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# Wealth distribution in Uruguay: capitalizing incomes in the dark.

Mauricio De Rosa

# Distribución de la riqueza en Uruguay

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## Resumen

La distribución de la riqueza es uno de los determinantes centrales de la desigualdad de ingresos y de importancia capital en sí misma. Sin embargo, relativamente poco se sabe sobre la misma, en particular en los países en desarrollo. En este artículo, la distribución y composición de la riqueza en Uruguay es estimada para el año 2012, empleando el método de capitalización, que consiste en estimar la riqueza de los individuos a partir de sus ingresos por capital y las tasas de rendimiento asociadas a los mismos. Las estimaciones se basan en (i) registros tributarios, que cubren a tres cuartas partes de la población y que son complementados con información proveniente de la Encuesta Continua de Hogares y (ii) estimaciones propias de la riqueza agregada nacional, calculadas a partir de una variedad de fuentes de información, que incluyen datos catastrales, información financiera del Banco Central del Uruguay, registros tributarios de empresas y de la Encuesta Financiera de los Hogares Uruguayos (EFHU). Los resultados indican que al menos un tercio de la riqueza es poseída por el 1% más rico, mientras que la participación del decil de mayor riqueza es de 60%. Por otro lado, el 50% más pobre posee poco más del 5% de la riqueza, en tanto que el 40% de la población que se encuentra entre la mediana y el décimo decil, posee el 35% de la riqueza. La riqueza inmobiliaria es la forma de riqueza que presenta una distribución menos desigual, en tanto que las riquezas financiera y empresarial se encuentran fuertemente concentradas en el 1% más rico. Se desarrollaron análisis de sensibilidad para testear los supuestos más importantes del método de capitalización, mostrando que las principales conclusiones son robustas. Los resultados son por su parte consistentes con estimaciones a partir de la EFHU y con la distribución de los bienes inmuebles provenientes del Impuesto al Patrimonio.

Palabras clave: distribución de la riqueza, método de capitalización, registros tributarios, países en desarrollo, Uruguay.

Código JEL: D31, E01, E22

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# Wealth distribution in Uruguay: capitalizing incomes in the dark.

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## Abstract

Wealth inequality is arguably one of the key drivers of overall economic distribution and of major importance in its own right. However, relatively little is known about it, particularly in the developing world. In this article, Uruguay's wealth distribution and composition in 2012 are estimated -for the first time-, based on the capitalization method. Wealth distribution estimations are mainly based on very detailed tax micro-data and own estimations of aggregate national wealth. Results show that at least one third of total wealth is owned by the wealthiest 1% and top 10%'s share is almost 60%, whilst 35% is owned by the "middle 40". Financial wealth and business property in particular are heavily concentrated among the wealthiest 1%. Sensitivity tests are performed to assess the method's key assumptions, showing that main results are robust. Moreover, estimations are consistent with a novel household wealth survey and with real estate tax data.

**Key words:** Wealth distribution, capitalization method, tax records, developing countries, Uruguay.
**JEL classification:** D31, E01, E22

# 1 Introduction

Income inequality in Latin America has experienced a downturn since the early 2000s, in the context of rapid economic growth and redistributive public policies (Cornia, 2014). However, it is still high compared with European countries, and the decreasing trend has stopped or even reversed in recent years (Gasparini et al., 2018). In this context, very little is known about wealth distribution, which is one of the key drivers of income inequality and a key dimension of overall economic inequality (Piketty, 2014). This rises the question: how concentrated is wealth in developing countries compared to rich economies?

To contribute to answer this question, distribution and composition of wealth in Uruguay[1] in 2012 are estimated, based on the capitalization method recently applied by Saez and Zucman (2016) for the United States[2]. The method consists on estimating individual net wealth by capitalizing personal capital incomes, based on capitalization factors for each type of wealth that are equivalent to the inverse of their return rate. Capital incomes are mainly drawn in this paper from a high quality tax records database -which covers 75% of adult population- combined with household survey data. In regard to data availability, as in most of the developing world and even many rich countries (Piketty and Zucman, 2014), there are no estimates of balance sheets from Uruguay's National Accounts. Hence, unlike similar studies such as Saez and Zucman (2016) for US, Toledano-Martínez (2015) for Spain or Garbinti et al. (2017) for France, incomes are capitalized *in the dark*, that is, with no official wealth aggregates as reference point. To overcome this caveat, a wide range of secondary sources is also used to estimate aggregate wealth and return rates.

