

Beyond tax-survey combination:  
inequality and the blurry household-firm border.

---

Mauricio De Rosa  
Joan Vilá

**INSTITUTO DE ECONOMÍA**

Serie Documentos de Trabajo

Mayo, 2022

DT 10/2022

ISSN: 1510-9305 (en papel)

ISSN: 1688-5090 (en línea)

## Agradecimientos:

Este trabajo representa un nuevo esfuerzo por elaborar Cuentas Nacionales Distributivas para Uruguay, combinando el conjunto de bases de microdatos (tributarios y de encuestas de hogares) y Cuentas Nacionales. Representa una actualización y mejora de las estimaciones realizadas en el DT 05/20 de esta misma serie (“Distributing the missing third: growth and falling inequality in Uruguay 2009-2016”).

Agradecemos al grupo de investigación de Desigualdad y Pobreza del Instituto de Economía-UdelaR por sus aportes y contribuciones. Nos gustaría agradecer especialmente a Andrea Vigorito por sus ideas y sugerencias durante todo el proceso de redacción de este artículo; también extendemos nuestro agradecimiento a Martín Leites y Luciana Méndez, coordinadores del grupo, y a los participantes del seminario en el que presentamos este artículo. También estamos muy agradecidos con el equipo del World Inequality Lab por su ayuda continua y sus valiosos comentarios en las diferentes etapas de este proceso: en particular, nos gustaría agradecer a Facundo Alvaredo, Ignacio Flores y Marc Morgan. También agradecemos a los participantes en la sesión sobre “DINA en los países en desarrollo” en la Primera Conferencia WIL en diciembre de 2017, y a los participantes en la sesión “Distribución del ingreso” en la IX Conferencia de la Red de Desigualdad y Pobreza (sesión de Uruguay, noviembre de 2017), donde se presentaron las primeras versiones de este documento. Agradecemos a Nora Lustig, con quien discutimos en profundidad muchos de los aspectos clave de este esfuerzo. Finalmente, agradecemos a Gustavo González, ex coordinador de la Asesoría Económica de la Dirección General Impositiva, y a Fernando Peláez y Sol Mascarenhas, por la invaluable ayuda y comentarios recibidos durante esta investigación. Todos los errores son propios.

## Acknowledgements:

This paper represents a new effort to elaborate National Distributive Accounts for Uruguay, combining the set of microdata bases (tax and household survey) and National Accounts. It represents an update and improvement of the estimates made in DT 05/20 of this same series (“Distributing the missing third: growth and falling inequality in Uruguay 2009-2016”).

We are grateful to the inequality research group *Instituto de Economía-UdelaR* for their inputs and contributions. We would like to especially thank Andrea Vigorito for her insights and suggestions throughout the whole process of writing this article; we also extend our thanks to Martín Leites and Luciana Méndez, coordinators of the group, and to the participants of the seminar in which we presented this article. We are also very grateful to the World Inequality Lab's team for their continuous help and invaluable comments at different stages of this process: in particular, we would like to thank Facundo Alvaredo, Ignacio Flores, and Marc Morgan. We are also grateful to the participants in the session on “DINA in developing countries” at the First WIL Conference in December 2017, and the participants in the session “Income Distribution” at the IX Conference of the Network of Inequality and Poverty (Uruguayan session, November 2017), who commented on early versions of this paper. We thank Nora Lustig, with whom we discussed in depth many of the key aspects of this effort. Finally, we thank Gustavo González, former coordinator of *Asesoría Económica* at *Dirección General Impositiva*, and to his staff, Fernando Peláez and Sol Mascarenhas, for the invaluable help and comments received during this research. Any errors remain our own.

Forma de citación sugerida para este documento: De Rosa, M., Vilá, J. (2022) “Beyond tax-survey combination: inequality and the blurry household-firm border.”. Serie Documentos de Trabajo, DT 10/2022. Instituto de Economía, Facultad de Ciencias Económicas y Administración, Universidad de la República, Uruguay.

# Beyond tax-survey combination: inequality and the blurry household-firm border.

Mauricio De Rosa\*

Joan Vilá<sup>†</sup>

## Abstract

Inequality evidence based on surveys, tax records, or their combination often result in divergent trends, fueling the distributional debate in Latin America. Beyond the relative strengths and weaknesses of these sources, tax-survey data still face two important shortcomings: they are unable to account for the entirety of household or national income, and they are affected by firm owners' decisions about the distribution of profits, changing which incomes researchers can actually observe. Based on unique data which matches social security data, household surveys, personal income tax records, and firm tax records, we assess inequality trends in Uruguay in light of these issues. We show that increasing profit-distribution behavior by firms pushes tax-survey top shares upwards, but that this trend is offset when undistributed profits are accounted for. Although top income groups benefited to a greater extent from recent economic growth, overall inequality decreased in tax-survey, household income, and national income series.

Key words: Firms, Income inequality, National Accounts, Latin America, Tax records.

JEL Classification: D31, D33, E01

(\*) M. De Rosa, Instituto de Economía, Universidad de la República, Uruguay, correo electrónico: mauricio.derosa@fcea.edu.uy

(<sup>†</sup>) Joan Vilá, Instituto de Economía, Universidad de la República, Uruguay, correo electrónico: joan.vila@fcea.edu.uy

## Resumen

La evidencia sobre las tendencias recientes de la desigualdad basada en encuestas, registros tributarios o su combinación a menudo da como resultado tendencias divergentes, alimentando el debate distributivo en América Latina. Más allá de las fortalezas y debilidades relativas de estas fuentes, los datos de encuestas y registros tributarios aún enfrentan dos deficiencias importantes: no pueden dar cuenta de la totalidad del ingreso de los hogares o nacional, y se ven afectados por las decisiones de los propietarios de las empresas sobre la distribución de las ganancias, cambiando los ingresos que pueden observar los investigadores. A partir de una novedosa base de datos que combina datos de seguridad social, encuestas de hogares, registros tributarios sobre la renta personal y registros de impuestos de empresas, evaluamos las tendencias de desigualdad en Uruguay a la luz de estos desafíos. Mostramos que el incremento de la distribución de utilidades por parte de las empresas incrementa los niveles de desigualdad en los registros tributarios, pero que esta tendencia se compensa cuando se incorporan las utilidades no distribuidas. Por otra parte, mostramos que, aunque los grupos de ingresos más altos se beneficiaron en mayor medida del crecimiento económico reciente, la desigualdad disminuyó en las distintas series construidas: encuestas-registros tributarios, ingresos de los hogares e ingreso nacional.

Palabras clave: Empresas, Desigualdad del ingreso, Cuentas Nacionales, América Latina, Registros tributarios.

Código JEL: D31, D33, E01

# 1 Introduction

Survey and tax data are the most extensively used sources in the study of income inequality worldwide, and they stand at the epicenter of the debate on the recent evolution of inequality in Latin America. Yet, even if we assume that survey and tax data can be effectively combined—a big *if*—are they sufficient to assess trends in inequality?

There are at least two issues that should be kept in mind. First, tax-survey inequality estimates may be detached from key variables such as growth. The data sources upon which most research is based are not consistent, since growth is measured using macroeconomic aggregates from national accounts, while inequality estimates are based on tax-survey micro-data. This micro-macro inconsistency not only makes it difficult to properly address the question of how economic growth is distributed among income groups, but also may lead to biased trends if the gaps between sources change over time. Second, even if all micro-macro gaps remain unchanged, and the micro-data captures a constant share of household income, tax-survey-based personal inequality estimates depend on decisions about the allocation of income between firms and households, affecting what can actually be observed by the researcher. If firm owners decide —because of the economic cycle, tax policy changes, or another reason—to withdraw more of their incomes from the businesses they run (i.e., they increase the distribution of profits<sup>1</sup>), observed capital incomes at the tax-survey level mechanically increase, pushing inequality estimates upwards.

Capital is the single most challenging income source underlying these two issues. [Alvaredo et al. \(2022\)](#) show a large micro-macro gap in Latin American, mostly explained by capital incomes, both at the household and national income levels. This has consequences in the measurement of inequality and its changes over time, given the potential distributive impact of capital incomes kept at the firm level ([De Rosa et al., 2022](#)). Moreover,

---

<sup>1</sup>In most countries, the share of undistributed profits is very high, between 4-10% [WIL \(2021\)](#), and there is evidence that it is growing [Flores \(2018\)](#).

distinguishing capital incomes from the rest is difficult even at the tax-survey level—let alone imputing unobserved ones—and it depends on a firm’s legal status and its owner’s decisions (see e.g. [Kopczuk and Zwick \(2020\)](#); [Smith et al. \(2019\)](#)). Adequately accounting for capital incomes therefore requires detailed data on firms and owners ([WIL, 2021](#)), which is very rarely available ([Fairfield and Jorratt De Luis, 2016](#); [Alstadsæter et al., 2017](#)). Thus, the micro-macro gap and the blurriness of household-firm borders both impose major challenges when drawing conclusions about levels of inequality, and more importantly, about inequality trends, from tax-survey data alone. Yet going beyond tax-survey data entails heavy assumptions unless sufficient additional information is gathered.

In this paper, we attempt to overcome these challenges based on unique data that matches records from social security, household surveys, personal income taxes, and firm taxes, combined with national accounts. These data allow us not only to provide detailed personal capital income estimates, but also to match owners’ and firms’ administrative data to account for the complex interplay between owners and firms. We impute undistributed profits to provide a national income inequality series, which mechanically pushes the income concentration upwards. However, we show that as firms distribute more dividends, tax-survey based inequality—especially the top shares—increases, and this trend is offset when (decreasing) undistributed profits are accounted for. Accounting for undistributed profits thus yields the counter-intuitive result of tempering income concentration trends, while at the same time enabling us to jointly study inequality and national income growth.

We aim to contribute to the inequality-trends debate in Latin America, which cannot be separated from the data controversy. Household surveys and tax data are a key input for any distributional study, yet they have significant drawbacks. They do not include all income sources and, in the case of tax data, do not account for the entire income

distribution. Household surveys allow for a correct estimation of the incomes of most of the population, but might be subject to underreporting and undercoverage at the top of the income distribution (Bourguignon, 2015; Lustig et al., 2019). Conversely, the increasing use of tax records to measure income inequality has resulted in improvements in terms of coverage of top incomes (Atkinson et al., 2011), but also has important caveats. For instance, changes in the tax system may create incentives to alter reported income through income shifting or deferment, tax avoidance, or tax evasion, problems that may be particularly relevant in the short term (Burkhauser et al., 2012; Goolsbee, 2000; Piketty, 2003). Not surprisingly, different institutions that produce inequality estimates report heterogeneous and often divergent results. Ferreira et al. (2015) and Lustig et al. (2016) review the main international information sources that analyze the evolution of inequality<sup>2</sup> and conclude that results differ across databases, both in levels and in trends, even when the welfare concept and inequality measures are held constant. This divergence increases when the estimate refers to a specific country and a short time frame.

Some of the drawbacks of both household surveys and tax data can be tackled by considering the totality of national income, which does not depend on the definition of taxable income and, by construction, refers to all possible income sources in the economy. Moreover, national income represents a standardized income concept, precisely defined by the System of National Accounts (SNA) and internationally accepted (United Nations, 2008). Yet the task of accounting for all remaining incomes not included in tax or household surveys is challenging, since the gap between micro- and macro-based income estimates is large (Deaton, 2005; Alvaredo et al., 2022). Given this important micro-macro gap, the potential improvements in the distributive results obtained depend, to a large extent, on the imputation assumptions used to distribute the missing income at the household level (Zwijnenburg, 2022).

---

<sup>2</sup>CEPALSTAT, Income Distribution Database (IDD), LIS, PovcalNet, Socio-Economic Database for Latin America and the Caribbean (SEDLAC), “All the Ginis” (ATG), the World Income Inequality Database (WIID), and the Standardized World Income Inequality Database (SWIID).

Efforts to obtain income inequality estimates consistent with macroeconomic aggregates have been performed for Latin American countries in the past (Altimir, 1987), showing the difficulties and pitfalls of such an exercise. More recently, following the Distributional National Accounts (DINA) methodology (WIL, 2021), an increasing number of DINA-based estimates for both developed (Blanchet et al., 2019; Piketty et al., 2018; Garbinti et al., 2018) and developing countries (Piketty et al., 2017; Piketty and Chancel, 2017; Novokmet et al., 2018; Morgan, 2017; De Rosa et al., 2022) have emerged. We build on Burdín et al. (2022), who put together a tax-survey micro-database matching social security data (formal labor incomes and pensions), personal income tax data (detailed personal capital incomes), and firm tax data (untaxed firm income withdrawals by firm owners and incomes from pass-through corporations), accounting for over 75% of the adult population. The remaining population and informal incomes were added using household survey data and a sub-sample of matched tax-survey individuals. In this paper, we supplement this tax-survey dataset with recently-published national accounts data to account for micro-macro gaps, coupled with novel firm-owner matched data to impute undistributed profits.

The contributions of this paper are threefold. First, we document micro-macro gaps for the Uruguayan case, showing a reduced gap between tax-survey data and national accounts estimates, in contrast to what is found for most Latin American Countries (Alvaredo et al., 2022). We show that this is the result of increased profit-distribution by firms, observed both in national accounts and at the owner-firm level, which increases the top shares in tax-survey data, mirrored by decreasing undistributed profits, which offsets the surge in top income shares. This contributes to an understanding of the divergent trends between national income distribution and micro-data-based inequality. Our detailed account of the evolution of tax-survey income, household income, and national income distribution supports the overall conclusion that inequality in Uruguay has de-



creased, a conclusion further supported by national income estimates.

