and fourth terms of 2004. The sample size was then large enough to provide reliable estimates, at a national, urban and rural level, with a standard level of confidence of at least 95% and an error coefficient of ±3% (See Table 26). Unfortunately, ENEMDU's individual micro data was not available for all the quarters of the period analyzed (See Table 25). Therefore, the characterization of the total control population in order to determine the income tax compliance, could exclusively be done for the year 2004 as this was the only year with micro data for all four quarters. Furthermore, the income distribution of the total control population was not estimated for 2001 because the ENEMDU individual micro data base for that year was not available. For the rest of the years, as observations came from different quarters, the income distribution for the total control population was estimated assuming that the quarterly changes in the proportion of individuals with an income above the personal income tax basic fraction would be similar to the one existent within available quarters.

As a final point, before passing to the next section, it was required to become acquainted with some specificities of the Ecuadorian personal income tax which are detailed on the Ecuadorian "internal tax law regime"[47]: Income tax is applied on economic rent or value added, as the Ecuadorian taxable income is the difference between yearly incomes and directly related expenditures. In other terms, an individual may have an income but not a taxable income if directly related expenditures, along the fiscal year, were equal or higher than the generated income. Moreover, there is a basic fraction below which all taxable incomes are free of income tax, such as 7,400 dollars in 2005. On the excess of basic fraction

---

[47] Law No.2004-26/RO.No.463/17th of November 2004.

five marginal rates (5%, 10%, 15%, 20% and 25%) increasing with taxable income are applied (See Table 19). The boundaries of those marginal tax rates are annually adjusted only by inflation considerations. In addition, income tax returns are not mandatory for individuals with total taxable income below the basic fraction and for those whose income results at least in 90% of the wages of a unique employer. In the latter case, income tax is retained directly by the employer. Finally, individuals with business incomes superior to 40,000 US dollars or business total assets superior to 24,000 US dollars have the duty to keep accounts.

V.   MAIN FINDINGS

5.1 The Ecuadorian Personal income tax compliance

a) The personal income tax coverage

It was found that besides the lack of an historical series (only five years), personal income tax database had a second major problem which was its reduced number of tax filers. Only 3% of adults handed over, directly or via the intermediary of their employer, an income tax return to the SRI in 2001. This corresponded to 4% of the economically active population (EAP)[48] which could be considered a useful variable to determine the total control population of the personal income tax, in years when individuals' income micro data was not available, even if the EAP includes some adults who did not receive a monetary income (unemployed) and leaves out those who received a monetary income but were not actives ("rentiers", retired people and pensioners). The possibilities to exclude the rural sector of the analysis, which represented 39% of the adults, and to subtract the non-adult component from the EAP (eight percent of the EAP) were not of help as tax filers' still represented only 7% of the 2001 urban adult EAP. Therefore, for the analysis of tax compliance, it was decided to limit the total control population to adults with earnings above the personal income tax basic fraction. This reduction did not affect compliance results as adults with an income below the personal income tax basic fraction did not have to pay personal income tax and for them it was not even mandatory to fulfill a tax return. In other terms, the total control population was reduced from all adults with monetary income to exclusively those with a potential taxable income. This represented a large reduction as the micro data from

---

[48] The Ecuadorian EAP comprises all persons aged ten years and over who either worked, had a job or were searching for one.

the individuals' income data base reported that, in 2004, 96.5% of the adults had a yearly income inferior to the personal income tax basic fraction (7,200$ for that year). The total control population was then reduced from 7,908,872 to 277,910 tax units. As shown in Table 29, the resulting personal income tax compliance was of 50% implying that only half of the individuals who should pay personal income tax actually did so.

Such a low level of personal income tax coverage might be explained by the weight of the informal sector on the economy. As such a variable was hard to quantify, three proxies from the individuals' income micro database were selected: the first one was the lack of public health insurance (IESS) which was mandatory for every worker in the formal sector of the economy, the second one was to work for an establishment which did not have the taxpayer's identification number (RUC) and the third one was to have a work with conditions of informality (self-employed, domestic servants, and so forth[49]). This way, a tax compliance of 85% was found, excluding the informal sector (See Table 33). The result was coherent with officially aggregated data which placed Ecuador at the top of Latin American ranges with an informal sector accounting for 58 % of non-agricultural employment in 2004[50]. Though, it is important to notice that the informal sector is traditionally related to low income sectors of the economy given that poor people would accept low-paid jobs in order to avoid unemployment. Nevertheless, the constructed definition of the informal sector identified that in the urban areas, 39% of the individuals with incomes over the basic fraction were part of the informal sector of the economy, whereas 65% in the rural area. Taking into account that individuals with an income above the basic fraction belong to the 5% wealthiest Ecuadorians, those findings implied that the informal sector of the economy was not only restricted to low income activities but widely spread, especially in the rural sector. It would be of interest to analyze this heterogeneity of low and high revenues from the informal sector and in which way they are integrated or not integrated (underground economy, legally-prohibited activities and money laundering) into the national and maybe even the global economy.

Excluding the informal sector, a hole of 15% still remained in order to attain personal income tax full coverage. On that matter, it was possible that the individuals' income survey was overmeasuring the number of adults with high revenues or that an important tax evasion from tax units belonging to the formal sector of the economy existed. As it is usually the case with income surveys, the first possibility was rejected. The existing bias in measuring the upper part of the income distribution worked exactly the other way round since the personal income tax coverage increased with revenue (See Table 29 and Table 33). This latter one

---

[49] See ENEMDU glossary (www.inec.gov.ec).
[50] ILO (2005) P. 93.

even exceeded the 100% from the eight deciles of tax fillers' income (See Table 30) proving that the rich were missing on income surveys. Either individuals with high income had an aversion to inform about the totality of their revenues to the survey' interviewers, or the sample of the survey underrepresented rich sectors because of field problems regarding the difficulty of interviewers to approach to wealthier people, or rich people's answers had been eliminated ex-post considered as atypical values which generated bias problems. In any case, the personal income tax returns were proven to be a better tool to seize the revenue from the richest sectors as taxpayers' fulfillment of tax returns is mandatory. Once excluded the presumption of overmeasuring income, exclusively the second hypothesis was left to be examined as tax units were classified either from the informal or from the formal sector of the economy. Unfortunately, this hypothesis could not be totally analyzed as the personal income tax database requested did not include geographical variables necessary to exclude the possibility that other factors explained this gap. For instance, from Table 33 one can see that the formal sector's tax evasion decreases with income since the first deciles. However, it might be possible that this behavior can be explained not by an increase of income but by a geographic concentration of rich people and/or by a lack of tax culture on poor regions of the country. According to the aggregated statistics of the Ecuadorian National Bureau of Taxes, in 2003, just 40% of the individuals with a taxable identification number (RUC) were from the Ecuadorian "*Costa*", whereas more than 50% of the adults lived in that region of the country (See Table 35). In the case that the remaining hole of 15% on personal income tax coverage would be heterogeneously distributed between regions or provinces, it would be possible to identify the behavior determinants of the formal sector tax evasion which could be the number of tax agencies in the region, predominantly economical activities, the levels of people's education, and so forth.

b) **The personal income tax gap and its effective tax rate.**

In the Ecuadorian context characterized by low levels of personal income tax coverage, seizing the income distribution of tax fillers and non-tax fillers became mandatory before calculating the level of generated tax in the case of full compliance. For that purpose, the 50% of personal income tax compliance found for 2004 had to be assumed as representative for the period from 2001 to 2005 as there was no other accurate way to estimate the number of non-tax fillers. Then, in order to seize their income distribution, tax units from the individuals' income survey were divided in two groups: the first one for tax units from the formal sector of the economy and the second one for tax units from the informal one. This partition was made by means of the three proxies used before to explain the level of personal income tax compliance of 2004 (the lack of public health insurance, to work for an establishment without a taxpayer identification number and to work

with conditions of informality). Following, the number of tax fillers was compared to the quantity of non-tax fillers by centiles of income. The difference found between the number of tax units from the formal sector and the amount of tax fillers, when positive, was considered as the quantity of tax evaders from the formal sector of the economy. In doing so, it was possible to add the amount of tax evaders to the quantity of tax units from the informal sector of the economy and to attain the whole group of non tax-fillers with their respective income distribution (See Table 36). The average income distribution of non-tax fillers during the period from 2002 to 2005 was the one chosen for the extrapolation during the period from 2001 to 2005 since the number of observations from the individuals' income survey was limited on the tax fillers' top centiles of income and individuals' income survey was not available for 2001. Finally, a last assumption was made, a tax evader, a tax unit from the informal sector and a tax filler, if having a similar level of income, would generate the similar level of taxable income. However, a word of caution is in order; this assumption does not signify that to a determined level of income, a unique level of taxable income will correspond, as this was not the case for the existent tax fillers. It simply implies that the relation between income and taxable income will remain the same in the case of full compliance. Even if the methodology chosen to seize the income distribution of non-tax fillers was constructed over some strong assumptions, it was considered the most accurate for the Ecuadorian case as the income distribution from individuals' income data base and taxpayers' data base were quite different even limiting the comparison for levels of income above the personal income tax basic fraction.

Having completed the extrapolation, the resulting tax gap amounted to 25% of the actually generated tax, signifying that tax receipts were about 80% of the theoretical tax receipts during the period from 2001 to 2005 (See Table 37). The effective tax rate in the case of full compliance was 4.9% compared to 6.4% for only tax fillers. An additional figure was calculated from the comparison between the actually generated tax and the taxable income in the case of full compliance. It showed that the actually generated personal income tax represents 3.9% of the taxable income in the case of full compliance. This allows understanding, in part, why personal income tax represents only 1% of the government receipts in comparison to 45% in the United States (See Table 2 and Table 3).

