Gendered effects of the Personal Income Tax in Uruguay

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Abstract

This article aims to analyze the gendered effects of PIT in Uruguay after the introduction of a dual regime with individual filing. For this purpose, we use data from the Household Survey of Uruguay for 2013 and we classify the population according to their household organization. The empirical strategy was assessed through the estimation of a zero-one inflated beta model (ZOIB). This model addresses properly the fact that the ratio PIT to income is a fraction with high proportion of zeros. Our findings show that in the raw estimations the dual earner category bears the largest PIT burden and exhibits the highest proportion of taxpayers, followed by the male breadwinner type. However, this order is related to their differences in several characteristics: income level (per capita income and household size), number of earners and sources of income appear to be the most important. Once we take into account these differences, households with breadwinner husbands and dependent wives report the highest PIT burden, followed by households in which both spouses work and finally, single worker women.

Keywords: Economics of Gender, Family Economics, Income Tax, Tax incidence

JEL classification codes: B54, J16, H22, H24, H31

Resumen

El presente artículo tiene como objetivo analizar la incidencia de género del IRPF en Uruguay, luego de la aplicación de un régimen dual de declaración individual. Para este fin, se utilizan los datos de la Encuesta Continua de Hogares para 2013 y se clasifica a la población en función de la organización del hogar. La estrategia empírica consiste en la estimación de un modelo ZOIB. Este modelo aborda adecuadamente el hecho de que la relación impuesto/ingreso es una fracción con alta proporción de ceros. Los resultados indican que en las estimaciones por categoría de hogar, los hogares de ingresos duales poseen la mayor carga tributaria y exhiben la mayor proporción de contribuyentes, seguidos por los hogares tradicionales de varón proveedor. Sin embargo, este orden tiene que ver con diferencias en el nivel de ingresos (el ingreso per cápita y el tamaño del hogar), en el número de perceptores y en las fuentes de ingresos. Una vez que se controla por ellas, los hogares patriarcales reportan la mayor carga de IRPF, seguido de los hogares en los que ambos cónyuges trabajan y, por último, los hogares monoparentales femeninos.

Introduction

A strand of the literature studies the role of public policies in mitigating or reinforcing asymmetrical gender behavior. Stotsky (1996) defined and identified explicit and implicit gender bias in tax policies, particularly relevant in the Personal Income Tax (PIT). The explicit bias arises from the tax code, when it identifies and treats men and women differently. Implicit forms of gender bias refer to provisions in the tax systems that tend to generate different incentives for men than for women, due to the culture or socioeconomic arrangements.

Many of the studies focused on the implicit bias under joint filing in which the tax is assessed on the income of the couple. Thus, the second earner (typically women) pays a higher tax than if she was taxed individually because of increasing marginal rates. This pattern is criticized from different perspectives. For example, it is at odds with the policy recommendations derived from the optimal taxation perspective. Indeed, individuals with higher labor supply elasticity should be less taxed. As married women have a more elastic labor supply than theirs spouses, tax rates on labor income should be lower for women than for men (Alesina et al., 2011). Besides, from a gender perspective, joint taxation discourages the participation of married women in the labor market and men's participation in unpaid domestic work creating gender biases.

It is not surprising that feminist economics gives support to individual filing. However, Stotsky (1997) and Elson (2006) mention different source of gender bias that persist under individual filing. Particularly under a global income tax, gender bias may arise for example from the rules governing the allocation of shared capital income, of exemptions or other tax preferences. Thus, under the gender equity perspective, an income tax regime that taxes every source separately (schedular income tax) is preferable.

Motivated for several reasons, there has been a trend in developed countries to reform their PIT systems to dual regimes (that tax capital and labor separately) with individual filing. However, gender bias may arise even under individual filing and a schedular system. For example, Rodríguez Enriquez et al. (2010) find a gender bias in Argentina because women are more prone to be employed in occupations that are taxes at lower rates than occupations intensive in men.

In Uruguay, a dual income tax with individual filing was introduced in 2007. The aim of this study is to analyze the effect of PIT focusing on the assessment of the existence of gender bias.

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We use the Household Survey carried out in 2013 by the Statistical Office in Uruguay. Our unit of analysis is the household, as proposed by Grown and Valodia (2010) in a comparative study of gender and taxation. We are particularly interested in comparing PIT incidence in three typical cases: a) households supported by a worker man who lives with a dependent housewife who is not engaged in paid employment, b) households in which both couple members work, and c) households in which a single woman works. Thus, we classify the population according to their household organization. We assess the effect of household type on the ratio PIT to income through the estimation of a zero-one inflated beta model (ZOIB). This model addresses properly the fact that the ratio PIT to income is a fraction with high proportion of zeros.

We find that, given per capita income household, PIT incidence is higher for male breadwinner households, followed by dual earner households. Following Elson (2006) and Grown and Valodia (2010), we consider this result consistent with gender equality because it is in line with an equal gender time allocation within the family. However, male breadwinner households also bear a higher incidence than female breadwinner households with a dependent spouse. Finally, the female lone breadwinner type exhibits the lowest PIT incidence. The low level of tax paid by the female types is explained by the high participation of non-taxed sources in their household income.

The main contribution of this study is to provide evidence about the gendered impact of PIT in a developing country context, which recently passed a tax reform that follows the main guidelines of the regimes in advanced economies.

The remainder of this study proceeds as follows. In the next section we provide a description of the Uruguayan economy, after that we present the data and methodology and then we report the main results of the analysis. In the final section we conclude.

