

Distributional National Accounts for Uruguay 2009-2014:

Falling inequality through the lens of DINA*

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Abstract. This paper presents the methodology and results of the estimation of Distributional National Accounts for Uruguay over the period 2009-2014. The main difference with studies for other countries is that detailed National Accounts estimations do not exist for recent years, besides estimations of national income itself. Thus, we build a database that, for the first time, combines all available income data from tax records, household surveys and a variety of secondary sources, which is then scaled up in order to match national income. We present factor, pre-tax and post-tax disposable income inequality series. Results show that inequality fell during the period, led by a moderate increase in the national income share of the bottom 90%, in contrast with the decline in the shares of the top 10% and especially the top 1%. The top 1% share of pre-tax income reached its lowest point in 2014, with an estimated 11% of income recorded by the tax-survey database, and 19% in our DINA series, which accounts for all national income. The large gap between the two estimations is mainly explained by undistributed profits. Factor income inequality is much larger than pre-tax income, whilst post-tax inequality is lower still. Indeed, taxes and transfers reduce the top 1% income share by around three percentage points. In spite of the fall in inequality over the period, new income generated was not evenly distributed. Roughly half (47.8%) of the income growth between 2009 and 2014 was accrued by the “middle 40”, while over a third (35.7%) was appropriated by the top 10%. The bottom 50% captured the remaining 16.5% of new income, a share similar to the top 1%.

* This paper is part of a larger effort of the inequality research group of *Instituto de Economía* of *Universidad de la República*, and hence it builds on previous work by Gabriel Burdín, Fernando Esponda and Andrea Vigorito. Moreover, this study is only possible thanks to the databases and technical support provided by the *Dirección General Impositiva*.

1. Introduction

Although in the European context Uruguay might be considered a relatively high inequality country, historically it has been among the least unequal countries in Latin America. However, income inequality has experienced significant movements over the last 25 years. Based on high-quality household surveys¹, studies have consistently shown that after more than a decade of increases, income inequality has experienced a rapid decline between 2008 and 2012 - illustrated by around seven point fall in the Gini index, in the context of a 5.5% national income growth rate - followed by a relative stagnation from 2013 to 2016. Different methodologies and data sources have been used to measure and analyze this recent evolution. In particular, due to the availability of income tax records since 2009, it is possible to estimate top income shares more accurately. Studies show that the drop of overall inequality seems to be robust to the data source, but tax data based top 1% share shows stability of around 15% (Burdín et al. 2014, 2015).

These data sources, however, have significant drawbacks. In particular, they do not include all income sources and - in the case of tax data - do not account for the entire income distribution. In fact, household survey and the tax records account for just 30% and 55% of national income respectively. What would have been the evolution of income inequality if we could combine the complete income information from these two datasets? Furthermore, what would have been the evolution of income inequality if we could consider all possible income sources, or even all national income?

In this paper we estimate *Distributional National Accounts* (DINA) (see Alvaredo et al. 2017) to provide income distribution estimates for 2009-2014, based on income definitions that are consistent with the macroeconomic aggregates. This will allow us to zoom in on a short period in which income inequality seemed to have fallen and analyze it through the lens of DINA.

Estimations of factor income, pre-tax national income and post-tax disposable income inequality series (see 3.1) are presented. DINA guidelines and all previous work done for countries and regions such as United States, France, China, Russia, India, the Middle East and Brazil, heavily rely on detailed National Accounts as the cornerstone piece of information for the estimation of the series (see section 2). However, Uruguay's National Accounts present very limited information. From 2006 on, estimations of national income are only based on the expenditure and production approaches, but not on the income approach. Moreover, estimates are presented by industries but not by institutional sector. This means that we do not know how much income is accrued by households, government or the corporate sector, nor do we know the labour or capital shares of national income. The only official aggregate reference point that we have is the national income estimation itself. This major drawback, however, is somewhat offset by the availability of high-quality tax and survey micro-

¹ Available from 1986 to 2016, see 3.2.2.

data, as well as a wide range of administrative records on total revenues, deficits, firms' balance sheets, among others.

Thus, the estimation procedure follows a bottom-up approach, and consists of three major stages. In the first stage, we combine all available income information from tax records and household surveys to account for the entire adult population. Essentially, we start with tax data, which covers 77% of the adults aged 20 or more and add, using the survey, non earners and individuals with exclusively informal or untaxed incomes. We then impute all remaining informal or untaxed incomes from the survey to very similar individuals in the tax data -in terms of incomes, sex, age and income sources-. Population and incomes are then adjusted so that they match official estimations (of total population projections, non contributory pensions, cash transfers, social security contributions, etc). This database accounts for around 60-65% of national income. In the second stage, we impute all remaining tax revenues (including indirect taxes and taxes on production) and social security deficits, as well as undistributed profits reported in firms' balance sheets. This procedure allows us to reach around 70% of national income. In the third and final stage, we scale up proportionally labor, capital and mixed incomes in order to match aggregate estimates of national income, based on the official estimates (available until 2005) extrapolated based on the evolution of the corresponding aggregates in the household survey. By construction, the second and third estimation stages are identical in distributional terms, but the former accounts for around 70% of all national income whilst the latter accounts for all, and thus it represents the full DINA-based estimation.

In each estimation stage, aggregate income estimations account for an increasing proportion of national income, but also entail a growing number of assumptions. In the first stage, we depart from highly reliable micro-data sources, over which we impute first 5-10% in the second stage, and finally an additional 30% of national income in the third and final stage. The size of the imputations call for a cautious reading of the final estimates. This is why we estimate income inequality series for the three stages, in order to be able to track and account for changes in the level and evolution of the inequality series at the different imputations stages.

Results show that inequality fell during the period 2009-2014, led by a moderate increase in the national income share of the bottom 90%, in contrast to the decline in the shares of the top 10% and especially the top 1%. The top 1% share of pre-tax income reached its lowest point in 2014, with an estimated 11% of income recorded by the tax-survey database, and 19% in our DINA series, - that accounts for all national income - departing from an initial share of 12.5% and 22% respectively.

The large gap between first and second-third stage estimations is mainly explained by undistributed profits, estimated based on firms' tax records, which represent around 5% of national income and prove to be a crucial income source as results are extremely dependent of it. The imputation of undistributed profits is important since may be

considered as way of saving for firms' owners, but is highly delicate since a proxy for firms' ownership is needed. Utilities and dividends are an inaccurate choice in the Uruguayan case since very few firms actually distribute them and so they are extremely concentrated (see 4.3.2). Most profits remain in the firm, were they are essentially untaxed, or are withdrawn through bank accounts that are shared between firms and owners. Thus, imputing all undistributed profits based in these incomes would entail an artificially large concentration in top earners (almost 90% to top 1% and 60% to top 0.1%). That is why we use as a proxy of firms' ownership the sum of all taxable capital incomes, which include incomes from real estate, insofar there is evidence that individuals invest simultaneously in business sector and in real state. Thus, we believe this to be a more accurate proxy, but it still entails a large concentration of undistributed profits imputations which affect results of the second and third imputation stages.

Factor income inequality is much larger than pre-tax income - as it includes social security contributions but excludes pensions - whilst post-tax inequality is lower still. Indeed, taxes and transfers reduce the top 1% income share by around three percentage points. In spite of the fall in inequality over the period, new income generated was not evenly distributed. Roughly half (47.8%) of the income growth between 2009 and 2014 was accrued by the "middle 40", while over a third (35.7%) was appropriated by the top 10%. The bottom 50% captured the remaining 16.5% of new income, a share similar to the top 1% (14.2%), which is 50 times smaller in terms of population.

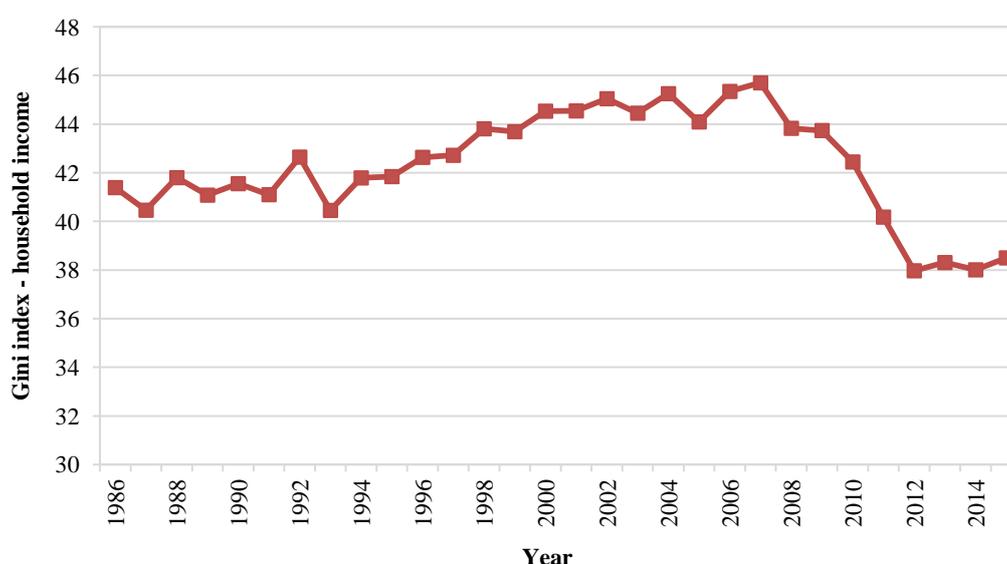
The contribution of this paper is twofold. First, we improve previous top income share estimates for Uruguay (Burdín et al. 2014, 2015, WID.world), by combining all available income information from the tax records and the household surveys, which entails not only adding informal workers and non-earner adults as in previous studies, but also imputing informal and untaxed incomes to the formal population. These imputed incomes include, in particular, owner occupied rental income, social and health contributions and cash transfers, which have a significant distributive impact. We believe this to be an important contribution in its own right. We also make these estimations fully consistent with national income estimates and, at the very least, show the significant gap that exists between macro and micro-data.

Second, the case of Uruguay may be important as it is one of the few developing countries to undertake the effort of building DINA series, and hence, it may be informative of the methodological specificities, problems and possible solutions in such contexts. We intend to adapt the DINA framework to a developing country with severe National Accounts information limitations, and with high informality rates compared to the rich countries. Hence, our estimations rely on high-quality micro-data both of individuals and firms. Even though all the estimates presented should be considered as preliminary, the methodological difficulties of this specific context may be important in similar ones.

2. Background

Uruguay is a small South American country with around three and a half million inhabitants and roughly two and a half million adults². After decades of unstable economic growth and recurrent economic crisis, it has sustained an average annual growth rate of around 4% in the last thirteen years, reaching a per-capita GDP of USD 21,625, around 40% above the Latin American average, but around a half the average of the OECD countries³. Economic growth, coupled with a series of relatively large reforms both in the labor market and in the tax and transfers system put in practice by a center-left coalition in office since 2005, turned into a rapid decline in income inequality. These reforms included a major raise in the minimum wage, the restoration of centralized, collective wage bargaining, an expansion of both coverage and amount of non contributory cash transfers schemes, and a tax reform that introduced progressive income taxation (more on this in 3.2.1). As depicted in Figure 1, income inequality experienced a major downturn over the 2008-2013 period and stagnated afterwards⁴.

Figure 1. Per capita household survey-based income inequality 1986-2015



Source: own elaboration based on household survey

Until recently, the studies that analyzed personal income distribution were mainly based on the household survey (see 3.2.2). Since 2009, the availability of income tax data has allowed for a different approach (Burdín et al. 2014, 2015). In general terms, overall inequality (measured using same income definitions and units of analysis for both data sets) falls in estimations based on income tax data, though less steeply and from a higher level than in the survey. Even though inequality measured with synthetic indexes such as the Gini or Theil drops in both databases, top income shares show stability in tax data of about 15% in 2009-2014, but a drop from 11.6 to 8% in the survey. This is

² We consider adults as individuals with twenty years or more.

³ Values in PPP. <https://data.worldbank.org/>

⁴ During the falling inequality period, the gross national income growth rate was around 5.5%.

somewhat unsurprising, since the comparison shows that the survey underestimates incomes from top earners, especially capital incomes, which are almost entirely accrued by top earners (located at the far right tail of the distribution). This is consistent with findings for other countries. Moreover, it shows the increasing difficulties of the survey to capture adequately top incomes.

The estimation of top incomes shares of Burdín et al. (2014, 2015), refers essentially to what is called fiscal income in the DINA literature. In those studies, population with exclusively informal or untaxed incomes, as well as individuals with no incomes at all, is accounted for, but not all their incomes are considered. In particular, social and health contributions, cash transfers and owner occupied housing imputed rent were not taken into account. These incomes may have significant relevance in the bottom of the distribution. Moreover, as there is no imputation of informal or untaxed incomes for the tax data individuals, there is an implicit assumption that they exclusively receive formal and taxed incomes, which may be particularly problematic at the bottom of the distribution.

The literature on top incomes has been expanding over the past fifteen years, combining fiscal data, survey data and National Accounts. Long run series of top incomes shares have been estimated for many developed countries (Atkinson & Piketty 2007, 2010; Atkinson, Piketty, & Saez, 2011). The World Wealth and Income Data Base (WID.world), now assembles all available estimations of both income and wealth levels and distributions for an increasing number of countries over time. This effort is being expanded both in geographical and time coverage.

There are a number of countries for which there has been considerable progress in DINA-based series estimation. In all cases, National Accounts, survey and income tax data, as well as a range of secondary sources are used in order to produce inequality estimates.

In the case of United States, DINA-based estimates of pre and post-tax income inequality are available from 1913 onwards (Piketty, Saez, & Zucman, 2016). Although average pre-tax income increased 60% since 1980, for the bottom 50% of income distribution it has remained stagnant, while for the top 1% it grew 27 times. They also show that the redistributive power of the government appears to be rather limited, only partially offsetting this increase. Tabulated income tax and survey data is combined, with explicit assumptions made for unaccounted income in order to make total income consistent to macroeconomic aggregates. Thus, in terms of the survey-tax reconciliation, they depart from income tax data and then estimate the probability of receiving each of the untaxed income sources by income groups, and then assign the average income amount of the corresponding group in the survey. Finally, they then adjust the number of income earners and/or the average amount in order to match macroeconomic totals.

Distributional national accounts for France are presented in Garbinti, Goupille-Lebret, & Piketty (2016) for 1900-2014. The previously documented U-shaped pattern of the income distribution is also found, although higher levels of inequality are reported in relation with previous evidence (Piketty, 2003). They depart from the income tax data and then adjust these estimations using both national accounts and surveys. In order to account for non taxable capital income, they randomly assign assets (owner-occupied housing, deposits, life insurances) to categories defined on the basis of age, financial, labour and replacement incomes, and then compute the corresponding income flows from those assets.

In the case of China, wealth levels and income inequality have been estimated for 1978-2015 by Piketty, Yang, & Zucman (2016). Wealth-income ratio rose from 350% to 700%. Income inequality, on the other hand, used to be closer Northern Europe Countries, and is now similar to US, with a top 10% share around 41%. In order to estimate income inequality, they depart from household survey tabulated income data and adjust them using income tax data on high-income tax payers. Finally, national accounts and wealth surveys are used to account for tax-exempt capital income. They argue that survey data is reliable up to the 90th percentile, and that income tax data is reliable from the 99.5th percentile on. Between these two points, they adjust the income survey data upwards based on a linearly increasing factor that ranges from 1 in p90 to the tax-survey ratio of p995 (about 1.3-1.6).

Very similarly, in DINA estimations for India presented by Chancel & Piketty (2017), survey data is adjusted based in tax data tabulations. Up to percentile 90, survey data is assumed to be reliable (although sensitivity tests are performed with different thresholds) and tax data Pareto interpolations are used for top fractiles. In this case, the scaling up from fiscal income to national income is performed proportionally, thus preserving the estimated distribution but matching national accounts aggregate estimates. Results are presented from 1922 to 2014, and so interpolations for a number of years are carried out for both tax and survey data. Moreover, as survey data does not have information on household income but only on expenditure, income is estimated based on consumption profiles. Results show that top 1% shares are at its maximum level since the introduction of the income tax in 1922. The top 1% of earners captured less than 21% of total income in the late 1930s, before falling to 6% in the early 1980s and rising to 22% in 2014.

Novokmet, Piketty, & Zucman, (2017) carry out estimations of income and wealth distribution for Russia based on National Accounts, surveys and newly available tabulated tax income data. They find a rapid increase of inequality over the post-soviet period. Departing from high inequality levels in 1905, with a top 10% share of 40-45% and a top 1% of 20%, income inequality was reduced during the soviet era, reaching a top 10% share of 20-25% and a top 1% of around 4%. In the 1990s, inequality rose dramatically and at present it is slightly higher than at the beginning of the 20th century. In order to estimate the corresponding series for recent decades, the authors departed

from the available household surveys and, alike the Chinese case, they adjusted incomes upwards based on tax records tabulations for top income brackets and on a linear factor from p90 to the top. National Accounts data is used to impute untaxed capital incomes. For the soviet era, tabulated income data and surveys were used when available. Over the pre-soviet period, a table that was estimated by Tsarist tax authorities in 1905 in preparation for the possible introduction of an income tax was used.

A similar study by Alvaredo, Assouad, & Piketty (2017) is performed for the Middle East, which relies on household surveys, income tax data, wealth rankings and national accounts. Middle East is defined as the region going from Egypt to Iran, and from Turkey to the Gulf countries. They start by gathering a database including annual series on population, national income and as much distributional data-bases as possible for different countries between 1990 and 2016. Survey data, when available, is corrected upwards using the generalized Pareto interpolation based on Lebanese tax micro-data. Survey data is assumed to be accurate up to the 80th percentile, and adjusted upwards in the same way as in the Russian and Indian papers. Rich lists and national accounts are used to impute tax-exempt capital income. In the benchmark series, the Middle East appears to be the most unequal region in the world, with a top decile income share of 61%.