5.2 The Ecuadorian personal income tax level of progressivity

The total control population estimated to analyze the personal income tax compliance stood for all adults with incomes above the personal income tax basic fraction. This reduction was accomplished because tax fillers represented only 3%

of adults in 2001. Nevertheless, this is not the case in some other countries such as the United States where tax fillers represent 90% of the tax units.[51] Therefore, in order to guarantee the international comparability of the results from this section, all adults (aged eighteen and above) with monetary income below the personal income tax basic fraction were reintegrated to the total control population. Since the individual income survey significantly understated real incomes and its individual micro data was not available for the whole of the analyzed period, the gross domestic product (GDP) was chosen as the total control income. Thus, the appended group represented, during the 2001-2005 period, an average of 67% of the total income, resulting in a top share income distribution shown in Table 39. The Ecuadorian top shares of income were on average: 24.7% for the top 1%, 13.6% for the top 0.1%, 4.6% for the top 0.01% and 1.1% for the top 0.001%. These figures were higher than those found by Alvaredo (2007) for Argentina which were during the period 2001-2004 on average: 21.5% for the top 1%, 9.6% for the top 0.1% and 3.6% for the top 0.01% (See Table 40). This was not very surprising as "Argentina has traditionally been identified as one of the economies with lowest relative inequality in Latin America despite the recurrent macroeconomic crisis"[52]. However, Latin American top shares of income resulted in much higher figures than those found by Alvaredo and Saez (2007) for Spain, in 2002: 9.5% for the top 1%, 3.2% for the top 0.1% and 1.0% for the top 0.01%. Comparing the income share of top 1% in Spain (9.5%) with those in Argentina and Ecuador, the Ecuadorian the income share of the top 1% was found to be 2.6 times higher, whereas the Argentinean one 2.3 times. Additionally, it is important to mention that income share of the top 1% increased from 22.3% in 2001 to 25.9% in 2005 as compared from 18.8% in 2001 to 22.1% in 2004 in the Argentinean case.

Bearing in mind the importance of top income shares in determining the personal income tax level of progressivity according to Atkinson's explanation[53] (summarized in section IV), as well as the fact that, during the 2001-2005 period, the top 1% of income earners generated an average of 88% of the overall personal income tax and finally also to simplify calculations and the presentation of results, the following description of the personal income tax level of progressivity was limited to the top 1% of income earners. In the following, the decile of income or the decile of taxable income will refer to a decile builded including exclusively the top 1% of income earners. As shown in Table 41, the effective tax rate for the top 1% remained almost unchanged during the period from 2001 to 2005. It amounted to 11.1% on average and increased with the income from 0%[54] for the first decile of income to 17.8% for the last decile of income. The tax structure was

---

[51] Piketty and Saez (2006), Appendix A.
[52] Alvaredo (2007), p. 6.
[53] In Atkinson and Piketty (2007), p. 46.
[54] It consists of individuals with high levels of income but non taxable income.

progressive in terms of taxable income as its Gini coefficients were on average 0.435 after-tax compared to 0.460 before-tax. The larger the difference between before- and after-tax Gini coefficients is, the larger is the redistributive effect of the tax. The latter declined through the period, the difference between before- and after-tax Gini coefficients changed from 0.031 in 2001 to 0.009 in 2005. In order to have a parameter of comparison, the Gini differences of the United States federal tax system ranged from 0.024 to 0.032 during the period from 1979 to 2001, according to the Internal Revenue Service (IRS). The reduction of the personal income tax level of progressivity was accompanied by a slight augmentation of taxable income inequality. Before- and after-tax Gini coefficients shifted from 0.459 to 0.463 and from 0.427 to 0.454 respectively throughout the period (See Table 42). The same analysis as above was applied to the total income with very different results (See Table 43). The results of the Ecuadorian personal income tax turned out to be regressive for every year of the analyzed period, except for 2002. The Gini differences amounted to -0.007 for 2001 and 2005, -0.008 for 2003 and 2004 and 0.013 for 2002. Regarding Gini coefficients, both before- and after-tax, they improved from 0.665 to 0.601 and from 0.671 to 0.622 respectively.

Results proved that the Ecuadorian personal income tax for the top 1% was progressive in respect to taxable income but regressive regarding income. In order to confirm this relationship, the personal income tax shares paid by the top 1% were calculated for the period 2001 to 2005. In Table 44 it is possible to observe that personal income tax shares continuously decreased with rising income. For instance the share of personal income tax fell from an average of 4% for individuals in the first decile to 0.5% for those in the last decile of income. Even if it is evident that to generate business income more expenditure is compulsorily required and this expenditure generally may increases with the size of business activities, the Ecuadorian data showed suspicious figures. The share of taxable income was on average 1.5% for the top 1% while savings interest rates for individuals were above 5%. To illustrate better this behavior, on Table 45, one can see that obviously taxable income shares also decreased almost continuously with increasing income. They declined from on average 53.7% for individuals in the first decile to 3.3% for those in the last decile. Since the Ecuadorian taxable income is defined as the economic rent or value added, it was possible to affirm that the Ecuadorians' profit shares decreased with rising income. Individuals in higher deciles hold higher incomes but at the same time lower levels of profits.

In order to comprehend the relation between income and profit, the income structure of the top 1% was analyzed by its two main components: professional wages and business incomes (See Table 46). It was found that professional wages shares decreased continuously with rising income while business income shares augmented continuously. Professional wages represented on average 47.5% of the

total income for individuals in the first decile of income and only 3.4% for those in the last decile. On the other hand, business income shares increased with rising income representing merely 6.9% of the income for individuals in the first decile and 95.2% for those in the last decile. The existence of an inverse relation between increasing income and professional wages shares as well as a positive relation between income shares was evident. Therefore, with prudence, it was possible to infer that taxable income shares and personal income tax shares were potentially higher for individuals with professional incomes as they were mostly located in the first deciles of income, whereas taxable income shares and personal income tax shares were potentially lower for individuals with business income as they were located preponderantly in the top deciles of income. A word of caution is in order as obviously the share of professional wages and business income on each decile of income does not necessarily reflects the share of individuals having professional and business incomes. Keeping this in mind, individuals in the lower deciles, who are primarily individuals obtaining professional wages, are highly holding the incidence of the personal income tax whilst individuals in the higher deciles, who are primarily individuals obtaining business incomes, hold the tax incidence in a lower proportion. These important differences in the levels of income and sources of income could be basically the explanation of why the personal income tax was found regressive with respect to income during the period from 2001 to 2005. In such a context, improving the level of "progressivity" of the personal income tax could be an appropriate measure for individuals having business income or being in the top deciles of income while it might be inadequate for individuals having professional income or being in the lower deciles of income. It would be of interest to know in detail which tax shields such as debt, inflated expenditures or others are mainly used by business in order to justify such low levels of return to individuals from the top 0.1% income share.

VI.   CONCLUSIONS

In order to evaluate the Ecuadorian personal income tax level of compliance and its level of progressivity, an estimation of different total control incomes and total control populations was required at each stage of research. For instance, to calculate the personal income tax generated in the case of full compliance, it was required to seize the number of individuals with incomes over the personal income tax basic fraction as well as their income distribution. These types of estimations were difficult to achieve in a context of high levels of income inequality and low levels of personal income tax compliance as the individuals' income survey significantly understated real incomes and the number of tax fillers on personal income tax data base was reduced. Merging both types of data bases was possible only to some degree as income distribution from both data bases were different,

and so even if one limits the analysis to individuals with incomes above the personal income tax basic fraction. Even so, with due caution, it was possible to obtain accurate results of some principal characteristics of the Ecuadorian personal income. In the future the methodology aspects might be improved and new data sources integrated in order to enrich the results.

This research is a first attempt to understand some principal characteristics of the Ecuadorian personal income tax not having been investigated before. Even though some of the findings were already intuitively well known by the majority of the Ecuadorians, it was important and necessary to quantify them. For instance, it was found that the Ecuadorian personal income tax compliance was of 50%, the tax gap amounted to 25% and the effective tax rate was 4.9%. Besides, some unexpected results were found such as a regressive effect of the personal income tax on income distribution, revealed by negative before- and after-tax Gini differences for every year excepting 2002. Furthermore, for the first time top shares of income were calculated using personal income tax data as primary source of information.

Finally, it is important to mention that to improve the well-being of the people research directly linked to finding ways to solve empirical problems is sorely needed in Developing countries, or at least in Ecuador.

Appendix I : Some figures of the Ecuadorian fiscal structure

Table 1 : The Ecuadorian gross domestic product per capita

	Years				
	2001	2002	2003	2004	2005
Nominal GDP *(in millions of US dollars)*	21,250	24,899	28,636	32,636	36,489
Real GDP *(in millions of constant 2000 US dollars)*	16,784	17,497	18,122	19,558	20,486
GDP Deflator* *(in ratio)*	0.79	0.70	0.63	0.60	0.56
Per capita nominal GDP *(in Us dollars)*	1,703	1,967	2,230	2,505	2,761
Per capita real GDP *(in constant 2000 US dollars)*	1,345	1,382	1,411	1,501	1,550

Source: Central Bank of Ecuador (BCE).

Table 2 : Percentage composition of the Ecuadorian Government receipts by source

	Years					Average
	2001	2002	2003	2004	2005	
Oil revenues	27	22	24	26	24	25
TVA	29	26	25	23	24	25
Social contributions	9	12	13	13	12	12
Income tax *(a + b)*	11	9	11	11	13	11
Corporation income taxes *(a)*	10	8	10	10	12	10
Individual income taxes *(b)*	1	1	1	1	1	1
Tariffs	7	7	6	6	6	6
Other taxes	14	21	20	19	20	19
Surplus of public enterprises	2	3	1	3	1	2
Total government receipts	100	100	100	100	100	100
Total government receipts *(in millions of nominal US dollars)*	4,955	6,361	6,910	8,177	9,146	

Source: Central Bank of Ecuador (BCE) and the Ecuadorian National Bureau of Taxes (SRI).

Table 3 : Percentage composition of the United States Government receipts by source

	2001	2002	Years 2003	2004	2005*	Average
Individual income taxes	50	46	45	43	43	45
Corporation income taxes	8	8	7	10	11	9
Social insurance and retirement receipts	35	38	40	39	38	38
Excise taxes	3	4	4	4	4	4
Other taxes	4	4	4	4	4	4
Total receipts	100	100	100	100	100	100

* estimate

Source: Historical Tables, Budget of the United States Government, Fiscal Year 2006.