Traits of Uruguayan economy

A socio-economic gendered picture

In Table 1 we present a set of indicators that gives a socio-economic gendered picture of Uruguay and the average of the Latin American region.

At the beginning of the XXth century, the country already had low fertility and high life expectancy compared to Latin American standards. Since then, fertility has decreased and life expectancy has increased, and Uruguay is now in an advanced stage of demographic transition. Around 14% of the population is older than 64 years old as

reported in Table 1 whereas this proportion is less than 7% on average in Latin America.

Besides, the level of education of women, their labor force participation and their marital status have undergone a substantial change since the middle of the XXth century. Uruguay form part of the group of Latin American countries in which these processes are in the most advantaged stage, in part also because of differences in the initial conditions. Uruguayan women have on average 10.2 years of schooling and their participation rate is 67% whereas on average for Latin American countries, these figures are 8.7 and 55%, respectively. In sum, this brief picture shows that women are very much involved in the economy so they would be affected by the creation of a Personal Income Tax.

These changes affected the households' structure which is substantially different from the Latin American average. Because in Uruguay the ageing process is more advanced, there is a relatively high incidence of one person households (mostly elder) and couples without children, as reported in Table 1. Another relevant characteristic is that the participation of extended households is relatively low. In this paper we focus on non-extend households that take into account 84% of total households. In turn, lone-parent households –that in their majority are composed by an adult woman- are 12% of total households.

Table 1. Socio-demographic characteristics

	Uruguay			Average of Latin American countries		
	All	Women	Men	All	Women	Men
Children per woman [a/]		2.04			2.14	
Life expectancy [a/]	77.0	80.5	73.3	74.8	78.1	71.5
Population older than 64 [b/ c/]	14.0	16.5	11.2	6.7	7.5	5.9
Years of education [b/ d/]	9.8	10.2	9.5	8.7	8.7	8.8
Participation rate [b/ c/ e/]	76.1	66.9	85.7	68.5	54.8	82.6
Households structure [b/ f/]						
One person households	21.9			11.0		
Couple family without children	17.2			9.0		
Couple family with children	33.2			39.9		
Lone-parent family	12.0			11.9		
Other households	15.7			28.2		

Notes:
[a/] 2005-2010; [b/] 2010: [c/] Percentage of population; [d/] Population ages 25-59; [e/] Population ages 15-64; [f/] Percentage of households
Source: CEPAL (2016) and World Bank (2016)

The Personal Income Tax

In 2007 the government implemented a tax reform with the objective of improving the efficiency and progressivity of the tax system. The reform included the creation of a Personal Income Tax that reflected the spirit of the latest reforms that were proposed and debated in developed countries.

First, it is an individual filing system without explicit gender bias. Joint taxation is allowed for married couples or in consensual union. According to the Tax Office, less than 2% of potential taxpayers choose joint taxation which can be explained by the lack of incentives of the tax rate schedule (Burdin et al, 2015).

Second, it was conceived as a dual tax under which capital income is taxed at a flat rate whereas labor income and pensions are subjected to progressive rates. Some months after its introduction, litigious issues led to take out the tax on pensions and to create a specific progressive tax on pensions. Anyway, in this study we refer to PIT as the sum of taxes on pensions, labor and capital income. The government justified the dual income tax because of the difficulties of tracing the non-domestic sources of income, the prevention of lobbying activities and the high risk of evasion (Barreix and Rocca, 2007). With regard to the concern of this study, a relevant characteristic of the dual structure is that a flat rate on capital income eliminates the incentive for capital income splitting between the household members. At the same time, it generates a relief for the government in the regulation about ownership and splitting treatments (for pros and cons of dual income taxes, see Genser and Reutter, 2007).

Capital gains (derived from sales) and holding income (derived from the possession of assets) are taxed at a flat rate that varies between 3% and 12% depending on the source (interests, profits, etc.). Deductions are allowed for bad debts, real estate taxes, and cost of renting. In most of the cases, there is a withholding agent. If not, payments in advance and annual filings are required.

Pensions are subject to individual progressive taxation and there is no option for joint taxation. There are four marginal rates that range from zero to 25%. Tenants are allowed to subtract 6% of their rent and no other deductions are allowed. The agencies that administer the Social Security System are the withholding agents responsible for collection and payment of the tax. When receiving pensions from different agencies, the taxpayer must do an annual filing.

Taxes on labor income have to be paid monthly based in the case of employees (held at source) and bimonthly in the case of self-employed. An annual filing is required except

in the case of employees with only one job and eventual disparities should be closed out. The tax is equal to a primary tax minus tax credits.

The primary tax is calculated applying the rate on the gross earnings of employees and on 70% of gross income of self-employed under the consideration that inputs take account for 30% of the amount of the sales. The tax schedule comprises seven marginal rates that range from zero in the first bracket to 30% in the seventh bracket.