Finally, Morgan (2017) studies the case of Brazil, where estimations show that the already high inequality levels exhibit an increase during 2001-2015, reaching a top 1% share among 25-28% in the last year. The top 10% and the bottom 50% experienced gains during the period, but whilst the former captured 61% of total growth, the latter only captured 18%. The “middle 40” share decreased, and so inequality among the bottom 90 declined, but this downturn was offset by the increase in the top shares. The tax tabulated data used accounts for the top 20% of the distribution, and thus a centile distribution is estimated using generalized Pareto for this group (Blanchet, Fourniere, & Piketty, 2016). In the benchmark estimations, the departing point is the survey data, which is upwards corrected by centile, starting at the point in which the tax-survey average income ratio is higher than one (around p90). Finally, investment income attributable to pension and insurance funds held by individuals, imputed rents and undistributed profits are imputed using National Accounts aggregate estimates proportionally to financial income distribution.

In this paper, we estimate DINA based series that may be compared with this recent and rapidly expanding literature.

3. Definitions and data sources

3.1. Income definitions and unit of analysis

We estimate inequality series of factor income, pre-tax national income and post-tax disposable income for 2009-2014. Following Alvaredo et al. (2017), factor income refers to the sum of all income flows accruing directly or indirectly by the owner of production factors, before tax-transfers and social security payments. The main difference between factor income and pre-tax national income relies in the treatment of pensions, which are accounted on a distribution basis for the pre-tax national income and on a contribution basis for factor income. Finally, post-tax disposable income (post-tax hereon), includes the effect of the tax-transfers system.

For each of the three definitions, a wide range of income sources are included, and some incomes, such as taxes or pensions, may be included as part of individual's income in one but not in the others. Table A. 1 of the appendix contains a detailed description of incomes sources included in each income definition and the corresponding data sources.

In the DINA framework, both factor and pre-tax national income must match national income by construction. Post-tax disposable income is necessarily lower because it does not include in kind government spending. Thus, factor and pre-tax DINA series must account for the distribution of total national income, which is defined as GDP minus capital depreciation plus net foreign income.

Following DINA guidelines, the unit of analysis is individualistic adults or equal-split adults. In the equal-split series, income is divided among cohabiting adults ("broad equal split"), whilst in the individualistic series income is attributed to each individual income earner. In this paper, as most income from the tax data and the survey is attributed to a single individual, our series could be considered mostly individualistic.

The Uruguayan personal income tax is collected on an individual basis and households are not identified. Joint taxation by couples is allowed but rather rare (see 3.2.1). In the case of the household survey most incomes are attributed to different earners, but there are some exceptions, such as incomes from real estate ownership, as well as owner occupied housing rent, are reported by the household as a whole. In this paper, we split them equally within the adult members (see 4.2.3). In the case of non contributive child transfers (which are matched when possible or otherwise imputed (see 4.2.4)), the same procedure is performed and incomes are distributed between all adults.

For the reasons described above, most incomes are attributed on an individualistic basis, though a few are equal-split. We believe that this unit of analysis definition is the most accurate description of reality that we can obtain given the data restrictions, but we should stress that is insufficient. In particular, due to the nature of tax records, we are not able to analyze household incomes, which for some purposes is very important.

3.2. Data sources

3.2.1. Income tax records

The Uruguayan tax system is mainly based on indirect taxes, which represent roughly 65% of total fiscal revenue. The personal income tax was originally established in 1961, but in 1974, the military government that took power in 1973 abolished both the personal income and the inheritance tax. In 2007, personal income tax was reintroduced in the context of a broader reform implemented during the first government of the center-left party *Frente Amplio*. The reform included a dual personal income tax (*Impuesto a las Rentas de las Personas Físicas*, IRPF), combining a progressive tax schedule on labour income with a flat tax rate on capital income and the preexisting corporate income tax (*Impuesto a las Rentas de las Actividades Económicas*, IRAE). Pensions were originally included in IRPF as labour, but soon after the reform, this component was declared unconstitutional. As a result, pensions were no longer taxed within the IRPF scheme; instead, a new and separate tax on pensions was passed in July 2008, known as *Impuesto de Asistencia a la Seguridad Social* (IASS).

The tax administration, (*Dirección General Impositiva*, DGI) created special databases for research purposes, merging the universe of IRPF and IASS records for 2009-2014. In this way, for each individual we have information on taxable income for the following sources: capital, pensions, labour income, both pre and post-tax. Additionally, each record contains information on sex, age, industry for each occupation, employer (salaried or self-employed) and deductions. Tax rates are depicted in Table 1.

Table 1. Income categories and tax rates of IRPF and IASS

Panel a) IRPF: Labour income			
2009-2011		2012-2014	
Annual income in USD ⁵	Tax rate	Annual income in USD	Tax rate
0 - 10,600	0%	0-10,600	0%
10,600 – 15,150	10%	10,600 – 15,150	10%
15,150 – 22,720	15%	15,150 – 22,720	15%
22,720 – 75,750	20%	22,720 – 75,750	20%
75,750 – 151,510	22%	75,750 – 113,630	22%
151,510 or more	25%	113,630 – 174,320	25%
		174,320 or more	30%
Panel b) IASS: Pensions			
Annual income in USD			Tax rate
0 – 12,120			0%
12,120 – 22,720			10%
22,720 – 75,750			20%
75,750 or more			25%
Panel c) IRPF: Capital income			
Capital income category			Tax rate
Interests from bank deposits in Uruguayan currency or UI for an year length or less			3%
Interests from bank deposits in Uruguayan currency or UI for an year length or less with no adjustment clause for an year or more			3%
Interest, obligations and other securities 3 years or more length			5%
Copyrights			7%
Profits, dividends and benefits			7%
Sports rights			12%
Participation certificates (issued by financial trusts)			7%
Remaining financial and non-real estate capital			12%
Real-estate capital			12%
Capital gains			12%
Dividends or benefits from IRAE contributors			7%
Imputed rents by non-resident entities			12%

Source: DGI

In the case of labour income and pensions, as the Social Security Institute (*Banco de Previsión Social*, BPS) is the withholding agent, the information included in the micro-data refers to the whole universe of workers contributing to the social security or pensioners, independently on whether they are net tax payers or not⁶. Comparisons to the household survey and the population projections show that income tax records account for approximately 75% of adult population and 80% of workers. In this last case, the difference corresponds to informality. As mentioned above, the tax unit is the individual, but married couples have the chance of filling a joint tax return in the case of

⁵One *Bases de Prestaciones y Contribuciones* (BPC) is about USD 130.

⁶ Those individuals having only one occupation do not need to file a tax return, as the withholding operates as one. Only 14% of workers file tax returns.

labour income. However, less than 2% of the individuals included in the tax records choose this regime.

Taxable incomes include wages, salaries, commissions, overtime payments, vacation payments, annual leave, end of the year payments, per diem stipends not subject to return and any other payments received from employers are considered taxable income. Unemployment, illness and maternity subsidies, accident insurance and unemployment benefits and child allowances are excluded from taxable income.

The data-base disaggregates salaried and self-employment earnings. Additionally, DGI provided information on income and income tax for those personal services societies that chose contributing IRAE and not IRPF⁷. These cases were incorporated to our database.

Capital incomes are divided into rents from real estate and lease and financial and profit rents. In the first group, those individuals having housing rents whose annual value is below USD 5.000⁸ are not subject to IRPF, in case they choose to make their bank information publicly available and do not have other capital rents higher than USD 379 a year. The second group includes all cash or in-kind rents coming from bank deposits and other financial assets, business profits and utilities distributed by those firms contributing to entrepreneurial income tax (IRAE), copyright among others. Among this group, public debt interests, gains obtained from private capitalization pension accounts and business profits distributed by firms with total annual revenue lower than USD 500.000⁹ are exempt from IRPF and from filing a tax return. The same holds for the personal services sector if individuals choose contributing IRAE. Banks, real estate agencies and institutions in charge of payments are set as withholding agents in most cases; if not, individuals need to file a tax return.

Finally, national personal property taxes are matched to the income tax database¹⁰. Less than 10.000 pay this tax, which has a relatively low enforcement and that will be gradually eliminated in the next few years.

3.2.2. Household Surveys

The National Statistical Office (*Instituto Nacional de Estadísticas*, INE) gathers the household surveys since 1968. At present, these surveys are carried out throughout the whole year and collect information in detail on household composition, labour force status and other related outcomes, socioeconomic variables and personal income by source. During the period covered by this research, the sampling framework was the

⁷Self-employed workers with annual revenue lower than 4 million “Indexed Units” (approximately USD 520,000), can choose to pay IRAE, with a flat rate of 25%. All self-employed workers can deduce up to 30% from their income.

⁸ The non-taxable income is determined in *Bases de Prestaciones y Contribuciones (BPC)*. It is a unit of measure that is updated annually by the consumer price index.

⁹ The USD500.000 correspond to 4.000.000 UI or “Indexed Unit”.

¹⁰ Most real estate taxes are local. See 4.3.1 for a description of the imputation procedure of these local taxes.

2012 National Census 2011/12. Since 2006, ECH are representative of the whole country, including rural areas (which account for 15% or less of the population). The micro-data include a weighting factor that expands the results to the corresponding population projections estimated by INE-CELADE for each year. Sample size were approximately 46,000 households over the period.

After-tax labour income is gathered for each household member aged 14 years or more, including cash and in-kind earnings for salaried workers, self-employed and business owners. Information is separately recorded for the main occupation and the remaining ones. The survey also gathers information on the contributory status of the labour force in each occupation. Salaried workers are also asked on whether they contribute to the social security system for their whole earnings or they underreport.

A separate set of questions gathers information for non-salaried workers in agriculture, collecting information on sharecropping and cattle pasturage and capitalization. Except for profit withdrawal in the case of self-employed and business owners, capital income is captured in the household questionnaire. Each item is added up by the respondent for the whole household, and, hence, individual information cannot be recovered. Interests, dividends, rents, benefits and imputed value of owner occupied rental income are gathered in separate questions.

Transfer income is collected for each individual and questions allow to disclose their origin (public/private, domestic/foreign) and the type of benefit in pensions (retirement and survival), contributory and non contributory child allowances, unemployment insurance, accident compensation and other benefits.

3.2.3. National Accounts and secondary data sources

As mentioned earlier on, in order to estimate distributional accounts in the DINA framework, it is necessary to construct income series fully compatible with national accounts concepts. Ideally, we should depart from detailed National Account estimations, but unfortunately that is not the case in Uruguay. Uruguay's National Accounts present estimations of national income based on the expenditure and production approaches, but not on the income approach. Moreover, estimates are presented by industries but not by institutional sector. This means that we do not know how much income is accrued by households, government or the corporate sector, nor do we know the labour or capital shares of national income. The last time Uruguay's Central Bank (*Banco Central del Uruguay*) updated the income generation account was 2005, and estimations by institutional sector are not available since the late 1990's.

The only official aggregate reference point available over the period is the national income estimation itself. Moreover, only the Gross National Income aggregate are available, and unofficial estimations of capital depreciation (of around 8% of GDP¹¹) are used to compute Net National Income. Hence, the final estimation step (scaling up

¹¹ Castro Zaballa (2010) y Basal, Gianelli, Mourelle y Vicente (2010).

the income distribution estimated as from survey and tax data to national accounts totals) requires further work in this case (see 4.3). The aggregate income estimations corresponding to the different primary income components are obtained from updated NAS estimations based on the household survey and secondary data sources (De Rosa et al. 2017). Thus, it is possible to use estimations of aggregate labour incomes (including social security contributions), the gross operating surplus, taxes net of subsidies and mixed income. The latter may be decomposed into labour and capital incomes.

3.2.4. Secondary data sources: social transfers, total revenues and undistributed profits

To compute a DINA-based income inequality series, a wide range of auxiliary data sources is necessary are used. The first one corresponds to the administrative records of a non-contributory child allowances (*Asignaciones Familiares-Plan de Equidad*). In this database, the entire universe of non-contributory child allowances are covered¹² and assigned to the adults of the household where the eligible children live. In 2014¹³, more than 350,000 adults received this transfer¹⁴, 160,000 of who were also in the personal income tax record (see 4.2.4).

An auxiliary table provided by DGI contains the total amount of taxed incomes and taxes for those cases in which earners cannot be singled out. This is the case of non-nominative shares, equities, securities, dividends or interests coming from bank deposits which are subject to the bank secrecy act. Approximately 40% of capital income throughout the period was non-nominative. All remaining aggregate tax revenues are annually reported by DGI, broken down by individual tax. Local taxes, which have a significant component of property taxes, are reported by the National Planning Office (*Oficina de Planeamiento y Presupuesto, OPP*).

DGI also provided firms tax records for the period 2009-2012 (Table 2). As stated before, firms pay the corporate income tax (*Impuesto a las Rentas de las Actividades Económicas, IRAE*). Firms with annual revenues under USD 500.000 (4 million indexed units) pay a lump fix tax and are not required to submit a balance sheet. Firms above that threshold pay 25% of IRAE over the net operating surplus and are forced to present annual balance sheets. These firms report their total profits, and as total distributed profits are provided by DGI, computation of total undistributed profits is straightforward. It is worth mentioning that the data includes public sector firms. This is different source that what is described in DINA guidelines, National Accounts do not provide this information, but it may actually be an advantage as it comes from tax microdata.

¹² They represent over 77% of the total child transfers.

¹³ This administrative data set is only available for that year, but due to the nature of the transfer, it does not vary significantly.

¹⁴ The beneficiaries of this transfer are children under age 18, so the adult receive the transfer refers to those over 20 who belong to households with one or more beneficiaries.

Table 2. Firms tax records 2009-2012

	2009	2010	2011	2012
Firms	174,708	175,447	189,156	177,969
Firms above threshold	80,714	81,863	86,813	91,148
Firms above threshold without public sector	76,246	77,369	82,032	86,857
Firms that distributed profits (nominative and non-nominative)	1,119	3,182	7,148	2,349
Firms that distributed nominative profits	747	1,137	1,335	1,580

Source: own elaboration based on DGI firms data

4. Estimation of DINA series

In this section, a detailed explanation of the construction of the DINA series is presented. As mentioned before, the lack of detailed National Accounts makes the Uruguayan case different from others, as there are no clear aggregate reference points for the estimations, besides the national income series itself. Thus, the estimation will be essentially “bottom-up”, that is, departing from a combined tax records-survey micro database, we carefully impute as much income as possible from different data sources, and finally scale up to match national income aggregates.

In each stage of the imputation, we increase the distance from the original micro databases, which are, in our view, high quality data sets, and so they represent a very important reference point. The second stage is the distribution of these incomes plus the imputation of all incomes for which administrative totals exist or can be computed, and thus covering all possible income sources. In the final stage, incomes are scaled up and so they are consistent with the National Accounts but keeping the distribution of the second stage intact. In this section we describe the process of estimation of factor income, pre-tax income and post-tax disposable income in the three stages.

4.1. Overview of the method

The process of DINA-based series construction for the Uruguayan case is depicted in Table 3¹⁵. It consists of three major stages. In the first stage (see 4.2), for each income definition, we depart from the tax micro data, which covers around 77% of adult population, and all formal and taxable labour and capital incomes plus pensions. We include the remaining population and their incomes using the household survey, reweighting the number of cases so that the total population is consistent with the population projections corresponding to adults aged 20 or more. Informal and untaxed incomes are imputed to tax records individuals using the household survey, and social security contributions are computed for each one based on the existing regulations. After that, incomes are adjusted to match existing administrative income totals (pensions, social security contributions, interests from deposits, etc). This database, that accounts for all adult population and combines all incomes from the tax records and the survey. Taking as a reference the pre-tax national income, the incomes up to this point represent around 64% of National Income for 2014¹⁶.

The second stage (see 4.3) consists on imputing undistributed profits and all remaining taxes and social security deficits. The undistributed profits totals come from tax records of the corporate and non profits sector, and total revenue by type of tax is reported by the tax authority (DGI), the Central Bank (BCU) or the Planning Office (OPP). These are imputed to the previous database and account for around 70% of national income in the pre-tax series. Note that, once these incomes and taxes are incorporated, all incomes

¹⁵ The percentages presented refer to the year 2012, but are almost identical for the complete series.

¹⁶ This proportion of National Income has been increasing systematically, departing from 59.9% in 2009.

accrued by households, government or the corporate sector¹⁷ are already considered, and thus we are accounting for all incomes that should be included in the factor, pre-tax or post-tax disposable income definitions.

In the third stage (see 4.4), labour incomes, capital incomes and mixed incomes are scaled up in order to match previous estimations of national income functional distribution. In the this final stage, total incomes matches the national incomes total for the factor and pre-tax incomes, and around 74% for post-tax disposable as it does not considers (by construction) in kind government spending. In Table A.62 of the appendix, contains in-detail estimations of aggregate imputations for the entire period.

*Table 3. Overview of the imputation stages (% of national income). 2014**

	Factor Income	Pre-tax income	Pos-tax disposable income
Incomes in tax records (formal and taxable incomes)	45.9%	49.6%	46.6%
Incomes in survey (informal taxable income)	3.7%	4.6%	5.1%
Informal or non taxable incomes accrued to individuals in tax records	9.3%	9.9%	10.3%
First stage	58.9%	64.2%	62.0%
Other taxes (and transfers) not present neither in tax records nor in the household surveys, but available on official aggregates, are imputed	6.4%	1.1%	-23.0%
Net undistributed profits are imputed based on Firms balance sheets	5.0%	5.0%	5.0%
Second stage	11.4%	6.1%	-18.0%
1st + 2nd stages	70.3%	70.3%	44.0%
Labour income is scaled up to match aggregate estimation	3.0%	2.3%	2.2%
Capital income is scaled up to match aggregate estimation	12.6%	12.5%	9.8%
Mixed income is scaled up to match aggregate estimation	12.4%	11.0%	10.5%
Others income is scaled up to match aggregate estimation	1.7%	3.8%	7.1%
Third stage	29.7%	29.7%	29.7%
Total % of national income	100.0%	100.0%	73.7%

Source: own elaboration based on ECH and DGI. Each panel represents total income in terms of national income for each estimation stage. Within each panel, in the rows total income corresponding to different estimation/imputation steps in each stage are depicted. Columns present these estimation stages for each of the three income definitions considered. *Remaining years in Table A2 to Table A6 of the appendix.