Second, the unusual individual-firm database we compiled for this paper allows us to assess the sensitivity of the distributional results to the imputation methods used, in particular for undistributed profits. Imputing undistributed profits based on capital incomes observed in tax-survey data produces estimates up to 5 percentage points lower for the top 1%'s share when compared with imputing them directly on firm owners.

Finally, the micro-macro consistent income definitions allow us to perform two additional exercises. First, we estimate the distribution of new income generated by economic growth. We show that the decline in relative inequality is coupled with very unequal benefits from economic growth, which were overwhelmingly captured by top income groups, increasing the absolute distances between high- and low-income groups. This may have implications not only for household consumption and saving levels, but also for societal perceptions of the level of inequality and its trend (Ravallion et al., 2004). Second, we compute effective tax rates, combining corporate and individual income taxes (Saez and Zucman, 2020). The strong concentration of capital incomes, along with a dual income tax system, implies a loss of progressivity of direct income taxes for very high-income groups at the household level. However, when firm owner data is used to impute corporate taxes, progressivity re-emerges at the national income level.

The paper is organized as follows. Section 2 describes recent inequality trends and data sources. In section 3, our estimation procedure is presented, mapping and documenting data gaps across sources. Distributional results are discussed in section 4, and section 5 concludes.

## 2 Background and data sources

### 2.1 Recent trends

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. After decades of unstable economic growth and recurrent economic crisis, it sustained an average annual growth rate of about 4.7% between 2004 and 2016<sup>3</sup>. This economic growth, coupled with a series of relatively large labor market and tax and transfers system reforms implemented by a center-left coalition in office from 2005 to 2020, resulted in a significant decline in income inequality.

These reforms included a major increase in the minimum wage, the restoration of centralized collective wage bargaining, an expansion in both the coverage and the amount of noncontributory cash transfers schemes, and the introduction of progressive income taxation (Amarante et al., 2014; Bucheli et al., 2013). Studies based on high-quality household surveys have consistently shown that income inequality experienced a rapid decline between 2008 and 2012, illustrated by a fall of about 7 points in the Gini index (see Figure A1), followed by relative stagnation from 2013 to 2016 (Cornia, 2014; Alvaredo and Gasparini, 2015; Gasparini et al., 2018).

The use of tax data as an alternative database shows a decline in overall inequality measured by synthetic indexes such as the Gini or Theil, though less steeply and from a higher level than in survey data. Conversely, in tax data, top income shares show stability and a slight increase of about 15-16% between 2009 and 2016, but a drop from 11.6 to 8% in survey data (Burdín et al., 2022).

---

<sup>3</sup>After this point, growth rates were considerably lower, about 1-1.5%.

## 2.2 Administrative micro-data

As in the rest of Latin America (OECD, 2021), indirect taxation represents the bulk of tax revenue in Uruguay (approximately 56% in 2021<sup>4</sup>). Income taxation (36% of total revenue) combines a flat corporate income tax (*Impuesto a la Renta de las Actividades Económicas*, IRAE) with a dual scheme for personal incomes: (i) a progressive tax on labor and pensions (*Impuesto a la Renta de las Personas Físicas*, IRPF-II and *Impuesto de Asistencia a la Seguridad Social*, IASS) and (ii) a flat personal capital income tax (*Impuesto a la Renta de las Personas Físicas*, IRPF-II) which includes rents, dividends, and other minor capital incomes.<sup>5</sup> The tax rates on personal income (IRPF and IASS) are shown in table A1. Firms' capital incomes are taxed at the firm level with a corporate tax of 25% rate and of 7% once dividends are distributed to households (IRPF-I), or alternatively, to the rest of the world. In the latter case, dividends pay 7-12% of *Impuesto a la Renta de los No Residentes*, IRNR.

The incorporation of a dual income tax in 2008 allows us to obtain detailed tax micro-data records for the period 2009-2016, which are the main data source for this study. This high-quality database includes labor and capital incomes, as well as pensions. In the case of labor income and pensions, the information comes from matched tax-social security records, so it includes the whole universe of workers contributing to social security, independent of whether they are net taxpayers or not. Comparisons to household surveys and population projections show that income tax records account for approximately 75% of the adult population and 80% of workers. In the latter case, the discrepancy corresponds to informality (see Burdín et al. (2022) for details). Taxable sources of labor income include wages, salaries, commissions, overtime payments, vacation payments,

---

<sup>4</sup>Based on monthly reports by *Dirección General Impositiva*, available at [www.dgi.gub.uy](http://www.dgi.gub.uy).

<sup>5</sup>In the case of capital income, it is exempt from taxation for those individuals who have housing rents whose annual value is below USD 5.000 and public debt interest, gains obtained from private capitalization pension accounts, and business profits distributed by firms with total annual revenue lower than USD 500.000 (4 million indexed units).

annual leave, end of the year payments, and any other payments received from employers. Unemployment, illness and maternity subsidies, accident insurance, unemployment benefits, and child allowances are excluded from taxable income.

Capital incomes are divided into rents from real estate and leases, and financial and profit rents. This 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 corporate income tax (IRAE), and copyright, among others. Banks, real estate agencies, and institutions in charge of payments are set as withholding agents in most cases; if not, individuals must file a tax return.

For all sources of income, most taxes are collected on an individual basis, and households are not identified.<sup>6</sup> For this reason, in this paper we use the individual as our unit of analysis. We believe that this definition is the most accurate description of reality that we can obtain given the data restrictions, but we should stress that it is insufficient. In particular, due to the nature of the tax records, we are not able to analyze household-level incomes and their distributional consequences.

As a second source of information from tax records, in this paper we use the balance sheets of firms that pay corporate income tax (IRAE). Firms with annual revenues above USD 500.000 (4 million indexed units) are obliged to present annual balance sheets (around 60% of registered firms), and pay 25% of IRAE over their net operating surplus.<sup>7</sup> These firms report their total profit, which is equivalent to the sum of profits distributed, undistributed, and paid to the rest of the world. Importantly, as discussed in section 3.3.2, a firm's tax files can be matched with the firm's owners from social security data.

---

<sup>6</sup>Joint taxation of couples is allowed but rather rare, less than 2% of total formal workers in 2016.

<sup>7</sup>Firms with annual revenues under USD 500.000 (4 million indexed units) pay a lump fixed tax and are not required to submit a balance sheet.

## 2.3 Household Surveys

The second source of micro-data comes from household surveys (*Encuestas Continuas de Hogares*, ECH) for the entire period (2009-2016). These surveys collect information on socioeconomic variables and personal income for each member of the household. After-tax labor income includes cash and in-kind earnings for salaried workers, the self-employed, and business owners. Information is separately recorded for the main occupation and additional ones. Salaried workers are also asked whether they contribute to the social security system, information which is used to identify informal earnings from this data source. Transfer income is collected for each individual, and survey questions disclose their origin (public/private, domestic/foreign) and the type of benefit: pensions (retirement and survival), contributory and noncontributory child allowances, unemployment insurance, accident compensation, or other benefits.

Except for profit withdrawal in the case of the self-employed and business owners, capital income is reported for the household as a whole, and hence, individual information cannot be recovered. In these cases, we split profits equally among the adult members of the household to maintain our individual-based analysis. Interest, dividends, rents, benefits, and the imputed value of owner-occupied rental income are gathered in separate questions. Capital income sources are reported on an annual basis; only the imputed value of owner-occupied housing is gathered for the month previous to interview.

## 2.4 National Accounts

National accounts estimates are provided by the Uruguayan Central Bank (BCU) and have very recently improved from a very low baseline. Uruguay's national accounts present estimates of gross national income based on the expenditure and production approaches, but not on the income approach, except for the newly available estimates for 2012 and 2016. Before this, the last time BCU updated the income generation account was 2005,

and estimates by institutional sector have not been available since the late 1990s.

Thus, the full national accounts for these two years are the key macro-data inputs for our analysis. They present an adequate (though far from perfect) level of detail required to match and scale income concepts from tax-survey data to household sector incomes (see section 3.2), and then on to national income. For years other than 2012 and 2016, a stable share of income components (both income sources and institutional sectors) is assumed, i.e., a simple backward interpolation is performed. Results do not change under alternative imputation procedures, given the relative stability of the estimates across both years. Incomes are presented gross of consumption of fixed capital, and therefore gross incomes were adjusted based on Mexican and Chilean data (i.e., share of Consumption of Fixed Capital, by income component and institutional sector, taken from Wid.World) to produce a net national income series.

### 3 Estimation stages

We estimate and compare inequality series based on (i) a combination of personal tax and survey data (*tax-survey series* hereafter), equivalent to the totality of income captured by these micro-data sources; (ii) a *household income* inequality series; and a (iii) *national income* inequality series. By construction, aggregate incomes from the first stage are conceptually equivalent to household sector incomes from the second stage, with differences resulting from a measurement mismatch. In contrast, incomes from the third stage are not supposed to be captured by tax-survey data, as they are accrued by other institutional sectors (government or corporate sector). Aggregate incomes corresponding to each series are depicted in Figure A2. The ratio of household income to net national income is relatively stable and close to 87-89%<sup>8</sup>, which contrasts with the increasing share of the

---

<sup>8</sup>This ratio is represented by  $\frac{B5n-S14}{B5n}$ . In the unadjusted national accounts, which are gross of consumption of fixed capital, the household sector represents 81 and 82% of gross national income for 2012 and 2016 respectively ( $\frac{B5g-S14}{B5g}$ ).

tax-survey income both in national income (almost 10 percentage points) and as a share of household income. In the following subsections, we address the estimation of each of these stages, discussing the reliability of the data and pondering alternatives.

### 3.1 Tax-survey series

The starting point for this analysis is the tax-survey data base, which is a combination of tax, social security, and household survey data. The matched tax-social security micro-data accounts for over three quarters of the adult population, providing detailed data on total formal labor, pension, and capital incomes. As in [Burdín et al. \(2022\)](#), we implement two adjustments to this database to build a series that is representative of the population as a whole and includes all taxable income sources. First, individuals who lack income or who receive incomes from purely informal sources are included based on the household survey. This population is re-weighted to match census-based population projections, assuming that individuals without earnings are correctly captured by the survey, and therefore only adjusting informal income earners. In a second step, the formal incomes of low-income earners are adjusted both for underreporting and for simultaneous earning of formal and informal incomes. These misreporting ratios come from a subsample of household-tax matched households ([Higgins et al., 2018](#)), while corrections for formal/informal income earners come from the household survey, using income thresholds from tax records.

For this article, we add to this dataset all remaining informal and untaxed incomes that are not included in the fiscal income series but that are part of household income in the national accounts. To impute these sources of income, we use household surveys, matching both databases according to the position of individuals by income in the databases. Among the main income sources included in this stage are cash transfers to households and owner-occupied rental income. Given the lower concentration of these

sources with respect to the distribution of total income, the series obtained in this stage show lower levels of inequality than those presented in [Burdín et al. \(2022\)](#).

### 3.2 Household income series

In order to account for all the sources considered in household sector incomes, the first step is to group tax-survey incomes in categories that match conceptually with national accounts definitions. This is done in Table 1, in which incomes are grouped in five categories: salaried work (wages), housing rent, investment income, non-salaried work (mixed), and benefits. Income components do not match exactly, especially in the cases of investment income and non-salaried work, for which mismatch is higher (for a full discussion, see [Alvaredo et al. \(2022\)](#)). Nevertheless, at that level of aggregation, the correspondence is high and it is therefore possible to compare incomes from both sources.

In the case of investment incomes, household sector aggregate D4-S14 is likely to include rent of natural resources (D45) and investment income from insurance, pensions, and investment funds (D44), which do not match incomes in the tax-survey database. Tax-survey housing rent includes rental income from non-dwellings, which should be included in mixed incomes. Pensions and wages, on the other hand, can be conceptually linked without major mismatches.

Figure 1 reports the scaling factors for each type of income, i.e., the factor by which tax-survey incomes should be multiplied in order to yield SNA-household incomes. Most scaling factors are close to one, which means that tax-survey and household sector aggregates are of the same orders of magnitude. In the case of mixed incomes, the scaling factor is around 1.5 and gets close to 2 for some years, while in the case of rents, tax-survey data represents a higher value than its household income correlate. However, the scaling factor that stands out is that of investment income, which starts the period at 7-8, and slowly decreases thereafter until it stabilizes close to 3-4.