Results show that the wealthiest 10% owns 59.6% of total wealth, whilst 34.7% of it is owned by the top 1%, which would locate Uruguay as a relatively high wealth inequality country compared to France, but not as extreme as Spain or the US. Virtually all of the business and financial wealth is owned by the top 10%, and more than 80 and 90% by the top 1% respectively.

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[1]Uruguay is a small high income country, with relatively low income inequality in the Latin American context. More on this in section 2.

[2]The method was originally proposed by Robert Giffen in 1913 (Fagereng et al., 2016), and applied for instance for the United Kingdom by Atkinson and Harrison (1978). Full description is presented in section 3.

Half of the real estate is owned by the "middle 40", and 32% by the top 10%. Bottom 50%, on the other hand, owns virtually nothing (less than 5%). In terms of wealth composition, 70% of Uruguay's wealth is real estate, which is the predominant type of wealth for 99% of individuals -if they have any-, whilst for the top 1%, 71.8% of wealth refers to business proprietorship, 21.8% is real estate and the rest is financial wealth (essentially deposits in the Uruguayan case).

As the capitalization method assumes that individuals face identical return rates for each asset class, sensitivity tests are performed, showing that the idiosyncratic returns may entail relatively large top shares' variations, specially for the very wealthy individuals, but wealth correlated returns do not seem to have a significant impact. Moreover, results are compared with a novel household wealth survey (*Encuesta Financiera de los Hogares Uruguayos*, EFHU), showing very similar results both in terms of wealth distribution and composition. Though concentration is as expected slightly lower in survey-based estimations, the general conclusions hold, meaning that the bottom 50 owns virtually no wealth, the middle 40 owns one third of total wealth and top 10%'s share is 60% or more. Furthermore, comparison with wealth-tax data (*Impuesto al patrimonio*), which covers the very top of real estate distribution, entail very consistent wealth shares for the top 0.1% (between 1-2.5%).

Top wealth holders are characterized, showing that wealth increases up to retirement age -slightly decreasing thereafter- and men are wealthier than women for all age groups. Strong correlation is found between income and wealth, particularly among individuals belonging to the top 1% of the wealth distribution, who tend to overlap (around 50%) with those in the right tail of total income distribution.

The contribution of this article is twofold. First, it provides estimates of wealth distribution based on tax records for a developing country, which are consistent with alternative data sources. Second, from a methodological viewpoint, it shows that the capitalization method is useful even in contexts with severe data restrictions, such as the absence of National Accounts balance sheets.

The rest of the article is organized as follows. Section 2 provides a brief background,

focusing on studies which are based on tax data and the capitalization method, as well as the scarce evidence regarding Latin America and Uruguay in particular. Section 3 presents the capitalization method and describes the procedure undertaken for the wealth distribution estimations in the Uruguayan framework. Main results are depicted in section 4, whilst robustness and sensitivity analysis is presented in section 5. Finally, section 6 concludes.

# 2  Background

Inequality is one of the oldest concerns in economics, notwithstanding, during the twentieth century its study had become increasingly marginalized (Atkinson, 2015). In this context, wealth inequality has been particularly disregarded, probably due to the scarcity of reliable data. In recent years, however, these issues have returned to the spotlight alongside the increasing income inequality in developed countries, which may be partially explained by changes in wealth inequality (Piketty, 2014).

To be sure, wealth is intrinsically important as it involves both economic resources and control over them. Moreover, it generates an income flow accrued by wealth holders, and it allows smoothing consumption when income declines, typically in the face of economic downturns or retirement age (Davies and Shorrocks, 2000). However, as Atkinson points out, "wealth is important because it gives not only income (interests, dividends and rent) but also security, freedom of maneuver, and economic and political power" (Atkinson, 1973, p.239)[3]. Furthermore, there is growing concern about the increase in the level of wealth in developed economies (Piketty and Zucman, 2014), and the incidence of this increase in wealth and income inequality is not yet clear (Kopczuk, 2014).