¹⁷ As mentioned in 3.2.4, all firms above a certain revenues threshold, are required to present their balance sheets. This is the case for all types of firms, thus including financial, non-financial sector as well as non-profits sector.

4.2. First estimation stage: the construction of the combined tax-survey micro database

4.2.1. The starting point: income tax records

We depart from the income tax data and add the missing population and their incomes. We assume that the information provided by the income tax data source is accurate, in the sense that all the people that receive formal and taxed incomes are in the data base and that they do not under-report (although they may have informal or untaxed income). This assumption entails the usual evasion and elusion caveats.

We consider all the available information at the income tax records, except for the capital gains (as they are too lumpy) and individuals with zero income or younger than 20 years old. As described above, in this database we cover all formal labour income (both taxed and untaxed), taxed and nominative capital incomes and pensions (Table 4).

4.2.2. Missing population

There is a 20-25% missing population in the tax records due to informality and inactivity of people in working age, which is a salient developing country feature¹⁸. This population is incorporated using information from the household surveys. Observations are brought in with all their informal or untaxed incomes, if they have any. These include, essentially, informal labour and capital incomes¹⁹, owner occupied rental income, unemployment insurance, other incomes (for example, payments in kind) and transfers²⁰. In the cases in which income is reported on the household basis and not separately recorded for each individual, typically owner occupied rental income, it was split equally between all adults within the household. Moreover, interests from deposits are also included. Although interests are formal and taxed, this information is not available in the income tax records due to banking secrecy, as mentioned above.

In this way, we add around 500.000 new individuals, which account for 20% of total adult population (see Table 5). This population is adjusted by applying a factor of 110% to the survey weights, in order to match the number of adults in the database with the official population estimates based on the last census. It is worth mentioning that in some years, the adjustment ratio is smaller than 100%. In those cases, incomes lost due to informal earners population reduction are redistributed among the same groups of earners.

In the end of the whole process, these incomes will represent almost 15% of total income in the main database.

¹⁸ In this paper, we refer to informality as non contribution to social security system. Note that it is different from the National Accounts notion of informality, which refers to production of households.

¹⁹ Formal but untaxed dividends and utilities cannot be singled out in the survey, as it does not report enough information about the firm.

²⁰ This includes both child transfers and other transfers. For the population with formal and taxed incomes, a distinction between them is made as it is possible to link with administrative micro-data on non-contributory child transfers. See 4.2.4.

Table 4 Number of cases by database and income source- 2014*

	Number of adults	% of total population
Total population**	2,451,525	100%
Population in tax records	1,901,037	77.5%
Labour income	1,152,240	
Labour and capital income	29,861	
Labour income and pensions	73,761	
Labour, capital income and pensions	4,365	
Pensions	572,731	
Pensions and capital income	26,069	
Only capital income	31,778	
Population with zero income	10,232	
Total population in survey	2,448,503	
Non earners and informal-untaxed incomes earners from survey	498,117	20.3%
Non earners adjusted***	550,488	22.5%

Number of earners by income source is depicted in the first panel. Number of non-earners and individuals with exclusively informal or untaxed incomes from household survey, and its adjustment to match total population of 20 years or more, is depicted in the second panel. *Remaining years in Table A 7 to Table A 11 of the appendix. ** Official population projections. ***Applying a factor of 110% to the survey weights Source: own elaboration based on ECH and DGI

4.2.3. Informal or untaxed incomes of individuals from tax records

Up to this point the data base accounts for those individuals with (i) exclusively formal and taxable incomes; (ii) exclusively informal or untaxed incomes or (iii) non earners. But informal or untaxed incomes accrued by people with formal and taxed incomes (that is, individuals in the tax records data base), are still missing. These are essentially those income sources described in 4.2.2, with the exception of child transfers, which were directly matched to these individuals from administrative records of transfers (see 4.2.4). Interests from deposits -although neither informal nor untaxed- also need to be imputed since they are not available in the tax records database due to banking secrecy.²¹

All these incomes are imputed using the household survey as follows: (i) individuals are organized in the incomes tax base and in the survey in groups defined by: age²², gender, type of formal and taxed incomes perceived²³, and income groups²⁴; (ii) informal and

²¹ On the other hand, formal but untaxed dividends and utilities, cannot be singled out in the survey, as it does not report enough information about the firm. Hence, it is not possible to account for this kind of income in the final data base. As the income tax data accounts only for taxed dividends and utilities and the survey for all, the total amount of the latter should be much larger than the one of the former. But, as the survey has severe limitations in references to capital incomes, the situation is exactly the opposite (total dividends in survey represents only the 82% of the taxed dividends present on tax micro-files), which does not enable us to make any assumptions about this income.

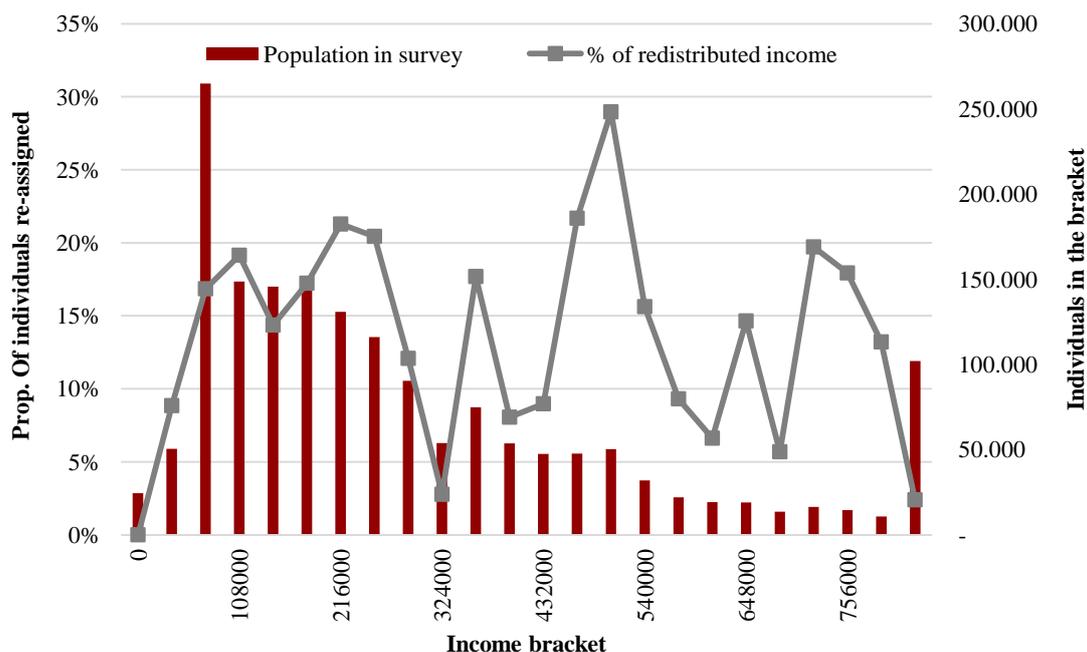
²² Four age groups: 20-34, 35-49, 50-64 and 65 or more.

²³ Eight categories with all possible combinations of formal labour income, formal capital income and pensions.

²⁴ These are yearly total income brackets of \$36,000, approximately USD 1,300. It is worth mentioning that the income brackets are constructed, as stated before, in absolute terms, but only up to the 95th percentile of the survey, and a single group is considered thereafter. This was done because the right end

untaxed incomes from individuals in the survey in each group, are randomly assigned to their correspondent individuals in the income tax records; (iii) if in any given group there are more observations in the survey than in the tax records, after completing step (iii), the unassigned incomes are proportionally allocated among individuals in the corresponding group in the tax records. Incomes of 15% of individuals are re-distributed in the last step, and most of these individuals are located in the lower middle part of the distribution (Figure 2).

Figure 2. Total individuals and proportion of individuals re-assigned by income bracket



Source: own elaboration based on ECH and DGI

In this way, we distribute all informal and untaxed incomes perceived by individuals with formal and taxed incomes, among those with the same characteristics in terms of annual income, gender, age and formal income sources. The main caveat is that, in step (iv), we are increasing the incomes of medium earners more than others. As commented in 4.2.5, this does not appear to have significant distributive implications.

4.2.4. Incomes with existing administrative totals, social security contributions and child transfers

As mentioned before, approximately 40% of total capital income is non-nominative, that is, DGI provides the total amount but it is unknown by whom they are perceived. As it is not possible to determine precisely the true allocation, and the profiles of the earners is not clear, they are imputed proportionally to the remaining capital incomes. Note that they exclude, at this point, interests from deposits, but include taxable rents from real estate. Thus, it is a rather generous imputation criterion and capital incomes

tail of the distribution in the income tax records is much larger and so the relatively small income brackets seldom had observations.

inequality estimates are most likely to be a lower bound. See 4.3.2 for a more complete discussion of these criteria.

Employers and employees social security contributions, as well as health insurance, are computed for each individual using existing regulations. They are then scaled up²⁵ in order to match administrative totals provided by the Social Security Administration (BPS). Scaling factors show a relatively well fit of the individual computations.

To complete this stage, the non-contributory child transfers administrative data base (see 3.2.4) is used to add this income. Approximately 40% of the adults that receive these transfers also earn formal and taxed incomes, and so they can be merged, as depicted in Table 5 .

Table 5. Adults who receive non contributory child allowances by source. 2014.*

Adults in tax records not receiving non-contributory child transfers	1,699,191
Adults who receive non-contributory child transfers and missing in tax records	200,246
Adults in tax records receiving non-contributory child transfers	162,323

Source: own elaboration based DGI and BPS.
*Remaining years in Table A 12 to Table A16 of the appendix.

Once both databases are linked, the amount of child transfers of population brought in directly from the survey, is adjusted to match the total amount of child transfers provided by BPS. Finally, the total amount of interests, both imputed and brought in (4.2.3 and 4.2.4), are adjusted to match the amount of interests reported by DGI. These two corrections entail adjustments of 5% (downwards) and 250%²⁶ respectively.

²⁵ The scaling up of social contribution as well as transfers, may not be 100% accurate since some of the official aggregates may refer to individuals younger than 20 years old, but these discrepancies are negligible.

²⁶ This adjustment reveals the poor performance of the household survey in terms of capital income, interests in this case.

4.2.5. Descriptive statistics of the first estimation stage-database

In this section we compare the first estimation stage-database we created to the survey and tax data in terms of income recipients, total amount of incomes and its distribution. Tables and Figures refer to 2014, but are essentially the same for the remaining years.

First, we compare the number of income earners by source, which are depicted in Table 6. Broadly speaking, in the resulting database the number of formal and taxed income earners should match the corresponding number in the tax records. The same should happen with individuals who earn informal or untaxed incomes when compared to the household survey. However, due to minor problems of the information in the datasets, and in particular to the adjustment procedures described in 4.2.2 and 4.2.3, this is not the case. In Table 6, these totals are depicted and the comparison ratio with the reference database is presented in relation to the reference total²⁷.

As described above, the number of informal labour income earners from the household survey is adjusted twice: (i) to match total population (see 4.2.2), and (ii) in the imputation of informal and untaxed incomes from the survey to the tax records (see 4.2.3), but with no effects on total informal labour income (as it is reassigned) or in distributional terms (see 4.2.5). The same happens for individuals who receive incomes from interests, informal capital incomes, unemployment insurance, owner occupied rental income and other transfers, but with a lower discrepancy ratio. Finally, in the case of non-contributory child transfers, the difference with the administrative record is due to the population adjustment for informal income earners and non-earners.

²⁷ For example, the percentage of formal income recipients is presented in relation to the tax records, whilst the informal labour is in relation to the survey.

Table 6. Number of individuals by income source - database 2014*

	Survey	Tax records	Reference database	First stage database	%
Formal labour income	1,160,194	1,182,870	1,182,870	1,182,866	100%
Informal labour income	438,332	-	438,332	390,615	89%
Formal capital income	65,092	82,255	100,354	100,354	100%
Interests	21,898	352	21,898	20,792	95%
Dividends	12,857	4,055	4,055	4,055	100%
Imputed dividends	-	-	-	82,101***	-
Other capital incomes	46,185	80,104	80,104	80,104	100%
Imputed other capital incomes	-	-	-	82,101	-
Informal capital incomes	149,503	0	149,503	141,394	95%
Pensions	591,035	663,473	663,473	663,473	100%
Unemployment insurance	45,859	0	45,859	41,839	91%
Non contributory child transfers	604,697	142,986	402,898**	374,619	93%
Other transfers	267,611	0	267,611	244,990	92%
Owner occupied rental income	1,816,339	0	1,816,339	1,688,029	93%
Other incomes	226,193	0	226,193	208,029	92%

Source: own elaboration based on ECH and DGI. *Remaining years in Table A18 to Table A 21 of the appendix.

(**) This is the total of administrative records of BPS; (***) These individuals are the ones who receive formal capital incomes in the tax records, but subtracting the interest earners who do not have any other incomes (since they are very few, these totals are practically identical)

In Table 7, the same analysis is depicted but in terms of total incomes. In this case, as the procedure deliberately entails adjusting all incomes to match the totals of the reference database, the comparison ratio with the reference database is always 100%. Note that the totals with (*) reflect that the total income amount came not from the household survey nor the tax records, but was provided separately by DGI in the case of income taxes or by BPS in the case of child transfers or social security contributions (see 3.2.4 and 4.2.4). Hence, as stated before, the main database accounts the sum of all incomes coming from the most accurate data source.

Table 7. Total income by source (thousand US dollars) 2014*

	Survey	Tax records	Reference database	First stage database	%
Formal labour income	15,525,530	14,592,973	14,592,973	14,592,974	100%
Informal labour income	1,822,762	-	1,822,762	1,822,762	100%
Formal capital income	273,060	692,510	1,096,528***	1,096,528	100%
Interests	25,387	350	25,387	25,387	100%
Imputed interests	-	-	39,139**	39,139	100%
Dividends	5,290	289,505	289,505	289,505	100%
Imputed dividends	-	-	260,768**	260,768	100%
Other capital incomes	242,383	402,655	402,655	402,655	100%
Imputed other capital incomes	-	-	79,074**	79,074	100%
Informal capital incomes	644,561	-	644,561	644,561	100%
Pensions	3,968,866	4,670,575	4,670,575	4,670,575	100%
Unemployment insurance	163,758	-	163,758	163,758	100%
Non-contributory child transfers	225,376	61,923	162,836**	162,836	100%
Other transfers	31,418	-	31,418	31,418	100%
Owner occupied rental income	293,144	-	293,144	293,144	100%
Other incomes	451,926	-	451,926	451,926	100%
Total population	23,400,399	20,017,981	23,930,481	23,930,481	100%

Source: own elaboration based on ECH and DGI. *Remaining years in Table A 22 to Table A 26 of the appendix. (***) Reflect that the total income amount came not from the household survey nor the tax records, but was provided separately by DGI in the case of income taxes or by BPS in the case of child transfers (***) This total combines incomes from tax records, survey and imputations based on total incomes provided by DGI

In order to compare preliminary the resulting distribution with tax and survey data, Gini indexes are computed for each income category (see Table 8). In general terms, the distribution of incomes is very similar to the one in the reference database, with differences no larger than two Gini points. It is important to note that, in the case of informal labour income, the final distribution does not largely differ from the survey. This fact is stressed out since due to the population adjustment procedures, a significant amount of informal labour income earners was lost (around 11%).

For the imputed dividends and other capital incomes, note that their distribution matches the one of total formal capital income, as they were distributed based on total reported by DGI and the actual distribution of formal capital incomes (see 4.2.3). Overall inequality is quite similar to the tax records database and, as expected, larger than inequality measured in the survey.

Table 8 Gini index by income source - database 2014*

	Survey	Tax records	Reference database	First stage database
Formal labour income	0.383	0.525	0.525	0.508
Informal labour income	0.417	-	0.417	0.412
Formal capital income	0.487	0.848	0.848	0.843
Interests	0.803	0.704	0.803	0.802
Imputed interests	-	-	-	0.802
Dividends	0.662	0.781	0.781	0.781
Imputed dividends	-	-	-	0.843
Other capital incomes	0.484	0.799	0.799	0.772
Imputed other capital incomes	-	-	-	0.843
Informal capital incomes	0.593	-	0.593	0.591
Pensions	0.440	0.473	0.473	0.472
Unemployment insurance	0.419	-	0.419	0.423
Non-contributory child transfers	0.293	-	0.293	0.313
Other transfers	0.555	-	0.555	0.552
Owner occupied rental income	0.601	-	0.601	0.607
Other incomes	0.392	-	0.392	0.423
Total population	0.457	0.539	-	0.536

Source: own elaboration based on ECH and DGI. *Remaining years in Table A 27 to Table A 31 of the appendix.

With the first estimation stage-database, we now have for the first time all available income information from tax records and household survey for the whole adult population. In Table 9, the shares of different deciles and fractiles of total income²⁸ are depicted in a cumulative way for each of the imputation step for 2014.

Taking as a reference starting point the top 1% share, when we add to formal and taxed income (1) the imputed totals in column 2 (that refer essentially to non-nominative capital incomes) inequality rises, since those incomes are mostly allocated among the top earners. When all informal incomes are included, inequality drops by 0.3 points at the top 1% share, because informal incomes mostly correspond to poorer individuals. Thus, shares up to the 6th decile grow. The same phenomenon is observed when adding child transfers and other transfers (columns 4 and 5), but with an even greater bias towards poorer individuals (up to 4th decile) as expected. Finally, in the last step inequality drops once again since at the “other incomes” category, owner occupied housing rent is included. In Table 10, income thresholds for the entire distribution are depicted.