Table 1: Mapping households' income-concepts across data sets

	Tax-survey	Household sector national accounts	Observations
Investment income	dividends (personal tax data), interest (survey), owner withdrawals (firm tax data)	$D4 = D41 + D49$	Dividends (D42) included in D49, but also rent of natural resources (D45) and investment incomes from insurance, pensions, and investment funds (D44)
Wages	Formal (tax) and informal (survey) wages	D1-D61	
Housing rent	Rent of owner occupiers (survey) + rental income (tax)	B2	Includes rental income from non-dwellings
Mixed	Self-employed income (survey + tax)	B3	Does not include rental income from non-dwellings
Benefits	Pensions (tax)	D62	Sick leave Unemployment insurance

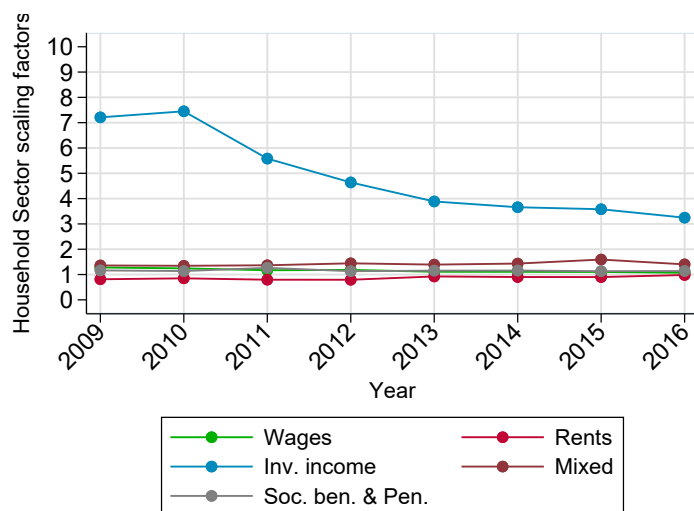
*Note.* Own elaboration based on similar table in [De Rosa et al. \(2020\)](#). Sources: based on [United Nations \(2009\)](#) and [OECD \(2013\)](#). All incomes are gross of capital depreciation.

Given these patterns, alternative adjustments were performed. For all but investment income, tax-survey incomes were adjusted by the corresponding scaling factor, so that aggregates are, by construction, equivalent to household sector incomes. Given the extreme gap in the case of investment income, such a procedure would entail dramatically increasing the incomes earned by relatively few individuals. Thus, an alternative imputation procedure was implemented: the gap between tax-survey and national accounts investment income is imputed based on a proxy of capital ownership. We use as a proxy the distribution of dividends plus interest from deposits, given that the incomes to be scaled up are precisely the equivalent of such an aggregate (D4n-S14 in the SNA).

### 3.3 National Income series

Of the incomes not included in household sector series, the most important one both quantitatively and for its distributional impact is undistributed profits, which correspond to B5n-S11/12 of SNA, i.e., the net operating surplus of private financial and non-financial

Figure 1: Scaling factors, 2009-2016



**Note.** Scaling factors of tax-survey data vs household aggregates based on Table 1. Own estimates based on tax-survey data (DGI-ECH) and National Accounts 2012, 2016 (BCU). A scaling factor higher than 1 shows that the National Account’s household income aggregate is larger than its counterpart in the tax-survey data. All incomes from national accounts are net of depreciation, based on Wid.World data for other Latin American Countries.

corporations. These incomes are one of the income sources of firm owners, who can decide to maintain these incomes within the firm or to distribute them as dividends, due to tax incentives and other reasons.

Undistributed profits are income flows in the Hicksian sense, since they can make owners wealthier (WIL, 2021). Moreover, accounting for these incomes may compensate for the possible change in the series of tax-survey incomes caused by firm owners’ decisions about the allocation of income, i.e., between keeping incomes at the firm level or distributing them as dividends. This is particularly relevant in the Uruguayan case, where only a small number of firms distribute dividends (De Rosa et al., 2018). In the remainder of this section, we discuss two alternative procedures to estimate the quantity of undistributed profits and, more importantly, to impute these profits to individuals.

### 3.3.1 National Accounts-based undistributed profits

The share of SNA's undistributed profits and the remaining residual incomes are depicted in Figure A6. The bulk of the incomes to be imputed are from undistributed profits, while the gap to reach net national income is only 1-2%. This residual income is imputed proportionally to individuals, so by construction, it has no distributional impact. Undistributed profits, on the other hand, represent 10-12% of national income and are likely to be concentrated within top income groups, thus involving a significant distributional impact. As a first alternative, these undistributed profits are imputed following the same criterion used to scale up investment income in section 3.2, i.e., using a proxy of capital ownership based on accrued dividends, interest and firm-owners total incomes, computed based on tax and survey data (see Figure A3).

Undistributed profits represent about one fourth of total capital income, which amounts to 38-39% of national income, as shown in Figure A5.<sup>9</sup> The figure also includes the amount of investment income captured in the tax-survey micro-database as a reference. The first thing to note is that the shares of both investment income and undistributed profits decrease throughout the period, which is partially offset by an increase in the operating surplus of households (i.e., owner-occupied rental income). It is important to note that the share of investment income in the tax-survey database is increasing throughout the period, but still represents less than a third of the total investment income of national accounts at the end of the period.

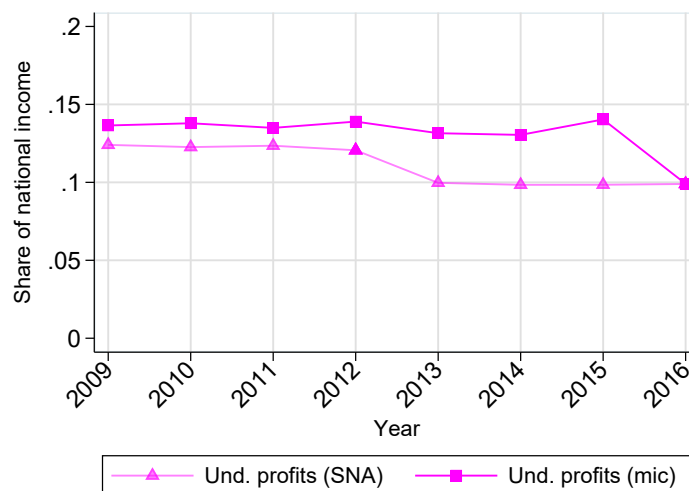
---

<sup>9</sup>The overall functional distribution of income is presented in Figure A4. It depicts household incomes from Table 1, as well as private undistributed profits and other incomes, particularly public undistributed profits (B5n-S13). The figure shows the labor-capital split based on a simple 70-30% mixed-incomes distribution rule, which allocates income to labor and capital (WIL, 2021). The labor share represents 61-62% of national income, of which 54-55% represents the wages component. It is worth pointing out that this is the share of net national income, including taxes net of subsidies.

### 3.3.2 Firm tax record-based undistributed profits

Alternatively, undistributed profits can be directly calculated based on firm tax records, which are equivalent to their aggregate accounting surplus (i.e., before any tax-related adjustments), net of distributed profits and capital incomes paid to the rest of the world. Aggregate distributed profits are calculated based on individual tax records, while capital income to the rest of the world is computed based on the balance of payments (see Figure A9, more on this below). Figure 2 compares both alternative undistributed profit aggregates in terms of national income, showing that the tax record-based aggregate is 1-3 percentage points higher. It is worth noting, however, that in years with observed national accounts estimates (2012 and 2016), the results are very similar.

Figure 2: Undistributed profits imputation: alternatives



**Note.** Own estimates based on firm tax data (DGI), National Accounts 2012, 2016 (BCU), and Balance of Payments (BCU). Undistributed profits calculated based on national accounts are equivalent to B5n-S11/12, undistributed profits computed based on firms' tax files are computed directly based on the micro-data provided by DGI, after subtracting rents paid to the rest of the world by the private sector (from Balance of Payments). All incomes from national accounts are net of depreciation, based on Wid.World data for other Latin American Countries (undistributed profits from firms' tax files are already net of depreciation).

However, the most important challenge is to be able to identify the individuals to whom we should distribute these undistributed profits. The identification of firm owners

is absent from most of the tax-survey databases used in the construction of the income series. We are able to match individuals that report being firm owners—i.e., partners of limited companies and other firms, directors and owners of small enterprises—in the social security data with the firms they own, which is a more adequate solution than most other imputation procedures (WIL, 2021). By matching firms with their owners, we are able to impute firm-specific undistributed profits to individuals in the tax-survey database. Although we are not able to impute this income proportional to each individual’s ownership share, assuming an equal split rule instead, we are able to allocate undistributed profits to individuals for whom we already have all remaining formal and informal income sources.

We are able to identify the owners of 55-60% of firms with undistributed profits and impute these profits to them. For the rest of the firms that report profits and for which we did not identify a shareholder or owner, we create new individuals in our database whose only source of income is the undistributed profits. We create for each of these firms a number of recipients equal to the average number of owners for observed firms in each year (2.3-2.4). Table A2 presents descriptive statistics for this procedure. The number of firms with positive results, and the number of individuals receiving undistributed profits, increases towards the end of the period (from less than 16,000 to more than 20,000 firms). Individuals created for firms with no owners identified represent slightly less than half of the total, but the average income of created observations is similar to that received by matched individuals.

The possibility of matching owners with firms allows us to build a national income series based fundamentally on micro-data, which is quite uncommon even for developed countries. Some precedents, which achieved estimates of top incomes by incorporating profits retained by the firms, highlight the importance of this source in determining the levels, and in many cases the evolution, of inequality based on these indicators (Fairfield and Jorratt De Luis, 2016; Alstadsæter et al., 2017; Kopczuk and Zwick, 2020; Wolfson

et al., 2016). On the other hand, we can also measure the sensitivity of the results to the imputation methods used. Alstadsæter et al. (2017), for example, point out significant differences between the distributive estimates obtained using imputation methods based on the perception of other capital income or dividends compared to those obtained using matched information for firm owners. This may be particularly relevant, given the usual assumptions surrounding estimates of the distribution of undistributed profits based on taxable capital (WIL, 2021). In our case, as in the rest of Latin American countries (Alvaredo et al., 2022), given the very low share of dividends and remaining investment income in tax-survey data, the choice of the imputation method is crucial in explaining the results obtained.

## 4 Results

### 4.1 The evolution of income distribution

The evolution of pre-tax income shares in the three imputation stages is depicted in Figure 3, i.e., the tax-survey, household sector, and national income series detailed in sections 3.1 to 3.3. The national income series is presented in its two alternative estimation procedures: one is based on national accounts data for private net undistributed profits and allocated to individuals based on tax-survey data (*alternative 1*), and the second is based entirely on matched firm-individual micro-data (*alternative 2*, see sections 3.3.1 and 3.3.2).

The first thing to note is that at each imputation stage, period-average inequality increases, as both scaling up to household sector income and allocating undistributed profits increase the relative importance of capital income, regardless of the way it is imputed. Recalling the scaling factors from Figure 1, capital income is scaled up in greater proportion than other incomes and is imputed based on the distribution of dividends and interest (Figure A3), which allocates it to top 10 and especially the top 1%. National

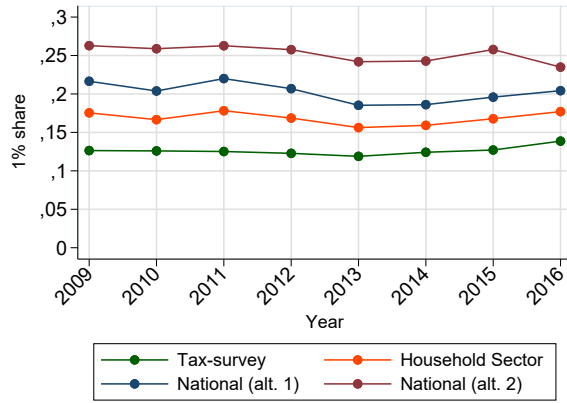
income inequality series using undistributed profit data from national accounts is based on the same imputation method, plus adding up to 10-12% of net national income. This may be considered conservative, since it is the result of a proxy based on tax-survey data, which captures only a fraction of investment income accrued by households. The second method (*alternative 2*), which allocates undistributed profits to individuals who report firm ownership (or to individuals created for firms with no matched owners), results in higher concentration, not only as a result of the imputation rule, but also because the quantity of firm-based net undistributed profits is 1-2 points higher on average (Figure 2). Moreover, it is interesting to note that the effect of these alternatives is only visible when considering the top 1%'s share, where the top share is around 5 percentage points higher in the owner-firm matched series, but less so in the remaining ones, and virtually undetectable when considering the overall Gini index (see Figure A7).

Aside from the importance of the alternative imputation procedure used for undistributed profits, another dimension of the series deserves to be highlighted. Although it is true that inequality trends appear to be rather similar across all imputation stages, while tax-survey and household series stay remarkably close, national income series present a slightly different trend, especially in our second alternative. In fact, as depicted in Table A3, while the top 1%'s share increases for the tax-survey series between 2009 and 2016 (from 12.6% to 13.9%), it remains relatively stable in the household income series, and it decreases in the national income series (from 21.7 to 20.4% in the first alternative and from 26.3 to 23.5% in the second). The origin of this changing trend is discussed in section 4.2.