Appendix II : Description of the Ecuadorian personal income tax database

Table 4 : The frequencies of the Ecuadorian personal income tax database

Year	Number of tax returns
2001	194,788
2002	212,118
2003	238,335
2004	247,229
2005	238,238
Total	1,130,708

Source: SRI database

27

Table 5 : The variables of the Ecuadorian personal income tax database

Variables	
Name	**Definition**
Year	Fiscal year.
Taxpayer id	Individual taxpayer's identification number.
Business Assets	Business assets (Balance Sheet) of taxpayers having the duty to keep accounts.
Business Liabilities	Business liabilities (Balance Sheet) of taxpayers having the duty to keep accounts.
Income Business	Taxpayers' business incomes (Income Statement).
Business Expenditure	Taxpayer's business expenditures (Income Statement).
Business Taxable Income	Taxpayer's business profit (income - expenses - workers share in profits- other reductions).
Farms Land Taxable Income	5% of the farm's land appraised value.
Real Estate Income	Rental income from real estate properties.
Other Rental Income	Rental income from other assets (machinery,…).
Real Estate Taxable Income	Real estate profit (income-expenses).
Other Rental Taxable Income	Other assets profit (income - expenses).
(-) Mariage Taxable Income	If married, incomes are still declared individually. The couple's incomes from business, farm lands, real estate and other rents can be declared by one of the partners or by both dividing the resulting taxable income in half.
Professional Income	Income from professional activities.
Other Labor Income	Income from other labor activities.
Professional Taxable Income	Profit from professional activities (income - expenses).
Total Labor Taxable Income	Profit from labor (professional activities + other labor activities)
Other Taxable Income	Royalties, foreign incomes and financial returns.
(-) Social Factors' Reductions	Reductions for people with disabilities and for people in the third age (older than 65).
Taxable Income	Sum of all taxable incomes - Social Factors' Reductions.
Generated Tax	A progressive share of taxable income (5%, 10%, 15%, 20% and 25%).
Reduction Especial Cases	Exemptions determined by law.
Retention tax deducted at source and anticipated payment	Ecuador has a tax system of retention tax deducted at source and anticipated payment is allowed.
Credit Balance	Share of the generated tax which is given back to taxpayers.
Tax Paid	Share of the generated tax which is paid in cash.

Table 6 : The variables of taxpayers' income structure in nominal US dollars

Variables	2001					2002					2003				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Business Income	16,968	156,662	0	14,299,801	3,305,195,381	20,875	178,473	0	19,167,038	4,427,862,406	22,132	176,404	0	18,168,408	5,274,809,351
Real Estate Income	230	2,484	0	329,716	44,718,613	299	2,935	0	316,131	63,456,995	352	3,177	0	361,807	83,999,367
Other Rental Income	14	770	0	180,000	2,744,146	17	737	0	131,617	3,498,626	18	1,083	0	360,000	4,312,161
Professional Wages	5,486	60,635	0	15,299,301	1,068,515,330	6,162	26,865	0	3,129,840	1,306,981,496	6,371	28,321	0	5,551,035	1,518,517,530
Other Labor Wages	1,427	20,045	0	6,118,941	277,915,058	1,746	24,514	0	8,032,602	370,343,867	1,979	44,590	0	20,516,719	471,630,386
Other Taxable Income	1,928	6,101	0	644,190	375,564,777	2,233	6,246	0	521,450	473,554,532	2,339	6,156	0	378,601	557,336,453
Gross Income	26,052	168,743	0	15,305,301	5,074,653,306	31,330	181,546	0	19,167,038	6,645,697,920	33,389	207,378	0	47,281,124	7,957,839,087

Source: SRI data base.

Table 6 : The variables of taxpayers' income structure in nominal US dollars (Continued 2)

Variables	2004					2005				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Business Income	25,434	187,615	0	15,189,918	6,288,088,748	30,232	216,709	0	21,938,607	7,202,318,234
Real Estate Income	396	4,321	0	860,418	97,788,339	455	4,209	0	702,744	108,464,347
Other Rental Income	16	955	0	220,023	4,025,774	15	643	0	140,294	3,500,329
Professional Wages	7,133	35,847	0	9,406,500	1,763,454,100	7,954	38,847	0	8,478,028	1,894,900,574
Other Labor Wages	2,144	23,169	0	9,497,071	529,939,619	2,418	15,129	0	4,738,402	575,962,921
Other Taxable Income	2,295	6,453	0	541,155	567,430,009	2,259	6,751	0	560,614	538,100,625
Gross Income	37,418	191,424	0	15,189,918	9,250,726,587	43,332	219,616	0	21,938,606	10,323,247,031

Source: SRI data base.

Table 7 : The variables of taxpayers' income structure in percentage

Variables	2001	2002	2003	2004	2005
Business Income	65.13	66.63	66.28	67.97	69.77
Real Estate Income	0.88	0.95	1.06	1.06	1.05
Other Rental Income	0.05	0.05	0.05	0.04	0.03
Professional Wages	21.06	19.67	19.08	19.06	18.36
Other Labor Wages	5.48	5.57	5.93	5.73	5.58
Other Taxable Income	7.40	7.13	7.00	6.13	5.21
Gross Income	100.00	100.00	99.41	100.00	100.00

Source: SRI data base.

Table 8 : The variables of taxable income structure in nominal US dollars

Variables	2001					2002					2003				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Business Taxable Income	711	6,361	0	1,167,023	138,488,224	970	6,597	0	678,151	205,795,347	1,125	7,145	0	1,076,173	268,126,744
Farms Land Taxable Income	6	196	0	22,160	1,145,679	5	212	0	52,103	1,047,473	5	199	0	33,000	1,109,535
Real Estate Taxable Income	177	1,968	0	522,461	34,430,065	233	2,039	0	228,000	49,306,867	285	2,350	0	149,260	68,024,713
Other Rental Taxable Income	8	317	0	36,944	1,615,001	10	375	0	74,012	2,020,903	10	401	0	58,854	2,469,165
Total Wages Taxable Income	3,362	10,950	0	656,771	654,797,096	4,145	12,947	0	1,106,980	879,168,674	4,619	12,518	0	446,118	1,100,888,410
Other Taxable Income	1,928	6,101	0	644,190	375,564,777	2,233	6,246	0	521,450	473,554,532	2,339	6,156	0	378,601	557,336,453
(-) Mariage Taxable Income	214	3,556	0	816,977	41,676,451	199	3,952	0	995,548	42,118,811	183	3,445	0	1,076,173	43,630,762
(-) Social Factors' Reductions	199	2,201	0	410,247	38,824,070	254	1,987	0	128,162	53,912,444	299	2,250	0	216,000	71,133,128
Taxable Income	5,778	13,142	0	1,167,023	1,125,540,322	7,142	14,669	0	1,111,226	1,514,862,541	7,901	14,412	0	448,025	1,883,191,130

Married couples provide independent income tax returns. Therefore, incomes from the couple's business, farms, real state and other rentals may be declared by one of the partners or by both dividing resulting taxable income in half.

Source: SRI data base.

Table 8 : The variables of taxable income structure in nominal US dollars (Continued 2)

Variables	2004					2005				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Business Taxable Income	1,256	7,001	0	508,323	310,389,596	1,420	8,029	0	924,632	338,375,099
Farms Land Taxable Income	4	183	0	42,493	995,001	5	196	0	33,461	1,122,979
Real Estate Taxable Income	327	2,667	0	159,667	80,713,010	362	2,924	0	223,375	86,344,246
Other Rental Taxable Income	10	442	0	88,279	2,383,712	9	385	0	60,475	2,144,666
Total Wages Taxable Income	5,195	13,014	0	439,294	1,284,357,194	5,905	16,634	0	1,739,187	1,406,840,281
Other Taxable Income	2,295	6,453	0	541,155	567,430,009	2,259	6,751	0	560,614	538,100,625
(-) Mariage Taxable Income	223	3,318	0	508,323	55,017,805	315	5,391	0	1,504,411	74,939,869
(-) Social Factors' Reductions	361	2,461	0	252,322	89,193,788	423	2,960	0	374,669	100,822,624
Taxable Income	8,503	14,761	0	584,416	2,102,056,930	9,223	17,866	0	1,068,815	2,197,165,404

Married couples provide independent income tax returns. Therefore, incomes from the couple's business, farms, real state and other rentals may be declared by one of the partners or by both dividing resulting taxable income in half.

Source: SRI data base.

Table 9 : The variables of taxable income structure in percentage

Variables	2001	2002	2003	2004	2005
Business Taxable Income	12.30	13.59	14.24	14.77	15.40
Farms Land Taxable Income	0.10	0.07	0.06	0.05	0.05
Real Estate Taxable Income	3.06	3.25	3.61	3.84	3.93
Other Rental Taxable Income	0.14	0.13	0.13	0.11	0.10
Total Wages Taxable Income	58.18	58.04	58.46	61.10	64.03
Other Taxable Income	33.37	31.26	29.60	26.99	24.49
(-) Mariage Taxable Income	3.70	2.78	2.32	2.62	3.41
(-) Social Factors' Reductions	3.45	3.56	3.78	4.24	4.59
Taxable Income	100.00	100.00	100.00	100.00	100.00

Married couples provide independent income tax returns. Therefore, incomes from the couple's business, farms, real estate and other rentals may be declared by one of the partners or by both dividing resulting taxable income in half.

Source: SRI data base.

Table 10 : The variables of tax payment structure in nominal US dollars

Variables	2001					2002					2003				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Retention tax deducted at source and anticipated payment	180	n.a	n.a	n.a	35,058,445	216	n.a	n.a	n.a	45,799,855	224	n.a	n.a	n.a	53,465,783
Reduction Especial Cases	0	1	0	369	1,108	0	2	0	722	2,755	0	27	0	6,806	52,895
Credit Balance	64	680	0	112,923	12,428,527	85	797	0	119,640	18,051,250	126	782	0	157,077	29,983,110
Tax Paid	109	1,479	0	278,804	21,174,512	110	1,392	0	206,699	23,425,804	85	1,035	0	85,752	20,189,468
Generated Tax	353	2,524	0	286,506	68,662,591	412	2,759	0	271,297	87,279,663	435	2,518	0	104,866	103,691,255

n.a = not available on database.

Source: SRI data base.

Table 10 : The variables of tax payment structure in nominal US dollars (Continued 2)

Variables	2004					2005				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Retention tax deducted at source and anticipated payment	226	n.a	n.a	n.a	55,799,773	285	n.a	n.a	n.a	67,869,491
Reduction Especial Cases	3	757	0	371,433	844,830	0	56	0	25,726	70,052
Credit Balance	148	1,997	0	902,332	36,591,109	161	1,344	0	271,203	38,307,919
Tax Paid	89	1,012	0	81,660	22,108,481	111	1,429	0	164,037	26,487,920
Generated Tax	467	2,449	0	94,918	115,344,191	557	3,404	0	259,469	132,735,381

n.a = not available on database.

Source: SRI data base.

Table 11 : The variables of tax payment structure in percentage

Variables	2001	2002	2003	2004	2005
Retention tax deducted at source and anticipated payment	51.06	52.47	51.56	48.38	51.13
Reduction Especial Cases	0.00	0.00	0.05	0.73	0.05
Credit Balance	18.10	20.68	28.92	31.72	28.86
Tax Paid	30.84	26.84	19.47	19.17	19.96
Generated Tax	100.00	100.00	100.00	100.00	100.00

Source: SRI data base.