²⁸ In all cases, they refer to all adult population, that is, after the procedure described in step 4.2.2 was performed.

Table 9. Income shares by imputation step of the first stage- 2014*

Total income fractiles	Formal incomes (1)	Imputed non nom. cap inc. (2)	Informal incomes (3)	Child transfers (4)	Other transfers (5)	Other incomes (6)	Total (7)
1 decile	0.2%	0.2%	0.2%	0.2%	0.2%	0.4%	0.4%
2 decile	0.5%	0.5%	0.6%	0.7%	0.7%	1.2%	1.3%
3 decile	1.6%	1.6%	1.8%	1.9%	1.9%	2.4%	2.6%
4 decile	2.8%	2.7%	3.1%	3.2%	3.2%	3.6%	3.9%
5 decile	4.1%	4.1%	4.5%	4.5%	4.6%	5.1%	5.6%
6 decile	6.2%	6.1%	6.4%	6.4%	6.5%	7.1%	7.4%
7 decile	9.1%	9.1%	9.1%	9.0%	9.1%	9.4%	9.7%
8 decile	12.1%	12.0%	12.0%	11.9%	12.0%	12.3%	12.6%
9 decile	18.4%	18.3%	18.0%	17.9%	17.9%	17.6%	17.6%
10 decile	44.9%	45.4%	44.5%	44.3%	43.9%	41.0%	38.9%
1-5 deciles	9.2%	9.1%	10.1%	10.5%	10.6%	12.7%	13.8%
6-9 deciles	45.9%	45.5%	45.4%	45.3%	45.5%	46.4%	47.3%
10 deciles	44.9%	45.4%	44.5%	44.3%	43.9%	41.0%	38.9%
90-99%	32.4%	32.4%	31.9%	31.7%	31.4%	29.8%	28.4%
Top 1%	12.5%	13.0%	12.7%	12.6%	12.5%	11.2%	10.5%
99-99.9%	32.4%	32.4%	31.9%	31.7%	31.4%	29.8%	28.4%
Top 0.1%	3.5%	3.8%	3.7%	3.6%	3.6%	3.1%	3.1%

Source: own elaboration based on ECH and DGI. Each column represents the distribution of income when a new income source is added. Hence, it should be read sequentially. *Remaining years in Table A 32 to Table A 36 of the appendix.

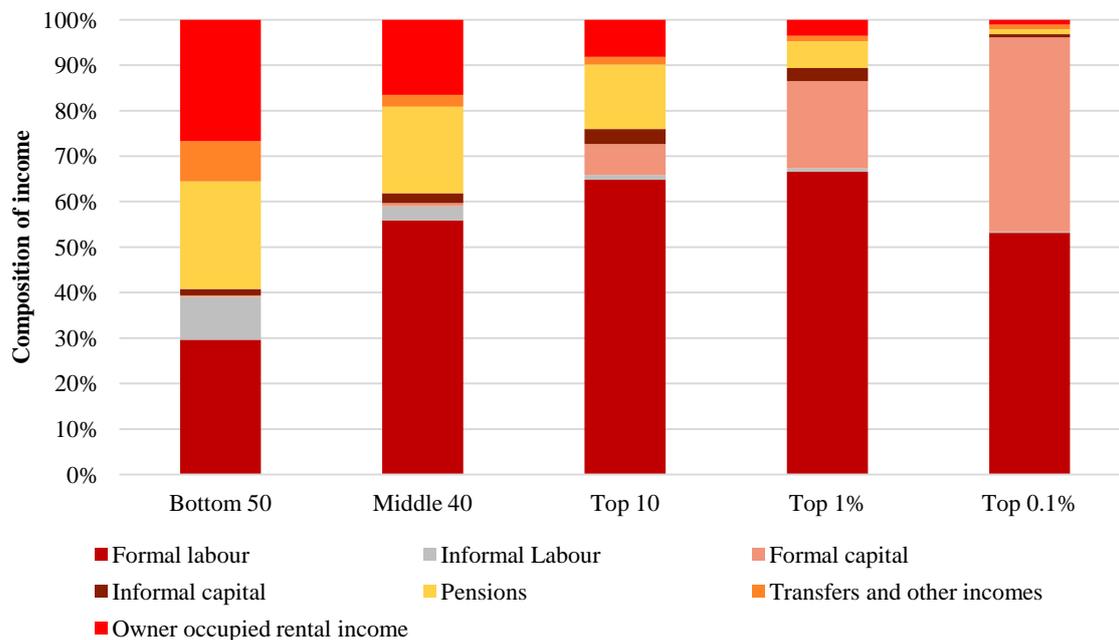
Table 10. Summary income statistics by total incomes fractiles (values in US dollars)– 2014*

Income group	Pop.	Min	Max	Mean	Share
Total income fractiles					
1 decile	245,176	-	1,034	520	0.4%
2 decile	245,129	1,034	2,256	1,588	1.3%
3 decile	245,927	2,256	3,879	3,075	2.6%
4 decile	244,382	3,879	5,660	4,768	3.9%
5 decile	245,347	5,660	7,758	6,682	5.6%
6 decile	244,954	7,758	10,266	8,972	7.4%
7 decile	245,170	10,266	13,093	11,671	9.7%
8 decile	245,135	13,093	17,577	15,189	12.6%
9 decile	245,153	17,577	25,795	21,171	17.6%
10 decile	245,152	25,795	1,277,8571	46,798	38.9%
1-5 deciles	1225961	-	7,758	3,326	13.8%
6-9 deciles	980412	7,758	25,795	14,252	47.3%
10 decile	245152	25,795	12,778,697	46,798	38.9%
90-99%	220637	25,795	70,159	37,999	28.4%
Top 1%	24515	70,163	12,778,697	125,994	10.5%
99-99.9%	242701	70,163	191,397	43,559	35.8%
Top 0.1%	2451	191,473	12,778,697	367,521	3.1%

Source: own elaboration based on ECH and DGI**Remaining years in Table A 26 (appendix). *Remaining years in Table A 37 to Table A 41 (appendix).

In terms of income composition (Figure 3), informal labour and capital incomes, together with pensions have a downward relative participation as we move to individuals with higher total income. Formal labour income represents just below 30% of total income for the bottom 50%, whilst pensions and owner occupied housing rent represent half of their incomes. Transfers are only clearly visible in the bottom 50% and tend to disappear thereafter. For the top 50%, formal labour income grows up to the top 1%, where it starts decreasing whilst capital incomes sharply increase. In the top fractiles, capital incomes represent more than 40% of total income, while the remaining incomes are essentially from labour earnings.

Figure 3. Income composition by income source and fractiles – 2014*



Source: own elaboration based on ECH and DGI* *Remaining years in Graph A 1 to Graph A 5 of the appendix.

4.3. Second estimation threshold: imputation of remaining taxes and undistributed profits

4.3.1. Incomes to be imputed

Up to the first threshold, all incomes perceived by households with the exception of undistributed profits have been considered. Undistributed profits are incomes that remain in the firm, that is, they are not distributed to the owners of the firm or other individuals. They are not used by households to satisfy consumption needs, but they are controlled by them. They may be considered essentially as a sort of savings and, as such, owners have it at their disposal. Hence, they should be considered as part of the incomes accrued by individuals. This is particularly true in the Uruguayan case, where very few firms actually distribute profits. The delicate issue is that they represent more than 5% of national income, and so its imputation is not straightforward and it is potentially risky from a distributional standpoint (more on this in 4.3.2).

As for taxes, all personal income taxes and social security contributions have been already taken into account, with the exception of nonresident income tax. Taxes on production, property taxes (both for households and for firms), as well as social security deficits, have not been considered yet.

In Table 11 totals to be imputed to the tax-survey database are depicted. Net undistributed profits²⁹, as mentioned earlier, come from firms' balance sheets. National production taxes and corporate taxes are annually reported by the tax authority (DGI), as well as non-residents taxes and wealth transfers taxes, which were not present in the tax records. Product taxes net of subsidies and Social Security Deficits³⁰ are reported by the Central Bank (BCU). Finally, local taxes are reported by the Planning Office³¹.

²⁹ As described in 3.2.4, DGI only provided data for 2009-2012. Undistributed profits for 2013 and 2014 were imputed based on real growth rate of the economy.

³⁰ Social Security Deficits are not divided in deficits from pensions and transfers. The disaggregation was performed to assure equivalence between factor income and pre-tax income.

³¹ The classification between the different categories in the local taxes was done based on the "object" of the tax, that is specified in the public data tabulations.

*Table 11. Incomes imputed in second estimation stage (thousand US dollars). 2014**

		% of national income
Net undistributed profits (a)	2,539,368	5.0%
Production taxes (b)	1,271,148	2.5%
Corporate taxes (c)	699,594	1.4%
Products taxes net of subs (d)	6,955,942	13.7%
Local taxes (e) – production	45,585	0.1%
Local taxes (f) – property	429,944	0.8%
Local taxes (g) – rest	613,771	1.2%
Nonresident income taxes (h)	139,243	0.3%
Non-considered personal property taxes (i)	62,013	0.1%
Contributive system deficit (j) – pensions	-2,690,159	-5.3%
Contributive system deficit (k) – transfers	-2,015,413	-4.0%
Imputed to factor income (a+b+c+e+f+g+h+i)	5,800,667	11.4%
Imputed to pre-tax income (a+b+c+e+f+g+h+i+j)	3,110,508	6.1%
Imputed to post-tax income (a-d+j+k)	-9,122,146	-18.0%

Source: own elaboration based on DGI, BCU, and OPP. *Remaining years in Table A 42 to Table A 46 of the appendix.

Note that not all these aggregates belong to the every income definition, and so the percentage of incomes that we impute in this stage in relation to the National Income varies significantly. Specifically, for the post-tax income is negative essentially because we are subtracting all products' taxes, which represent a large share of National Income.

As stated before, once these incomes and taxes are incorporated, all incomes accruing to households, government or the corporate sector³² are already considered, and so we are accounting for all incomes that should be included in the factor, pre-tax or post-tax disposable income definitions. Thus, second estimation stage series could be considered almost definitive DINA series, in the sense that they do account for all incomes types but do not add up to national income.

Two things are worth mentioning at this point. First, factor and pre-tax incomes are equivalent, whilst post-tax disposable is much lower as expected (see 3.1). Second, using all available information from tax micro databases, household surveys and all reported administrative totals, the gap to the national income is still 30%. Available data does not allow us to analyze precisely where the major discrepancies lay, as there is no disaggregation of national income into its different income components in the existing National Accounts.

³² As mentioned in 3.2.4, all firms that reach a certain size in terms of annual income, are required to present their balance sheets. This is the case for all types of firms, thus including financial, non-financial sector as well as non-profits sector.

4.3.2. The imputation criteria

For the benchmark series, three different criteria were adopted to impute these incomes, depending on their nature: (i) proportional to total income, (ii) proportional to real estate incomes or (iii) proportional to capital income³³.

Nonresident income taxes, local taxes (other than production or property), social security deficits and taxes on products net of subsidies were imputed with the first criterion, that is, proportionally to total individual income, as there is no clear way to impute them and this was the most neutral. More sophisticated procedures for these imputations do exist, but they involve making explicit assumptions about supply and demand elasticities and so we proceeded in this simpler manner following DINA guidelines (see Alvaredo et al. 2017)).

Personal property taxes³⁴, which are a combination of local property taxes and patrimonial wealth transfers, are imputed proportionally to property income. This income is the sum of rental income from tax records, owner occupied housing rent (imputed, see 4.2.3) and -in the factor and pre-tax cases- rental income taxes and property taxes from tax records.

Finally, production taxes, corporate taxes and undistributed profits, are imputed proportionally to capital incomes (described in 3.2.1), which includes real estate rent³⁵. The imputation of undistributed profits, in particular, is always complicated because a proxy of ownership of firms is needed. In most DINA studies, this sort of income is imputed proportionally to dividends. For the Uruguayan case we do not consider this income to be a good proxy of capital ownership, as very few individuals perceive incomes from firms in the form of dividends or other financial incomes. For instance, in the case of dividends, over the period 2009-2012 only 2516 firms out of more than 90.000 that are subject to corporate tax, distributed profits to their owners. This entails that around 6.000 people received dividends or utilities over the period³⁶ and barely over 800 received dividends every year. The concentration of these incomes is, thus, extremely high.

Uruguayan firm owners have alternative ways withdraw profits from firms. One of the favored is to use banking accounts shared among firms and owners, whom withdraw profits as a loan from the firm, paying almost no taxes for such an operation. This is a situation that emerged with the 2007 tax reform, since before that there were no direct personal capital income taxes, and so this would not be considered elusion before the reform. The problem has been noted by the government, and a new bill was passed in

³³ Note that there will be three imputation rules for every aggregate income definition, because these aggregates not always consider the same incomes (for instance, taxes, pensions, transfers, etc).

³⁴ Excluding the ones already accounted for in the tax databases. See 3.2.1.

³⁵ Note that this is the same criterion used to impute non nominative capital incomes. See 4.2.4.

³⁶ As stated before, around 40% of dividends is no-nominative, so this number may be actually a little but not significantly higher.

2016, which states that all profits for which it is impossible to prove that they have been re-invested in the firm, will be considered distributed and therefore taxable.

Thus, imputing large amount of incomes (such as the undistributed profits) proportionally only to dividends would entail imputing 87.5% to the top 1%, and 60% to the top 0.1%. An alternative assumption is to impute them proportionally to all taxed capital incomes. By doing so, we are adding a number of relatively small capital incomes, and also real estate rent, which represents around 50% of total taxed capital income and it is less concentrated than the others. The distribution of total taxable capital income (excluding capital gains) is depicted in Table 12.

*Table 12. Taxable capital incomes in the tax data - nominative. 2014**

	Total taxable capital income	Dividends and utilities
Bottom 90%	16.2%	1.9%
Top 10%	83.8%	98.1%
Top 1%	56.9%	87.5%
Top 0,1%	33.7%	60.3%

Source: own elaboration based on tax data. *Remaining years in Table A 37 to Table A 51 of the appendix.

This rather “generous” imputation criterion entails assuming that people who invest in business capital also does so in real estate. This may be so in the Uruguayan case, were real estate investment is popular, especially considering recurrent baking crisis. In fact, looking at the financial household survey (*Encuesta Financiera de los Hogares Uruguayos*, EFHU), the correlation between real estate (excluding owner occupied housing) and business capital is 0.67.

Thus, for the two reasons exposed, that is, that we want to avoid the risk of imputing large amounts of incomes based on an extremely concentrated distribution, and that we believe the alternative criterion is quite plausible, we impute capital incomes based on all taxable capital income.

In Table 13, distribution of the three incomes over which imputations were performed, are depicted (for pre-tax incomes 2014), as well as the total amount distributed in the second estimation stage. Incomes distributed based on “real estate owner’s incomes” are relatively small a distributed better than average, whilst the opposite happens with ones imputed based on capital income.

Table 13. Distribution of incomes used for imputations. Pre-tax income 2014*

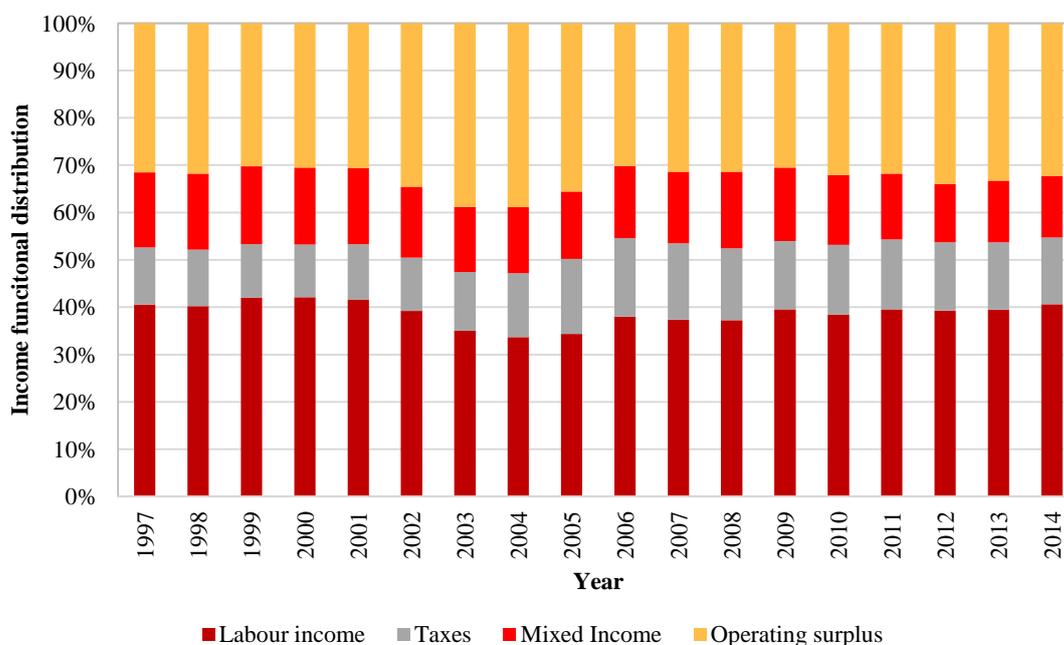
	Total Income	Capital Income	Owner income
Share of income imputed (% of NI)	-3.8%	9.0%	1.0%
Top 01	2.6%	59.2%	2.3%
Top 09-01	7.2%	27.2%	5.6%
Top 1	9.9%	86.4%	7.9%
Top 10	38.8%	98.3%	27.9%
Middle 40	47.7%	1.6%	49.7%
Bottom 50	13.5%	0.2%	22.3%

Source: own elaboration based on tax and survey data. *Remaining years in Table A 52 to Table A 56 of the appendix.