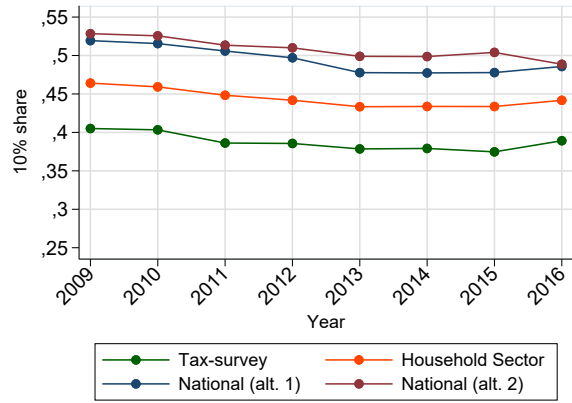
## 4.2 The effect of (un)distributed profits on inequality

The increasing trend of the top 1%'s share in tax-survey data, unaffected by undistributed profits, is consistent with similar estimates from Burdín et al. (2022), which were based

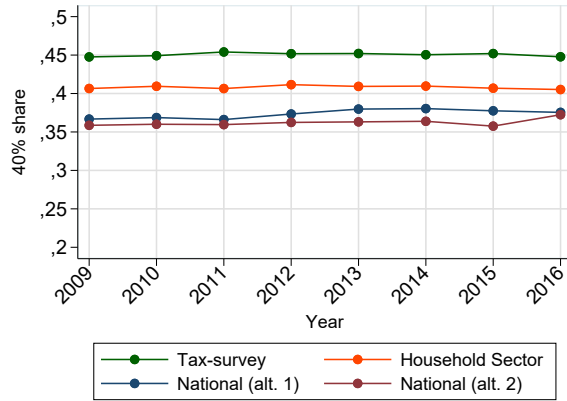
Figure 3: Pre-tax income shares by imputation stage, 2009-2016



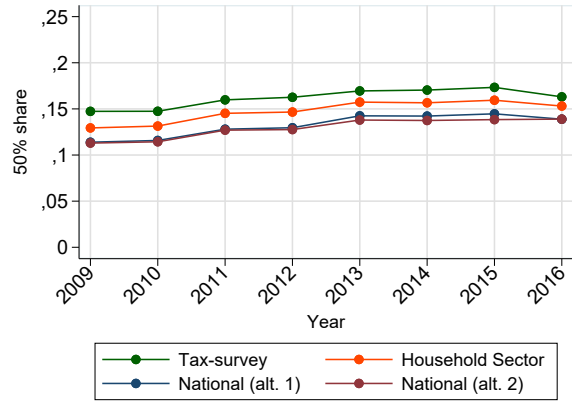
(a) Top 1%



(b) Top 10%



(c) Middle 40%



(d) Bottom 50%

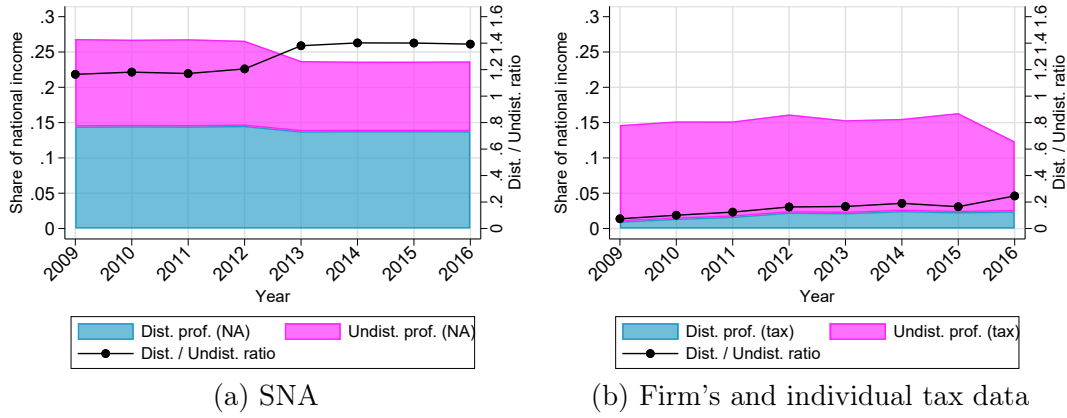
**Note.** Own elaboration based on tax records, household surveys, and national accounts (see point estimates in Table A3). First stage estimates (panel a) are the result of the combination of tax data and household surveys. Second stage estimates (panel b) include imputed undistributed profits and taxes, and in third stage estimates (panels c and d), incomes are scaled up to National Income aggregates by income source (alt 1 based on tax-survey capital-ownership proxy, alt 2 based on matched firm-owners data). All estimates refer to pre-tax personal income distribution. Top 1, 10, middle 40 and bottom 50%'s shares depicted in panels a, b, c and d respectively.



on the same data and imputation procedures. However, the increase in the top 1%'s share by the end of the period in the tax-survey series is somewhat neutralized by the imputation of undistributed profits in the third stage. The explanation lies in the changing size of the undistributed profits vis á vis the quantity of distributed profits. As dividends are taxed, they appear in an individual's tax records, pushing top incomes' shares upwards; however, this increase is mirrored by a decrease in undistributed profits. Therefore, when undistributed profits are imputed, the top 1%'s increasing share is offset and even slightly reversed. This finding highlights the importance of considering both distributed and undistributed profits in inequality analysis, since what may appear to be a surge in inequality may only reflect a change in the decisions of firm managers to either distribute dividends or keep them at the firm level.

To dig into this increase in the share of capital income captured in the tax-survey data, we present pre-tax profits produced at the firm level and their distribution into distributed profits (the bulk of investment income), undistributed profits, and profits distributed abroad. This last component is taken from the Balance of Payments and is depicted in Figure A9. Although it is not, by definition, a component of net national income, it is informative for how firm profits are split between the country and the rest of the world. Profits sent abroad represent close to 10% of net national income, while distributed profits represents less than half of total profits. In Figure 4, distributed and undistributed profits are portrayed, as well as the ratio between the two, using SNA data and tax data, i.e., undistributed profits from firm tax records and dividends from individual tax records. Despite different levels, which result from the previously discussed large gap between dividends observed in individual tax data and investment income from national accounts, both data sources indicate that throughout the period, firms have increased their distributional share.

Figure 4: Distributed and undistributed profits by source, 2009-2016



*Note.* Own estimates based on firm tax data (DGI), tax-survey data (ECH-DGI), National Accounts 2012, 2016 (BCU), and Balance of Payments (BCU). Both panels depict distributed and undistributed profits, as well as their ratios. In panel a, undistributed profits are equivalent to B5n-S11/12, while in panel b they come from balance sheets net of private capital incomes paid to the rest of the world (based on Balance of Payments). Distributed profits from panel a come from investment incomes excluding interest received by households (D41-S14), while in panel b they represent aggregate dividends from individual tax records. All incomes from national accounts are net of depreciation, based on Wid.World data for other Latin American Countries (undistributed profits from panel b are already net of depreciation).

Thus, Figures A8 and 4 indicate that two effects are at play: (i) firms increased their share of distributed profits; and (ii) a higher share of dividends is captured in the tax-survey data. These two combined effects result in the increase in tax-survey top income shares shown in Figure 3 and documented by Burdín et al. (2022). The increase in the distributional share of the firms also lowers the undistributed profits to be allocated in the national income series, decreasing the gap between the different series towards the end of the period.

The incorporation of undistributed profits into this last stage also has implications for the composition of income in the upper tail of the distribution. Figure 5 shows the income composition of the top 1% in the three estimation stages, while the composition for the other income groups is included in Figures A11, A12 and A13 of the appendix. Between the first two estimation stages, the top 1% experienced significant growth in its share of investment income, explained by the large percentage of this income not

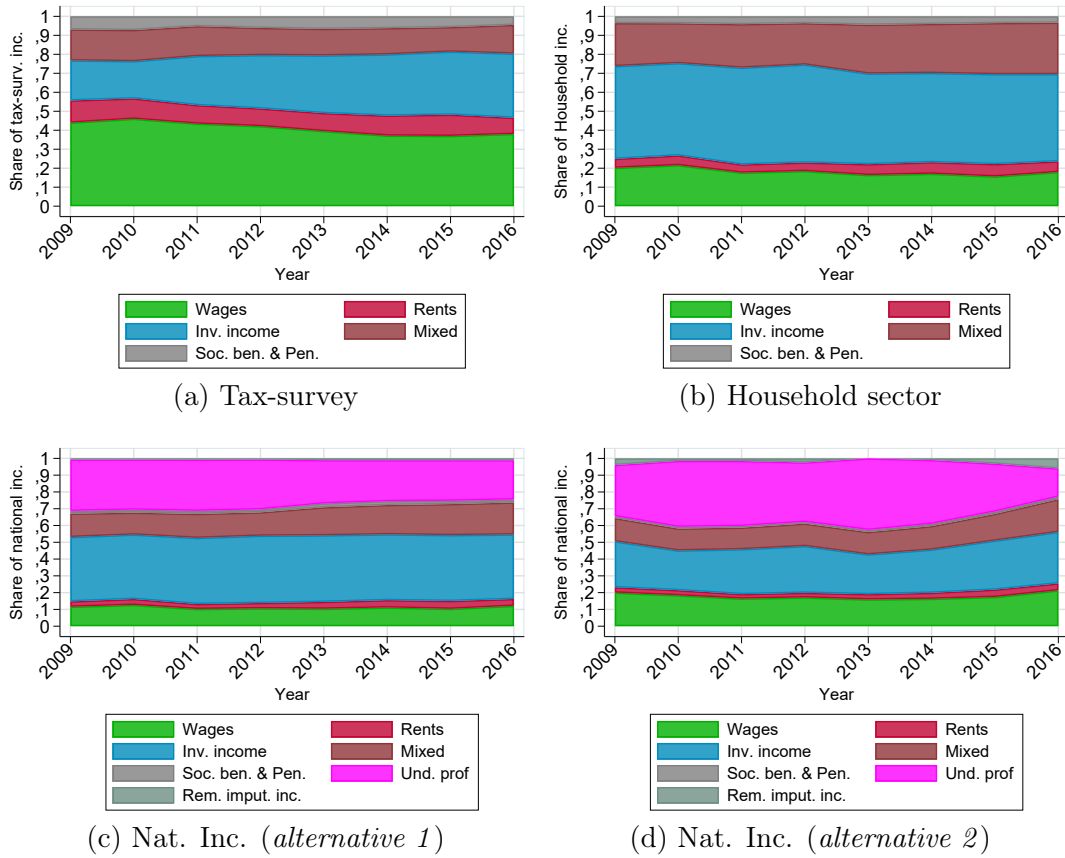
observed in the tax-survey database. A similar increase is observed in the top 10% of the distribution. On the other hand, the strong concentration of undistributed profits implies a clear change in the income composition of the top 1% in the national income series. Depending on the imputation method, this source of income represents between 25 and 40% of the total income of the top 1%. At this stage, capital income (investment income + rents + undistributed profits) represents at least two thirds of total income for this group. Finally, the downturn in the quantity of undistributed profits in the micro-database towards the end of the period is also evident in its decline as a share of the total income of the top 1%.

### 4.3 The distribution of growth

One of the most important advantages of this exercise is that in the last estimation stage, both versions of the national income series provide 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 while inequality is analyzed from a microeconomic perspective. Thus, our national income inequality series allow us to analyze growth and inequality consistently.

Figure 6 depicts the growth incidence curves, i.e., the growth rate by percentile over the 2009-2016 period, for the three imputation stages (panels a, b, and c-d) and for the two imputation alternatives of undistributed profits (panel c vs panel d). Broadly speaking, the slopes of the curves are negative, meaning that income grew faster for the bottom 50% and the lower half of the middle 40% than it did for top earners, hence fueling the decrease in inequality. This negative slope is less pronounced in the tax-survey-based series (panel a) compared to the series from the other two stages. Up to the sixth decile, real income growth is above 40% in real terms, which is consistent with the fact that both economic growth and the wage policy resulted in job creation and rapid labor income growth at the

Figure 5: Top 1% income composition, 2009-2016

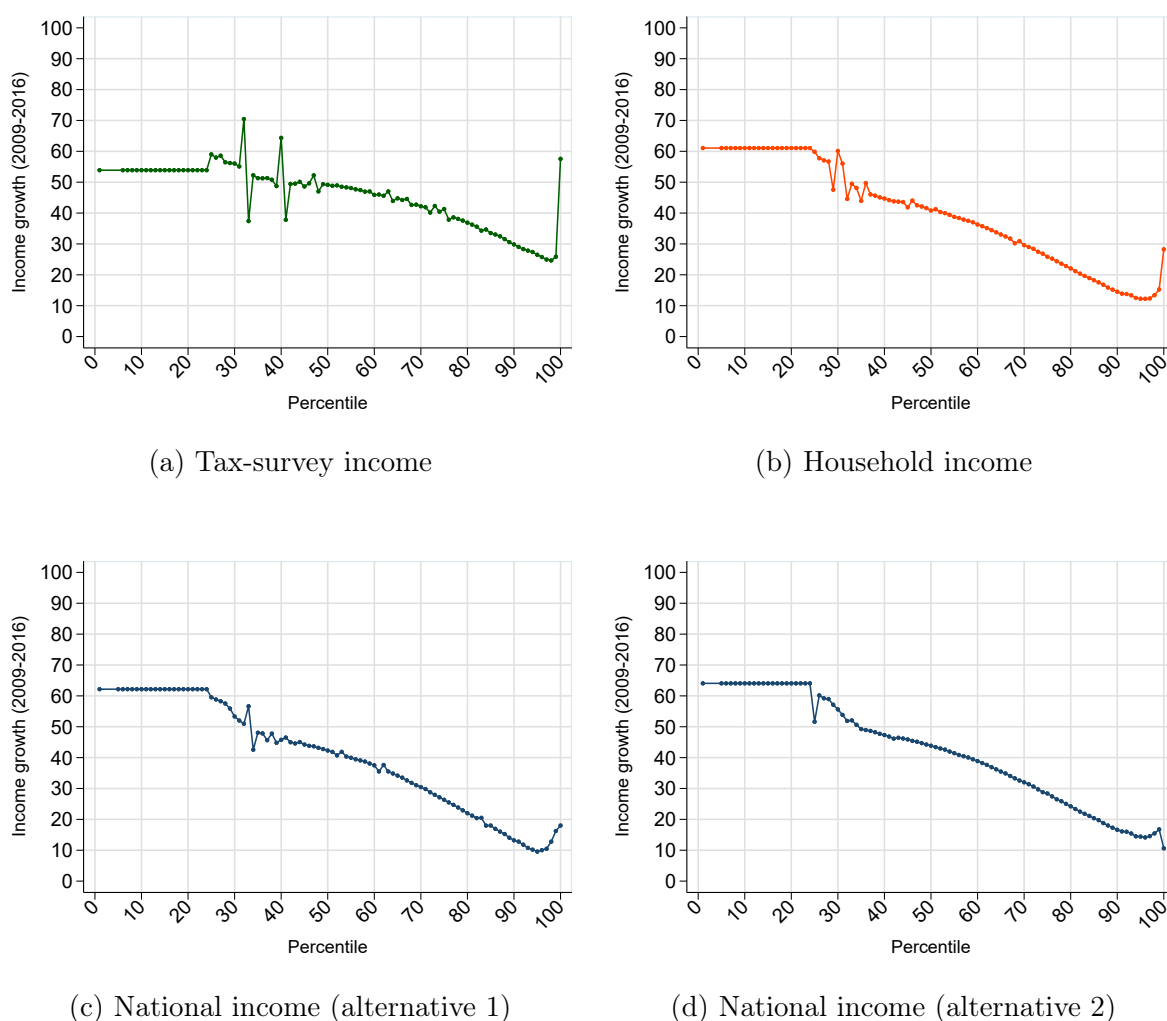


**Note.** Own elaboration based on tax records, household surveys, and national accounts. First stage estimates (panel a) are the result of the combination of tax data and household surveys. Second stage estimates (panel b) include imputed undistributed profits and taxes, and in third stage estimates (panels c and d), incomes are scaled up to National Income aggregates by income source (alt 1 based on tax-survey capital-ownership proxy, alt 2 based on matched firm-owners data). All estimates refer to pre-tax personal income distribution.

bottom of the distribution. Income growth falls thereafter, with the exception of the top 10%, which shows heterogeneous trends.