Table 12 : The variables of business activities in nominal US dollars

Variables	2001					2002					2003				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Business Assets	9,640	215,832	0	67,643,113	1,877,740,011	11,654	216,709	0	65,031,996	2,472,073,101	12,604	197,945	0	64,043,449	3,004,006,832
Business Liabilities	4,081	106,946	0	31,257,633	794,978,224	4,780	101,784	0	24,503,754	1,013,854,695	5,161	88,168	0	24,002,398	1,229,977,022
Business Income	16,968	156,662	0	14,299,801	3,305,195,381	20,875	178,473	0	19,167,038	4,427,862,406	22,132	176,404	0	18,168,408	5,274,809,351
Business Expenditure	15,228	151,933	0	14,046,958	2,966,294,866	19,373	168,606	0	18,159,223	4,109,271,805	20,754	172,774	0	17,803,575	4,946,396,128
Business Taxable Income	711	6,361	0	1,167,023	138,488,224	970	6,597	0	678,151	205,795,347	1,125	7,145	0	1,076,173	268,126,744

Source: SRI data base.

Table 12 : The variables of business activities in nominal US dollars (Continued 2)

Variables	2004					2005				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Business Assets	14,375	189,031	0	64,152,080	3,553,991,910	16,941	195,447	0	59,992,120	4,035,873,852
Business Liabilities	5,687	66,767	0	10,351,009	1,406,053,163	6,784	77,883	0	13,121,505	1,616,129,391
Business Income	25,434	187,615	0	15,189,918	6,288,088,748	30,232	216,709	0	21,938,607	7,202,318,234
Business Expenditure	23,861	181,089	0	15,164,905	5,899,163,966	28,891	211,865	0	21,101,118	6,883,036,267
Business Taxable Income	1,256	7,001	0	508,323	310,389,596	1,420	8,029	0	924,632	338,375,099

Source: SRI data base.

Table 13 : The means of business activities in nominal US dollars

Variables	2001	2002	2003	2004	2005
Business Assets	9,640	11,654	12,604	14,375	16,941
Business Liabilities	4,081	4,780	5,161	5,687	6,784
Business Income	16,968	20,875	22,132	25,434	30,232
Business Expenditure	15,228	19,373	20,754	23,861	28,891
Business Taxable Income	711	970	1,125	1,256	1,420
Business Income / Business Assets	176	179	176	177	178
Business Taxable Income / Business Income	4.2	4.6	5.1	4.9	4.7

Source: SRI data base.

Table 14 : The variables of rental activities in nominal US dollars

Variables	2001					2002					2003				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Real Estate Income	230	2,484	0	329,716	44,718,613	299	2,935	0	316,131	63,456,995	352	3,177	0	361,807	83,999,367
Other Rental Income	14	770	0	180,000	2,744,146	17	737	0	131,617	3,498,626	18	1,083	0	360,000	4,312,161
Farms Land Taxable Income	6	196	0	22,160	1,145,679	5	212	0	52,103	1,047,473	5	199	0	33,000	1,109,535
Real Estate Taxable Income	177	1,968	0	522,461	34,430,065	233	2,039	0	228,000	49,306,867	285	2,350	0	149,260	68,024,713
Other Rental Taxable Income	8	317	0	36,944	1,615,001	10	375	0	74,012	2,020,903	10	401	0	58,854	2,469,165

Source: SRI data base.

Table 14 : The variables of rental activities in nominal US dollars (Continued)

Variables	2004					2005				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Real Estate Income	396	4,321	0	860,418	97,788,339	455	4,209	0	702,744	108,464,347
Other Rental Income	16	955	0	220,023	4,025,774	15	643	0	140,294	3,500,329
Farms Land Taxable Income	4	183	0	42,493	995,001	5	196	0	33,461	1,122,979
Real Estate Taxable Income	327	2,667	0	159,667	80,713,010	362	2,924	0	223,375	86,344,246
Other Rental Taxable Income	10	442	0	88,279	2,383,712	9	385	0	60,475	2,144,666

Source: SRI data base.

Table 15 : The sum of rental activities in nominal US dollars

Variables	2001	2002	2003	2004	2005
Real Estate Income (a)	44,718,613	63,456,995	83,999,367	97,788,339	108,464,347
Other Rental Income (b)	2,744,146	3,498,626	4,312,161	4,025,774	3,500,329
Farms Land Taxable Income (c)	1,145,679	1,047,473	1,109,535	995,001	1,122,979
Real Estate Taxable Income (d)	34,430,065	49,306,867	68,024,713	80,713,010	86,344,246
Other Rental Taxable Income (e)	1,615,001	2,020,903	2,469,165	2,383,712	2,144,666
(d) / (a)		0.77	0.78	0.81	0.83	0.80
(e) / (b)		0.59	0.58	0.57	0.59	0.61
(c) / (d)		0.03	0.02	0.02	0.01	0.01

Source: SRI data base.

Table 16 : The variables of labor activities in nominal US dollars

Variables	2001					2002					2003				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Professional Wages	5,486	60,635	0	15,299,301	1,068,515,330	6,162	26,865	0	3,129,840	1,306,981,496	6,371	28,321	0	5,551,035	1,518,517,530
Other Labor Wages	1,427	20,045	0	6,118,941	277,915,058	1,746	24,514	0	8,032,602	370,343,867	1,979	44,590	0	20,516,719	471,630,386
Professional Wages Taxable Income	2,312	9,283	0	656,771	450,244,013	2,843	12,730	0	2,827,900	603,111,181	3,114	10,346	0	462,719	742,133,958
Total Wages Taxable Income	3,362	10,950	0	656,771	654,797,096	4,145	12,947	0	1,106,980	879,168,674	4,619	12,518	0	446,118	1,100,888,410

Source: SRI data base.

Table 16 : The variables of labor activities in nominal US dollars (Continued 2)

Variables	2004					2005				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Professional Wages	7,133	35,847	0	9,406,500	1,763,454,100	7,954	38,847	0	8,478,028	1,894,900,574
Other Labor Wages	2,144	23,169	0	9,497,071	529,939,619	2,418	15,129	0	4,738,402	575,962,921
Professional Wages	3,474	10,499	0	409,912	858,844,578	3,931	14,702	0	2,220,328	936,398,313
Total Wages Taxable	5,195	13,014	0	439,294	1,284,357,194	5,905	16,634	0	1,739,187	1,406,840,281

Source: SRI data base.

Table 17 : The average labor activities in nominal US dollars

Variables	2001	2002	2003	2004	2005
Professional Wages (a)	5,486	6,541	6,371	7,133	7,954
Other Labor Wages (b)	1,427	1,746	1,979	2,144	2,418
Professional Wages Taxable Income	2,312	2,843	3,114	3,474	3,931
Total Wages Taxable Income (d)	3,362	4,145	4,619	5,195	5,905
(b) / (a)	0.26	0.27	0.31	0.30	0.30
(c) / (a)	0.42	0.43	0.49	0.49	0.49
(c) / (d)	0.69	0.69	0.67	0.67	0.67

Source: SRI data base.

Table 18 : The main statistics of the Ecuadorian personal income tax database

Variables	2001					2002					2003				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Business Assets	9,640	215,832	0	67,643,113	1,877,740,011	11,654	216,709	0	65,031,996	2,472,073,101	12,604	197,945	0	64,043,449	3,004,006,832
Business Liabilities	4,081	106,946	0	31,257,633	794,978,224	4,780	101,784	0	24,503,754	1,013,854,695	5,161	88,168	0	24,002,398	1,229,977,022
Business Income	16,968	156,662	0	14,299,801	3,305,195,381	20,875	178,473	0	19,167,038	4,427,862,406	22,132	176,404	0	18,168,408	5,274,809,351
Business Expenditure	15,228	151,933	0	14,046,958	2,966,294,866	19,373	168,606	0	18,159,223	4,109,271,805	20,754	172,774	0	17,803,575	4,946,396,128
Business Taxable Income	711	6,361	0	1,167,023	138,488,224	970	6,597	0	678,151	205,795,347	1,125	7,145	0	1,076,173	268,126,744
Farms Land Taxable Income	6	196	0	22,160	1,145,679	5	212	0	52,103	1,047,473	5	199	0	33,000	1,109,535
Real Estate Income	230	2,484	0	329,716	44,718,613	299	2,935	0	316,131	63,456,995	352	3,177	0	361,807	83,999,367
Other Rental Income	14	770	0	180,000	2,744,146	17	737	0	131,617	3,498,626	18	1,083	0	360,000	4,312,161
Real Estate Taxable Income	177	1,968	0	522,461	34,430,065	233	2,039	0	228,000	49,306,867	285	2,350	0	149,260	68,024,713
Other Rental Taxable Income	8	317	0	36,944	1,615,001	10	375	0	74,012	2,020,903	10	401	0	58,854	2,469,165
(-) Mariage Taxable Income	214	3,556	0	816,977	41,676,451	199	3,952	0	995,548	42,118,811	183	3,445	0	1,076,173	43,630,762
Professional Wages	5,486	60,635	0	15,299,301	1,068,515,330	6,162	26,865	0	3,129,840	1,306,981,496	6,371	28,321	0	5,551,035	1,518,517,530
Other Labor Wages	1,427	20,045	0	6,118,941	277,915,058	1,746	24,514	0	8,032,602	370,343,867	1,979	44,590	0	20,516,719	471,630,386
Professional Wages Taxable Income	2,312	9,283	0	656,771	450,244,013	2,843	12,730	0	2,827,900	603,111,181	3,114	10,346	0	462,719	742,133,958
Total Wages Taxable Income	3,362	10,950	0	656,771	654,797,096	4,145	12,947	0	1,106,980	879,168,674	4,619	12,518	0	446,118	1,100,888,410
Other Taxable Income	1,928	6,101	0	644,190	375,564,777	2,233	6,246	0	521,450	473,554,532	2,339	6,156	0	378,601	557,336,453
(-) Social Factors' Reductions	199	2,201	0	410,247	38,824,070	254	1,987	0	128,162	53,912,444	299	2,250	0	216,000	71,133,128
Taxable Income	5,778	13,142	0	1,167,023	1,125,540,322	7,142	14,669	0	1,111,226	1,514,862,541	7,901	14,412	0	448,025	1,883,191,130
Generated Tax	353	2,524	0	286,506	68,662,591	412	2,759	0	271,297	87,279,663	435	2,518	0	104,866	103,691,255
Reduction Especial Cases	0	1	0	369	1,108	0	2	0	722	2,755	0	27	0	6,806	52,895
Credit Balance	64	680	0	112,923	12,428,527	85	797	0	119,640	18,051,250	126	782	0	157,077	29,983,110
Tax Paid	109	1,479	0	278,804	21,174,512	110	1,392	0	206,699	23,425,804	85	1,035	0	85,752	20,189,468
Gross Income	26,052	168,743	0	15,305,301	5,074,653,306	31,330	181,546	0	19,167,038	6,645,697,920	33,389	207,378	0	47,281,124	7,957,839,087

Source: SRI data base.