4.4. Third estimation stage: scaling up to national accounts totals

For the final stage, we proceeded as follows. Ideally, we should depart from the National Account System national income, but such information does not exist since 2005 (see 0 and 3.2.4). Even though there is no official data, previous estimations show the evolution of labour, capital, mixed income and taxes net of subsidies in relation to national income (De Rosa et al., 2017), depicted in Figure 4. To compute these shares, official estimations from 2005 were updated using the evolution of each type of income in the household survey.

Figure 4. Factor income functional distribution – 1997 - 2014



Source: De Rosa, Siniscalchi, Vigorito, Vilá & Willebald, 2017

We begin by scaling up the factor income series, which is the only for which we have estimations of functional distribution. Departing from this series, we scaled up factor labour, capital, and mixed incomes and taxes net of subsidies so as to match these aggregates. We make the distinction in the scaling up process, in order to make our aggregate estimates consistent to previous estimations, but in the micro level all of them are imputed proportionally to individual total income. This very conservative assumption is needed because in this stage around 30% of national income is imputed, and thus it is very risky to take too much distance from the second stage income distribution.

The imputations for pre-tax and post-tax disposable incomes were performed in a similar way. The first step was to compute an approximation of functional distributions for pre and post-tax incomes³⁷. To do so, we adjust each component of the factor functional distribution using the ratio of factor income to pre-tax income and to post-tax disposable income, estimated in the second stage estimations. Detailed results of this final step are depicted in Table A.62 of the appendix. Broadly speaking, up to the second threshold 93% of labor income, 65% of capital income and 15% of mixed income had been already accounted for. After scaling up, all these aggregates match by construction but the income distribution remains the same as before.

³⁷ Bare in mind that this is only for consistency purposes, because in all cases scaled up incomes are distributed proportionally to individual total incomes.

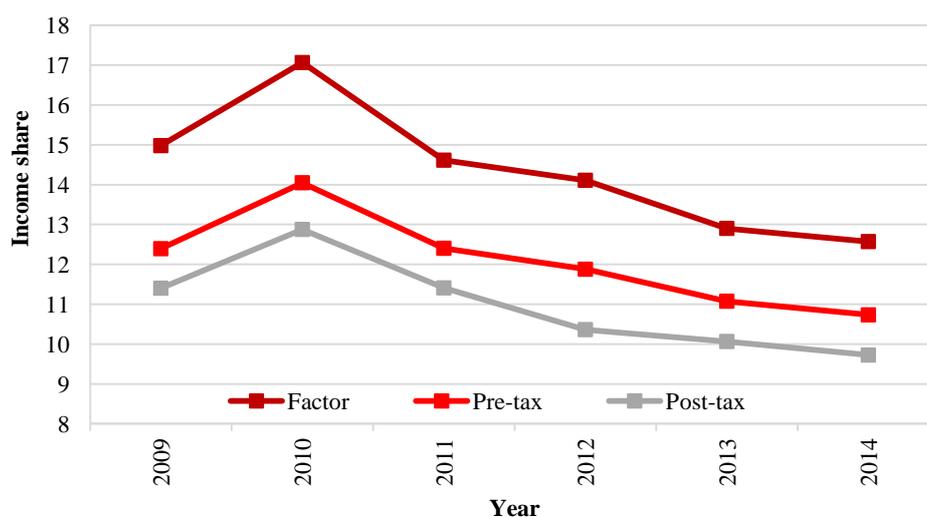
5. Results

5.1. Income distribution

In this section, we present the main results of the DINA estimations. As mentioned before, we estimated factor, pre-tax and post-tax disposable income. Moreover, we computed these estimates based on three stages. The first based on the combination of the tax and survey micro data (scaled up to official administrative totals when possible), as well as a set of computations for social security contributions. In the second, undistributed profits and remaining taxes were imputed, and in the final stage all incomes were scaled up in order to match macroeconomic aggregates. By construction, the second and third estimation stages are identical in distributional terms, but the former accounts for around 70% of all national income whilst the latter accounts for all, and thus it represents the full DINA-based estimation. For this reason, we will only present first and third stage – DINA - distribution estimations.

In Figure 5, the top 1% income share for the first stage is depicted. In terms of the three income definitions, the results are as expected. Factor income distribution, that is “previous” to social security contributions and pensions, shows consistently higher levels of concentration -more than 2%-, which is reasonable since over 25% of individuals in the database were 65 years or older. The pre-tax national income series is lower because it accounts for the effect of the social security system, but is around 1% higher than the post-tax disposable income. Hence, the tax-transfers system moderately reduces the top income shares over the period. The evolution of the three series is similar. After an initial increase in 2010, they systematically fall over the rest of the period.

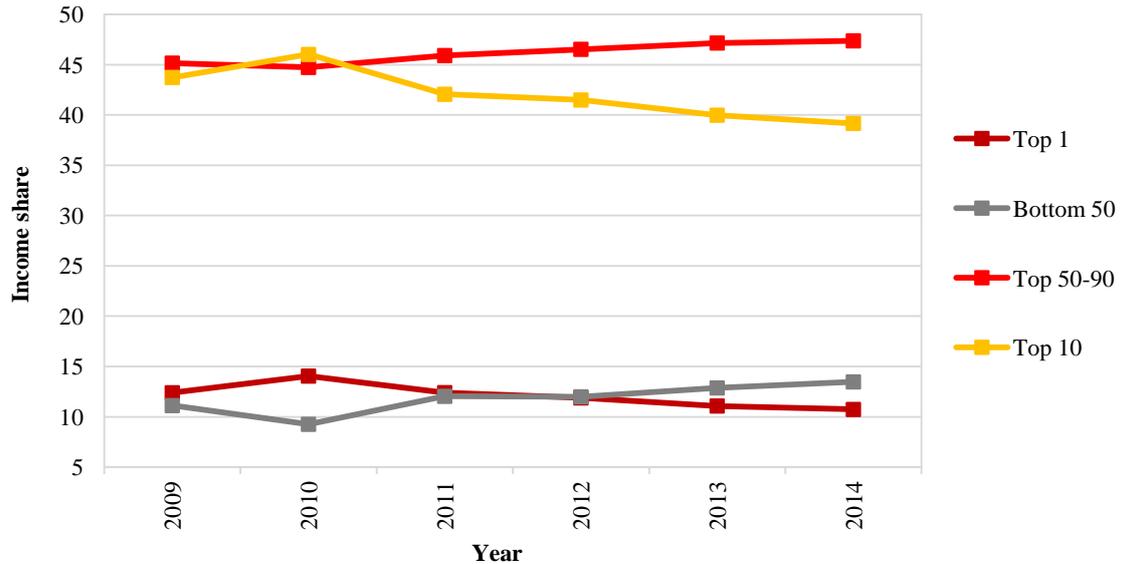
Figure 5. Top 1% share. First stage estimation.



Source: own elaboration based on data sources described in section 4.

Figure 6 shows that the reduction in inequality seems to be driven by a decrease in the top 1 and 10% shares, and a growing share of the bottom 90%. It is striking to observe the orders of magnitude involved: the top 1% and the bottom 50% capture roughly the same income share, whilst the same happens with the top 10% and the “middle 40%”. In the former case, the first group is 50 times larger, whilst in the latter is 4 times the size. Both the bottom 50% and the middle 40% increase their share, though rather moderately, and hence inequality falls over the period.

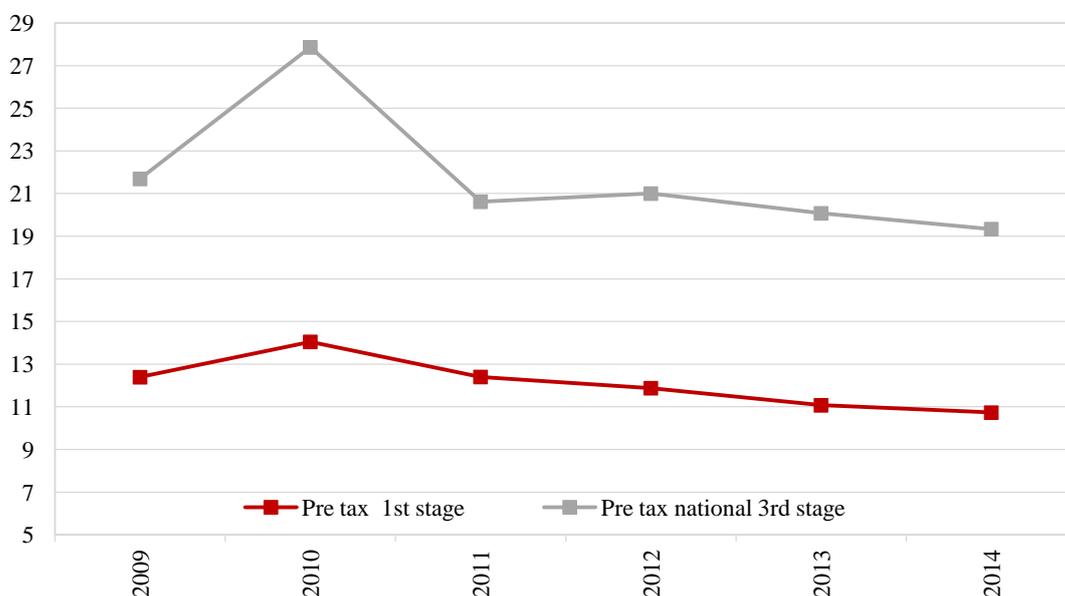
Figure 6. Pre-tax income shares. First stage estimation.



Source: own elaboration based on data sources described in section 4.

Series presented up to this point have the advantage of being comparable to previous studies (see 5.2) and to be based entirely on highly reliable data sources. In Figure 7, the comparison between this first stage estimation and the distribution of all national income is depicted for pre-tax income. The first obvious feature is the large gap between the two series, which is for most years between 8 and 9 percentage points. Thus, once we distribute the missing income, the top income shares increase enormously. This is explained essentially by the imputation of undistributed profits and taxes on firms, which represent over 9% of national income and are imputed to the top earners (see 4.3.2, more on this in 5.2). The large bump in 2010 is explained by an unusually high level of undistributed profits that year.

Figure 7. Top 1% share of pre-tax income. From first stage estimation to national income.

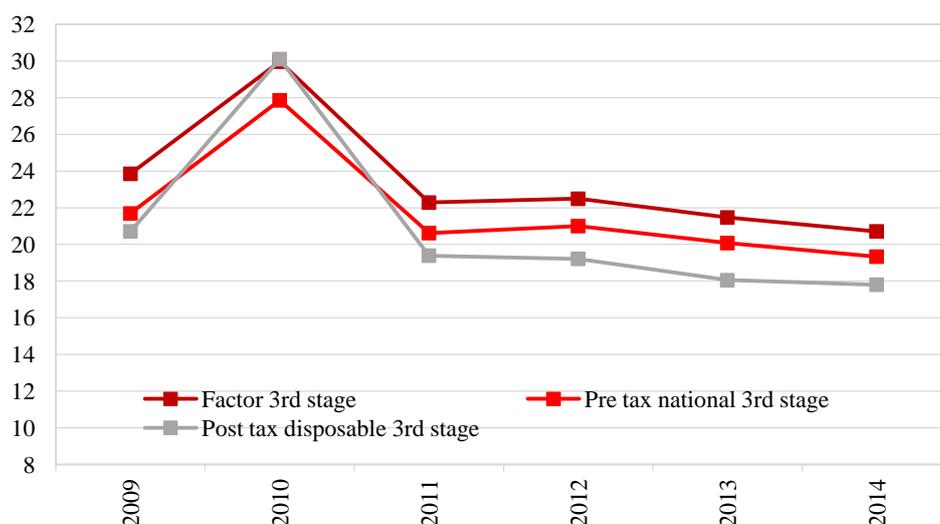


Source: own elaboration based on data sources described in section 4.

Figure 8 depicts the third stage estimation for the top 1% share, that is, the full DINA-based series. As stated before, top income shares are much higher than in the first stage, but the tendency is still decreasing. By the end of the period, the top 1% pre-tax share is almost 20% compared with less than 11% in the previous estimations (see 5.2). With the exception of 2010, the relation between the three income definitions is as expected. In particular, it is worth mentioning that in these estimations, the gap between pre and post-tax income series is larger as compared to the first stage, of around 3% for the top incomes share.

The year 2010 shows an odd relation between pre-tax and post-tax incomes, being the former lower than the latter, which may seem extremely counterintuitive. This is the result of the combined effect of the imputation sequence and the large amount of undistributed profits of that year. As stated above, in this second imputation stage both undistributed profits and taxes are imputed. As for taxes, the largest by far is the consumption tax, which is imputed proportionally to total income of individuals, hence, with no distributional impact. Then undistributed profits are imputed essentially to top earners, but note that this income is not considered as part of total income over which consumption taxes are imputed. This is so because, in fact, that income is not taxed nor used to consume. So, in the end, we impute taxes in a proportional manner but we add massive un-taxed incomes to the top, resulting in a regressive aggregate imputation. In 2010, the problem is amplified because of the large amount undistributed profits, but it should be noted that, in general terms, our second stage imputation procedure reduces the gap between pre and post-tax incomes.

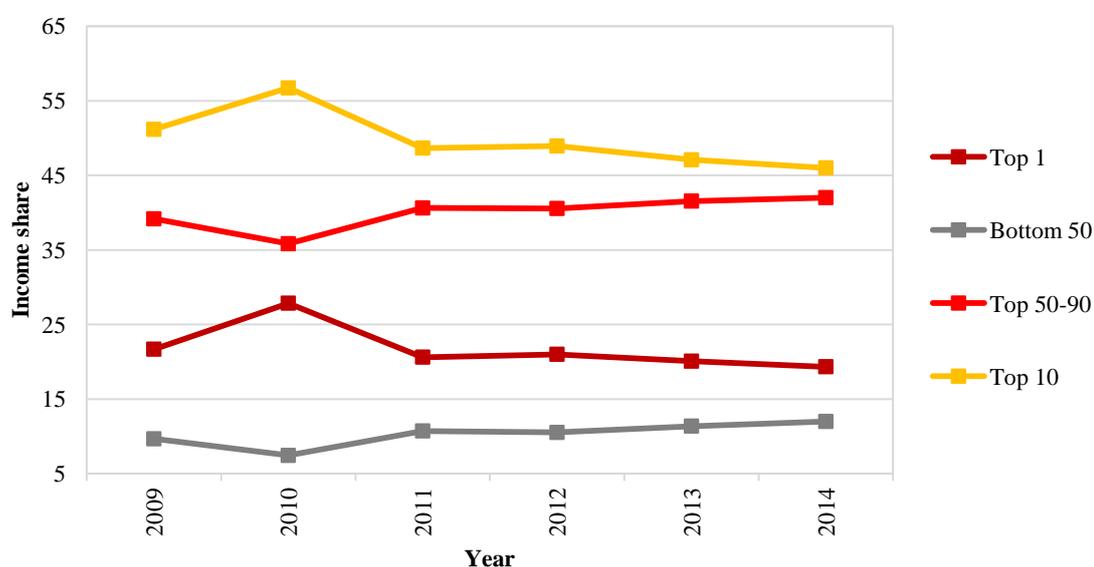
Figure 8. Top 1% share third stage estimation series.



Source: own elaboration based on data sources described in section 4.

In the third stage shares series for pre-tax income, depicted in Figure 9, the shares of top 1% almost doubles the bottom 50%. The distance is somewhat shorter in the case of top 10% and middle 40, but as in the first stage estimations, the bottom 90% increases its share of national income.

Figure 9. Pre-tax national income shares.



Source: own elaboration based on data sources described in section 4.

This reduction in inequality based on the increase in the bottom 90, with a reduction in both the top 10% and the top 1% shares is also visible when computing standard inequality indexes (Table 14). Conclusions in terms of time trends, level differences between the first and third stages series, as well as changes in inequality

between factor, pre-tax and post-tax are very similar. It is interesting to note that the redistributive power of the tax-transfers system varies around 2.5 points for both thresholds, consistent with previous findings that used completely different methods and databases (Corina, 2014).

Table 14. Gini index. First and third stages series 2009-2014.

Year	First stage			Third stage (DINA)		
	Factor	Pre-tax	Post-tax	Factor	Pre-tax	Post-tax
2009	0.672	0.596	0.569	0.711	0.647	0.625
2010	0.729	0.628	0.596	0.776	0.699	0.692
2011	0.660	0.578	0.551	0.693	0.624	0.601
2012	0.660	0.575	0.520	0.697	0.627	0.579
2013	0.634	0.559	0.534	0.672	0.610	0.583
2014	0.624	0.549	0.522	0.661	0.598	0.572

Source: own elaboration based on data sources described in section 4.

This last DINA series has the advantage of being comparable with recent DINA based estimations presented in section 2, at least in terms of income definitions. In Table 15, pre-tax national income shares are depicted. In general terms, Uruguay shows a slightly better income distribution than United States but much more concentrated than the French one. When compared with the remaining countries-regions, income is better distributed, especially in relation with Brazil that is the only Latin American country for which information is available.

Table 15. Pre tax national income shares for different countries-regions 2014

Income shares	United States	France	China	Russia	Middle East	India*	Brazil	Uruguay
Bottom 50	12.6	22.5	14.9	16.8	9.7	14.9	12.5	12.0
Middle 40	40.4	44.9	43.8	37.5	29.9	29.6	32.6	42.0
Top 10	47	32.6	41.3	45.7	60.4	55.5	54.9	46.0
Top 1	20.2	10.8	13.7	20.4	25.1	21.7	27.6	19.3

Source: WID.World. *Estimations for India refer to 2013.

5.2. Comparison between estimation stages and with previous findings

Taking as a reference point the top 1% pre-tax income share, it is possible to compare these results with previous findings. In Table 16 results of different estimations and data sources are depicted. These estimations are comparable in the sense that they all account for the entire adult population and to pre-tax incomes.