There is a set of possible methodologies and data sources that may be used to study personal wealth distribution: (i) data on estates at death, multiplied-up to yield estimates of the wealth of the living; (ii) wealth household surveys; (iii) wealth taxes data; (iv) "rich lists" or (v) the capitalization method (see Alvaredo et al. (2015) or Saez and Zucman (2016)). Most of the

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[3]In a similar spirit, more than two hundred years ago Adam Smith argued that "wealth, as Mr. Hobbes says, is power" (Smith, 1776).

evidence regarding wealth distribution refers to developed countries. Until recently, top wealth shares estimations were mainly based on inheritance taxes. In general terms, theses studies show that half of the population owns no more than 5% of total wealth, whilst the wealthiest 10% holds between 60 and 90% of it for countries such as France, the United Kingdom, United States or Sweden (see for expample Piketty (2014), Alvaredo et al. (2015) or Kopczuk (2014)).

Other studies aim to analyse wealth inequality worldwide relaying on a variety of information sources. Davies et al. (2011) use National Accounts, wealth surveys and secondary sources of a sample of (mostly) developed countries to fit a model that allows them to estimate level a distribution of wealth in the remaining countries. They find that the Gini index varies between 0.6 and 0.8. Worldwide, the wealthiest 10% controls over 70% of total wealth. Several sophistications to this procedure were performed by other scholars, see for example Davies et al. (2016) for an adjustment of the top tail using rich lists such as the ones compiled by Forbes or Fortune magazines. This approach is also used for the adjustment of the right tail of the US Survey of Consumers Finances distribution by Vermeulen (2018) with similar results.

New estimations based on the capitalization method are now available, starting from the study for US of Saez and Zucman (2016). They estimated that the wealthiest 0.1% owned around 22% of total net wealth in 2012, whilst the top 1% share is close to 42%. Moreover, they find that this share has been rising for the past three decades and it reached the same level as its maximum historical value, just before the 1930s great depression. In the case of Spain, capitalization method estimations show that the top 1% wealth share is around 40%, whilst the top 10% share is 65-75%. (Toledano-Martínez, 2015), whilst in France, the top 1% share is 20-25%, and the top 10 share is 55% (Garbinti et al., 2017).

Wealth inequality trends based on these methodologies yield very different results. Saez and Zucman (2016) show that the capitalization method estimations entail a higher wealth concentration compared with other methodologies, and they discuss these differences. This seems to be the case of all the studies that compare different estimation approaches, but the explanations are not coincident. See for instance Kopczuk (2014) or Bricker et al. (2015) for a further discussion about the US case, and Fagereng et al. (2016) for a similar discussion

regarding estimations for Norway.

Despite its major importance, very little is still known about wealth inequality in the developing world. Due to insufficient data, there are almost no studies regarding wealth distribution for developing countries. Torche and Spilerman (2006), use capital incomes drawn from household surveys to analyse certain asset distributions for sixteen Latin American countries, including Uruguay. They estimate business and housing wealth distributions, and find that the former is extremely concentrated (for instance, in Uruguay, 99.5% of total assets are held by the wealthiest 10%) while housing is relatively better distributed (the top 10% owns 25% of it in Uruguay and near 40% in Bolivia and Mexico). For land, which is considered a proxy of total wealth distribution, they use census data and estimate a Gini index of around 0.8 for Uruguay in the period 1970-2000. A similar approach is used in Amarante et al. (2010), in the only study regarding the specifically the Uruguayan case, arriving at similar results. This data base, however, is not best suited for wealth distribution since capital incomes are poorly captured by regular household surveys, specially at the top of the distribution (Alvaredo et al., 2016).

In this context, analysing wealth distribution in Uruguay is interesting since it is the first developing country for which wealth inequality is studied based on data and methodologies better suited for it such as tax data and the capitalization method. The estimates presented in this article may be informative of what could be expected for the rest of the developing world, and hence contribute to broaden our understanding of wealth distribution worldwide. Moreover, Uruguay has experienced a large decline in income inequality -of over 7 points of the Gini Index- between 2009 and 2013 in the context of a 5.5% average national income growth, but both economic growth and income inequality reduction have slowed down or even stopped altogether in recent years (De Rosa and Vilá, 2017). Thus, to better understand and be able to estimate wealth distribution is important, since it is one of the key drivers of income inequality and heavily determines income distribution and redistributive impact of public policies and economic growth (Piketty, 2014) .