38

Table 18 : The main statistics of the Ecuadorian personal income tax database (continued 2).

Variables	2004					2005				
	Mean	Std. Dev.	Min	Max	Sum	Mean	Std. Dev.	Min	Max	Sum
Business Assets	14,375	189,031	0	64,152,080	3,553,991,910	16,941	195,447	0	59,992,120	4,035,873,852
Business Liabilities	5,687	66,767	0	10,351,009	1,406,053,163	6,784	77,883	0	13,121,505	1,616,129,391
Business Income	25,434	187,615	0	15,189,918	6,288,088,748	30,232	216,709	0	21,938,607	7,202,318,234
Business Expenditure	23,861	181,089	0	15,164,905	5,899,163,966	28,891	211,865	0	21,101,118	6,883,036,267
Business Taxable Income	1,256	7,001	0	508,323	310,389,596	1,420	8,029	0	924,632	338,375,099
Farms Land Taxable Income	4	183	0	42,493	995,001	5	196	0	33,461	1,122,979
Real Estate Income	396	4,321	0	860,418	97,788,339	455	4,209	0	702,744	108,464,347
Other Rental Income	16	955	0	220,023	4,025,774	15	643	0	140,294	3,500,329
Real Estate Taxable Income	327	2,667	0	159,667	80,713,010	362	2,924	0	223,375	86,344,246
Other Rental Taxable Income	10	442	0	88,279	2,383,712	9	385	0	60,475	2,144,666
(-) Mariage Taxable Income	223	3,318	0	508,323	55,017,805	315	5,391	0	1,504,411	74,939,869
Professional Wages	7,133	35,847	0	9,406,500	1,763,454,100	7,954	38,847	0	8,478,028	1,894,900,574
Other Labor Wages	2,144	23,169	0	9,497,071	529,939,619	2,418	15,129	0	4,738,402	575,962,921
Professional Wages Taxable Income	3,474	10,499	0	409,912	858,844,578	3,931	14,702	0	2,220,328	936,398,313
Total Wages Taxable Income	5,195	13,014	0	439,294	1,284,357,194	5,905	16,634	0	1,739,187	1,406,840,281
Other Taxable Income	2,295	6,453	0	541,155	567,430,009	2,259	6,751	0	560,614	538,100,625
(-) Social Factors' Reductions	361	2,461	0	252,322	89,193,788	423	2,960	0	374,669	100,822,624
Taxable Income	8,503	14,761	0	584,416	2,102,056,930	9,223	17,866	0	1,068,815	2,197,165,404
Generated Tax	467	2,449	0	94,918	115,344,191	557	3,404	0	259,469	132,735,381
Reduction Especial Cases	3	757	0	371,433	844,830	0	56	0	25,726	70,052
Credit Balance	148	1,997	0	902,332	36,591,109	161	1,344	0	271,203	38,307,919
Tax Paid	89	1,012	0	81,660	22,108,481	111	1,429	0	164,037	26,487,920
Gross Income	37,418	191,424	0	15,189,918	9,250,726,587	43,332	219,616	0	21,938,606	10,323,247,031

Source: SRI data base.

Table 19 : The nominal tax rates of the Ecuadorian personal income tax

(in nominal US dollars)

Tax rate applied to the excess of taxable income*	2001 Taxable income between Basic	Maximum	Income tax on the basic	2002 Taxable income Basic	Max.	Income tax Basic	2003 Taxable income Basic	Max.	Income tax Basic	2004 Taxable income Basic	Max.	Income tax Basic	2005 Taxable income Basic	Max.	Income tax Basic
0%	0	5,000	0	0	6,200	0	0	6,800	0	0	7,200	0	0	7,399	0
5%	5,000	10,000	0	6,200	12,400	0	6,800	13,600	0	7,200	14,400	0	7,400	14,799	0
10%	10,000	20,000	250	12,400	24,800	340	13,600	27,200	340	14,400	28,800	340	14,800	29,599	340
15%	20,000	30,000	1,250	24,800	37,200	1,700	27,200	40,800	1,700	28,800	43,200	1,700	29,600	44,999	1,700
20%	30,000	40,000	2,750	37,200	49,600	3,740	40,800	54,400	3,740	43,200	57,600	3,740	44,100	58,799	3,740
25%	40,000	and more	4,750	49,600	and more	6,460	54,400	and more	6,460	57,600	and more	6,460	58,800	and more	6,460

* Excess of taxable income = Taxable income - basic taxable income

(a) Total personal income tax = personal income tax on the basic + personal income tax on the excess of income

(b) For instance, a taxpayer who had a taxable income of 15,000 US dollars in 2001 paid 250 US dollars + 10 % of (15,000-10,000)

Source: SRI

Table 20 : Tax fillers taxable income in nominal US dollars by decile

(Tax fillers with taxable income over the basic fraction)

Decile of Taxable income	Taxable income 2001	2002	2003	2004	2005	The shares of taxable income (%) 2001	2002	2003	2004	2005	Average	The cumulative shares of taxable income (%) 2001	2002	2003	2004	2005	Average
1	41,288,952	56,519,063	71,735,792	79,517,726	77,416,241	4.2	4.3	4.4	4.3	4.0	4.3	4.2	4.3	4.4	4.3	4.0	4.3
2	42,244,880	57,448,483	72,787,800	80,965,732	79,846,977	4.3	4.4	4.4	4.4	4.2	4.3	8.5	8.7	8.8	8.8	8.2	8.6
3	43,148,409	59,613,437	75,724,733	86,130,811	88,051,063	4.4	4.5	4.6	4.7	4.6	4.6	13.0	13.2	13.4	13.4	12.8	13.2
4	47,719,398	66,651,596	84,347,798	95,610,534	100,359,192	4.9	5.1	5.1	5.2	5.2	5.1	17.8	18.3	18.6	18.7	18.0	18.3
5	54,481,771	76,638,322	97,170,433	110,607,469	117,266,656	5.6	5.8	5.9	6.0	6.1	5.9	23.4	24.1	24.5	24.7	24.1	24.2
6	65,233,641	92,162,579	116,694,522	132,222,365	139,961,837	6.7	7.0	7.1	7.2	7.3	7.1	30.1	31.1	31.6	31.9	31.4	31.2
7	80,847,231	113,179,657	143,028,342	160,722,567	168,238,436	8.3	8.6	8.7	8.8	8.8	8.6	38.4	39.7	40.3	40.7	40.2	39.8
8	101,099,693	140,430,171	178,093,513	200,156,587	211,008,114	10.3	10.7	10.8	10.9	11.0	10.8	48.7	50.4	51.1	51.6	51.1	50.6
9	140,465,364	191,935,787	246,389,031	276,558,602	289,690,918	14.4	14.6	15.0	15.1	15.1	14.8	63.1	65.0	66.2	66.7	66.2	65.4
10	360,568,319	460,419,221	555,554,075	611,153,616	648,777,715	36.9	35.0	33.8	33.3	33.8	34.6	100.0	100.0	100.0	100.0	100.0	100.0
Total	977,097,658	1,314,998,316	1,641,526,039	1,833,646,007	1,920,617,148	100.0	100.0	100.0	100.0	100.0	100.0						

Source: SRI database.

Table 21 : Tax fillers generated personal income tax in nominal US dollars by decile

(Tax fillers with taxable income over the basic fraction)

Decile of taxable income	Generated tax					The shares of generated tax (%)						The cumulative shares of generated tax (%)					
	2001	2002	2003	2004	2005	2001	2002	2003	2004	2005	Average	2001	2002	2003	2004	2005	Average
1	48,948	60,753	74,250	80,686	83,862	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
2	96,744	107,534	126,850	153,087	205,399	0.15	0.13	0.13	0.14	0.16	0.14	0.22	0.20	0.20	0.21	0.23	0.21
3	142,171	215,472	273,697	411,341	615,603	0.21	0.25	0.27	0.37	0.48	0.32	0.43	0.45	0.47	0.58	0.71	0.53
4	370,470	567,690	704,850	885,327	1,231,010	0.56	0.67	0.69	0.79	0.97	0.74	0.99	1.12	1.16	1.37	1.68	1.27
5	708,839	1,032,621	1,311,316	1,591,349	2,005,723	1.07	1.22	1.29	1.43	1.58	1.32	2.06	2.33	2.46	2.80	3.26	2.58
6	1,189,137	1,825,683	2,303,123	2,699,276	3,202,664	1.79	2.15	2.27	2.42	2.52	2.23	3.85	4.48	4.73	5.21	5.78	4.81
7	2,123,141	3,080,358	3,857,578	4,446,784	5,377,622	3.20	3.62	3.80	3.98	4.24	3.77	7.05	8.11	8.53	9.20	10.02	8.58
8	3,930,924	5,602,205	7,124,568	8,174,173	9,595,696	5.93	6.59	7.02	7.32	7.56	6.88	12.98	14.70	15.56	16.52	17.58	15.47
9	7,790,711	10,772,544	13,999,937	15,899,683	17,215,213	11.74	12.68	13.80	14.24	13.56	13.21	24.72	27.38	29.36	30.76	31.14	28.67
10	49,939,306	61,718,712	71,645,924	77,286,447	87,434,099	75.28	72.62	70.64	69.24	68.86	71.33	100.00	100.00	100.00	100.00	100.00	100.00
Total	66,340,390	84,983,572	101,422,092	111,628,152	126,966,890	100.00	100.00	100.00	100.00	100.00	100.00						

Source: *SRI database.*

Table 22 : Tax fillers' effective personal income tax rates by decile

(Tax fillers with taxable income over the basic fraction)

Decile of	The effective tax rate*					
Taxable Income	2001	2002	2003	2004	2005	Average
1	0.12	0.11	0.10	0.10	0.11	0.11
2	0.23	0.19	0.17	0.19	0.26	0.21
3	0.33	0.36	0.36	0.48	0.70	0.45
4	0.78	0.85	0.84	0.93	1.23	0.92
5	1.30	1.35	1.35	1.44	1.71	1.43
6	1.82	1.98	1.97	2.04	2.29	2.02
7	2.63	2.72	2.70	2.77	3.20	2.80
8	3.89	3.99	4.00	4.08	4.55	4.10
9	5.55	5.61	5.68	5.75	5.94	5.71
10	13.85	13.40	12.90	12.65	13.48	13.25
Total	6.79	6.46	6.18	6.09	6.61	6.43

* Effective tax rate = generated tax / taxable income

Source: SRI data base.