On the tax-survey income series the spike in growth for the top 1% is noticeable, which is consistent with the increase in the income share of this group towards the end of the period. In the rest of the series (panels b and c), this increase is less pronounced, but it is also observed in other percentiles of the distribution within the top 10%. In turn, a sharp difference is observed in the growth of the top 1% between the different imputation alternatives for the national income series (panel c vs. panel d). The fall in the trend in *alternative 2* is explained by the reduction in the quantity of undistributed profits towards the end of the period. Figure [A15](#) shows the same growth incidence curves for the national income series but for the period 2009-2015. In this case, the trend reverses, with the top 1% having the largest growth within the highest percentiles. Therefore, changes in the aggregate of undistributed profits can generate significant annual variations in the right tail of the distribution, resulting in noisy estimates.

Figure 6: Growth Incidence Curves (GIC) by imputation stage, 2009-2016



**Note.** Own elaboration based on tax records, household surveys, and national accounts. First stage estimates (panel a) are the result of the combination of tax data and household surveys. Second stage estimates (panel b) include imputed undistributed profits and taxes, and in third stage estimates (panels c and d), incomes are scaled up to National Income aggregates by income source (alt 1 based on tax-survey capital-ownership proxy, alt 2 based on matched firm-owners data). All estimates refer to pre-tax personal income distribution.

Growth incidence 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. Note that even with a small growth rate among the top earners compared to the bottom 50%, given that their base-scenario income is sufficiently high, their absolute growth may be significantly larger compared to the bottom earners. For instance, even

in the extreme case of a perfectly flat growth incidence curve, i.e., 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 the distribution does not change, the distance in actual consumption or savings possibilities between groups keeps increasing as time goes by. This is the essence of the absolute inequality approach (Kolm, 1976a,b).

In Table 2, we show the share of growth, i.e., the share of new income captured by each income group in both national income series. In the first and fourth columns, average growth is depicted, showing relatively larger growth rates for the bottom 90% (and more so for the bottom 50%), as shown in the growth incidence curves. The top 1% shows larger income growth compared with the whole top 10%, in particular in *alternative 1* of the national income series. In columns 2 and 5, growth appropriation is depicted, showing that in terms of absolute growth capture, the winner seems be the top 10%, capturing a third of the growth during the period, while bottom 50% captures around 25%.

Table 2: Growth appropriation by income groups (2009-2016).

Income group	National income (alt. 1)			National income (alt. 2)		
	Income growth (1)	Growth approp. (2)	Diff. vs equal growth share (3)	Income growth (4)	Growth approp. (5)	Diff. vs equal growth share (6)
Top 0.1%	9.3%	4.0%	40.16	1.1%	0.7%	7.46
Top 1%	15.1%	14.9%	14.86	9.0%	10.8%	10.80
Top 10%	14.1%	33.3%	3.33	12.8%	30.8%	3.08
Middle 40%	24.9%	41.5%	1.04	26.7%	43.5%	1.09
Bottom 50%	48.7%	25.2%	0.50	50.1%	25.7%	0.51
Average	22.0%	100.0%	1.00	22.0%	100.0%	1.00

**Note.** Own estimates based on firm tax data and individual tax records (DGI).

Since the groups are of very different sizes, we include an alternative appropriation of growth that takes into account the population weights of each group (column 3 and 6). If the appropriation of new income corresponded to the population share, the bottom 50% would have to appropriated twice what they did in the 2009-16 period. The top 10%

thus appropriates more than three times what would correspond to its size, and the top 1% between 10 and 14 times more than its population share.

This appropriation of the new income generated by economic growth can increase the distance, in terms of absolute income, between different population groups. Figure [A10](#) shows an increase in the absolute Gini in all the estimated series. This analysis shows 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 income. In a period of economic expansion, a reduction in inequality in absolute terms requires that relative inequality be reduced at a faster rate than average incomes increase ([Anand and Segal, 2008](#)), which depends on the type of economic growth experienced by the economy and the policies in place to reduce inequality. This has implications for household consumption levels, but also for societal impressions of the level and trend of inequality. As [Ravallion et al. \(2004\)](#) and [Anand and Segal \(2008\)](#) highlight, perceptions of the increase in inequality in the world are often due to growing absolute gaps between rich and poor, rather than increases in relative inequality.

#### **4.4 Effective direct tax rates**

The blurry line dividing firms and their owners has consequences for income, but also for taxes paid as observed in the tax records, and therefore also for the effective tax rates estimated using these sources of information. Thus, our three-stage estimation procedure allows us to calculate effective tax rates while accounting for differences that may emerge from these imputation decisions. Corporate taxes were imputed following the same criteria as undistributed profits (both alternatives). In this way, the different income taxes on individual incomes (taxes on both labor and capital) are combined with the corporate tax (see [Saez and Zucman \(2020\)](#) for similar procedures).

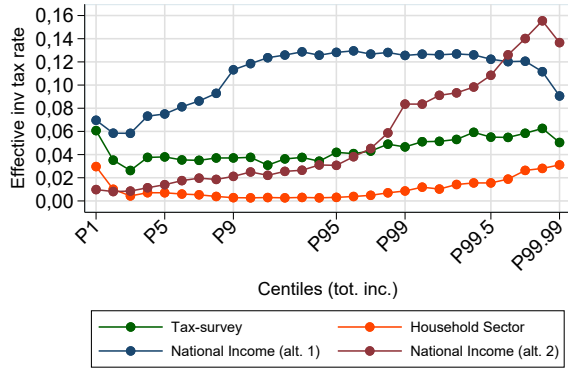
Figure [7](#) shows the effective tax rates paid by income fractile for the three stages



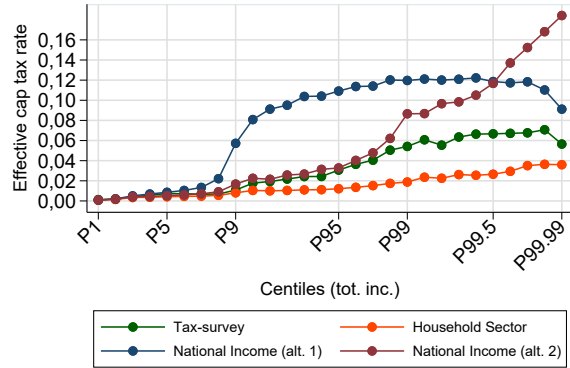
and the two alternatives corresponding to the national income series for 2016. Given the concentration of capital income and undistributed profits, we provide greater detail for the top 10 and 1%. The progressiveness of income taxes implies an effective rate close to zero up to the median income (panel d of Figure 7), with an increasing incidence of taxes throughout the distribution at least up to the top 1% in all estimates.

Series comparisons indicate that the scaled-up household income series, which scales incomes but not taxes since they are reported in tax records and assumed to be an accurate depiction of total revenue, results in a reduction in the average effective rate from 13 to 8% for the top 1%. The inclusion of taxes on the corporate sector entails an increase in effective rates to levels similar to those corresponding to the tax-survey series. This last stage implies the incorporation of highly concentrated income, which is in turn taxed at a flat rate of 25%. The effect of the introduction of taxes on the corporate sector is more evident in the series for capital income (panel a of Figure 7), and in particular in *alternative 2*, which translates into a growing effective rate even in the highest income fractiles.

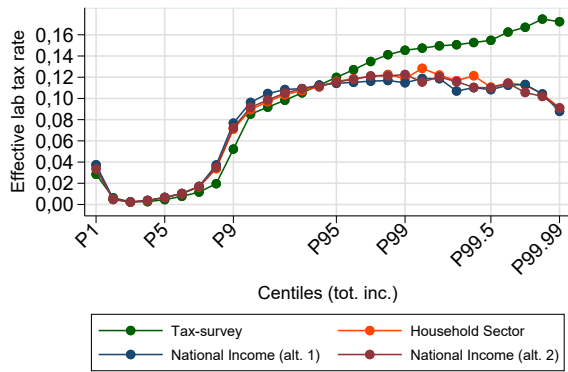
Figure 7: Effective tax rates, 2016



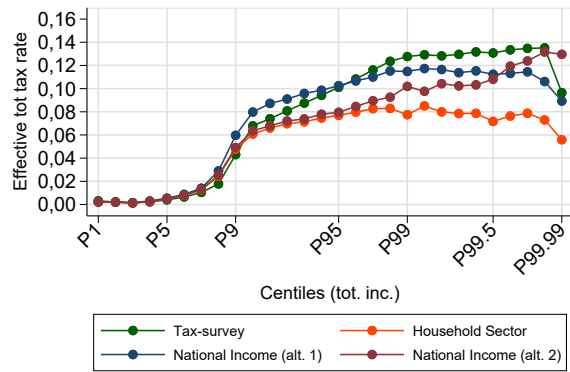
(a) Investment income



(b) Total capital incomes



(c) Labour incomes



(d) Total incomes

**Note.** Own elaboration based on tax records, household surveys, and national accounts. First stage estimates are the result of the combination of tax data and household surveys. Second stage estimates include imputed undistributed profits and taxes, and in third stage estimates, incomes are scaled up to National Income aggregates by income source (alt 1 based on tax-survey capital-ownership proxy, alt 2 based on matched firm-owners data). All estimates refer to pre-tax personal income distribution. Investment income (panel a) is included in total capital incomes (panel b). Panel d (total incomes) is the sum of panels b and c, plus all remaining incomes.

Finally, in all the series, a reduction in effective rates is observed in the right tail of the distribution. The combination of a dual income tax system that taxes capital at lower average rates than labor along with the concentration of capital income in the top 1% results in a reduction in average taxes for the top income groups. The drop is evident

in the top 0.1%, particularly for the tax-survey series. The regressiveness of the set of taxes at the very top of the distribution is similar to that found by [Saez and Zucman \(2020\)](#) for 2008 in the United States, explained by the ability of high-income individuals to avoid personal income taxes and obtain their income from direct participation in their firms.

## 5 Concluding remarks

In this paper, we highlight the difficulty of assessing inequality trends, not only as a result of the challenges inherent in combining different data sources to close measurement gaps, but also stemming from what can actually be observed and how economic decisions affect it. We tackle these challenges using a rare combination of survey, social security, personal income tax, and corporate tax micro-data, combined with national accounts. We presented distributive estimates for the Uruguayan case based on this unique data in three different stages: tax-survey series, household income series, and national income series in order to document their differences.

Thus, this article points out the need to consider different income aggregates, and to track changes in inequality based on both what we can see in our tax records and surveys, and what remains hidden within firms and, more generally, within national income as a whole. We have shown that the imputation of these incomes does not have a mechanical effect on inequality trends, and may change our understanding of their evolution. Particularly, in the last stage, the method chosen for the distribution of undistributed profits has important distributive consequences. In this paper, using a matched database of owners of firms, we show how the usual method of imputation based on observed capital incomes from tax-survey data may be underestimating levels of inequality. More importantly, we show how even in periods of sharp reductions in inequality, the distribution of growth is extremely concentrated given high baseline income concentration. This may

be particularly important in high inequality contexts, such as those observed in all Latin American countries, and it highlights the need not only to boost economic growth, but also to dramatically improve its distribution.