*Table 16. Top 1% pre-tax income share. 2009-2014**

Year	Household survey (1)	Previous fiscal income study (2)	First stage estimations (3)	Third stage estimations (4)
2009	11.60	14.60	12.39	21.69
2010	10.20	15.00	14.05	27.86
2011	9.40	14.80	12.40	20.62
2012	7.30	14.80	11.88	21.00
2013	8.30	14.80	11.07	20.08
2014	8.00	14.40	10.73	19.34

Source: own elaboration based on data sources described in section 4 and (Burdín et al., 2015, WID.world). **Remaining income definitions in Table A 57 to Table A 58 of the appendix.

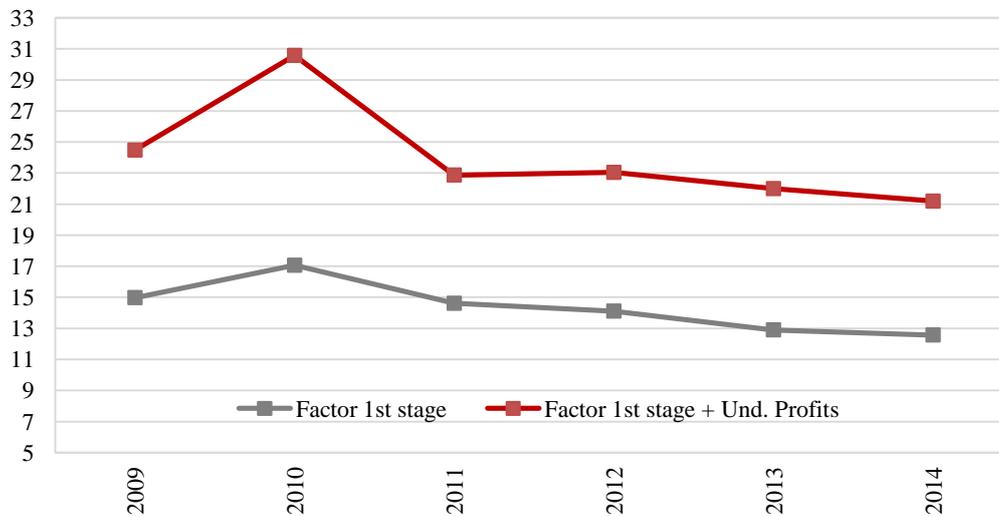
The growing divergence between the survey results and the fiscal income distribution is not part of the objectives of this paper, but is well documented and it is important as a reference point (for details, see Burdín et al. 2014, 2015). Comparing the second and third columns is interesting since they are based on the same databases (see section 2). In earlier studies, top income shares of pre-tax income were around 15% and rather stable (Burdín et al. 2014, 2015). Here, estimations are between 1 and 3 percentage points lower³⁸, which is consistent with the improvements performed in the present estimations. In particular, we included social security contributions, transfers and owner occupied housing rent, which have a redistributive effect. Furthermore, we imputed informal and untaxed incomes to the formal individuals, which have a much more important effect in the lower part of the formal population distribution. This may also explain why our estimates show falling top incomes shares, whilst in previous results they were stable.

The dramatic increase between the third and fourth columns is explained essentially by the imputation of undistributed profits, which represent over 5% of national income and are imputed to the top earners (see Table A.62 of the appendix). In Figure 10 the isolated effect of the imputation of undistributed profits over factor income is depicted. Please note that this is the result of a rather “generous” imputation criterion such as the one described in 4.3.2. Moreover, the sudden increase in 2010 seems to be explained by the same reason. In that year, undistributed profits were unusually high, hence massively amplifying the moderate increase in the top income share of that year³⁹. These elements shed light of the importance, at least in the Uruguayan case, of a careful treatment of undistributed profits, and more generally, of the need to fully understand the way in which firms re-invest or distribute incomes to their owners.

³⁸ The distance between the two series seems to be increasing too, but the period is still too short to be sure.

³⁹ This increase is not present for the rest of the top 10% or the middle 40, which is consistent with the fact that the reason is the imputations of the undistributed profits that are allocated in the top 1%.

Figure 10. Sensitivity analysis of undistributed profits imputation.

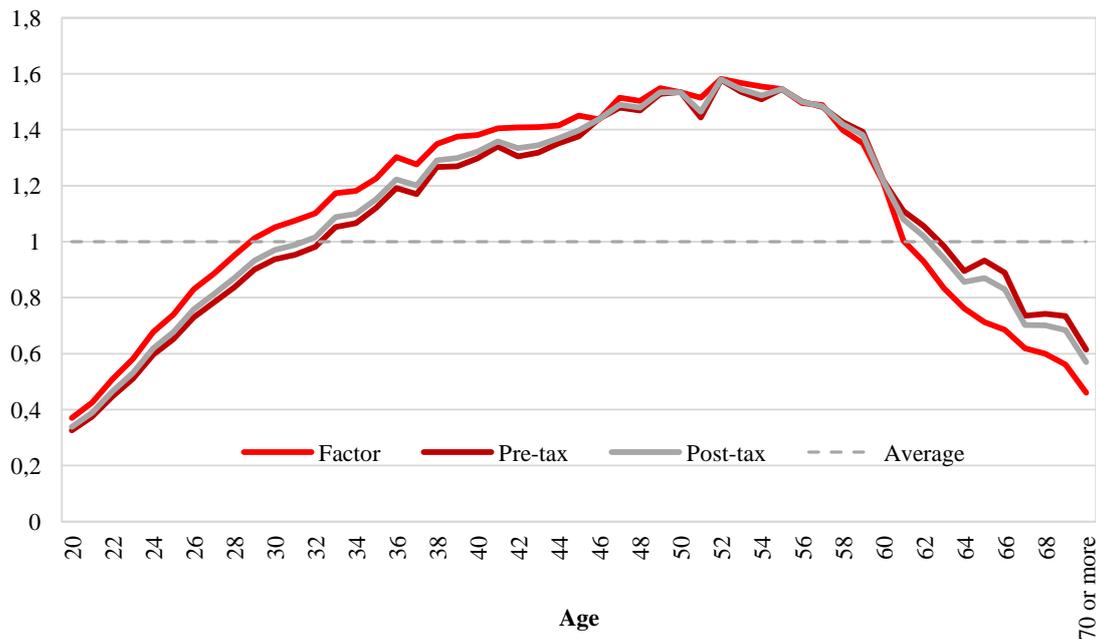


Source: own elaboration based on data sources described in section 4.

5.3. Third stage analysis by age and gender

One of the major drawbacks of working with tax records as compared to surveys is that there is very little information about the individuals. One of the things we do know is age and gender, and so it is worth describing the results in those terms. In Figure 11, average income by age is depicted, normalized in reference to average income. The inverse U-shape pattern typical of life-cycle models is perfectly clear for all income definitions. Moreover, it is interesting to note that factor income is higher than the rest up to the retirement age, and lower thereafter, which is consistent with the fact that it includes contributions and excludes pensions. On the other hand, although pre and post tax series are very similar, pre-tax income is lower than post-tax for working age individuals, and it is the inverse situation for the elderly, suggesting that the tax-transfers system favors younger groups.

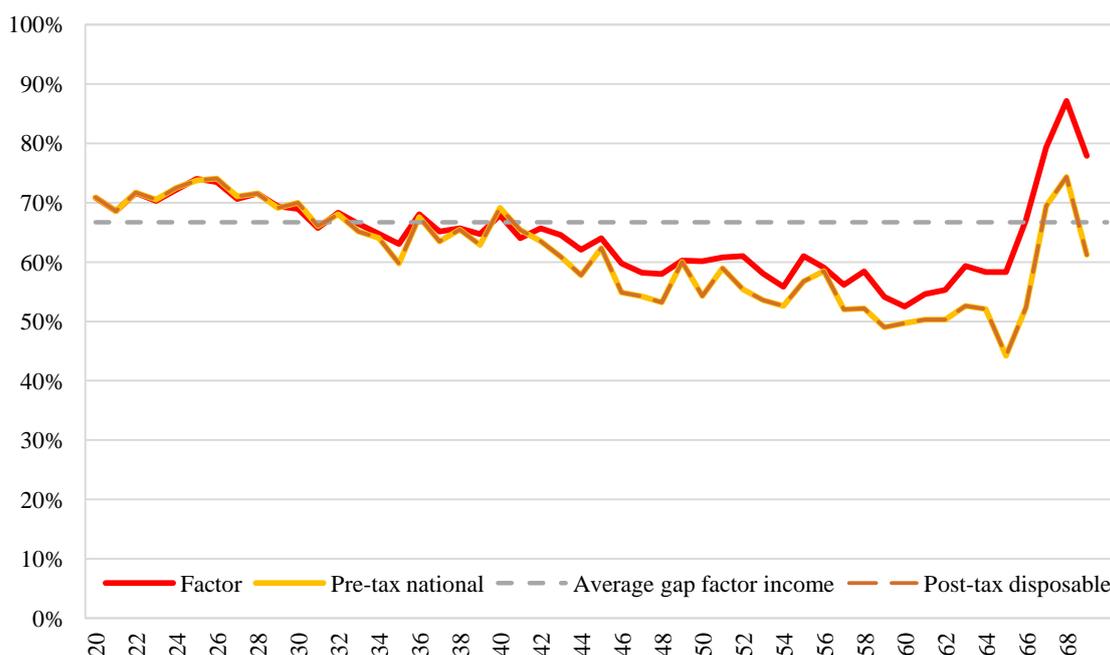
Figure 11. Average income (factor, pre-tax and post tax) by age



Source: own elaboration based on data sources described in section 4.

In Figure 12 the income gender gap by age group is presented. Women consistently capture less income than men for all income definitions and all age groups. The gap starts at around 70% and gets systematically lower during the working age. Factor income is higher for middle aged individuals and older, suggesting that social security contributions tend to equalize incomes between men and women, especially for the elderly still enrolled in the labor force. As for pre and post-tax incomes, the gap is a little lower for the latter, which entails that the tax-transfers system benefits women more than men, at least for older individuals.

Figure 12 Income gender gap of factor, pre-tax and post-tax income by age



Source: own elaboration based on data sources described in section 4.

5.4. The distribution of growth

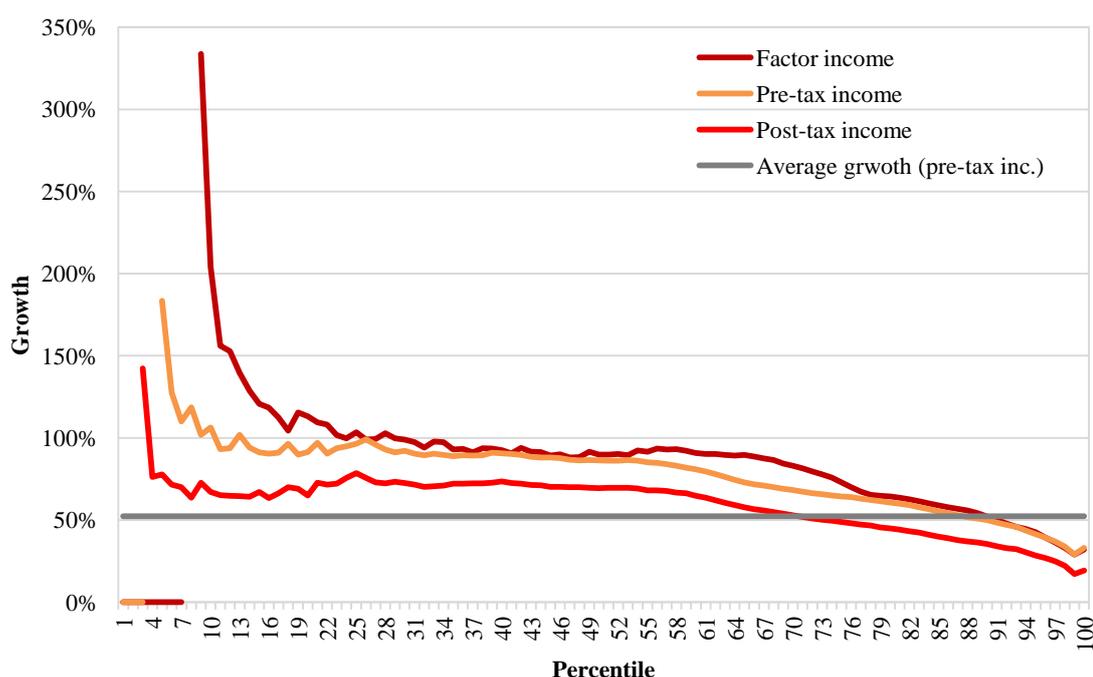
One of the most important advantages of DINA based inequality analysis is that, by accounting for all national income, it provides full micro-macro consistency. This is relevant, in particular, for the analysis of growth and its distribution, since growth is typically measured in macroeconomic terms whilst inequality is analyzed from a microeconomic perspective. For this reason, we describe growth distribution only based on the third stage, that is, the complete DINA-based series.

As stated above, between 2009 and 2014 Uruguay experienced both average income growth and falling income inequality. In

Figure 13, the growth incidence curves for the three income definitions are depicted. They show the average growth rate⁴⁰ by centile over the 2009-2014 period. Broadly speaking, the slope of the curve is - as expected - negative, meaning that income grew faster for bottom than for top earners and thus fueling the fall of inequality.

⁴⁰ Income is expressed in 2012 terms. Implicit GDP deflator was used for the computation.

Figure 13. Growth Incidence Curves 2009-2014



Source: own elaboration based on data sources described in section 4.

Up to the second decile, growth rates are very high. This is consistent with the fact that both economic growth and the wages policy (see section 2) entailed jobs creation and rapid wage growth at the bottom. Nevertheless, analysis at the bottom is noisier than in the rest because there are incomes that go from zero to positive values, altering the number of income earners in lower centiles and creating artificially high income growth. Between the second and sixth decile (seventh in the case of factor income), income growth is high, between 80 and 100%, but rather stable. Income growth starts falling up to the right tail of the distribution, with the exception of a small spike in the top 1%.

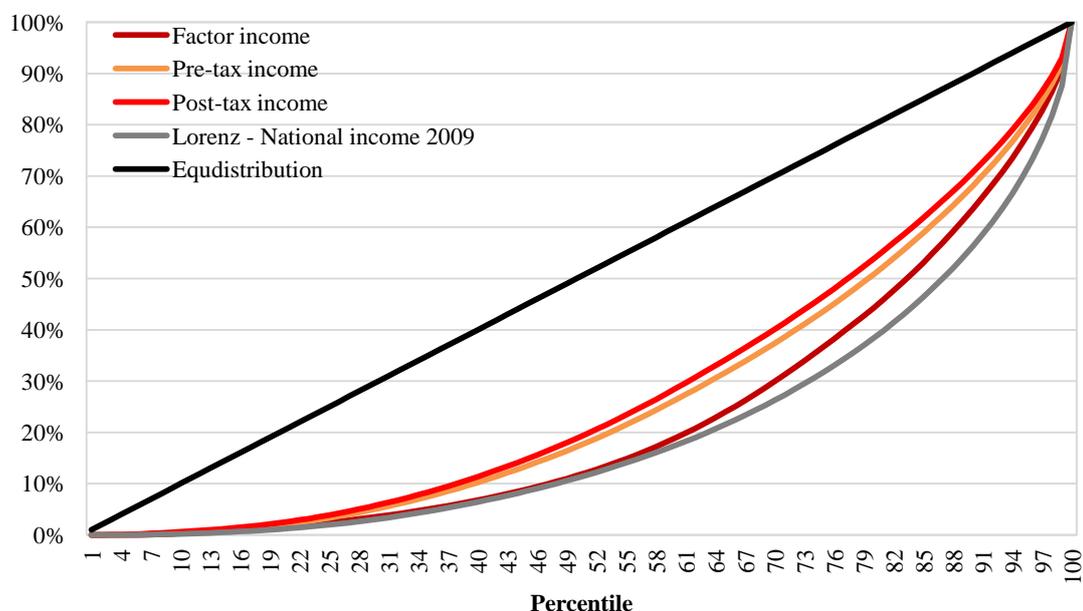
As for the differences in terms of the three income definitions, it is important to mention that they may not refer to the same people, because each centile distribution is computed over different incomes. For instance, we observe more zero-growth centiles⁴¹ in the factor distribution, which probably refer to the retired population with no factor income that belong to higher centiles in the pre or post-tax income distributions. For the same reason, the seventh decile shows higher growth rates than the others. First, they refer to different individuals, and second, they are not affected by the growth in pensions⁴², that grew less rapidly than wages and capital incomes in higher factor income deciles. Finally, it may be strange that pre-tax income grew faster than post-tax income for the lower centiles, given that they include transfers. Most likely, this is because the transfers system was already deployed by 2009, and thus it did not affected growth rate as it affected the income level (see 4.2.5).

⁴¹ And also a much higher growth rates at the bottom.

⁴² In Uruguay, the Constitution mandates that pensions are adjusted by the average wage growth.

In Figure 14 the same pattern is observed. The concentration curves of the income generated between 2009 and 2014 are systematically to the left of the Lorenz curve of the national income of 2009. That means that income growth had an equalizing effect with respect to the current income distribution in 2009.