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# 3  Data and methodology

The concept of wealth used is quite straightforward. In general terms, net wealth refers to assets minus liabilities over which ownership rights can be enforced and that provide economic benefits to their owners (Piketty and Zucman, 2015). This definition excludes "human capital", as it is not possible to buy it or sell it in the market. Notwithstanding, there is a wide range of assets that may fit this definition. Due to information restrictions, in this article the notion of net wealth will be restricted to real estate (that is, housing and land), business wealth and financial wealth. Pension plans and durable goods are therefore excluded. There are, nevertheless, other important dimensions of the wealth definition that need to be explicit, such as the unit of analysis, the geographical scope and the method of valuation (Alvaredo et al., 2015). In this study, as personal capital income data are capitalized, the unit of analysis refers to individuals. Moreover, due to the Uruguay's tax system, the geographical scope regards individuals who generate income in the country [4]. Finally, the valuation method is the market value since, as it will be explained bellow, assets value is estimated based on market prices.

In this section, the methodology for the estimation of wealth distribution and its limitations, are described in 3.1. The estimation of the two key components of the capitalization method strategy, that is, the incomes to be capitalized and the capitalization factors, are described in 3.2 and 3.3 respectively.

## 3.1  The capitalization method

The wealth distribution estimations in this article are based on the capitalization method, since it is a well fit methodology to study the wealth concentration when focusing on top wealth holders (see Saez and Zucman (2016) and Piketty (2015)). The method consists on estimating individual net wealth by capitalizing personal capital incomes, using capitalization factors for each type of wealth which are equivalent to the inverse of their return rate. Essentially, if for certain individual $i$, the amount of wealth $p$ that she owns $(w_{ip})$ yields $(r_p)$ providing her with

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[4]Tax data on dividends accrued by individuals off borders, as well as non-residents, was not available for this study.

an income flow ($k_{ip}$) (eq. 1), then it is possible to trace back the wealth stock by applying a capitalization factor ($f_p$), equivalent to the inverse of its return rate (eq. 2).

$$k_{ip} = r_p * w_{ip} \tag{1}$$

$$w_{ip} = k_{ip} * f_p \tag{2}$$

Being:

$$f_p = 1/r_p \tag{3}$$

The method has some important drawbacks. The most relevant one refers to the fact that it is assumed that for each type of wealth $w_p$, the capitalization factor $f_p$ is the same for all individuals. This may not be the case, as individuals may face different return rates $r_p$, thus biasing the estimations (Alvaredo et al., 2015). One possible bias is associated with idiosyncratic returns, that is, that identical individuals in terms of observable characteristics face different return rates for the same assets. Furthermore, it is possible that returns are positively correlated with wealth, which is argued to be a "more serious concern" (Saez and Zucman, 2016). This may happen because higher income individuals are better informed and advised of investment opportunities, and so they are able to own safer and more profitable portfolios. If return rates rates $r_p$ are larger for higher income individuals, then their capitalization factors $f_p$ would be lower, thus mechanically overestimating wealth concentration at the top.

However, the most significant drawback for performing this procedure in the Uruguayan case is the absence of adequate National Accounts, since wealth aggregates estimations -the balance sheet- is not reported by the Central Bank. Ideally, estimates of $r_p$ and $f_p$ should be estimated considering eq. 4, that is, estimating the rate of return of each type of wealth by comparing total wealth $W_p$ with the sum of the capital income flows.

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$$f_p = W_p/K_p \tag{4}$$

Being:

$$W_p = \sum w_{ip}, K_p = \sum k_{ip} \tag{5}$$

This is what Saez and Zucman (2016) do for the United States, where $W_p$ aggregates are taken directly from their Flow of Funds (US' balance sheet). The most important advantage of this procedure is that it provides full micro-macro consistency between wealth distribution estimations and aggregate estimations (Alvaredo et al., 2016).

As no such estimations exist for Uruguay, it is necessary to use a wide range of secondary information sources in order to impute incomes that are not taxed and to estimate the capitalization factors. Hence, in 3.2 the construction process of the capital incomes data base $k_{ip}$ is described, whilst the capitalization factors' estimation process ($f_p$) is depicted in 3.3. Wealth distribution results of section 4 are derived directly from these estimates and eq. 2.

## 3.2    The capital incomes database ($k_{ip}$)

The first step to perform the capitalization method, is to ensemble a data base with all capital incomes, accounting for the full adult population. The departure point is a tax incomes data base, described in 3.2.1. Untaxed incomes and population with informal or zero incomes are added following the procedure depicted in 3.2.2, and the resulting $k_{ip}$ database is described in 3.2.3.