The tax credits comprise personal contributions and taxes that are levied on labor income, a fix amount per child (with a higher level in case of disabled child) and mortgage payments when the house is used for permanent residence and its cost is lower than a threshold. The tax credit for children can be distributed between parents. When parents are divorced and they do not agree about this distribution, each one can deduct 50%. In order to calculate the amount of the tax credit, a progressive rate schedule applies that ranges from 10% in the first bracket to 30% in the sixth. After subtracting these tax credits, tenants are allowed to additionally subtract 6% of their rent. If this deduction generates a surplus, this surplus is not refunded by the Tax Office and cannot be transferred to the following year.
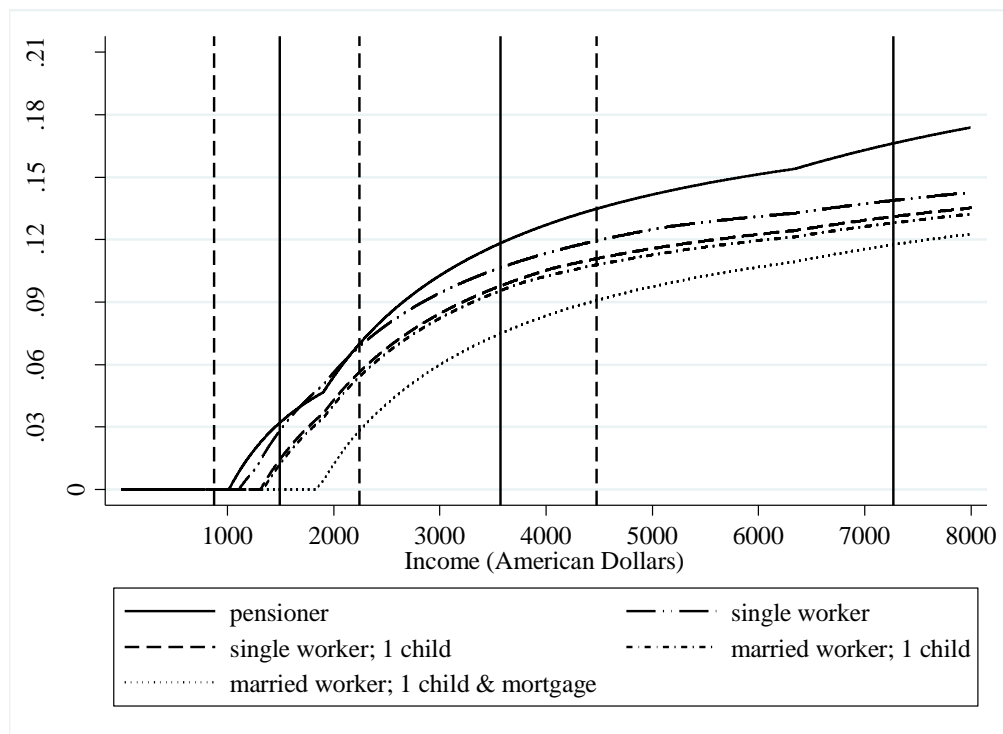
In Figure 1 we show the tax burden by income according to the statutory rates. We graph the case of pensioners and four types of workers, in order to take into account that the ratio tax to labor income depends of the feasibility of using tax credits. We overlapped dotted vertical lines at percentiles 75, 90 and 99 of the distribution of pensions meanwhile continuous lines indicate the same percentiles of the distribution of labor income. These values were provided by IECON (2016) and are based on administrative records of the Tax Office.

As shown in Figure 1, pensioners are exempted up to around US$ 1000 per month.[1] The labor earnings schedule starts after a tax-free allowance of about US$ 900 but a single worker (who faces the highest burden among workers) pays taxes only when the gross earnings exceeds US$ 1100 because of tax credits. These thresholds actually work as stemmed from the vertical lines. According to estimations by Burdin et al. (2015) on the base of tax records, in 2012 only 20.1% of pensioners and 33.6% of workers paid the PIT.

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[1]We use prices of 2013 for the conversion to American Dollars.

For most levels of income, the burden tax is higher for pensioners than workers; this is related to the tax credits allowed for labor earnings and not to the primary rates. Among workers, the highest burden corresponds to a single person without children followed by a single person with one child. To calculate the tax burden of a single parent worker with one we assumed that he/she deduces 100% of the child benefit. The tax burden is a bit lower when the parent of child is married or in union. Though there are no explicit legal differences, the single worker pays higher taxes because contributions to the health system (that allow tax credits) are lower for them than for married people. Finally, the lowest burden corresponds to a married worker with a child who is paying a mortgage which allowance is equal to the maximum allowable value.

Figure 1. Personal Income Tax burden by income for selected individual types

Source: author's calculations based on schedule rates.

Data and methods

Data and imputations

We use the Household Survey (ECH because of the Spanish abbreviation of *Encuesta Continua de Hogares*) carried out along 2013 by the Statistical Office (INE because of the Spanish abbreviation *Instituto Nacional de Estadística*). It is a nation-wide

representative survey that in 2013 reported information of 46622 households (response rate of 89.3%). Among several characteristics of household members, it registers in-kind and in-cash income received the month before the interview, by source. As it is usual in income surveys, capital income is underestimated.

Our variable of interest is the ratio of PIT paid by all the members of the household to household gross income. We work with the population and we assign the same tax burden to all household members. As the ECH inquires income after taxes and contributions, we estimated taxes and contributions using the statutory rates in force in 2013, and we added them to reported income in order to have a proxy of gross income.

In the case of capital income, we computed the taxable capital gains as the sum of the total amount of capital income sources and we assumed that there is no evasion. The ECH does not provide information to estimate deductions so we implicitly assumed that conditions for them were no present.

The ECH reports whether or not the worker contributes to the Social Security System. We assumed that there is no partial evasion of contributors and that non-contributors do not pay taxes either. For the estimation of PIT, we did not consider joint taxation because there is no information about it in the survey and it is rarely used. Regarding credits, we considered contributions and children benefits, but we did not impute deductions related to mortgages and rents because the ECH does not provide information for an appropriate assumption. Credits for children were assigned to the head of the household who is usually the household member who receives the highest income.

To analyze sources of income we deflated them by the Index Price of Consumption and classified them in four: capital income, labor income, other income (public and private transfers plus self-consumption), and rental house (rental value of owner-occupied houses).