## References

- Alstadsæter, A., Jacob, M., Kopczuk, W., and Telle, K. (2017). Accounting for business income in measuring top income shares. In *Proceedings. annual conference on taxation and minutes of the annual meeting of the national tax association*, volume 110, pages 1–39. JSTOR.
- Altimir, O. (1987). Income distribution statistics in latin america and their reliability. *Review of income and wealth*, 33(2):111–155.
- Alvaredo, F., De Rosa, M., Flores Beale, I., Morgan, M., et al. (2022). The inequality (or the growth) we measure: Data gaps and the distribution of incomes. *CEPR Discussion Papers*.
- Alvaredo, F. and Gasparini, L. (2015). Recent trends in inequality and poverty in developing countries. In *Atkinson A. and Bourguignon F. (eds.) Handbook of income distribution*, volume 2, pages 697–805. Elsevier.
- Amarante, V., Colafranceschi, M., and Vigorito, A. (2014). *Uruguay’s Income Inequality and Political Regimes over the Period 1981–2010*. Cornia A. (ed.) *Falling Inequality in Latin America. Policy Changes and Lessons*, WIDER Studies in Development Economics. Oxford University Press.
- Anand, S. and Segal, P. (2008). What do we know about global income inequality? *Journal of Economic Literature*, 46(1):57–94.
- Atkinson, A. B., Piketty, T., and Saez, E. (2011). Top incomes in the long run of history. *Journal of economic literature*, 49(1):3–71.
- Blanchet, T., Chancel, L., and Gethin, A. (2019). How unequal is europe? evidence from distributional national accounts, 1980-2017. *WID. world Working Paper*, 6.

- Bourguignon, F. (2015). Appraising income inequality databases in latin america. *The Journal of Economic Inequality*, 13(4):557–578.
- Bucheli, M., Lustig, N., Rossi, M., and Amábile, F. (2013). *Social spending, taxes and income redistribution in Uruguay*. The World Bank.
- Burdín, G., De Rosa, M., Vigorito, A., and Vilá, J. (2022). Falling inequality and the growing capital income share: Reconciling divergent trends in survey and tax data. *World Development*, 152:105783.
- Burkhauser, R. V., Feng, S., Jenkins, S. P., and Larrimore, J. (2012). Recent trends in top income shares in the united states: reconciling estimates from march cps and irs tax return data. *Review of Economics and Statistics*, 94(2):371–388.
- Cornia, G. A. (2014). *Falling inequality in Latin America: Policy changes and lessons*. OUP Oxford.
- De Rosa, M., Flores, I., and Morgan, M. (2020). Inequality in Latin America Revisited: Insights from Distributional National Accounts. WIL Technical Notes.
- De Rosa, M., Flores, I., and Morgan, M. (2022). More unequal or not as rich? On the Missing Half of Latin American Income. Technical report.
- De Rosa, M., Sinisclachi, S., Vilá, J., Vigorito, A., and Willebald, H. (2018). La evolución de las remuneraciones laborales y la distribución del ingreso en Uruguay; futuro en foco. *Cuadernos Sobre Desarrollo Humano: Montevideo, Uruguay*.
- Deaton, A. (2005). Measuring poverty in a growing world (or measuring growth in a poor world). *Review of Economics and statistics*, 87(1):1–19.
- Fairfield, T. and Jorratt De Luis, M. (2016). Top income shares, business profits, and effective tax rates in contemporary c hile. *Review of Income and Wealth*, 62:S120–S144.

- Ferreira, F. H., Lustig, N., and Teles, D. (2015). Appraising cross-national income inequality databases: An introduction. *The Journal of economic inequality*, 13(4):497–526.
- Flores, I. (2018). Income under the carpet: What gets lost between the measure of capital shares and inequality. <http://precog.iiitd.edu.in/people/anupama>.
- Garbinti, B., Goupille-Lebret, J., and Piketty, T. (2018). Income inequality in france, 1900–2014: evidence from distributional national accounts (dina). *Journal of Public Economics*, 162:63–77.
- Gasparini, L., Bracco, J., Galeano, L., and Pistorio, M. (2018). Desigualdad en países en desarrollo: ¿ajustando las expectativas? *Documentos de Trabajo del CEDLAS*.
- Goolsbee, A. (2000). What happens when you tax the rich? evidence from executive compensation. *Journal of Political Economy*, 108(2):352–378.
- Higgins, S., Lustig, N., and Vigorito, A. (2018). The rich underreport their income: Assessing bias in inequality estimates and correction methods using linked survey and tax data.
- Kolm, S.-C. (1976a). Unequal inequalities. I. *Journal of economic Theory*, 12(3):416–442.
- Kolm, S.-C. (1976b). Unequal inequalities. II. *Journal of economic theory*, 13(1):82–111.
- Kopczuk, W. and Zwick, E. (2020). Business incomes at the top. *Journal of Economic Perspectives*, 34(4):27–51.
- Lustig, N. et al. (2019). The missing rich in household surveys: Causes and correction approaches. Technical report, Tulane University, Department of Economics.
- Lustig, N., Teles, D., et al. (2016). Inequality convergence: How sensitive are results to the choice of data? Technical report.

- Morgan, M. (2017). Extreme and persistent inequality: New evidence for Brazil combining national accounts, surveys and fiscal data, 2001-2015. *World Inequality Database (WID.org) Working Paper Series*, 12:1–50.
- Novokmet, F., Piketty, T., and Zucman, G. (2018). From Soviets to oligarchs: inequality and property in Russia 1905-2016. *The Journal of Economic Inequality*, 16(2):189–223.
- OECD (2013). *OECD Framework for Statistics on the Distribution of Household Income, Consumption and Wealth*. OECD Publishing.
- OECD (2021). *Revenue Statistics in Latin America and the Caribbean 2021*. OECD Publishing.
- Piketty, T. (2003). Income inequality in France, 1901–1998. *Journal of political economy*, 111(5):1004–1042.
- Piketty, T., Alvaredo, F., and Assouad, L. (2017). Measuring inequality in the middle east 1990-2016: The world’s most unequal region?
- Piketty, T. and Chancel, L. (2017). Indian income inequality, 1922-2014: From British Raj to billionaire Raj?
- Piketty, T., Saez, E., and Zucman, G. (2018). Distributional national accounts: methods and estimates for the United States. *The Quarterly Journal of Economics*, 133(2):553–609.
- Ravallion, M., Thorbecke, E., and Pritchett, L. (2004). Competing concepts of inequality in the globalization debate [with comments and discussion]. In *Brookings trade forum*, pages 1–38. JSTOR.
- Saez, E. and Zucman, G. (2020). The rise of income and wealth inequality in America: Ev-



idence from distributional macroeconomic accounts. *Journal of Economic Perspectives*, 34(4):3–26.

Smith, M., Yagan, D., Zidar, O., and Zwick, E. (2019). Capitalists in the twenty-first century. *The Quarterly Journal of Economics*, 134(4):1675–1745.

United Nations (2008). System of national accounts. <https://unstats.un.org/unsd/nationalaccount/docs/SNA2008.pdf>.

United Nations (2009). *System of National Accounts 2008*.

WIL (2021). Distributional National Accounts Guidelines: Methods and Concepts Used in the World Inequality Database.

Wolfson, M. C., Veall, M. R., Brooks, W. N., and Murphy, B. B. (2016). Piercing the veil: Private corporations and the income of the affluent.

Zwijnenburg, J. (2022). The use of distributional national accounts in better capturing the top tail of the distribution. *The Journal of Economic Inequality*, pages 1–10.

## Tables in appendix

Table A2: Summary Statistics of undistributed profits recipients: matched and imputed individuals.

	2009	2010	2011	2012	2013	2014	2015	2016
<i>Panel A: Total recipients of undistributed profits (individuals)</i>								
Number of recipients	38535	39344	43844	45013	45210	46320	48489	51598
Mean	115765.7	167269	156317.8	174848.3	204844.3	219745.3	197646.5	141484.7
p25	2801.306	3565.805	4149.711	4441.729	5117.777	5432.162	4494.195	3751.444
p50	10219.73	13115.72	16018.45	16818.29	19277.87	21001.7	17694.77	14884.86
p75	39419.05	48242.72	60670.85	65035.17	72180.11	79333.26	68650.12	56926.98
<i>Panel B: Matched recipients of undistributed profits (individuals)</i>								
Number of recipients	22709	23688	25749	25699	25791	25543	25688	27334
Mean	115790	156619.8	165908.6	200139.5	203462.1	237513.5	203342.4	138791
p25	4247.9	5323.781	5561.698	6201.606	7057.772	7696.342	6013.379	4850.763
p50	17453.45	21402.13	24834.46	26609.19	29095.83	31258.5	27356.36	22622.34
p75	60718.89	72654.74	87068.65	94227.25	102823.8	109917.7	94386.34	79549.48
<i>Panel C: Imputed recipients of undistributed profits (individuals)</i>								
Number of recipients	15826	15656	18095	19314	19419	20777	22801	24264
Mean	115730.9	183381.5	142670.7	141195.6	206680.1	197900.8	191229.2	144519.2
p25	1964.492	2572.886	3274.976	3262.449	3926.993	4159.588	3700.491	3228.878
p50	5486.369	7203.526	9467.611	10192.2	11933.6	13557.49	11739.84	10102.32
p75	16507.39	21024.42	30941.33	33639.81	38867.49	47272.23	43256.94	34935.44
<i>Panel D: Total recipients of undistributed profits firms</i>								
Number of firms	15848	16668	18108	19508	19830	20786	20629	19773
Matched recipients	9414	10007	10597	11129	11325	11493	11303	10808
Imputed recipients	6434	6659	7509	8378	8504	9291	9327	8966

**Note.** Own estimates based on firm tax data and individual tax records (DGI). The table presents the imputation method of undistributed profits based on matched owners-firms. Panel A depicts the total number of individuals who receive undistributed profit in our final base. Panel B displays only the individuals for whom it was possible to match firms with individuals, while panel C includes the individuals created from firms with positive undistributed dividends, but for whom an owner was not identified. Finally, panel D shows the number of firms with matched and imputed recipients. Amounts in current dollars, at the average exchange rate of each year.

Table A1: Income categories and tax rates of IASS and IRPF (cat. I and II)

Panel a) IRPF: Labor income			
2009-2011		2012-2016	
Annual income in BPC	Tax rate	Annual income in BPC	Tax rate
0 - 84	0%	0-84	0%
84 - 120	10%	84 - 120	10%
120 - 180	15%	120 - 180	15%
180 - 600	20%	180 - 600	20%
600 - 1200	22%	600 - 900	22%
1200 or more	25%	900-1380	25%
-	-	1380 or more	30%

Panel b) IASS: Pensions	
Annual income in BPC	Tax rate
0 - 96	0%
96 - 180	10%
180-600	20%
600 or more	25%

Panel c) IRPF: Capital income	
Capital income category	Tax rate
Interest on bank deposits in Uruguayan currency or UI (one year length or less)	3%
Interest on bank deposits in Uruguayan currency or UI (one year length or less)	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 mobiliary capital	12%
Real-estate capital	12%
Capital gains	12%
Dividends or benefits from IRAE contributors	7%
Imputed rents by non-resident entities	12%

*Note.* Own elaboration based on DGI.

Table A3: Income shares, 2009-2016

	Tax- survey	Hous. sector	Nat. Inc. (alt 1)	Nat. Inc. (alt 2)
Top 1 %				
2009	12.6%	17.5%	21.7%	26.3%
2010	12.6%	16.7%	20.4%	25.9%
2011	12.5%	17.8%	22.0%	26.3%
2012	12.3%	16.9%	20.7%	25.8%
2013	11.9%	15.6%	18.5%	24.2%
2014	12.4%	15.9%	18.6%	24.3%
2015	12.7%	16.8%	19.6%	25.8%
2016	13.9%	17.7%	20.4%	23.5%
Top 10 %				
2009	40.5%	46.4%	51.9%	52.8%
2010	40.3%	45.9%	51.6%	52.6%
2011	38.6%	44.8%	50.6%	51.3%
2012	38.6%	44.2%	49.7%	51.0%
2013	37.9%	43.3%	47.8%	49.9%
2014	37.9%	43.4%	47.7%	49.9%
2015	37.5%	43.4%	47.8%	50.4%
2016	38.9%	44.2%	48.6%	48.9%
Middle 40 %				
2009	44.8%	40.7%	36.7%	35.9%
2010	44.9%	40.9%	36.9%	36.0%
2011	45.4%	40.6%	36.6%	36.0%
2012	45.2%	41.2%	37.3%	36.2%
2013	45.2%	40.9%	38.0%	36.3%
2014	45.0%	41.0%	38.0%	36.4%
2015	45.2%	40.7%	37.8%	35.8%
2016	44.8%	40.5%	37.5%	37.2%
Bottom 50 %				
2009	14.7%	12.9%	11.4%	11.3%
2010	14.7%	13.1%	11.6%	11.4%
2011	16.0%	14.5%	12.8%	12.7%
2012	16.3%	14.7%	13.0%	12.8%
2013	16.9%	15.7%	14.2%	13.8%
2014	17.0%	15.7%	14.2%	13.7%
2015	17.3%	15.9%	14.5%	13.8%
2016	16.3%	15.3%	13.9%	13.9%

*Note.* Own elaboration based on tax records, household surveys, and national accounts. First stage estimates are the result of the combination of tax data and household surveys. Second stage estimates include imputed undistributed profits and taxes, and in third stage estimates, incomes are scaled up to National Income aggregates by income source (alt 1 based on tax-survey capital-ownership proxy, alt 2 based on matched firm-owners data). All estimates refer to pre-tax personal income distribution.