### 3.2.1    Taxed capital incomes

The capital incomes ($k_{ip}$) database construction is a very important part of the estimation procedure since wealth distribution depends on capital income distribution, particularly if return

rates are similar for different types of wealth as will be described in 3.3. As stated before, the departure point is the tax returns database, which is complemented with household survey data and firms tax records in order to account for (i) untaxed capital incomes and (ii) non covered population[5].

The tax returns records are a high quality administrative database reported by the Tax Authority (*Dirección General Impositiva*, DGI) covering approximately 1.800.000 individuals, that is, around 75% of Uruguay's total adult population. In addition to individual incomes, it also contains informations about age, gender and industry. Capital tax records in Uruguay refer to 12 capital income categories (taxed at flat rates of 7 or 12%), which may be aggregated in dividends and utilities, land and housing rent, financial incomes and capital gains[6][7]. This database presents the usual evasion and elusion caveats(Alvaredo et al., 2016).

We consider all the available information at the income tax records, except for individuals with zero income or younger than 20 years old. As described above, this database covers all formal labour income (both taxed and untaxed), taxed and nominative capital incomes and pensions. Even though only capital incomes are capitalized, the remaining incomes (labour and pensions) are useful for the following steps of the procedure.

### 3.2.2 Accounting for untaxed data and non-covered population

Owner occupied housing rent, interests for deposits, "non nominative" dividends, and undistributed profits[8] are not accounted for in the tax records and need to be imputed.

There are different reasons why these capital incomes are not included in the tax data. Owner occupied housing rent is not taxed in the Uruguayan tax system, and hence it is not covered by the tax records. Non-nominative dividends -which represent approximately 40% of total dividends- are a type of taxed capital income for which, because of tax regulation, it is

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[5]It is worth noting, at this point, that the same procedure is performed in the estimation of the Distributional National Accounts database (De Rosa and Vilá, 2017), and so it will be straightforward to append the wealth estimates to the incomes estimates from DINA in future studies.

[6]Wealth thresholds for these top fractiles are depicted in Table A.1.

[7]After capitalizing all capital incomes, capital gains from the tax records are directly added to individual's wealth.

[8]As will be explained below, only a fraction of undistributed profits are imputed to individuals.

not possible to identify by whom they are accrued. Interests derived from bank deposits are subject to the bank secrecy act, and hence they are taxed at source and not at the individual level. Total amount of both non-nominative dividends and interests is reported by DGI.

A more delicate problem refers to undistributed profits. In Uruguay, 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, actually distributed profits to their owners. This entails that around 6.000 people received dividends or utilities over the period and barely over 800 received dividends every year (De Rosa et al., 2017). Uruguayan firm owners have alternative ways to withdraw profits. One of the favoured is to use banking accounts shared among firms and owners, whom withdraw profits as a loan from the firm and hence are virtually untaxed[9]. To account for these profits, a matched firms-individuals' tax database is used. In the that database is possible to observe the amount of profits distributed to individuals in the firms that actually do distribute them, which is on average 30%, but varies by size, industry and type of proprietorship. Thus, this different profit distribution rates were used to estimate the total amount of profits accrued by individuals in firms that do not distribute profits.

The capital incomes mentioned above are imputed based on two different criteria. Owner occupied rental income and interests are imputed based on the household survey as follows[10]: (i) individuals are organized in the incomes tax base and in the survey in groups defined by: age, gender, type of formal and taxed incomes perceived , and income groups ; (ii) informal and 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 tax-records' group.

The second criteria applies to undistributed profits -in the sense described above- and non-

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[9]The problem has been noted by the government, and a new bill was passed in 2016 (see law 18.083 of 2007), which states that all profits for which no proof of re-investment in the firm is presented, will be considered distributed and therefore taxed.

[10]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 split equally between all adults within the household.

nominative dividends. Imputing these incomes is difficult since a proxy for firms' ownership is needed. As mentioned above, dividends are probably an inaccurate choice in the Uruguayan case since very few firms actually distribute them and so they are extremely concentrated. Thus, as depicted in Table A.3, 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, a number of relatively small capital incomes are added, and also real estate rent, which represents around 50% of total taxed capital income and it is less concentrated than the others.

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. In fact, looking at the financial household survey (EFHU), the correlation between real estate (excluding owner occupied housing) and business capital is 0.67. Thus, in order to avoid the risk of imputing large amounts of incomes based on an extremely concentrated distribution, and based on the evidence the alternative criterion is plausible, untaxed business incomes are imputed proportionally to all taxable capital income.