Gendered classification of the population

In order to capture gender differences, we made a classification that takes into account the household structure and the employment status of their members. We distinguish non-extended from extended households. The non-extended groups are composed by individuals alone or couples, with or without children at any age, whereas in the extended households there are members related by other links (grand-parents, brothers-

in-law, nephews, non-relatives, etc.). The classification appears in the first column of Table 2.

The "couple, male breadwinner" category includes the non-extended households formed by a couple (with or without children) in which only the male works. Around 19% of individuals live in this type of household. The "single, female breadwinner" category consists of a non-extended household headed by a lone worker woman, and accounts for 7.8% of population. The "couple, dual earner" group corresponds to non-extended households formed by a couple in which both the male and female work. This category is the most frequent, accounting for 30.6% of individuals.

As reported in Table 2, most of the households of these three categories have children and the average age of the adults is rather similar. In turn, as shown in Figure 2, the "couple, dual earner" category has the highest per capita income of the three types. Labor income is the most important source for the three categories and public transfers are more important for the "single, female breadwinner" type than for the others.

These three categories represent typical types that enlist the interest of the gender perspective of tax studies. Two minor categories (that account for 6% of the population) may work as counterfactual types: a) "couple, female breadwinner", in which only the female of a couple works and may be compared with "couple, male breadwinner", and b) "single, male breadwinner" whom household is headed by a lone worker man (and not a woman). The latter type is the richest of all non-extended households.

Non-extended households without workers are classified in three groups "couple, non-employed" (7%), "single, non-employed male" (1.3%) and "single, non-employed female". These categories are mostly supported by pensions and the incidence of children is rarely frequent. However, the "single, non-employed female" includes cases of one-parent homes headed by working-age women mostly supported by public transfers.
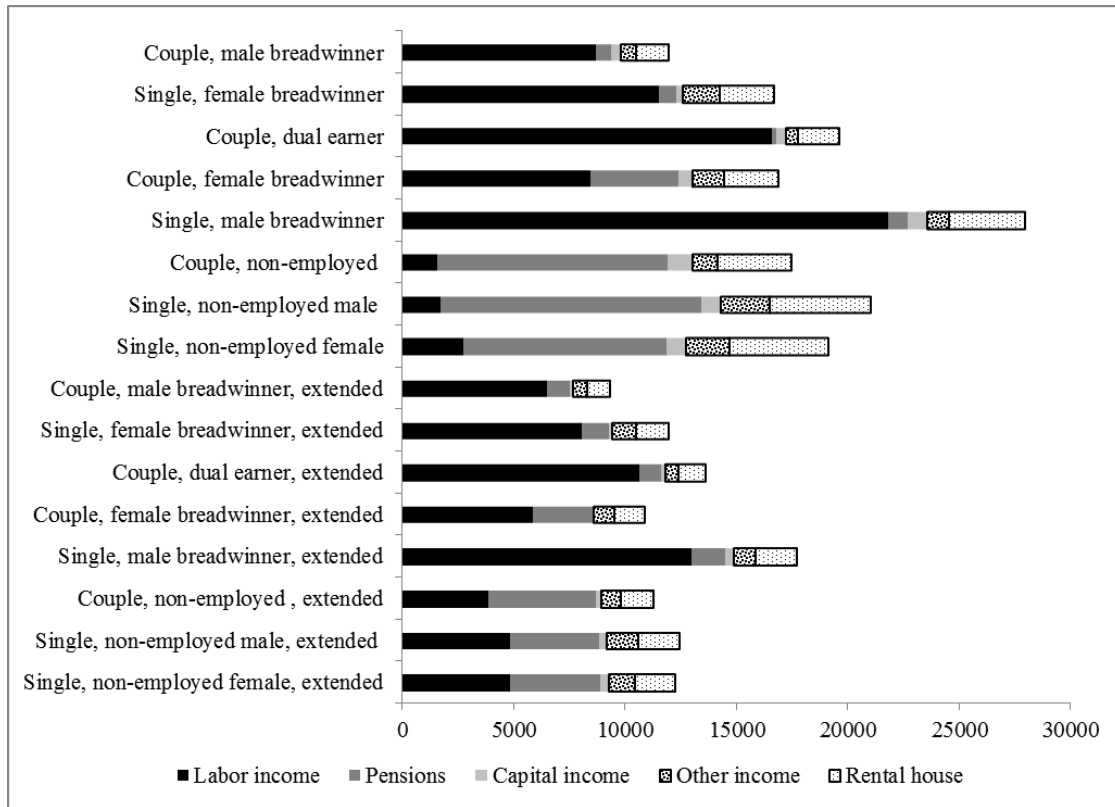
An analogous classification is made within extended households, which account for 22% of the population. Given the type, the per capita income is lower in extended than in non-extended households.

Table 2. Main characteristics of household categories.