# Figures

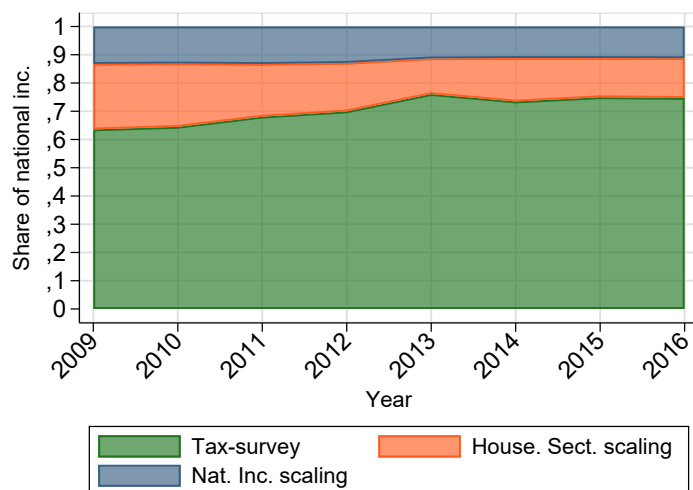
## Figures in appendix

Figure A1: GDP and income inequality 1986-2019



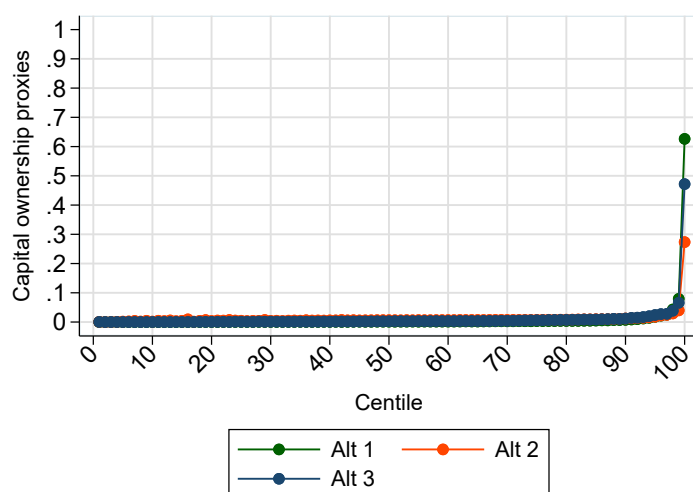
**Note.** In the primary axis GDP is presented with GDP 2005=100, whilst percapita household income gini index (estimated based on the household survey) is depicted on the secondary axis. During the period 2009-2016 (between red lines, period with tax data available), gini index dropped by about 7 points, and National Income grew at a 5.5% rate.

Figure A2: Income shares by estimation stage, 2009-2016



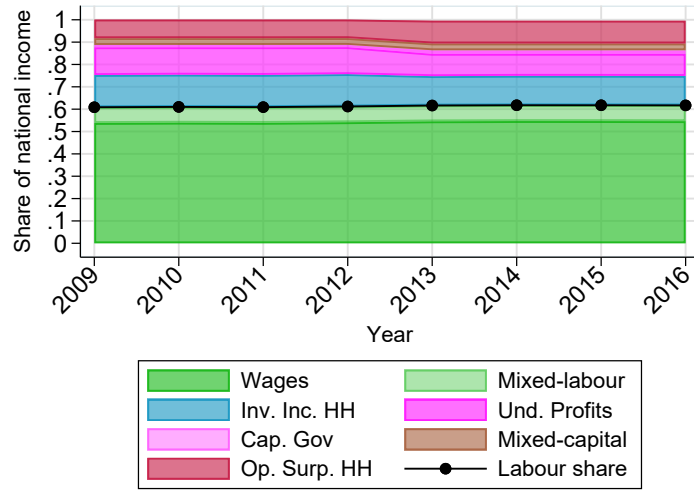
**Note.** Own estimates based on tax-survey data (DGI-ECH) and National Accounts 2012, 2016 (BCU). The figure depicts aggregate income by estimation stage: the dark-green area is the sum of tax-survey incomes, the orange area are incomes added during scaling to household sector based on scaling factors depicted in Figure 1, while the blue area represents remaining imputed incomes of Figure A6. All incomes from national accounts are net of depreciation, based on Wid.World data for other Latin American Countries.

Figure A3: Proxies of firm ownership, 2016



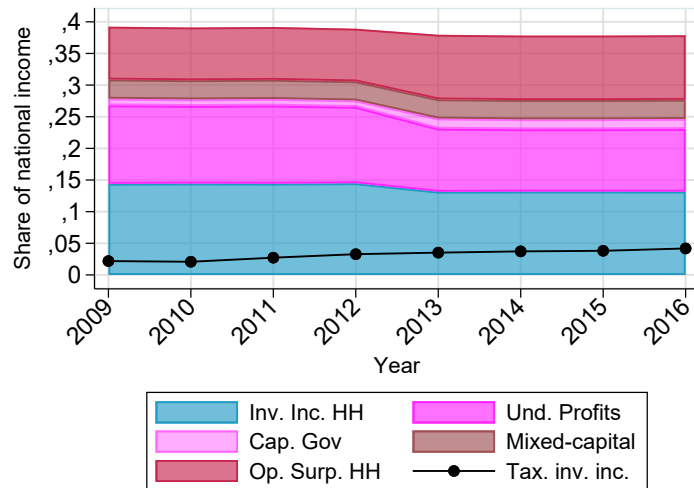
**Note.** Own estimates based on tax-survey data (ECH-DGI). *Alt. 1* refers to the distribution of taxable capital incomes from DGI. *Alt. 2* refers in turn to the sum of all taxable and non-taxable capital incomes, including rents and owner occupied housing rents. The preferred alternative (*Alt. 3*) excludes owner occupied housing rent, but includes total incomes reported in the household survey by firm-owners.

Figure A4: Functional income distribution, 2009-2016



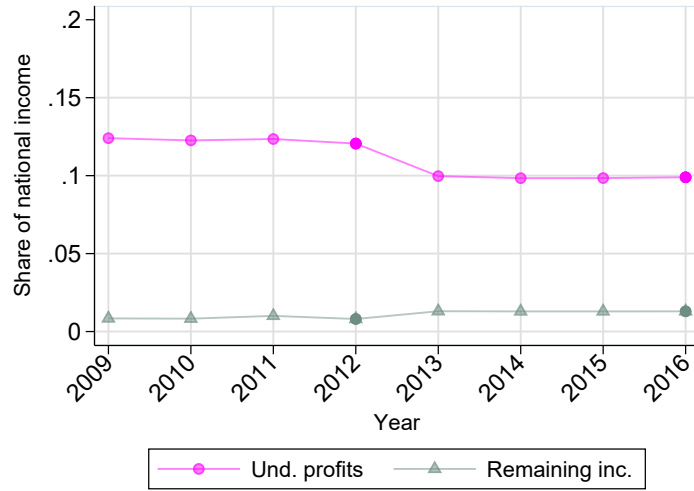
*Note.* Own estimates based on tax-survey data (DGI-ECH) and National Accounts 2012, 2016 (BCU). The figure presents the distribution of net national incomes in capital and labor shares and their components. All incomes from national accounts are net of depreciation, based on Wid.World data for other Latin American Countries.

Figure A5: Capital incomes composition



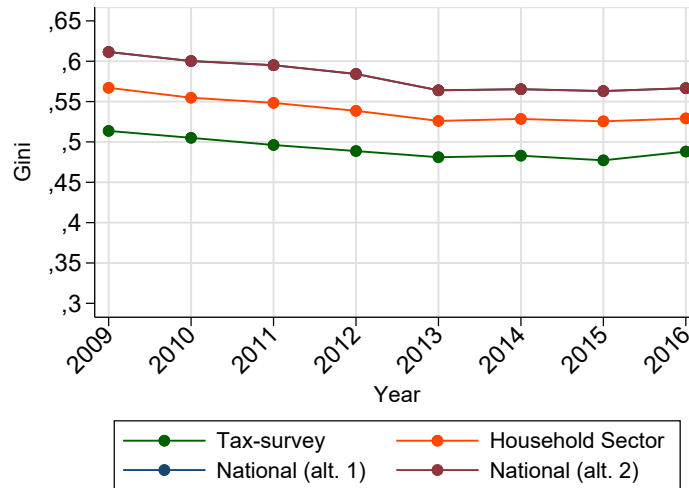
*Note.* Own estimates based on firm tax data (DGI), tax-survey data (ECH-DGI) and National Accounts 2012, 2016 (BCU). Solid filled areas represent national account's aggregates, while dotted line depicts aggregate investment incomes (dividends, interest, etc.) from tax-survey data. This line is conceptually consistent with national account's investment income received by households (light blue area), D4-S14. All incomes from national accounts are net of depreciation, based on Wid.World data for other Latin American Countries.

Figure A6: Income aggregates of non-household sector



**Note.** Own estimates based on National Accounts 2012, 2016 (BCU). Dots in dark colors represent actually observed data points in national accounts. Undistributed profits (B5n of private corporations S11/12) are allocated based on the capital ownership proxy, while remaining components of national income (outside household sector B5n-S14 and B5n-S11/12) are distributed proportionally to total incomes from tax-survey data. All incomes from national accounts are net of depreciation, based on Wid.World data for other Latin American Countries.

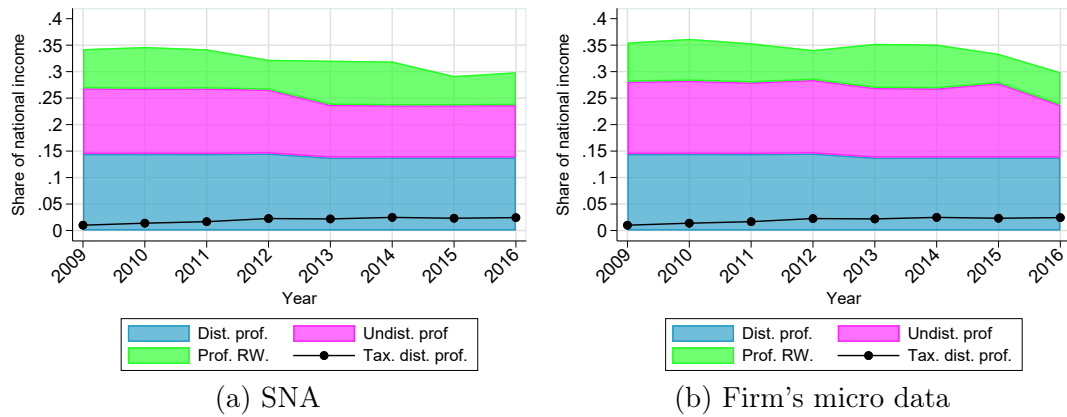
Figure A7: Pre-tax Gini index by source and imputation stage, 2009-2016



**Note.** Own elaboration based on tax records, household surveys, and national accounts. First stage estimates (panel a) are the result of the combination of tax data and household surveys. Second stage estimates (panel b) include imputed undistributed profits and taxes, and in third stage estimates (panels c and d), incomes are scaled up to National Income aggregates by income source (alt 1 based on tax-survey capital-ownership proxy, alt 2 based on matched firm-owners data). All estimates refer to pre-tax personal income distribution.

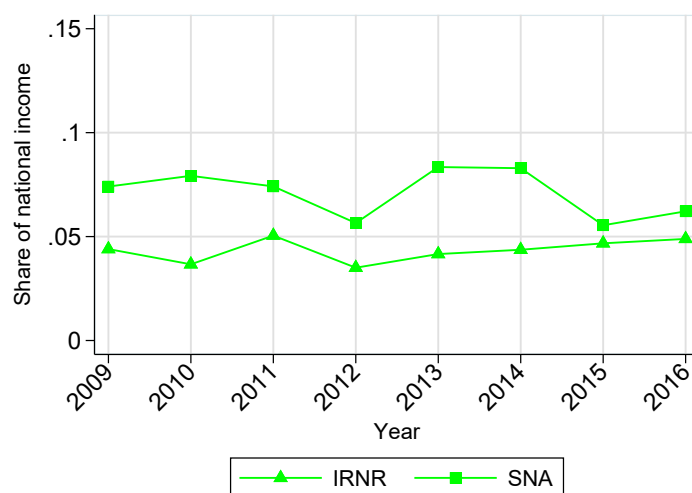


Figure A8: Firms profits by alternative, 2009-2016



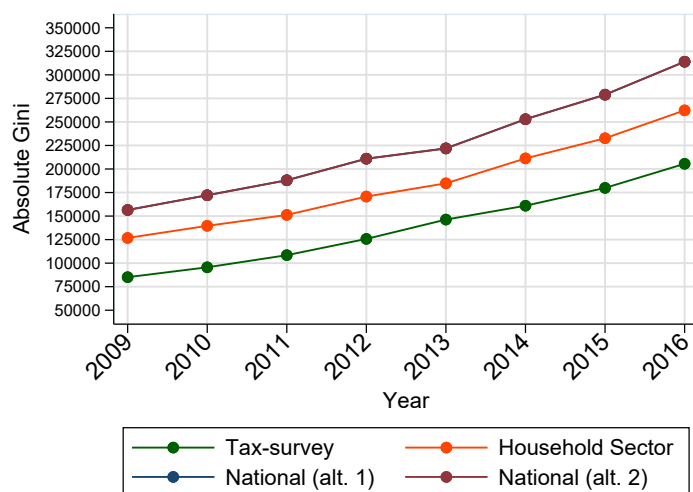
**Note.** Own estimates based on firm tax data (DGI), tax-survey data (ECH-DGI), National Accounts 2012, 2016 (BCU), and Balance of Payments (BCU). Both panels depict observed dividends observed in tax-survey data, investment incomes of households excluding interest (SNA, D41-S14), undistributed profits and capital incomes sent abroad (computed based on Balance of Payments). All but undistributed profits are equivalent in both panels. In Panel a, undistributed profits are calculated based on national accounts (B5n-S11/12), while Panel b presents undistributed profits computed based on firms' tax files. All incomes from national accounts are net of depreciation, based on Wid.World data for other Latin American Countries (undistributed profits from panel b are already net of depreciation).