It is also necessary to account for individuals who are absent from the tax records. There is around 25% missing population in the tax records due to informality and inactivity of people in working age[11], which is a salient developing country feature. This population is incorporated using information from the household surveys. Observations are brought in with all their informal or untaxed capital incomes, as depicted in Table A.2. These include, essentially, interests from deposits, and owner occupied rental income. This population is adjusted by applying a factor to the survey weights (almost negligible), in order to match the number of adults in the database with the official population estimates based on the last census. In the end of the whole process, these incomes will represent 10% of total income in the capital incomes database.

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[11] Elderly people are covered, since pensions are formal and taxed.

### 3.2.3  The resulting capital incomes data base

After the imputation procedure is performed, 86.62% of total wealth incomes are imputed. As shown in Table 1, the imputation is particularly large in the case of real estate incomes (90%). Note that the proportion of imputed capital incomes is higher than in Saez and Zucman (2016), were they represent around 2/3 of total capital incomes.

Table 1: Imputed capital incomes fraction (in %)

| Source | Total capital income | Business income | Financial income | Real estate income |
|--------|----------------------|-----------------|------------------|--------------------|
| Tax data | 13.38 | 22.79 | 28.84 | 9.43 |
| Imputed | 86.62 | 77.21 | 71.16 | 90.57 |

Source: own elaboration. Notes: Taxable capital incomes are reported by DGI on individual basis. Imputed capital incomes refer to untaxed income flows, which are imputed based on Household Income Survey and administrative income aggregates. Business incomes are essentially dividends, financial incomes are interests from deposits, whilst real estate income refer to owner occupied rental income, rents perceived for other real estate properties and land.

In Table 2, capital income shares for different income groups are depicted. Total capital income is highly concentrated, top 10% share is just below 60%, whilst top 1% share is 33.5%. Most of the remaining capital incomes are accrued by the "middle 40%" -individuals located between the median and the $90^{\text{th}}$ centile-, whilst the bottom 50% earns barely above 5% of total capital income. Business and financial income are entirely accrued by the top 10%, more than 90% of it by the top 1%. Real estate income is, as expected due to the presence of owner occupied rental income, less unequally distributed. Almost half of it is perceived by the middle 40%, whilst the top 1% only accounts for 12%.

## 3.3  The capitalization factors' ($f_p$)

Net capitalization factors are computed separately and using different strategies and information sources. In all cases, total net wealth is compared to total capital income flows for each type of wealth $w_p$. Thus, these capitalization factors already consider liabilities, as they are

Table 2: Capital income shares (in %)

| Income fractiles | Total capital income | Business income | Financial income | Real estate income |
|---|---|---|---|---|
| Bottom 50% | 5.58 | 0.00 | 0.00 | 7.63 |
| Middle 40% | 35.67 | 0.00 | 0.00 | 49.02 |
| Top 10% | 58.74 | 100.00 | 100.00 | 43.35 |
| Top 10% (exc. 1%) | 25.20 | 6.47 | 8.91 | 31.20 |
| Top 1% | 33.54 | 93.53 | 91.09 | 12.15 |
| Top 1% (exc. .01%) | 14.38 | 30.31 | 33.85 | 8.36 |
| Top 0.1% | 19.17 | 63.23 | 57.23 | 3.79 |

Source: own elaboration. Notes: In each column, shares are estimated based on fractiles of each income source. Business incomes are essentially dividends, financial incomes are interests from deposits, whilst real estate income refer to owner occupied rental income, rents perceived for other real estate properties and land.

computed based on net wealth aggregates[12].

In the case of business wealth capital factors, they were computed using firms' tax records. The database is provided by the Uruguayan tax authority and it refers to approximately 50.000 medium and large firms, which hire over 60% of the labour force (De Rosa et al., 2017). Firms are complied to report their total financial and non financial assets and liabilities, as well as the amount of profits. Business return rate is estimated straightforward following equation 4, based on total business wealth $W_{bus}$ (computed based on this database) and total business income $K_{bus}$ (computed based the business incomes described in 3.2). Return rates are estimated by industry, size and type of proprietorship, with an average $r_{bus}$ of 1.9%[13].