Table 23 : Tax fillers' effective personal income tax rates by centile

(Only tax fillers with taxable income over the basic fraction)

Centile of Taxable Income	2001	2002	2003	2004	2005
90	0.06	0.06	0.06	0.06	0.07
91	0.07	0.07	0.07	0.07	0.07
92	0.07	0.07	0.07	0.07	0.08
93	0.08	0.08	0.08	0.08	0.08
94	0.08	0.08	0.08	0.08	0.09
95	0.09	0.09	0.09	0.09	0.09
96	0.10	0.09	0.10	0.10	0.10
97	0.11	0.11	0.11	0.11	0.11
98	0.13	0.12	0.12	0.12	0.13
99	0.16	0.15	0.15	0.15	0.15
100	0.20	0.20	0.20	0.19	0.20

Source: SRI database.

Table 24 : Per centile ratios and Gini coefficients of tax fillers' taxable income

(Only tax fillers with taxable income over the basic fraction)

	2001	2002	2003	2004	2005	Average
Before-tax						
Gini Coefficient	0.42	0.40	0.39	0.39	0.40	0.40
p90/p10	4.10	4.08	4.16	4.22	4.48	4.21
p90/p50	2.93	2.81	2.86	2.82	2.75	2.83
p10/p50	0.72	0.69	0.69	0.67	0.62	0.68
p75/p25	2.32	2.36	2.35	2.32	2.38	2.35
After-tax						
Gini Coefficient	0.39	0.38	0.37	0.36	0.37	0.37
p90/p10	3.86	3.82	3.89	3.93	4.20	3.94
p90/p50	2.79	2.66	2.70	2.68	2.61	2.69
p10/p50	0.73	0.70	0.70	0.68	0.63	0.68
p75/p25	2.24	2.28	2.27	2.23	2.29	2.26

p = per centile.

Source: SRI database.

Appendix III : Description of the Ecuadorian personal income tax base

Table 25 : The disponibility of ENEMDU micro data base and its number of individual observations

(number of individual observations)

Years	Quarters				Total
	I	II	III	IV	
2001	No	No	No	No	0
2002	No	No	No	24,799	24,799
2003	No	No	24,611	82,317	106,928
2004	81,930	24,304	37,519	83,043	226,796
2005	34,285	24,424	24,105	No	82,814

Source: ENEMDU data base.

Table 26 : The confidence level of ENEMDU individuals yearly income data

(Year 2004)

Level	Population older than 18 years	Number of individual observations on ENEMDU survey	Error coefficient with Z=95% and S^2=0.25	Standard Deviation with Z=95% and e=3%
National	7,908,872	226,796	**0.002**	210.3
Urban	5,447,696	136,346	**0.003**	126.0
Rural	2,461,176	90,450	**0.003**	84.7
Women	4,075,912	114,296	**0.003**	105.9
Men	3,832,960	112,500	**0.003**	104.4

Z= Level of confidence, e= error coefficient and S^2= Standard Deviation.

Source: ENEMDU data base.

Table 27 : The Ecuadorian income distribution –Tax units vs. personal income tax base-

(Year 2004, nominal US dollars and only population older than 18 years)

Gross Income	Tax units			Tax fillers
Less than	National	Urban	Rural	National
7200*	7,631,276	5,187,975	2,443,301	108,644
9,600	73,231	68,089	5,142	35,296
12,000	70,755	65,154	5,601	14,938
24,000	97,129	92,081	5,048	38,010
more than 24,000	36,481	34,397	2,084	50,341
Total	7,908,872	5,447,696	2,461,176	247,229

* Personal income tax basic fraction in 2004.

Source: ENEMDU households survey data base and SRI taxpayers' data base.

Table 28 : The Ecuadorian income distribution –Tax units vs. personal income tax base- in percentage

(Year 2004 in percentages, US nominal dollars and only population older than 18 years)

Total income	Tax units (%)			Tax fillers
Less than	National	Urban	Rural	National
7200*	96.5	95.2	99.3	43.9
9,600	0.9	1.2	0.2	14.3
12,000	0.9	1.2	0.2	6.0
24,000	1.2	1.7	0.2	15.4
more than 24,000	0.5	0.6	0.1	20.4
Total	100.0	100.0	100.0	100.0

* Personal income tax basic fraction in 2004.

Source: ENEMDU households survey data base and SRI taxpayers' data base.

Appendix IV : The Ecuadorian personal income tax compliance

Table 29 : The Ecuadorian personal income tax compliance by intervals of income

(Year 2004, nominal US dollars and only population older than 18 years)

Gross Income More than	Total tax units *(a)*	Total tax fillers *(b)*	Tax compliance *(a)/(b)*
7200*	73,231	35,296	0.48
9,600	70,755	14,938	0.21
12,000	97,129	38,010	0.39
24,000	36,481	50,341	1.38
Total	277,596	138,585	0.50

* Personal income tax basic fraction in 2004.

Source: ENEMDU households survey data base and SRI taxpayers' data base.

Table 30 : The Ecuadorian personal income tax compliance by decile

(Year 2004, nominal US dollars and only population with income over the basic fraction)

Decile of Total income	Total income More than	Total tax units *(a)*	Total tax fillers *(b)*	Tax compliance *(a)/(b)*
1	7200*	9,115	13,859	1.52
2	7,560	48,362	13,858	0.29
3	8,690	66,172	13,859	0.21
4	10,554	56,402	13,858	0.25
5	13,117	30,491	13,859	0.45
6	16,367	28,277	13,858	0.49
7	21,600	20,976	13,859	0.66
8	30,326	10,983	13,858	1.26
9	51,083	4,053	13,859	3.42
10	115,598	2,765	13,858	5.01
Total		277,596	138,585	0.50

*Personal income tax basic fraction in 2004.

Source: ENEMDU households survey data base and SRI taxpayers' data base.

Table 31 : The variables chosen as proxies of the Ecuadorian informal sector

(Year 2004, population older than 18 years and nominal US dollars)

Gross Income	Total tax units	Informal sector'proxies**			Total tax units	Informal sector'proxies**			Total tax units	Informal sector'proxies**		
More than	National	Insurance	RUC	Work	Urban	Insurance	RUC	Work	Rural	Insurance	RUC	Work
7200*	73,231	18,107	7,125	13,934	68,089	15,835	5,333	13,013	5,142	2,272	1,792	921
9,600	70,755	23,800	8,903	15,683	65,154	20,494	6,406	14,668	5,601	3,306	2,497	1,015
12,000	97,129	35,170	9,397	22,268	92,081	32,253	7,422	21,128	5,048	2,917	1,975	1,140
24,000	36,481	12,885	3,418	6,309	34,397	11,602	2,272	6,036	2,084	1,283	1,146	273
Total	277,596	89,962	28,842	58,194	259,721	80,184	21,432	54,844	17,875	9,778	7,410	3,349

** The variable insurance indicates the number of tax units without the public health insurance mandatory in the formal sector; the variable

RUC stands for the number of tax units working for an establishment which does not have a taxpayer identification number; and the variable

work shows the number of tax units whose works have characteristics of informality (self-employed, domestic servants, etc).

* Personal income tax basic fraction in 2004.

Source: ENEMDU households' survey.

Table 32 : The variables chosen as proxies of the Ecuadorian informal sector in percentage

(Year 2004, population older than 18 years, nominal US dollars and percentage of the total number of tax units)

Gross Income	Total tax units	Informal sector proxies** (%)			Total tax units	Informal sector proxies** (%)			Total tax units	Informal sector proxies** (%)		
More than	National	Insurance	RUC	Work	Urban	Insurance	RUC	Work	Rural	Insurance	RUC	Work
7200*	73,231	25	10	19	68,089	23	8	19	5,142	44	35	18
9,600	70,755	34	13	22	65,154	31	10	23	5,601	59	45	18
12,000	97,129	36	10	23	92,081	35	8	23	5,048	58	39	23
24,000	36,481	35	9	17	34,397	34	7	18	2,084	62	55	13
Total	277,596	32	10	21	259,721	31	8	21	17,875	55	41	19

** The variable insurance indicates the percentage of tax units without the public health insurance mandatory in the formal sector. The variable

RUC stands for the percentage of tax units working for an establishment which does not have a taxpayer identification number. The variable

work shows the percentage of tax units whose works have characteristics of informality (self-employed, domestic servants, etc).

* Personal income tax basic fraction in 2004.

Source: ENEMDU households' survey.

Table 33 : The Ecuadorian personal income tax compliance, the informal sector excluded

(Year 2004, population older than 18 years and nominal US dollars)

Gross Income More than	Total tax units from the formal sector	Total Tax fillers *(a)*	Tax Compliance *(a)/(b)*
7200*	48,266	35,296	0.73
9,600	41,093	14,938	0.36
12,000	53,651	38,010	0.71
24,000	20,920	50,341	2.41
Total	163,931	138,585	0.85

* Personal income tax basic fraction in 2004.

Table 34 : The Ecuadorian personal income tax compliance, the informal sector excluded

(Year 2004, nominal US dollars and only individual with total income over the basic fraction)

Total income Decile	Total income More than	Total tax units from the formal sector *(a)*	Total tax fillers *(b)*	Tax compliance *(a)/(b)*
1	7200*	6,843	13,859	2.03
2	7,560	29,927	13,858	0.46
3	8,690	39,662	13,859	0.35
4	10,554	30,895	13,858	0.45
5	13,117	17,569	13,859	0.79
6	16,367	16,596	13,858	0.84
7	21,600	11,547	13,859	1.20
8	30,326	6,930	13,858	2.00
9	51,083	2,766	13,859	5.01
10	115,598	1,195	13,858	11.60
Total		163,931	138,585	0.85

* Personal income tax basic fraction in 2004.