Household Category	Frequency (weighted cases) (%)	Households with children (%)	Number of members (average)	Number of earners (average)	Number of informal workers (average)	Age of the household head and spouse (average)	Number of cases in the sample
All	100.0	59.8	3.7	1.9	0.4	48.9	124,987
Couple, male breadwinner	18.4	72.4	4.1	1.4	0.4	42.5	22,230
Single, female breadwinner	7.8	60.6	2.9	1.5	0.5	45.2	11,225
Couple, dual earner	30.7	72.1	3.8	2.3	0.5	41.4	37,082
Couple, female breadwinner	3.2	42.1	3.3	1.9	0.5	52.4	4,033
Single, male breadwinner	3.2	20.1	1.7	1.2	0.4	47.1	4,125
Couple, non-employed	7.0	9.1	2.6	1.7	0.1	68.5	9,008
Single, non-employed male	1.3	3.6	1.4	1.1	0.1	70.2	1,886
Single, non-employed female	6.1	22.0	2.2	1.1	0.1	65.9	8,670
Couple, male breadwinner, extended	4.0	83.1	5.8	2.3	0.8	48.5	4,721
Single, female breadwinner, extended	4.1	71.8	4.4	2.2	0.7	47.9	5,113
Couple, dual earner, extended	4.5	80.5	5.4	3.2	0.9	45.8	5,268
Couple, female breadwinner, extended	0.8	70.1	5.2	2.8	0.7	56.5	943
Single, male breadwinner, extended	1.7	37.7	3.5	2.2	0.6	44.4	1,976
Couple, non-employed , extended	2.2	65.2	5.0	2.7	0.3	66.5	2,615
Single, non-employed male, extended	0.8	50.1	3.9	2.0	0.4	65.6	974
Single, non-employed female, extended	4.2	62.8	4.3	2.2	0.4	65.8	5,118

Source: Authors' calculations based on *Encuesta Continua de Hogares* 2013, *Instituto Nacional de Estadística*

Figure 2. Per capita income of households by source

Source: Authors' calculations based on *Encuesta Continua de Hogares* 2013, *Instituto Nacional de Estadística*

Empirical strategy

We aim to identify gender differences in the PIT tax burden as well as to examine the role of some specific household characteristics in the explanation of those differences. A particular issue in our study is that the main variable of interest, the proportion of PIT in gross income, is a fraction.

Given that most of the households are not taxed and that no household is taxed at 100%, the variable has a high proportion of zeros and no presence of ones. These zeros can provide important information for the study of the lowest levels of taxation and their inclusion has theoretical and empirical reasons. Hence, we conduct the empirical analysis considering a dependent variable that assumes values in the interval [0, 1) and contains excess of zeros.

In a case like this, the dependent variable is not symmetrically distributed, so that the predicted values of the linear regression model may lie outside the unit interval. As an alternative, Cook et al (2008) proposed the zero-one inflated beta model (ZOIB) which addresses properly the issue related to the inflation process in the data.

Several authors (Paolino, 2001; Kieschnick and McCullough, 2003; Smithson and Verkuilen, 2006) argue that the beta regression model is the most suitable for distributional asymmetries and can be adjusted for data in the interval (0, 1) since the density function adopts different shapes depending on the function parameters. Ferrari and Cribari-Neto (2004) proposed the following parameterization for the density function of the response variable *y* when it adopts a beta distribution $B(\mu,\phi)$:

$$f(y; \mu, \emptyset) = \frac{\Gamma(\phi)}{\Gamma(\mu\phi)\Gamma((1 - \mu)\phi)} y^{\mu\phi - 1}(1 - y)^{(1-\mu)\phi - 1}, \qquad y \in (0,1)$$

where μ is the mean $(0 < \mu < 1)$, ϕ a precision parameter $(\phi > 0)$ and $\Gamma(.)$ is the gamma function.

In practice, the beta distribution is not suitable for modeling data that contains zeros or ones. Therefore, we apply a combination of two distributions, a beta distribution and a distribution function lying behind the variable when it takes a value (*c*). For a detailed description of this methodology see Ospina and Ferrari (2010, 2012).

When *c* equals zero, the density is called a zero-inflated beta distribution and the probability function generated by the combination is:

$$b_c(y; \alpha, \mu, \phi) = \begin{cases} \alpha & if \ y = c \\ (1 - \alpha)f(y; \mu, \phi) & if \ y \in (0,1) \end{cases}$$

In this paper, we carry out all the estimations using the Stata module *zoib* developed by Buis (2012). The *zoib* command consists of a maximum likelihood estimation of the combined model; a logistic regression for whether or not the proportion equals zero and a beta regression for the proportions in the interval (0, 1). We perform all the estimations using robust standard errors.

Our explanatory variable of interest is a vector of dummy variables that captures household type, that is, the gendered classification of the population. Besides we use several variables that reflect household characteristics that may explain differences in the PIT burden. These variables are: the household per capita income, a dummy variable that assumes a value equal to one when there is at least one member younger than 18 in the household, the household size, the number of earners per household and the number of workers that are not contributors to the social security system in the household. Additionally, we break down the household income by source in order to capture separately the incidence of all sources: capital income, labor income, pensions, other income (public and private transfers plus self-consumption) and rental value.