Figure 14. Growth concentration curves 2009-2014



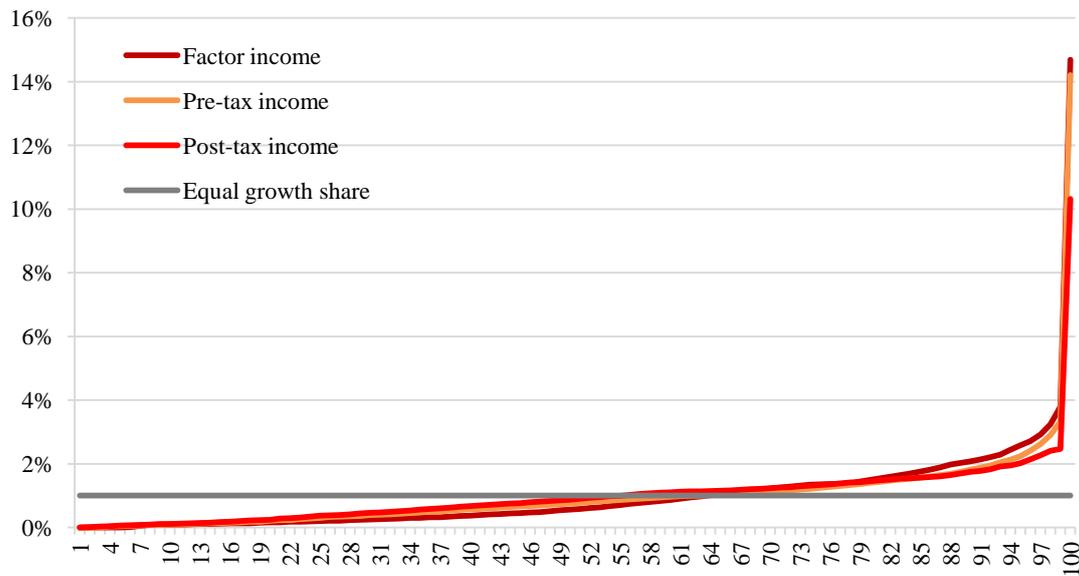
Source: own elaboration based on data sources described in section 4.

Hence, growth incidence curves and concentration curves are fully consistent with what we have shown so far. The somewhat problematic feature of this analysis is that it refers to relative changes in income, not absolute. The fact that concentration curves are below the 45° line highlights the idea that although growth had an equalizing effect, it was not pro-poor in absolute terms. Note that even with a small growth rate of the top earners compared to the bottom 50, given their base-scenario income is sufficiently high, their absolute growth may be significantly higher compared to the bottom earners. For instance, in the case of a perfectly flat growth incidence curve, that is, an equal income growth with no changes in the distribution, each group will capture their exact share in the base scenario. This may be important because, even if distribution does not change, the distance in actual consumption or savings possibilities between groups keep becoming larger as time goes by.

In Figure 15, growth appropriation curves are depicted. They show the share of growth, that is, the share of the new income captured by each centile⁴³. An opposite slope in absolute terms is observed, meaning that the higher individuals are in the income distribution (independently of which income definition we are considering), the larger is the share of growth they capture. The somewhat interesting thing is that this happens in an income inequality reduction period.

⁴³ Hence, the sum of all percentages depicted add up to 100%.

Figure 15. Growth Appropriation Curves. 2009-2014.



Source: own elaboration based on data sources described in section 4.

In the Figure, an “equal growth share” line is depicted as well, showing how much income each centile should have captured if growth was even in absolute terms (in this case, 1%)⁴⁴. By construction, by comparing with this line we are comparing the new-income appropriation with the population share, that is, we are performing a per-capita growth analysis. Up to roughly the sixth decile, individuals captured less growth than their “equal share”. From this point on, the share of income appropriated by the centiles surpasses that share, with a dramatic sharp increase in the top 1%. Hence, around the 60th centile, individuals capture the average absolute share of growth, in the 95th they capture twice their equal share, and for the top 1%, they get 14 their equal share⁴⁵.

In Table 17, the same analysis is performed by income groups and refereeing to the pre-tax income. In the first column, average growth is depicted, showing how it is larger than the average for the bottom 90 (and more so for the bottom 50), consistent with results in section 5.1. In the second panel, the top 1% is broken down in smaller groups, showing a particularly good performance of the top 0.1%, with more rapid growth not only than the remaining top 1%, but also when compared with the whole top 10%.

⁴⁴ Please note that we refer to *equal* defined as the capture of an equal share of the new income taken as a comparison reference point, not in terms of justice theory, which largely surpasses the aims of this paper.

⁴⁵ It is interesting to note that the share top incomes capture (14%) is lower than their initial share (nearly 22%), precisely because their growth rate was much lower than the average.

Table 17. Growth appropriation by income groups. Pre-tax national income 2009-2014.

	Average income growth (1)	Growth appropriation (2)	Growth appropriation in terms of "equal growth" (3)
Top 10	36.1%	35.7%	356.9%
Middle 40	64.7%	47.8%	119.5%
Bottom 50	90.6%	16.5%	33.0%
Average	52.4%	100.0%	100.0%
Top 01	39.2%	8.1%	8088.2%
Top 09_01	27.6%	6.1%	680.3%
Top 1	33.2%	14.2%	1421.1%

Source: own elaboration based on data sources described in section 4.

In column 2, the growth appropriation is depicted, showing that in terms of absolute growth capture, the winner seems to be the middle 40, capturing around half of the growth. The top 10% captures more than a third of the new income, 40% of which accrues to the top 1%.

But, since the groups are of very different sizes, column 2 does not account for the complete story. Column 3 shows that appropriation in terms of each group's "equal growth share", that is, essentially weighting each appropriation share by the size of the group⁴⁶. Broadly speaking, bottom 50 gets one third of their equal growth share, middle 40 end up in a tie, and the top 10% gets four times more. As mentioned earlier, top 1% captures 14 times the even growth share, but with significant differences within. Hence, most of that growth is accrued by the top 0.1%, with an astonishing share of growth that is 80 times larger than their equal growth share.

This analysis intends to show the limits of the recent reductions in income inequality, which effectively shortened the gap in relative terms between income groups, but was not enough to neutralize the growing gap in terms of absolute incomes, which is determinant in terms of consumption and savings possibilities.

⁴⁶ This is so because the "equal share" is the share of the population each group represents.

6. Concluding remarks

In this paper, we present estimations of income distribution for Uruguay over the period 2009-2014, following DINA guidelines as much as possible. The difference between these estimations and the ones presented in similar articles is that we could not depart from detailed National Accounts, and so we had to perform our estimations based on a bottom-up approach. We did so by combining high-quality tax and survey data -which represents our first estimation stage and is, in our view, an important contribution in its own right-, imputing all remaining income sources and then scaling up to national incomes in the second and third estimation stages.

The somewhat unexpected result is that, after combining all possible income information from tax data, household surveys, social security contributions and scaling incomes up – when possible – to official administrative totals, we could only account for around 60-65% of national income. When we imputed undistributed profits and all remaining taxes (both local and national), we barely reached 70% of national income. It is the first time that such a database is built for Uruguay, and it accounts for literally every income source.

There are many possible reasons for this large gap with national accounts totals. The main suspect is informal and untaxed incomes from the survey. It is very likely that there is underreporting of incomes such as owner occupied rental income, and probably in others as well. Moreover, it may be the case that there are more undistributed profits than the ones reported by firms. But in any case, it is rather hard to conclude that these factors, even combined, can account for as much as 30% of national income. The other candidate is the national income estimation itself. The absence of complete National Accounts series makes it very difficult to fully understand why such large differences emerge.

Given this large gap, we believe that at least in countries such as Uruguay, it would be wise to estimate both proper DINA-based inequality series and series based on careful combination of micro-data from tax records and surveys, and thus being able to account for distributional incidence of some of the more delicate imputations. In any case, further work is still required to fully understand this large gap and the best ways to deal with it. Hence, in this article we present estimations that account for all national income, and so they can be considered consistent and comparable with other DINA-based estimations, and we also present income distribution for intermediate estimation stages that do not account for all national income but entail less distributive assumptions. The evolutions -in large part by construction- are extremely similar, although the levels are not.

Results show that inequality fell during the period, led by a moderate increase in the national income share of the bottom 90%, in contrast with the decline in the shares of the top 10% and especially the top 1%. The top 1% share of pre-tax income reached its lowest point in 2014, with an estimated 11% of income recorded by the tax-survey database, and 19% in our DINA series, - that accounts for all national income -

departing from an initial share of 12.5% and 22% respectively. The large gap between the two estimations is mainly explained by undistributed profits, which prove to be a very delicate income source as results are extremely dependent of it. Factor income inequality is much larger than pre-tax income - as it includes social security contributions but excludes pensions - whilst post-tax inequality is lower still. Indeed, taxes and transfers reduce the top 1% income share by around three percentage points. In spite of the fall in inequality over the period, new income generated was not evenly distributed. Roughly half (47.8%) of the income growth between 2009 and 2014 was accrued by the “middle 40”, while over a third (35.7%) was appropriated by the top 10%. The bottom 50% captured the remaining 16.5% of new income, a share similar to the top 1% (14.2%), which is 50 times smaller in terms of population.

Results presented in this paper should be considered preliminary. Future improvements on the methodology will provide more accurate estimations. In particular, a more careful treatment of indirect taxes imputation is important in order to better understand the effect of the tax-transfers system. Furthermore, it is necessary to improve the imputation of undistributed profits, or at least to understand in depth its distributional implications. More generally, we need to better understand the relation between surpluses at the firm level and the way those incomes are accrued (or not) by households. Following steps will also include estimating post-tax national income, and hence imputing all in kind government spending, and also estimating wealth distribution, thus completing the DINA based estimations for Uruguay.

Bibliography

Alvaredo, F., Assouad, L., & Piketty, T. (2017). Measuring Inequality in the Middle East 1990-2016: The World's Most Unequal Region? *WID.world Working Paper Series N° 2017/15* .

Alvaredo, F., Atkinson, B., A., Chancel, L., Piketty, T., Saez, E., et al. (2017). *Distributional National Accounts (DINA) guidelines: concepts and methods used in WID.world*. World Wealth and Income Database, WID.world.

Atkinson, A. B., & Piketty, T. (2007). *Top incomes over the twentieth century: a contrast between continental european and english-speaking countries (Volume 1)*. Oxford: Oxford University Press.

Atkinson, A. B., & Pketty, T. (2010). *Top incomes: a global perspective (Volume 2)*. Oxford: Oxford University Press.

Atkinson, A. B., Piketty, T., & Saez, E. (2011). Top incomes in the long run of history. *Journal of Economic Literature* , 3-71.

Blanchet, T., Fourniere, J., & Piketty, T. (2016). Generalized Pareto Curves: Theory and Applications to Income and Wealth Tax Data for France and the United States, 1800-2014. *WID.world working paper series N° 2017/3* .

Burdín, G., De Rosa, M., & Vigorito, A. (2015). *Sectores de altos ingresos en Uruguay: participación relativa y patrones de movilidad en el período 2009-2012*. Montevideo: DT 03/15 Instituto de Economía.

Burdín, G., De Rosa, M., & Vigorito, A. (2015). *Uruguay Estimates of Top Income Shares 2009:2012*. WID.world technical not series N° 2015/2 .

Burdín, G., Esponda, F., & Vigorito, A. (2014). *Desigualdad y sectores de altos ingresos en Uruguay: un análisis en base a registros tributarios y encuestas de hogares para el período 2009-2011*. Montevideo: DT 06/14. Instituto de Economía. .

Chancel, L., & Piketty, T. (2017). Indian income inequality, 1922-2014: From British Raj to Billionaire Raj? *WID.world working paper series N° 2017/11* .

Corina (Ed.), G. (2014). *Falling inequality in Latin America: policy changes and lessons*. OUP Oxford.

De Rosa, M. ..., Siniscalchi, S., Vigorito, A., , Vilá, J., & Willebald, H. (2017). Los vínculos entre la distribución funcional y personal del ingreso. *Cuadernos de desarrollo humano, PNUD* .

De Rosa, M. (2016). Distribución de la riqueza en Uruguay: una aproximación por el método de capitalización. Tesis de Maestría en Economía. Facultad de Ciencias Económicas y de Administración, Universidad de la República.

Garbinti, B., Goupille-Lebret, J., & Piketty, T. (2016). *Income inequality in France, 1900-2014: evidence from Distributional National Accounts (DINA)*.

Instituto Nacional de Estadística. (2016). *Estimación de la pobreza por el método del ingreso*. Montevideo.

Morgan, M. (2017). Extreme and Persistent Inequality: New Evidence for Brazil Combining National Accounts, Survey and Fiscal Data, 2001-2015. *WID.world working paper series 2017/12* .

Novokmet, F., Piketty, T., & Zucman, G. (2017). From Soviets to Oligarchs: Inequality and property in Russia 1905-2016. *WID. world working paper series N° 2017/09* .

Piketty, T. (2003). Income inequality in France, 1901-1998. *Journal of political economy*, vol 111, n° 5 , 1004-1042.

Piketty, T., Saez, E., & Zucman, G. (2016). Distributional National Accounts: methods and estimates for the United States. *NBER Working Paper Series* .

Piketty, T., Yang, L., & Zucman, G. (2016). *Capital accumulation, private property and rising inequality in China, 1978-2015*.

Appendix

Table A. 1. Information sources and income definitions

Individual incomes by aggregate income definition					Source/Type of data	
		Pre-Tax Factor Income	Pre-Tax National Income	Post-Tax Disposable Income		
Individual incomes	Labor income	Formal labor income	Formal labor income	Formal labor income	Tax micro data	
		Informal labor income	Informal labor income	Informal labor income	Survey data	
	Mixed income	Self employed income	Self employed income	Self employed income	Tax micro data-survey data	
	Capital income		Nominative utilities and dividends	Nominative utilities and dividends	Nominative utilities and dividends	Tax micro data
			Non-nominative utilities and dividends	Non-nominative utilities and dividends	Non-nominative utilities and dividends	Tax aggregate data
			Net undistributed profits	Net undistributed profits	Net undistributed profits	Tax micro data (firms)
			Other non-nominative capital incomes	Other non-nominative capital incomes	Other non-nominative capital incomes	Tax aggregate data
			Real estate income	Real estate income	Real estate income	Tax micro data
			Other taxed capital incomes	Other taxed capital incomes	Other taxed capital incomes	Tax micro data
			Owner occupied housing rent	Owner occupied housing rent	Owner occupied housing rent	Survey data
			Interests	Interests	Interests	Survey data-Tax aggregate data
			Other untaxed capital income	Other un-taxed capital income	Other un-taxed capital income	Survey data
		Other earnings	Remaining earnings	Remaining earnings	Remaining earnings	Survey data
	Taxes and transfers	Personal taxes	Labor income taxes	Labor income taxes		Tax micro data
			Capital incomes taxes	Capital incomes taxes		Tax micro data
Mixed income taxes			Mixed income taxes		Tax micro data	
		Property taxes	Property taxes		Tax micro data-Tax aggregate data	
Transfers				Child transfers	Administrative micro-data - aggregate official data	
			Other cash transfers	Survey data		
Social security	Contributions	Personal contributions (pensions and			Computed - aggregate official data	

		health)			
		Employers contributions			
		Social security transfers	Unemployment, illness and maternity insurances	Unemployment, illness and maternity insurances	Survey data-aggregate official data
			Pensions	Pensions	Tax micro data-Tax aggregate data
		Pensions taxes	Pension taxes		Tax micro data-Tax aggregate data
		Contributive system deficit	Contributive system deficit - pensions	Contributive system deficit - pensions + transfers	Aggregate official data
Firms	Production and rent taxes	Production taxes	Production taxes		Tax micro data (firms)-Tax aggregate data
		Rent taxes	Rent taxes		Tax micro data (firms)-Tax aggregate data
	Remaining taxes-subsidies	Remaining taxes-subsidies	Remaining taxes-subsidies	Remaining taxes-subsidies	Aggregate official data

Source: own elaboration

Table A2. Overview of the imputation stages aggregates – 2009

Table A3. Overview of the imputation stages aggregates – 2010

Table A4. Overview of the imputation stages aggregates – 2011

Table A5. Overview of the imputation stages aggregates – 2012

Table A6. Overview of the imputation stages aggregates – 2013

Table A 7 Total population by database-2009

Table A 8 Total population by database-2010

Table A 9 Total population by database-2011

Table A 10 Total population by database-2012

Table A 11 Total population by database-2013

Table A 12 Adults that receives child transfer by source. 2009

Table A 13 Adults that receives child transfer by source. 2010

Table A 14 Adults that receives child transfer by source. 2011

Table A 15 Adults that receives child transfer by source. 2012

Table A16 Adults that receives child transfer by source. 2013

Table A 17 Number of individuals by income source - database 2009

Table A18 Number of individuals by income source - database 2010

Table A 19 Number of individuals by income source - database 2011

Table A 20 Number of individuals by income source - database 2012

Table A 21 Number of individuals by income source - database 2013

Table A 22 Total amount of income by income source - database (Uruguayan pesos) 2009

Table A 23 Total amount of income by income source - database (Uruguayan pesos) 2010

Table A 24 Total amount of income by income source - database (Uruguayan pesos) 2011

Table A 25 Total amount of income by income source - database (Uruguayan pesos) 2012

Table A 26 Total amount of income by income source - database (Uruguayan pesos) 2013

Table A 27 Gini index by income source - database 2009

Table A 28 Gini index by income source - database 2010

Table A 29 Gini index by income source - database 2011

Table A 30 Gini index by income source - database 2012

Table A 31 Gini index by income source - database 2013

Table A 32 Income shares by imputation step- 2009

Table A 33 Income shares by imputation step- 2010

Table A 34 Income shares by imputation step- 2011

Table A 35 Income shares by imputation step- 2012

Table A 36 Income shares by imputation step- 2013

Table A 37 Summary income statistics by total incomes fractiles – 2009

Table A 38 Summary income statistics by total incomes fractiles – 2010

Table A 39 Summary income statistics by total incomes fractiles – 2011

Table A 40 Summary income statistics by total incomes fractiles – 2012

Table A 41 Summary income statistics by total incomes fractiles – 2013

Table A 42 Incomes imputed in 2nd stage. 2009

Table A 43 Incomes imputed in 2nd stage. 2010

Table A 44 Incomes imputed in 2nd stage. 2011

Table A 45 Incomes imputed in 2nd stage. 2012

Table A 46 Incomes imputed in 2nd stage. 2013

Table A 47 Taxable capital incomes in the tax data - nominative. 2009

Table A 48 Taxable capital incomes in the tax data - nominative. 2010

Table A 49 Taxable capital incomes in the tax data - nominative. 2011

Table A 50 Taxable capital incomes in the tax data - nominative. 2013

Table A 51 Taxable capital incomes in the tax data - nominative. 2013

Table A 52 Distribution of incomes used for imputations. Pre-tax income 2009

Table A 53 Distribution of incomes used for imputations. Pre-tax income 2010

Table A 54 Distribution of incomes used for imputations. Pre-tax income 2011

Table A 55 Distribution of incomes used for imputations. Pre-tax income 2012

Table A 56 Distribution of incomes used for imputations. Pre-tax income 2013

Table A 57 Growth appropriation by income groups. Factor income 2009-2014.