Table 35 : Distribution of individuals with taxpayer identification by regions and provinces

Natural Regions	Provinces	Individuals with a tax id*		Population older than 18 years*		Difference
		Number	Percentages *(a)*	Number	Percentages *(b)*	*(a)-(b)*
Costa	El Oro	36,573	3.3	321,794	4.4	-1.1
	Esmeraldas	18,622	1.7	214,053	2.9	-1.2
	Guayas	304,132	27.7	2,101,485	28.7	-1.0
	Lors Rios	26,275	2.4	386,502	5.3	-2.9
	Manabi	54,419	5.0	699,287	9.6	-4.6
	Total *Costa*	440,021	40.1	3,723,121	50.9	-10.7
Sierra	Azuay	60,821	5.5	352,950	4.8	0.7
	Bolivar	9,708	0.9	95,988	1.3	-0.4
	Canar	13,066	1.2	113,878	1.6	-0.4
	Carchi	11,822	1.1	92,295	1.3	-0.2
	Chimborazo	30,396	2.8	230,830	3.2	-0.4
	Cotopaxi	18,935	1.7	198,652	2.7	-1.0
	Imbabura	31,789	2.9	203,118	2.8	0.1
	Loja	29,338	2.7	229,942	3.1	-0.5
	Pichincha	369,184	33.7	1,509,297	20.6	13.1
	Tungurahua	47,181	4.3	272,970	3.7	0.6
	Total *Sierra*	622,240	56.7	3,299,920	45.1	11.7
Oriente	Napo	4,448	0.4	40,113	0.5	-0.1
	Orellana	2,667	0.2	45,109	0.6	-0.4
	Pastaza	6,558	0.6	33,526	0.5	0.1
	sucumbios	6,431	0.6	72,387	1.0	-0.4
	Mororna Santiago	7,257	0.7	56,370	0.8	-0.1
	Zamora Chinchipe	4,039	0.4	38,043	0.5	-0.2
	Total Oriente	31,400	2.9	285,548	3.9	-1.0
Insular	Total *Insular*	2,901	0.3	12,514	0.2	0.1
	Total National	1,096,562	100.0	7,321,103	100.0	0.0

* Until march 2003.

** From last national Census on 2001.

Source: INEC and SRI official statistics

Appendix V : The Ecuadorian personal income tax gap and its effective tax rate

Table 36 : The income distribution of personal income tax non-fillers

(only older than 18 years with income over the basic fraction)

Centile of tax fillers'income**	Tax units*					Non tax-fillers***				
	2002	2003	2004	2005	Average	2002	2003	2004	2005	Average
5	3.2	1.9	1.7	3.1	2.5	2.3	0.6	0.8	1.5	1.3
10	2.0	0.3	1.6	4.4	2.1	0.6	0.3	0.5	3.5	1.2
15	4.6	19.4	5.4	12.2	10.4	3.5	24.8	4.5	14.6	11.8
20	14.5	4.0	12.0	5.0	8.9	17.9	2.5	14.7	4.3	9.8
25	6.3	10.4	5.5	19.0	10.3	6.0	11.5	4.7	24.3	11.6
30	8.1	14.1	18.3	7.6	12.0	8.6	17.0	24.4	8.0	14.5
35	4.3	2.5	6.5	14.0	6.8	3.7	1.2	6.1	17.2	7.1
40	13.3	15.7	13.9	7.6	12.6	16.2	19.3	17.5	8.0	15.3
45	12.0	3.5	7.5	3.2	6.5	14.4	1.8	7.7	1.7	6.4
50	1.5	6.0	3.5	6.3	4.3	0.9	5.1	1.8	6.1	3.5
55	6.0	2.4	6.6	2.3	4.3	5.5	1.1	6.4	1.0	3.5
60	3.8	5.6	3.5	5.6	4.6	3.0	4.5	1.9	5.1	3.6
65	5.6	1.6	5.1	1.7	3.5	5.0	0.9	4.0	0.9	2.7
70	5.8	3.6	2.5	2.8	3.7	5.2	3.2	1.3	1.2	2.7
75	2.5	3.0	2.2	2.3	2.5	2.0	1.9	1.1	1.2	1.6
80	2.7	1.6	1.8	1.4	1.9	1.7	0.9	1.2	0.7	1.1
85	3.4	1.9	1.0	1.1	1.8	2.7	1.2	0.4	0.5	1.2
90	0.6	0.9	0.5	0.6	0.6	0.6	0.6	0.3	0.3	0.4
95	0.0	0.3	0.3	0.0	0.1	0.0	0.3	0.3	0.0	0.2
100	0.0	1.2	0.7	0.0	0.5	0.0	1.3	0.5	0.0	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* From the ENEMDU households' data base extrapolation, supposing that the relationship between each quarter of the year would be similar to the existent across available quarters (See Section IV).

** From the SRI tax fillers' data base.

*** Non tax-fillers were obtained by adding tax evaders (tax units from ther formal sector - tax fillers) and tax units from the informal sector (See Section V).

Source: ENEMDU data base and SRI data base.

Table 37 : The generated personal income tax in the case of full compliance

(In nominal US dollars and only individuals with taxable income over the basic fraction)

Decile of taxable income	Generated tax if full compliance					The shares of generated tax (%)						The cumulative shares of generated tax (%)					
	2001	2002	2003	2004	2005	2001	2002	2003	2004	2005	Average	2001	2002	2003	2004	2005	Average
1	102,865	127,141	160,030	174,593	176,909	0.13	0.12	0.13	0.12	0.11	0.12	0.13	0.12	0.13	0.12	0.11	0.12
2	328,651	449,087	547,475	682,543	917,917	0.41	0.43	0.43	0.48	0.56	0.46	0.54	0.55	0.56	0.60	0.67	0.58
3	1,630,144	2,156,275	2,706,652	3,189,040	3,694,700	2.03	2.05	2.12	2.25	2.26	2.14	2.57	2.60	2.68	2.85	2.93	2.73
4	2,454,355	3,077,095	3,944,577	4,985,292	5,378,035	3.06	2.93	3.10	3.51	3.29	3.18	5.63	5.52	5.78	6.36	6.23	5.90
5	2,884,484	3,918,405	4,221,301	4,489,478	5,095,455	3.60	3.73	3.31	3.16	3.12	3.38	9.23	9.25	9.09	9.52	9.35	9.29
6	2,361,483	3,759,261	5,659,564	6,268,064	8,240,200	2.95	3.57	4.44	4.42	5.05	4.08	12.18	12.82	13.53	13.94	14.39	13.37
7	3,456,954	5,976,613	7,311,855	8,836,528	9,979,970	4.31	5.68	5.74	6.22	6.11	5.61	16.49	18.50	19.27	20.16	20.50	18.99
8	5,500,133	9,614,614	11,936,672	13,272,981	15,578,389	6.86	9.14	9.37	9.35	9.54	8.85	23.35	27.64	28.64	29.51	30.04	27.84
9	8,884,579	12,697,574	17,626,434	20,938,599	24,059,955	11.08	12.07	13.84	14.75	14.73	13.29	34.43	39.72	42.48	44.26	44.77	41.13
10	52,567,891	63,410,875	73,284,312	79,130,986	90,197,439	65.57	60.28	57.52	55.74	55.23	58.87	100.00	100.00	100.00	100.00	100.00	100.00
Total	80,171,538	105,186,939	127,398,872	141,968,103	163,318,969	100.00	100.00	100.00	100.00	100.00	100.00						
Generated tax*	66,340,390	84,983,572	101,422,092	111,628,152	126,966,890												
Tax gap**	13,831,148	20,203,368	25,976,779	30,339,951	36,352,080												
Tax gap in ratio*	0.8275	0.8079	0.7961	0.7863	0.7774												

* From the SRI database.

** Tax gap = Total generated tax if full compliance - generated tax.

*** Tax gap in ratio = generated tax / total generated tax if full compliance.

Table 38 : The Ecuadorian personal income tax effective tax rate

(Individuals with taxable income over the basic fraction)

Decile of Taxable income	The actual effective tax rate*						The effective tax rate* if full compliance					
	2001	2002	2003	2004	2005	Average	2001	2002	2003	2004	2005	Average
1	0.12	0.11	0.10	0.10	0.11	0.11	0.20	0.18	0.18	0.18	0.18	0.18
2	0.23	0.19	0.17	0.19	0.26	0.21	0.54	0.54	0.52	0.58	0.77	0.59
3	0.33	0.36	0.36	0.48	0.70	0.45	1.77	1.71	1.71	1.81	2.01	1.80
4	0.78	0.85	0.84	0.93	1.23	0.92	1.98	1.88	1.90	2.13	2.24	2.03
5	1.30	1.35	1.35	1.44	1.71	1.43	2.06	2.04	1.72	1.64	1.82	1.86
6	1.82	1.98	1.97	2.04	2.29	2.02	1.59	1.82	2.13	2.11	2.66	2.06
7	2.63	2.72	2.70	2.77	3.20	2.80	2.13	2.65	2.52	2.71	2.92	2.59
8	3.89	3.99	4.00	4.08	4.55	4.10	3.11	3.79	3.65	3.60	4.03	3.64
9	5.55	5.61	5.68	5.75	5.94	5.71	4.32	4.29	4.59	4.80	5.25	4.65
10	13.85	13.40	12.90	12.65	13.48	13.25	12.84	11.87	11.29	10.97	11.67	11.73
Total	6.79	6.46	6.18	6.09	6.61	6.43	5.10	4.89	4.68	4.65	5.12	4.89

* Effective tax rate = generated tax*100 / taxable income

Source: SRI data base.

Appendix VI : The Ecuadorian personal income tax level of progressivity

Table 39 : Top income shares in Ecuador

Income share		Year				Variation 2001-2005
in percentage	2001 *(a)*	2002	2003	2004	2005 *(b)*	*(b)-(a)*
Top 1%	22.29	24.56	25.26	25.79	25.85	3.57
Top 0.1%	13.20	13.55	13.73	13.79	13.73	0.52
Top 0.01%	4.64	4.53	4.81	4.63	4.54	-0.10
Top 0.001%	1.18	1.17	1.29	1.01	1.03	-0.15

Table 40 : Top income shares in Argentina

(adjusted for underreporting)

Income share		Year			Variation 2001-2005
in percentage	2001 *(a)*	2002	2003	2004 *(b)*	*(b)-(a)*
Top 1%	18.79	21.53	23.47	22.10	3.31
Top 0.5%	14.69	17.22	18.94	18.19	3.50
Top 0.1%	7.69	9.62	10.67	10.29	2.60
Top 0.01%	2.76	3.77	4.09	3.77	1.01

Source: Alvaredo (2007),table 6.