In the case of real estate, capitalization factors are also computed based on equation 4. Total net real estate $W_{est}$ is estimated based on cadaster administrative data (provided by the (*Dirección Nacional de Catastro*). This information covers the whole territory form both urban and non urban areas. Two adjustments to this data are performed. First, as cadaster values may

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[12]This means that in this version of the capitalization method, which does no capitalizes liabilities separately, even if individual wealth estimates cannot not be negative, overall wealth will take into account debts, as they are incorporated in the capitalization factor estimations.

[13]This rather "low" net return rate may be explained by the fact that it refers not to the overall return rate of the firm, but to the return rate actually faced by the individual firm-owners, that is, considering only what they actually withdraw from the firm.

not reflect real market prices, information provided by the registrations authority (*Dirección General de Registros*) is used to adjust prices. This adjustment is made by neighborhoods and type of building in the case of the capital city, Montevideo, and by city or proximity in the remaining cities. To adjust non urban prices, information provided by the Ministry of Agriculture is used. The second adjustment refers to mortgages, which need to be subtracted to compute total net wealth. In order to do this, the novel household financial survey (EFHU) is used to estimate total household mortgages as a fraction of total real estate (96.3%), and then estimate total net real estate wealth. Total real estate income $K_{est}$ is computed based on the data base described in 3.2, and the resulting real estate return rate $r_{est}$ is 2%.

Finally, in the case of financial assets return rates $r_{fin}$, the estimation is not based on equation 4, but rather drawn directly from Uruguayan Central Bank reports. Thus, it is computed as a weighted average of return rates of different deposits, resulting in a $r_{fin}$ of 2.2%.

# 4 Results

In this section, main results on wealth distribution and composition are presented. Moreover, wealth holders are characterized in terms of sex, age and income group. As stated above, these estimates rely on a series of important assumptions, whose implications are explored based on sensitivity analysis in section 5.

## 4.1 Wealth distribution and composition

In Table 3, wealth shares are depicted for different wealth groups. As expected, given the concentration of capital income depicted in Table 2, results show very high levels of wealth inequality. The top 10% total wealth share is almost 60%, whilst the middle 40% owns roughly 35% of total wealth. The remaining wealth, less than 6%, is owned by the bottom 50% of the population.

Breaking down the top 10% in smaller groups, it is possible to observe that most of the group's wealth is owned by the top 1%. The wealthiest 1% share is 34.8%, almost identical to

Table 3: Wealth shares (%)

| Wealth fractiles | Total wealth | Business wealth | Financial wealth | Real estate | Capital gains |
|---|---|---|---|---|---|
| Bottom 50% | 5.49 | 0.09 | 0.49 | 7.74 | 20.49 |
| Middle 40% | 34.89 | 0.61 | 2.00 | 49.43 | 29.86 |
| Top 10% | 59.61 | 99.31 | 97.51 | 42.82 | 49.64 |
| Top 10% (exc. 1%) | 24.79 | 7.09 | 15.69 | 31.98 | 28.92 |
| Top 1% | 34.82 | 92.22 | 81.82 | 10.84 | 20.72 |
| Top 1% (exc. .01%) | 14.69 | 29.35 | 31.98 | 8.35 | 16.80 |
| Top 0.1% | 20.13 | 62.87 | 49.84 | 2.49 | 3.92 |

Source: own elaboration. Notes: Business wealth, financial wealth and real este (including land and housing), net of liabilities in all cases, are estimated trough capitalized incomes, whilst capital gains are added directly from tax records. In each column, shares are estimated based on fractiles of each wealth type. Estimations refer to 2012.

the entire middle 40's share. Even within the top 1% wealth concentration is considerable, the top 0.1% share estimates indicate that this very wealthy groups owns one fifth of total wealth. This entails that one third of the top 10% wealth is owned by the wealthiest 0.1%.

Given Uruguay's reduced population, top wealth shares refer to extremely few people. For instance, the top 1% and 0.1% represent around 24.000 and 2.400 individuals respectively[14]. For this reason, wealth share estimations of these groups should be taken cautiously, considering that small changes in their wealth or their tax declarations -as well as in the assumptions made- may impact the results significantly (more in this in section 5).