We compute and report the marginal effects of the variables for the total proportion. In the case of the household type vector, the effect is the discrete effect of moving from "couple, dual earner" to the household type, valuing the rest of the variables at their mean. For the other variables, the effect is measured for the "couple, dual earner" household valuing the rest of the variables at their mean.
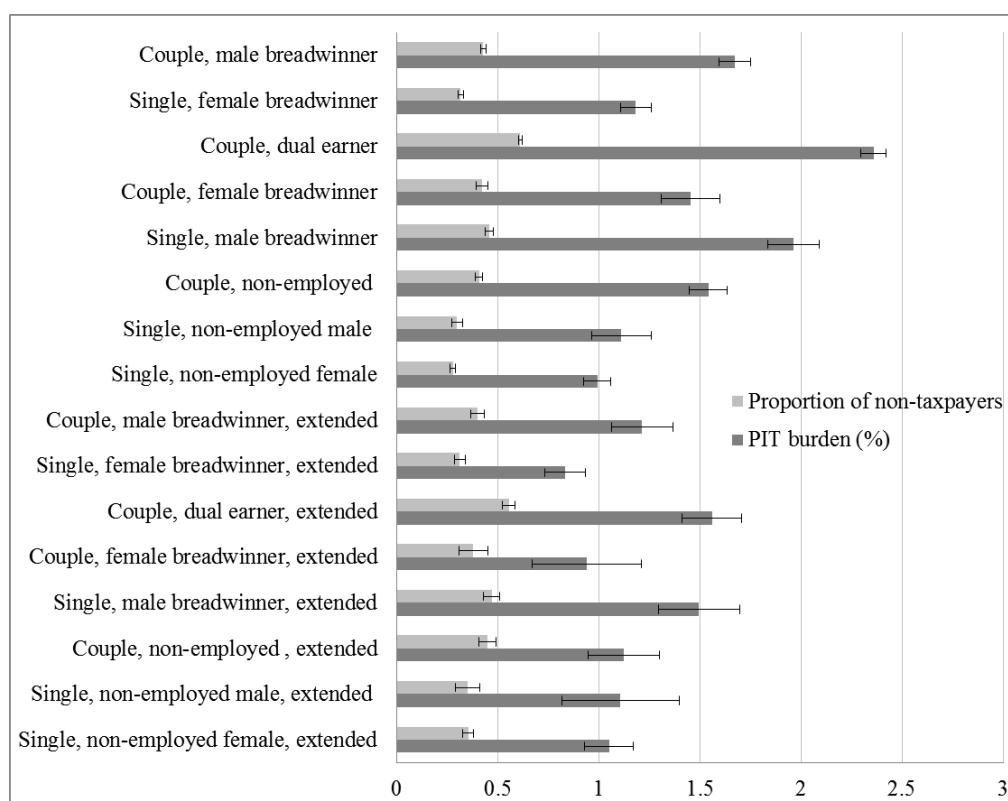
Results

Global incidence analysis

The PIT is a progressive tax. Its Kakwani index is positive and its value is 0.360. Besides, the Gini index declines from 0.426 when calculated with pre-tax income to 0.413 when using post-tax income, reflecting the PIT equalizing effect. However, the distributive effect is limited because of the tax size and exemptions. Around 54% of the population lives in households that do not pay the tax, and the PIT average burden is 1.8% among all the population and 3.9% among the population in taxpayer households.

In Figure 3 we present the incidence of PIT by household type. The dark bar shows the average burden and the pale bar the proportion of non-taxpayers; for both variables, a straight line indicates the 95% confidence interval of the estimation.

At the top we show the five types of non-extended working households. The "couple, dual earner" category bears the largest PIT burden (2.4%) and exhibits the highest proportion of taxpayers (61%). With regards to the rest, there is a gender difference given "single" or "couple" which is captured by the sex of the breadwinner. Indeed, the "couple, dual earner" category is followed by the male breadwinner types, with an average burden of 2% when living with no partner and 1.8% when living with a partner. Finally, the lowest burden corresponds to female breadwinner types: 1.5% when in union or married and 1.2% when lone.

The PIT burden is higher for households of workers than households of non-employed. Among the latter ones, the highest tax incidence corresponds to the "couple, non-employed" type with an average burden of 1.5% whereas the single types bear a burden of around 1%. There are not significant gender differences between single types.

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Figure 3. Average PIT burden and proportion of non-taxpayers by household type.

Source: Authors' calculations based on *Encuesta Continua de Hogares* 2013, *Instituto Nacional de Estadística*

We report the incidence of PIT for extended households following the same order than for non-extended households. Tax burden is lower for extended household and the internal patterns between types are similar to the already depicted.

Exploring differences among non-extended workers' households

In Table 3 we report the (discrete and marginal) effects obtained with the estimations of a set of ZOIB models. The estimated burden gap of household types is estimated respect to the "couple, dual earner" category.

In Model 1 we do not include any control. Thus, the estimated effects replicate the patterns of the raw PIT burden differences already shown: dual earner type has the highest burden, followed by male types and finally, female types.

In Model 2 we introduce per capita income and presence of children as controls. The signs of the marginal effects indicate that the PIT burden increases with income and is higher when there are children in the household. Remind that these variables are not randomly distributed among households. In particular, "couple, dual earner" exhibits the highest per capita income so at least part of their high level of PIT burden is now

captured by income. The introduction of these two controls makes the order (according to PIT burden) of household types to change. Now, the "couple, male breadwinner" type bears the highest burden. The second place is shared by "couple, dual earner" and "couple, female breadwinner" (with no significant statistical differences between them), and the third by single types. Note that the gender differences mentioned for the raw gap remain within the couple types but have disappeared for the single types.

Table 3. Marginal effects estimated by a zero-inflated beta regression

VARIABLES	Model 1	Model 2	Model 3	Model 4
Couple, male breadwinner	-0.0067***	0.0066***	0.0043***	0.0048***
Single, female breadwinner	-0.0116***	-0.0122***	-0.0104***	-0.0056***
Couple, female breadwinner	-0.0084***	-0.0017	-0.0020***	0.0036***
Single, male breadwinner	-0.0045***	-0.0155***	-0.0135***	-0.0155***
Per capita income		0.0240***	0.0241***	
Presence of children (Yes=1)		0.0142***	0.0087***	0.0085***
Household size			0.0039***	0.0043***
Number of earners (labor, capital earnings or pensions)			-0.0007***	-0.0042***
Informal workers			-0.0064***	-0.0047***
Per capita capital income				0.0571***
Per capita labor income				0.0292***
Per capita pension				0.0279***
Per capita public transfer				-0.0037***
Per capita inputed rent of owner-occupied house				-0.0051***
Observations				124987

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Note: the vector of household types includes 16 categories (presented in Table 2); for the estimation we omitted "Couple, dual earner".