Table 41 : The effective tax rate of the personal income tax for the Top 1%

(It includes only the top 1% income share)

Decile of taxable income	Effective tax rate (%)					
	2001	2002	2003	2004	2005	Average
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.4	0.1	0.0	0.0	0.0	0.1
3	1.8	1.3	1.0	0.7	0.5	1.0
4	3.7	2.9	2.4	2.0	1.8	2.5
5	5.2	4.7	4.3	3.8	3.5	4.3
6	6.4	6.0	5.8	5.3	5.2	5.7
7	7.6	7.8	7.6	7.1	6.8	7.4
8	9.2	9.4	9.5	9.5	9.5	9.4
9	10.9	10.7	10.8	11.0	11.6	11.0
10	18.7	18.1	17.4	17.1	17.9	17.8
Total or Top 1%	11.4	11.1	10.8	10.7	11.4	11.1

Table 42 : Taxable income' per centile ratios and Gini coefficients (exclusively for the top 1%)

(It includes only the top 1% income share)

	2001	2002	2003	2004	2005	Average
Before-tax						
Gini Coefficient	0.46	0.459	0.455	0.464	0.463	0.460
p90/p10	8.21	9.117	10.342	11.529	11.438	10.127
p90/p50	2.16	2.376	2.436	2.694	2.796	2.492
p10/p50	0.26	0.261	0.235	0.234	0.244	0.247
p75/p25	3.25	3.720	4.115	4.399	4.544	4.005
After-tax						
Gini Coefficient	0.43	0.432	0.428	0.437	0.454	0.435
p90/p10	7.17	8.029	9.060	10.086	9.992	8.866
p90/p50	2.00	2.211	2.260	2.486	2.561	2.304
p10/p50	0.28	0.275	0.250	0.246	0.258	0.262
p75/p25	3.02	3.546	3.776	4.025	4.136	3.700

p = per centile.

Table 43 : The before and after-tax Gini coefficients for the top 1%

(It includes only the top 1% income share)

	2001	2002	2003	2004	2005	Average
Before-tax						
Gini Coefficient	0.66	0.626	0.609	0.599	0.597	0.619
p90/p10	10.92	9.859	8.441	8.283	8.335	9.168
p90/p50	6.56	5.429	4.895	4.726	4.744	5.270
p10/p50	0.60	0.551	0.580	0.571	0.569	0.574
p75/p25	3.73	3.385	3.052	2.926	2.899	3.198
After-tax						
Gini Coefficient	0.67	0.613	0.617	0.607	0.604	0.622
p90/p10	11.60	10.095	8.948	8.749	8.682	9.614
p90/p50	6.71	5.519	4.979	4.807	4.804	5.365
p10/p50	0.58	0.547	0.556	0.549	0.553	0.558
p75/p25	3.75	3.442	3.118	2.993	2.963	3.252

p = per centile.

Table 44 : The personal income tax generated by the top 1% (in terms of income)

(It includes only the top 1% income share)

Decile of income	tax rate in terms of income* (%)					
	2001	2002	2003	2004	2005	Average
1	5.3	3.4	5.9	5.5	0.0	4.0
2	4.7	3.2	6.2	6.1	5.2	5.1
3	5.3	3.9	4.3	3.8	3.7	4.2
4	4.3	3.8	3.8	3.7	3.5	3.8
5	4.5	3.2	3.3	3.2	3.0	3.4
6	3.8	2.9	3.0	2.9	2.7	3.1
7	3.2	2.6	2.6	2.5	2.3	2.6
8	2.6	2.2	2.2	2.0	1.9	2.2
9	2.0	1.6	1.5	1.4	1.3	1.6
10	0.5	0.5	0.5	0.4	0.4	0.5
Total or Top 1%	1.6	1.4	1.5	1.4	1.4	1.5

* Tax rate in terms of income = Generated tax * 100 / Income.

Table 45 : The taxable income of the top 1% (in terms of income)

(It includes only the top 1% income share)

Decile of income	Taxable income in terms of income* (%)					
	2001	2002	2003	2004	2005	Average
1	67.1	69.2	69.0	63.3	0.0	53.7
2	66.4	70.9	69.5	66.6	54.9	65.7
3	63.6	52.9	50.7	44.7	39.8	50.4
4	50.1	43.5	41.7	38.3	34.5	41.6
5	44.7	34.2	33.6	31.1	28.3	34.4
6	34.6	28.0	28.4	26.6	24.1	28.3
7	25.7	22.6	22.5	21.1	18.9	22.1
8	19.1	17.4	17.5	16.2	14.8	17.0
9	12.8	11.4	11.3	10.5	9.6	11.2
10	3.4	3.5	3.4	3.0	3.1	3.3
Total or Top 1%	13.9	13.9	14.3	13.5	12.4	13.6

* Taxable income in terms of income = Taxable income * 100 / Income.

Table 46 : The two main sources of income of the top 1%

(It includes only the top 1% income share)

Decile of income	Income structure * (%)											
	2001		2002		2003		2004		2005		Average	
	Wages**	Business	Wages**	Business	Wages**	Business	Wages**	Business	Wages**	Business	Wages**	Business
1	49.9	1.9	46.3	3.2	46.1	6.5	50.0	10.0	45.4	12.8	47.5	6.9
2	83.5	0.5	45.1	3.6	49.2	5.8	46.8	9.4	46.2	17.5	54.2	7.4
3	54.7	2.7	55.0	10.3	48.1	21.0	43.7	30.7	44.7	35.2	49.2	20.0
4	62.1	5.8	50.4	23.7	42.6	34.1	42.1	38.5	39.8	43.8	47.4	29.2
5	59.3	15.3	43.1	38.7	37.9	45.4	35.9	50.0	32.8	55.4	41.8	40.9
6	49.2	32.0	38.3	48.7	32.8	55.1	31.6	57.3	30.2	60.8	36.4	50.8
7	39.0	49.6	29.9	61.8	26.3	64.5	24.9	67.2	22.8	70.8	28.6	62.8
8	27.6	65.0	23.7	70.7	20.9	73.2	19.6	75.5	16.5	79.1	21.6	72.7
9	15.6	79.9	13.6	83.2	12.4	84.9	11.8	85.6	9.7	87.7	12.6	84.3
10	5.5	93.1	3.1	95.6	2.7	94.6	2.6	96.5	2.9	96.3	3.4	95.2
Total or Top 1%	17.9	75.4	14.9	78.2	13.9	78.5	13.6	80.3	12.9	81.8	14.6	78.8

* The sum of wages and business is not equal to 100% because real estate income, other rental income, other labour wages and other taxable incomes are not included.

** Just professional wages are included, other labour wages not.

BIBLIOGRAPHY

Acosta, A. (2001), <u>Breve Historia Económica del Ecuador</u>. Corporación Editora Nacional. Quito-Ecuador.

Alvaredo, F. (2007), "The Rich in Argentina over the Twentieth Century: From the Conservative Republic to the Peronist Experience and beyond 1932-2004", Paris School of Economics.Working paper No2007-02. .

Alvaredo, F. and Saez, E. (2007), "Income and Wealth Concentration in Spain in a Historical and Fiscal Perspective". Centre for Economic Policy Research. Discussion papers series. No.5836

Atkinson, A. and Piketty, T. (2007), <u>Top Incomes over the Twentieth Century: A Contrast between European and English-Speaking Countries</u>, Oxford University Press. New York, United States.

Chen, S. and Ravallion, M. (2007), "Absolute Poverty Measures for the Developing World, 1981-2004", Development Research Group, World Bank.

Conesa, J. and Krueger D. (2005), "On the Optimal Progressivity of the Income Tax Code". NBER Woriking Paper 11044. MA, United States.

Couffignal, G. (2002), <u>L´Amérique latine, entre démocratisation et mondialisation</u>. *Ramses* .

Diamond, P. (1998), "Optimal Income Taxation: An Example with a U-shaped Pattern of Optimal Marginal tax Rates", *American Economic Review*, Vol. 88, No.1

Drosdoff, D. (2002), "Tax cheats beware: How a radical tax reform in Ecuador helped to increase revenue and fight corruption". *IDB América* (Sept). Inter-American Development Bank, Washington, Unites States.

ECLAC. (2005), <u>Economic Survey of Latin America and the Caribean 2004-2005</u>. United Nations, Santiago, Chile.

ECLAC (2007), <u>Social Panorama of Latin America 2006</u>. United Nations, Santiago, Chile.

Gruber, J. and Saez, E. (2002). "The Elasticity of Taxable Income: Evidence and Implications", *Journal of Public Economics,* 84.

ILO (2005), "2005 Labour Overview: Latin America and the Caribbean" International Labour Organization. Regional Office for Latin America and the Caribbean. Lima, Perú.

Kopczuk, W. (2004), "Tax Bases, Tax Rates and Elasticity of Reported Income" Department of Economics, Columbia University, New York, NY.

Martner, R. and Tromben, V. (2004), Tax reforms and fiscal stabilization in Latin American countries. United Nations/ILPES-CEPAL, Santiago, Chile.

Mas-Colell, A., Whinston, M. and Green,J. (1995), Microeconomic Theory. Oxford University Press. New York, United States.

Mena, E. (2000), "La modernización de la administración tributaria en el Ecuador" V Congreso Internacional del CLAD sobre la Reforma del Estado y la Administración Pública, Santo Domingo, Rep. Dominicana.

Mirrlees, J. (1971), "An Exploration in the Theory of Optimum Income Taxation" *The Review of Economic Studies*, Vol.38, No.2.

Paz y Miño , J. (2002), Revolución Juliana: Nación, Ejército y bancocracia. Abya-Yala 2002.

Piketty T., Saez E. (2003), "Income Inequality in the United Sates, 1913-1998", *Quarterly Journal of Economics* 118.

Piketty, T. and Saez, E. (2006), "How Progressive is the U.S. Federal Tax System? A Historical and International Perspective". *NBER* Working Paper NO.12404.Cambridge, MA.

Saez, E. (2001), "Using Elasticities to Derive Optimal Income Tax Rates", *Review of Economic Studies*, 68.

Salanié, B. (1998), Microeconomie: Les Défaillances du marché, Economica, Pairs.

Salanié, B. (2002), Microeconomie : Théorie Economique de la Fiscalité, Economica, Pairs.

Tanzi, V. and Zee, H. (2000), "Tax Policy for Emerging Markets: Developing Countries". IMF Working Paper No.00/35.

The World Bank. (2006), <u>World Development Indicators 2006</u>, World Bank Publications, Washington, D.C. USA.