Figure A9: Private capital incomes paid to the rest of the world



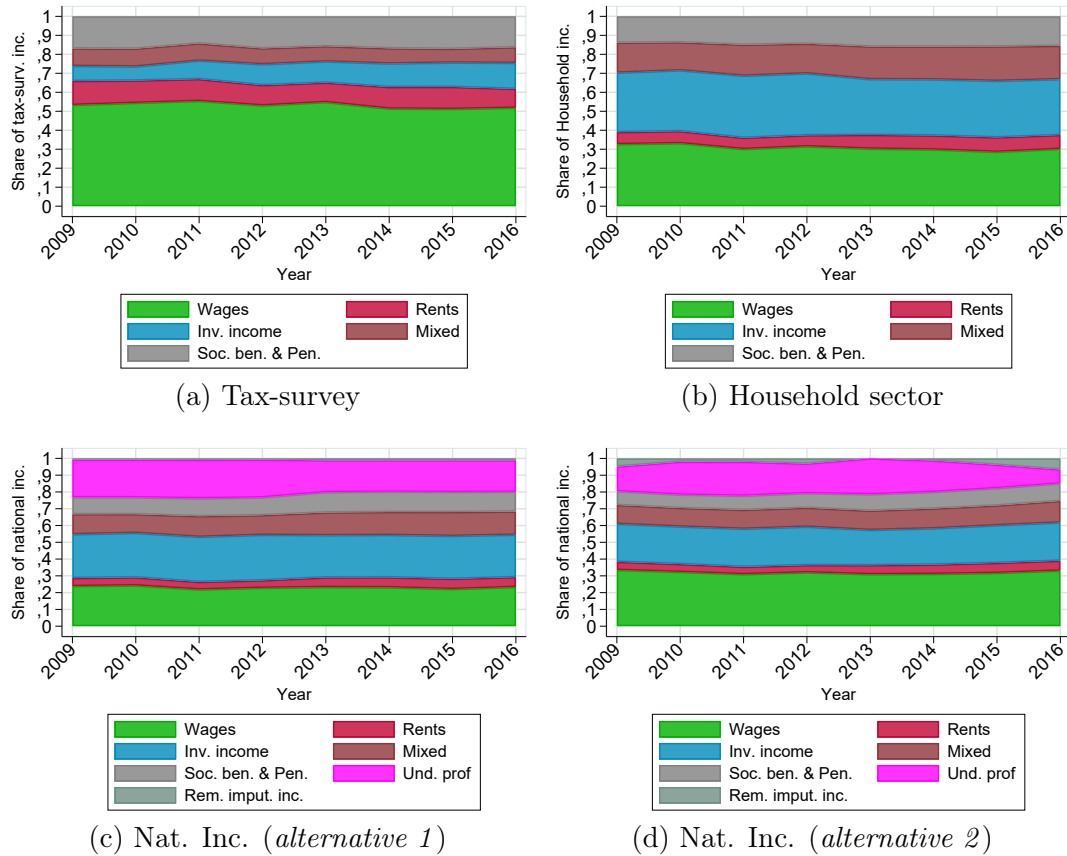
**Note.** Own estimates based on Balance of Payments (BCU) and *Impuesto a la Renta de los No Residentes* (IRNR) series (DGI). Balance of payments series is constructed based on Central Bank data for two periods: 2009-2012 and 2013-2016. The latter series has an updated methodology but has not been matched with the previous one, resulting in higher private primary income (1.B-credit), i.e., capital incomes paid to the rest of the world by the private sector. The 2009-2012 series was thus adjusted by the ratio of the two period averages. IRNR series is constructed by dividing IRNR aggregate taxes collected by its main flat rate (7%).

Figure A10: Absolute income inequality by estimation stage, 2009-2016



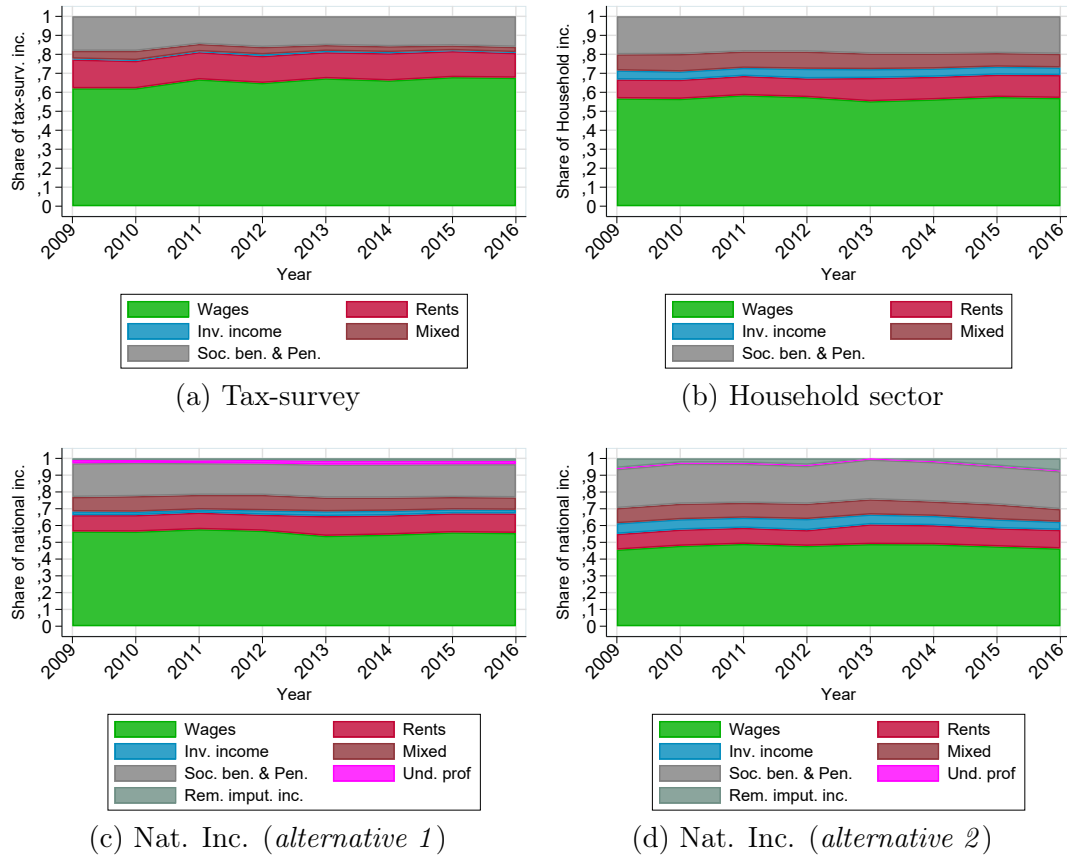
**Note.** Own elaboration based on tax records, household surveys, and national accounts. First stage estimates (panel a) are the result of the combination of tax data and household surveys. Second stage estimates (panel b) include imputed undistributed profits and taxes, and in third stage estimates (panels c and d), incomes are scaled up to National Income aggregates by income source (alt 1 based on tax-survey capital-ownership proxy, alt 2 based on matched firm-owners data). All estimates refer to pre-tax personal income distribution. Absolute inequality measures based on [Kolm \(1976a,b\)](#), computed with *sgini* by Philippe Van Kerm, Luxembourg Institute of Socio-Economic Research (LISER) and University of Luxembourg.

Figure A11: Top 10% income composition, 2009-2016



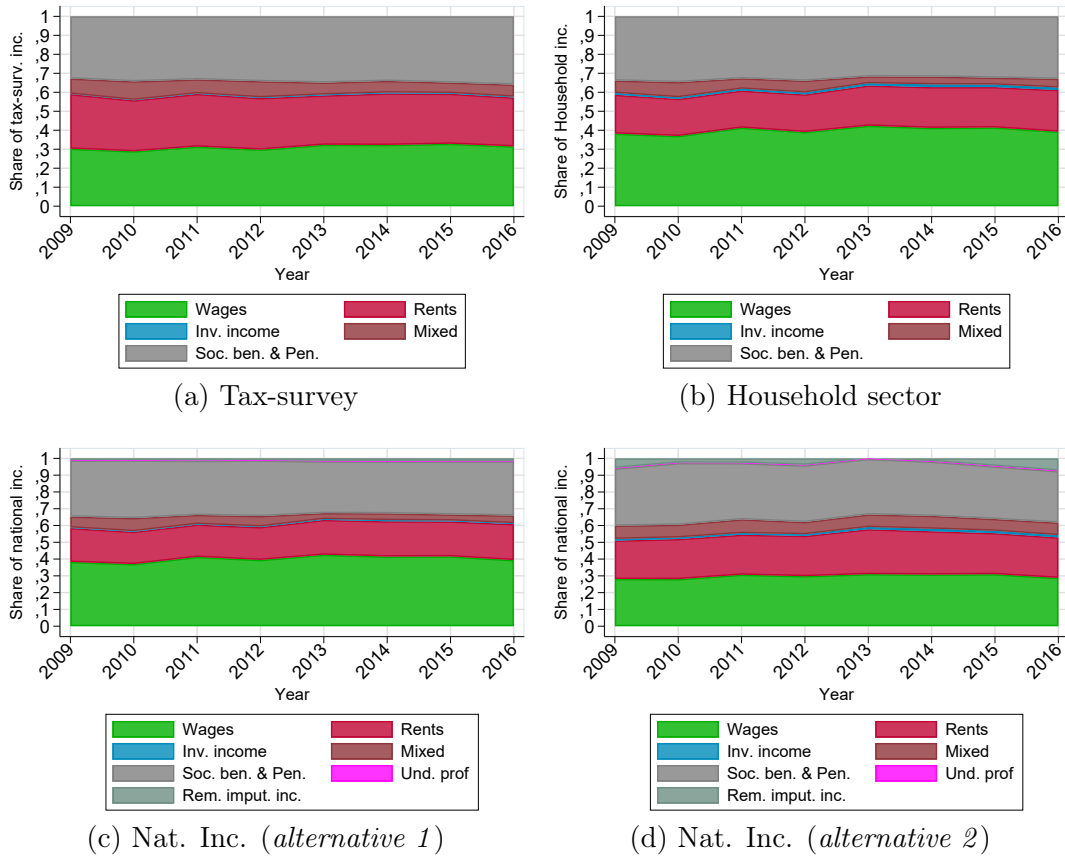
**Note.** Own elaboration based on tax records, household surveys, and national accounts. First stage estimates (panel a) are the result of the combination of tax data and household surveys. Second stage estimates (panel b) include imputed undistributed profits and taxes, and in third stage estimates (panels c and d), incomes are scaled up to National Income aggregates by income source (alt 1 based on tax-survey capital-ownership proxy, alt 2 based on matched firm-owners data). All estimates refer to pre-tax personal income distribution.

Figure A12: Middle 40% income composition, 2009-2016



**Note.** Own elaboration based on tax records, household surveys, and national accounts. First stage estimates (panel a) are the result of the combination of tax data and household surveys. Second stage estimates (panel b) include imputed undistributed profits and taxes, and in third stage estimates (panels c and d), incomes are scaled up to National Income aggregates by income source (alt 1 based on tax-survey capital-ownership proxy, alt 2 based on matched firm-owners data). All estimates refer to pre-tax personal income distribution.

Figure A13: Bottom 50% income composition, 2009-2016



**Note.** Own elaboration based on tax records, household surveys, and national accounts. First stage estimates (panel a) are the result of the combination of tax data and household surveys. Second stage estimates (panel b) include imputed undistributed profits and taxes, and in third stage estimates (panels c and d), incomes are scaled up to National Income aggregates by income source (alt 1 based on tax-survey capital-ownership proxy, alt 2 based on matched firm-owners data). All estimates refer to pre-tax personal income distribution.

Figure A14: Growth Incidence Curves (GIC), 2009-2015

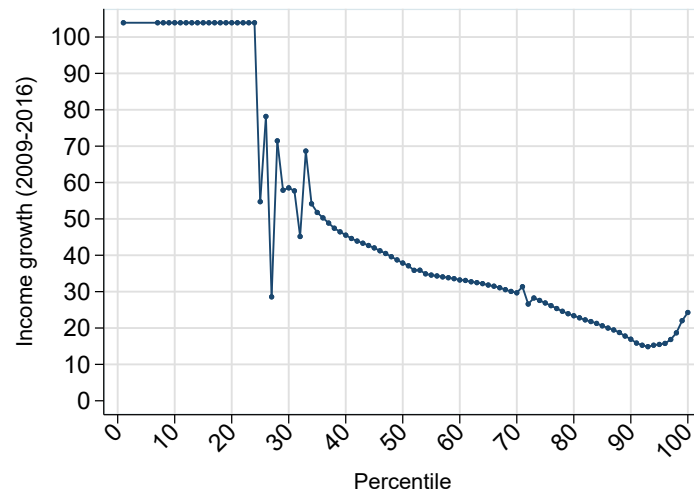


Figure A15: National income (alternative 2)

*Note.* Own elaboration based on tax records, household surveys, and national accounts. Alternative 2 refers to national income series estimated based on matched owner-firms data. All estimates refer to pre-tax personal income distribution.