In Model 3 we add new controls: household size, number of earners and number of informal workers. Household size has a positive effect. Note that given per capita income, the greater the household size, the higher the total household income. Thus, the positive effect of size is related to the progressivity of marginal tax rates of pensions and labor earnings. The number of earners has negative effect and once again, the progressivity of marginal taxes contributes to explain this sign. Indeed, a certain level of income generates a lower level of PIT when the number of members receiving income is higher. Finally, as expected the number of informal workers (the ones who evade

contributions and taxes on labor income) has a negative effect. Once again, all these variables are not randomly distributed between households. Thus, they contribute to explain the between household gaps. Their introduction reduces PIT burden gap but does not change the order. The reduction is particularly important when comparing n the "couple, dual earner" and the "couple, male breadwinner" types. This is not surprising: the "couple, male breadwinner" type has a higher household size, less earners and less informal workers than the "couple, dual earner" type.
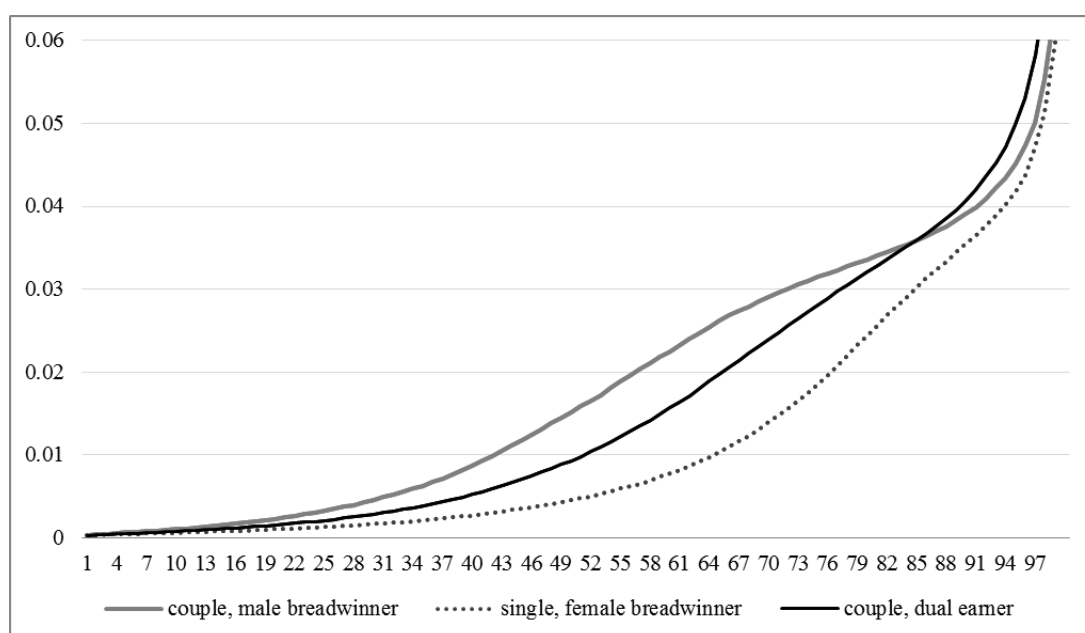
Finally, we estimated Model 4 in which the explanatory variable of income is split in several sources. This is motivated by the difference of the statutory taxes by source in a context in which income structure by source varies between household types. However, the marginal effect of each source is not only due to the different taxes but also to the total level of income. We obtain that capital income has the greater effect, reflecting the higher levels of income of households that are mainly supported by capital. On the other extreme, transfers are more important for poor than rich which is captured through a negative effect on PIT burden. Controlling by income source reduces the gaps if compared with previous Models. Two results merit some comment. First, "Couple, female breadwinner" approaches "Couple, male breadwinner". Second, "single, female breadwinner" approaches "couple, dual earner" and "couple, male breadwinner". These changes stem from the high proportion of non-taxed sources of income among female types. .

In sum, the point of departure indicates that households formed by a couple in which both spouses work bear the highest PIT burden, followed by the typical patriarchal household in which the husband works but not the wife, and finally, the lone mother household. But this order is related to their differences in several characteristics: income level (per capita income and household size), number of earners and sources of income appear to be the most important according to the description in section 2. Once we take into account these differences, families of breadwinner husbands and dependent wives report the highest PIT burden, followed by families in which both spouses work and finally, lone worker women.

These results reflect the average situation. We also did an estimation based on Model 3 in which the household type is interacted with per capita income. In Figure 4 we report the predicted ratio of PIT burden across the per capita income distribution for the "couple, dual earner", "couple, male breadwinner" and "single, female breadwinner" types. The average depicted pattern is clearly identified in the central range of the

distribution of income. Indeed, the "couple, male breadwinner" type bears the highest burden between the percentile 25 and 75. But over percentile 75 the highest burden corresponds to the "couple, dual earner" category and the differences are statistically significant at conventional levels. Meanwhile, the "single, female breadwinner" has the lowest burden level across all the distribution though the magnitude of the gap is lower at the tails.

Figure 4. Predicted of PIT across percentiles of the per capita income distribution for three selected household types.

The burden tax of non-employed

In Table 4 we present the estimated burden gap of the non-employed household respect to "couple, dual earner" type. The Models are the same as the reported in Table 3.

Model 1 reports the non-controlled gaps which reflect that the burden is lower for non-employed couples than for dual earners households. A similar pattern is found for single types: both female and males types bear a lower burden when non-employed than employed. This general finding also holds for Models 2 and 3.