Table A 58 Growth appropriation by income groups. Post-tax disposable income 2009-2014.

Table A. 59 Mean and share income (labour incomes)

Income group	Formal labour income		Informal labour income		Total labour income	
	Mean	Share	Mean	Share	Mean	Share
1	486	0.0%	46	0.0%	532	0.0%
2	8,757	0.6%	3,244	1.8%	12,001	0.8%
3	17,911	1.3%	8,927	5.1%	26,838	1.7%
4	23,884	1.7%	13,531	7.7%	37,415	2.4%
5	42,537	3.0%	22,199	12.6%	64,736	4.1%
6	70,881	5.0%	27,432	15.6%	98,313	6.2%
7	112,081	8.0%	28,338	16.1%	140,418	8.9%
8	164,231	11.7%	26,816	15.3%	191,047	12.1%
9	264,028	18.8%	23,268	13.2%	287,296	18.2%
10	702,284	49.9%	21,988	12.5%	724,272	45.8%

1-5	18,695	6.6%	9,580	27.3%	28,275	8.9%
6-9	152,807	43.4%	26,464	60.2%	179,271	45.3%
10	702,284	49.9%	21,988	12.5%	724,272	45.8%
90-99	540,832	34.6%	20,806	10.7%	561,638	31.9%
Top 1	2,155,390	15.3%	32,623	1.9%	2,188,013	13.8%
99-99.9	650,289	45.8%	22,139	12.5%	672,428	42.1%
Top 0.1	5,849,885	4.2%	7,030	0.0%	5,856,915	3.7%

Source: own elaboration based on ECH and DGI

Table A. 60 Mean and share income (capital incomes)

Income group	Formal capital income		Informal capital income		Total capital income	
	Mean	Share	Mean	Share	Mean	Share
1	49	0.1%	2	0.0%	51	0.0%
2	383	0.4%	324	0.5%	707	0.4%
3	519	0.5%	754	1.2%	1,273	0.8%
4	646	0.6%	1,419	2.3%	2,065	1.3%
5	1,089	1.1%	2,338	3.8%	3,427	2.1%
6	1,533	1.5%	3,898	6.3%	5,430	3.3%
7	2,201	2.1%	5,213	8.4%	7,414	4.5%
8	3,409	3.3%	7,089	11.4%	10,498	6.4%
9	6,936	6.7%	11,818	19.0%	18,754	11.3%
10	86,546	83.8%	29,295	47.1%	115,841	70.0%
1-5	537	2.6%	966	7.8%	1,503	4.5%
6-9	3,520	13.6%	7,005	45.1%	10,524	25.4%
10	86,546	83.8%	29,295	47.1%	115,841	70.0%
90-99	27,650	24.1%	28,255	40.9%	55,905	30.4%
Top 1	616,624	59.7%	38,657	6.2%	655,281	39.6%
99-99.9	49,374	47.3%	29,339	46.7%	78,713	47.1%
Top 0.1	3,766,703	36.5%	24,968	0.4%	3,791,671	22.9%

Source: own elaboration based on ECH and DGI

Table A. 61 Mean and share income (pension, transfers and other incomes)

Income group	Pensions		Transfers		Owner occupied rental income		Other incomes	
	Mean	Share	Mean	Share	Mean	Share	Mean	Share
1	102	0.0%	982	2.9%	1,898	6.8%	24	0.1%
2	2,757	0.6%	5,098	14.7%	1,538	5.4%	1,098	2.5%
3	24,128	5.3%	3,164	9.1%	1,485	5.2%	2,284	5.2%
4	34,391	7.6%	4,148	12.0%	2,077	7.4%	3,302	7.6%
5	36,176	8.0%	4,924	14.3%	2,312	8.2%	3,529	8.1%
6	37,510	8.3%	4,628	13.4%	2,809	9.9%	4,436	10.2%
7	43,907	9.8%	3,920	11.4%	3,341	11.8%	5,113	11.7%
8	61,326	13.6%	3,300	9.6%	3,462	12.3%	6,136	14.1%
9	78,060	17.3%	2,815	8.2%	4,291	15.2%	8,066	18.5%

10	132,070	29.3%	1,561	4.5%	5,046	17.9%	9,597	22.0%
1-5	19,488	21.6%	3,659	53.0%	1,863	33.0%	2,045	23.5%
6-9	55,201	49.0%	3,666	42.5%	3,476	49.2%	5,938	54.5%
10	132,070	29.3%	1,561	4.5%	5,046	17.9%	9,597	22.0%
90-99	131,895	26.4%	1,706	4.5%	5,062	16.1%	9,817	20.3%
Top 1	133,642	3.0%	249	0.1%	4,908	1.7%	7,619	1.8%
99-99.9	132,877	29.2%	1,576	4.5%	5,054	17.7%	9,537	21.7%
Top 0.1	52,186	0.1%	74	0.0%	4,310	0.2%	15,570	0.4%

Source: own elaboration based on ECH and DGI

Table A.62. Aggregate incomes in the three stages – Factor, pre-tax and post-tax disposable income.

Aggregate incomes	2009	2010	2011	2012	2013	2014
First stage incomes						
Main database pre tax Factor Income (1)	351.750.463.876	396.448.147.775	465.917.997.399	519.484.645.698	623.388.966.516	712.154.522.461
Main database pre tax national income (2)	367.724.005.409	425.822.055.207	497.929.394.453	559.291.774.555	667.427.925.262	759.161.780.949
Main database post tax Disposable Income (3)	358.189.997.540	415.231.156.984	480.877.527.051	540.058.645.648	642.868.601.951	729.032.695.049
% of national income (1)	55,5%	55,6%	56,8%	56,1%	59,6%	60,4%
% of national income (2)	58,0%	59,7%	60,7%	60,4%	63,8%	64,4%
% of national income (3)	56,5%	58,2%	58,6%	58,3%	61,5%	61,8%
Second stage incomes						
Net undistributed profits (a)	40.309.817.255	72.243.595.705	41.976.908.541	54.023.502.893	51.340.233.172	59.030.149.538
Production taxes (b)	18.876.532.962	21.771.906.153	22.189.091.150	24.353.472.735	32.200.153.864	29.549.098.639
Corporate taxes (c)	9.362.095.037	9.598.882.856	10.857.569.512	11.974.099.955	13.421.780.245	16.262.764.216
Products taxes net of subsidies (d)	87.166.325.698	101.718.788.537	117.899.750.517	129.308.884.542	144.772.928.836	161.697.822.305
Local taxes (e) - production	1.463.498.680	845.929.869	988.343.831	1.066.344.383	1.042.099.884	1.059.672.992
Local taxes (f) - property	5.859.425.529	6.905.319.695	7.597.361.099	8.487.901.789	9.337.342.055	9.994.480.701
Local taxes (g) - rest	8.366.960.354	9.261.262.984	10.469.409.622	10.999.605.745	12.866.766.528	14.267.730.535
Non-considered personal income taxes (h)	1.784.579.981	1.662.248.712	2.587.790.134	2.053.474.348	2.678.819.697	3.236.839.548
Non-considered personal property taxes (i)	1.026.503.256	1.347.081.381	1.544.616.621	1.413.437.023	1.516.232.175	1.441.558.503
Contributive system deficit (j) - pensions	-15.973.541.534	-29.373.907.432	-32.011.397.053	-39.807.128.858	-44.038.958.746	-47.007.258.488
Contributive system deficit (k) - transfers	-38.062.185.323	-32.879.756.508	-38.797.191.964	-44.035.986.269	-52.464.598.761	-62.378.474.045
Non-considered personal incomes (l)	25.493.999.729	23.746.410.171	36.968.430.486	29.335.347.829	38.268.852.814	46.240.564.971
Total (1) (a+b+c+e+f+g+h+i)	87.049.413.054	123.636.227.355	98.211.090.510	114.371.838.871	124.403.427.621	134.842.294.672
Total (2) (a+b+c+e+f+g+h+i+j)	71.075.871.520	94.262.319.923	66.199.693.457	74.564.710.014	80.364.468.875	87.835.036.183
Total (3) (a-d+j+k)	-100.892.235.300	-91.728.856.773	-146.731.430.993	-159.128.496.776	-189.936.253.171	-212.053.405.301
% of national income (1)	13,7%	17,3%	12,0%	12,3%	11,9%	11,4%
% of national income (2)	11,2%	13,2%	8,1%	8,0%	7,7%	7,4%

% of national income (3)	-15,9%	-12,9%	-17,9%	-17,2%	-18,2%	-18,0%
2nd stage income (1)	438.799.876.929	520.084.375.130	564.129.087.910	633.856.484.569	747.792.394.137	846.996.817.133
2nd stage income (2)	438.799.876.929	520.084.375.130	564.129.087.910	633.856.484.569	747.792.394.137	846.996.817.133
2nd stage income (3)	257.297.762.240	323.502.300.211	334.146.096.059	380.930.148.872	452.932.348.780	516.979.289.748
2nd stage before scaling up: % of national income (1)	69,22%	72,91%	68,73%	68,40%	71,50%	71,84%
2nd stage before scaling up: % of national income (2)	69,22%	72,91%	68,73%	68,40%	71,50%	71,84%
2nd stage before scaling up: % of national income (3)	40,59%	45,35%	40,71%	41,10%	43,31%	43,85%

Third stage incomes

Labour share 2nd thres (1)	248.200.000.000	281.162.450.902	330.000.000.000	376.000.000.000	437.200.000.000	505.300.000.000
Labour share 2nd thres (2)	203.400.000.000	229.351.132.813	261.800.000.000	291.600.000.000	344.100.000.000	392.800.000.000
Labour share 2nd thres (3)	192.100.000.000	216.309.999.891	245.500.000.000	272.600.000.000	321.400.000.000	365.500.000.000
Capital share 2nd thres (1)	147.900.000.000	190.464.007.018	178.100.000.000	206.900.000.000	247.400.000.000	279.200.000.000
Capital share 2nd thres (2)	147.200.000.000	189.726.540.640	177.100.000.000	206.000.000.000	246.300.000.000	277.900.000.000
Capital share 2nd thres (3)	108.900.000.000	147.165.423.646	131.400.000.000	155.500.000.000	185.700.000.000	216.000.000.000
Mixed share 2nd thres (1)	20.210.000.000	23.910.044.955	26.830.000.000	28.590.000.000	25.880.000.000	26.290.000.000
Mixed share 2nd thres (2)	17.470.000.000	21.696.294.324	24.470.000.000	25.750.000.000	23.380.000.000	23.500.000.000
Mixed share 2nd thres (3)	16.910.000.000	21.044.960.291	23.610.000.000	24.950.000.000	22.400.000.000	22.420.000.000
Auxiliar: income to scale up	195.132.495.038	193.208.605.580	256.636.122.508	292.885.597.572	298.004.344.476	332.069.610.953
Labour share national (1)	44,57%	43,61%	44,65%	44,11%	44,46%	45,85%
Capital share national (1)	34,39%	36,31%	35,91%	38,22%	37,51%	36,51%
Mixed share national factor (1)	17,50%	16,71%	15,64%	13,82%	14,68%	14,59%
Labour income national (1)	282.527.037.875	311.044.513.734	366.504.835.819	408.776.515.257	464.987.346.695	540.652.927.119
Labour income national (2)	231.531.021.369	253.726.667.097	290.760.503.083	317.019.233.641	365.970.141.806	420.281.950.866
Labour income national (3)	218.668.186.848	239.299.517.116	272.657.385.435	296.362.973.561	341.827.386.157	391.071.927.295
Capital income national (1)	218.019.624.280	258.997.896.626	294.725.951.609	354.183.592.225	392.271.712.900	430.448.670.430
Capital income national (2)	216.987.753.171	257.995.070.719	293.071.117.518	352.642.919.277	390.527.578.365	428.444.432.352
Capital income national (3)	160.529.662.502	200.119.359.962	217.445.199.559	266.194.048.289	294.441.621.203	333.011.865.376
Mixed income national (1)	110.928.437.574	119.192.931.670	128.349.523.751	128.033.508.600	153.499.432.918	171.983.165.295

Mixed income national (2)	95.889.154.102	108.157.259.080	117.059.740.820	115.315.244.717	138.671.435.148	153.731.623.600
Mixed income national (3)	92.815.431.933	104.910.321.945	112.945.667.379	111.732.635.172	132.858.860.022	146.666.510.685
Scale up labour income (1)	34.327.037.875	29.882.062.832	36.504.835.819	32.776.515.257	27.787.346.695	35.352.927.119
Scale up labour income (2)	28.131.021.369	24.375.534.284	28.960.503.083	25.419.233.641	21.870.141.806	27.481.950.866
Scale up labour income (3)	26.568.186.848	22.989.517.225	27.157.385.435	23.762.973.561	20.427.386.157	25.571.927.295
Scale up capital income (1)	70.119.624.280	68.533.889.608	116.625.951.609	147.283.592.225	144.871.712.900	151.248.670.430
Scale up capital income (2)	69.787.753.171	68.268.530.079	115.971.117.518	146.642.919.277	144.227.578.365	150.544.432.352
Scale up capital income (3)	51.629.662.502	52.953.936.317	86.045.199.559	110.694.048.289	108.741.621.203	117.011.865.376
Scale up mix income (1)	90.718.437.574	95.282.886.715	101.519.523.751	99.443.508.600	127.619.432.918	145.693.165.295
Scale up mix income (2)	78.419.154.102	86.460.964.756	92.589.740.820	89.565.244.717	115.291.435.148	130.231.623.600
Scale up mix income (3)	75.905.431.933	83.865.361.654	89.335.667.379	86.782.635.172	110.458.860.022	124.246.510.685
Scale up other incomes (1)	-32.604.691	-490.233.575	1.985.811.329	13.381.981.490	-2.274.148.038	-225.151.891
Scale up other incomes (2)	18.794.566.395	14.103.576.462	19.114.761.087	31.258.199.938	16.615.189.157	23.811.604.136
Scale up other incomes (3)	41.029.213.754	33.399.790.385	54.097.870.135	71.645.940.550	58.376.477.094	65.239.307.597
3rd stage income (1)	633.932.371.967	713.292.980.710	820.765.210.418	926.742.082.141	1.045.796.738.613	1.179.066.428.086
3rd stage income (2)	633.932.371.967	713.292.980.710	820.765.210.418	926.742.082.141	1.045.796.738.613	1.179.066.428.086
3rd stage income (3)	452.430.257.277	516.710.905.791	590.782.218.566	673.815.746.444	750.936.693.256	849.048.900.702
3rd stage before scaling up: % of national income (1)	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
3rd stage before scaling up: % of national income (2)	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
3rd stage before scaling up: % of national income (3)	71,37%	72,44%	71,98%	72,71%	71,81%	72,01%
National income (net)	633.932.371.967	713.292.980.710	820.765.210.418	926.742.082.141	1.045.796.738.613	1.179.066.428.086
Labour share national (1) - to check	44,6%	43,6%	44,7%	44,1%	44,5%	45,9%
Capital share national (1) - to check	34,4%	36,3%	35,9%	38,2%	37,5%	36,5%
Mixed share national factor (1) - to check	17,5%	16,7%	15,6%	13,8%	14,7%	14,6%
Total Income (1) - check	633.932.371.967	713.292.980.710	820.765.210.418	926.742.082.141	1.045.796.738.613	1.179.066.428.086
Total Income (2) - check	633.932.371.967	713.292.980.710	820.765.210.418	926.742.082.141	1.045.796.738.613	1.179.066.428.086
Total Income (3)	452.430.257.277	516.710.905.791	590.782.218.566	673.815.746.444	750.936.693.256	849.048.900.702

Auxiliar: For imputation purposes (to use as totals in Stata)

To impute prop. to capital income (1) a+b+c+e	70011943934	104460314583	76011913034	91417419966	98004267166	105901685385
To impute prop. to total income (1) g+h	10151540335	10923511696	13057199756	13053080093	15545586225	17504570083
To impute prop. to property income (1) f+i	6885928785	8252401076	9141977720	9901338812	10853574230	11436039204
To impute prop. to capital income (2) a+b+c+e	70011943934	104460314583	76011913034	91417419966	98004267166	105901685385
To impute prop. to total income (2) g+h+j	-5822001199	-18450395736	-18954197297	-26754048764	-28493372521	- 29.502.688.405,90
To impute prop. to property income (3) f+i	6885928785	8252401076	9141977720	9901338812	10853574230	11436039204
To impute prop. to capital income (1) a	40309817255	72243595705	41976908541	54023502893	51340233172	59030149538
To impute prop. to total income (2) -d+j+k	-141202052555	-163972452478	-188708339534	-213151999668	-241276486343	- 271.083.554.838,73
To impute prop. to property income (3)	0	0	0	0	0	0

Source: own elaboration based on definitions of section 0

Graph A 1 Income composition by income source and fractiles – 2009

Graph A 2 Income composition by income source and fractiles – 2010

Graph A 3 Income composition by income source and fractiles – 2011

Graph A 4 Income composition by income source and fractiles – 2012

Graph A 5 Income composition by income source and fractiles – 2013