Among non-employed households, the couple type has the highest the burden whereas the difference between single female and single male is very little. The single female and single male difference remains very little in Models 2, 3 and 4 but their gap respect to the couple type is higher than in Model 1.

When estimating Model 2, the controlled PIT burden of the couple type increases in such a way that it surpasses workers' dual earner type. On the contrary, the effect of single types of non-employed decreases; thus, the burden difference between the couple and single types of non-employed increases from around 0.004 in Model 1 to 0.017 in Model 2. The household size and the number of earners introduced in Model 3 make this gap to narrow although the magnitude of the reduction is small: the difference between couple and single types is 0.013. Finally, in Model 4 the gap declines a bit once again (0.012).

The distinction of income sources has a major impact on the comparison of non-employed and workers' households. The distinction of income sources reverses the employment status burden pattern: couples, female and males types bear a higher burden when non-employed than employed. This is related to the differences of the relative participation of pensions and labor income. Remind that the statutory patterns shown in Figure 1 indicate that across per capita income distribution, the PIT burden is higher for pensioners than workers at a broad range of incomes.

In sum, on average the non-employed couples bear a higher PIT burden than single types given per capita income and other demographic characteristics. In Figure 4 we present the predicted ratio of PIT burden across the per capita distribution, calculated in analogous way than in Figure 3. The average pattern holds for ranges of per capita income higher than percentile 25.
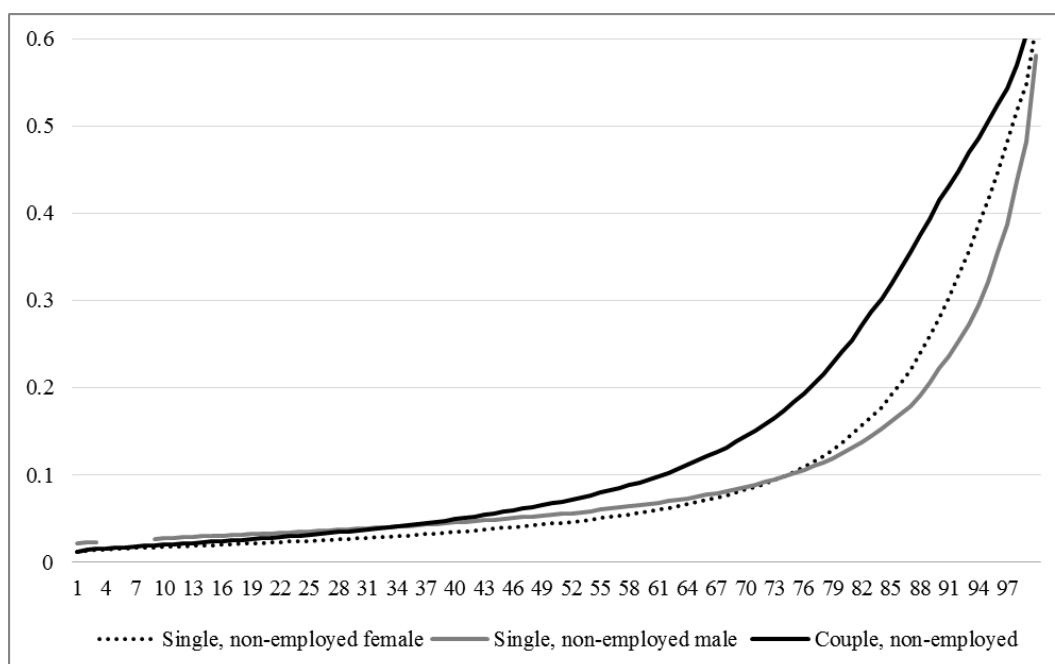
Table 4. Marginal effects estimated by a zero-inflated beta regression.

VARIABLES	Model 1	Model 2	Model 3	Model 4
Couple, non-employed	-0.0+083***	0.0016***	0.0003***	0.0075***
Single, non-employed male	-0.0128***	-0.0152***	-0.0137***	-0.0055***
Single, non-employed female	-0.0132***	-0.0157***	-0.0148***	-0.0049***
Controls		yes	yes	yes
Observations				124987

*** p<0.01, ** p<0.05, * p<0.1

Note: the vector of household types includes 16 categories (presented in Table 2); for the estimation we omitted "Couple, dual earner". Models 2-4 include the control variables exposed in Table 3.

Figure 5. Predicted of PIT across percentiles of the per capita income distribution for the three non-employed household types.

Conclusions

In this study, we analyze the gendered effects of PIT in Uruguay after the introduction of a dual regime with individual filing in 2007. We compare households supported by a worker man who lives with a dependent housewife with households in which both couple members work and households in which a single woman works.

We find that given the per capita household income, PIT incidence is higher for male breadwinner households, followed by dual earner households. This implies an incentive to the equal gender time allocation within the family, which is consistent with a gender unbiased tax. However, male breadwinner households also bear a higher incidence than female breadwinner households with a dependent spouse. Finally, the female lone breadwinner type exhibits the lowest PIT incidence. The low level of tax paid by the female types is explained by the high participation of non-taxed sources in their household income.

We also study three typical types of non-employed households. The non-employed couples bear a higher PIT burden than single types given per capita income and other demographic characteristics

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Another interesting finding is related to the comparison of households of pensioners and workers. Considering that pensioners have a lower per capita income than workers, the burden is lower as well. However, when we compare between recipients, given the per capita household income the pensioners have a higher PIT incidence. This is related to the scheduler income tax, particularly the nonexistence of deductions in the case of pensions.

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