Wealth inequality varies significantly across different types of wealth. Two concentration profiles emerge: in the first one, business and financial wealth show extreme concentration in top fractiles, whilst real estate and capital gains are less unequally distributed. Practically all business and financial wealth is owned by the top 10%, and the vast majority of it (more than 80 and 90% respectively) by the top 1%. Top 0.1% business and financial wealth shares are 50% or more. Even considering the caution with which these estimates should be read, it appears to be the case that the bulk of Uruguay's productive assets is owned by very few individuals[15].

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[14]Wealth thresholds for these top fractiles are depicted in Table A.1.

[15]It is worth noting that, as established in section 3, non residents are not included in this computations.

In the second group, in which by far the most important type of wealth is real estate (as will be discussed below), inequality is much smaller, for two main reasons. First, the middle 40 owns half of total real estate and the bottom 50's share is almost 8%. Thus, in sharp contrast with the business and financial wealth, the top 10% real estate share is barely above 40%. Second, inequality within this groups is significantly smaller than in the other types of wealth, the top 1% owns one fourth of top 10's real estate, and something similar happens within the top 1%.

Wealth composition is depicted in Table 4. When the whole population is considered, the most important type of wealth is real estate (70%). Business wealth is more than a quarter of total wealth, financial wealth is barely 3% and capital gains are negligible. The somewhat low financial wealth share, specially when compared with business wealth, may be explained by the almost complete absence of capital markets in Uruguay. Most firms are closely held corporations and financial wealth is only made of long term deposits and some government bonds[16].

Table 4: Wealth composition (%)

| Wealth fractiles | Business wealth | Financial wealth | Real estate | Capital gains |
|---|---|---|---|---|
| Bottom 50% | 0.42 | 0.24 | 98.75 | 0.60 |
| Middle 40% | 0.47 | 0.15 | 99.24 | 0.14 |
| Top 10% | 45.17 | 4.38 | 50.32 | 0.13 |
| Top 10% (exc. 1%) | 7.75 | 1.69 | 90.37 | 0.19 |
| Top 1% | 71.80 | 6.29 | 21.81 | 0.10 |
| Top 1% (exc. .01%) | 54.17 | 5.83 | 39.82 | 0.18 |
| Top 0.1% | 84.68 | 6.63 | 8.66 | 0.03 |
| Average | 27.11 | 2.68 | 70.05 | 0.16 |

Source: own elaboration. Notes: Business wealth, financial wealth and real este (including land and housing), net of liabilities in all cases, are estimated trough capitalized incomes, whilst capital gains are added directly from tax records. Estimations refer to 2012.

The fact that people own almost exclusively real estate -if they own anything-, is essentially true for 99% of the population. Indeed, if we consider the bottom 50, the middle 40

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[16]According to the wealth survey of 2012, these bonds represent 0.5% of total wealth.

or the top 10% excluding the wealthiest 1%, the real estate share is always above 90%, being almost 100% for the bottom 90%. It is only in the top 1% where financial and specially business wealth irrupt, turning wealth composition upside-down[17]. For the top 1%, for instance, business wealth surpasses 70% of wealth portfolio, whilst it reaches almost 85% for the wealthiest 0.1%. This extreme concentration determines that business wealth contribution to overall wealth inequality is very high. Performing a simple Shorroks' decomposition (Shorrocks, 1982), the combination of business and financial wealth accounts for 95% of overall inequality, 87% of which is explained solely by the former (see Table A.4).

As compared with capitalization method-based estimations from other countries, described in section 2, Uruguay's wealth distribution seems to be halfway between very high inequality countries, such as US or Spain, and lower wealth inequality countries such as France. Thus, both top 10% and 1% shares are 5-10 percentage points lower than US-Spain and higher than France by roughly the same distance.

Even though it is not one of the main objectives of this article, an important side conclusion of the estimation procedure is that once total amount of each type of wealth is added, total wealth represents 545% of National Income. Thus, Uruguay wealth-income ratio would be very similar to the lower bound ot the ones reported for advanced economies, which are around 500-700% (Piketty and Zucman, 2014). This results should be considered as preliminary, as much work is still needed to make this estimation fully comparable.

## 4.2   Top wealth holders

Information on individuals in the tax records is used to characterize wealth holders. In Figure 1, average wealth by sex and age groups is depicted. Wealth tends to increase up to retirement age, to slightly decrease afterwards. This is somewhat consistent with a life-cycle pattern, but it is not possible to be certain since it is cross section data.

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[17]It is also possible to observe this in the wealth density function by source, see Figure A.1

Figure 1: Average wealth by sex and age groups
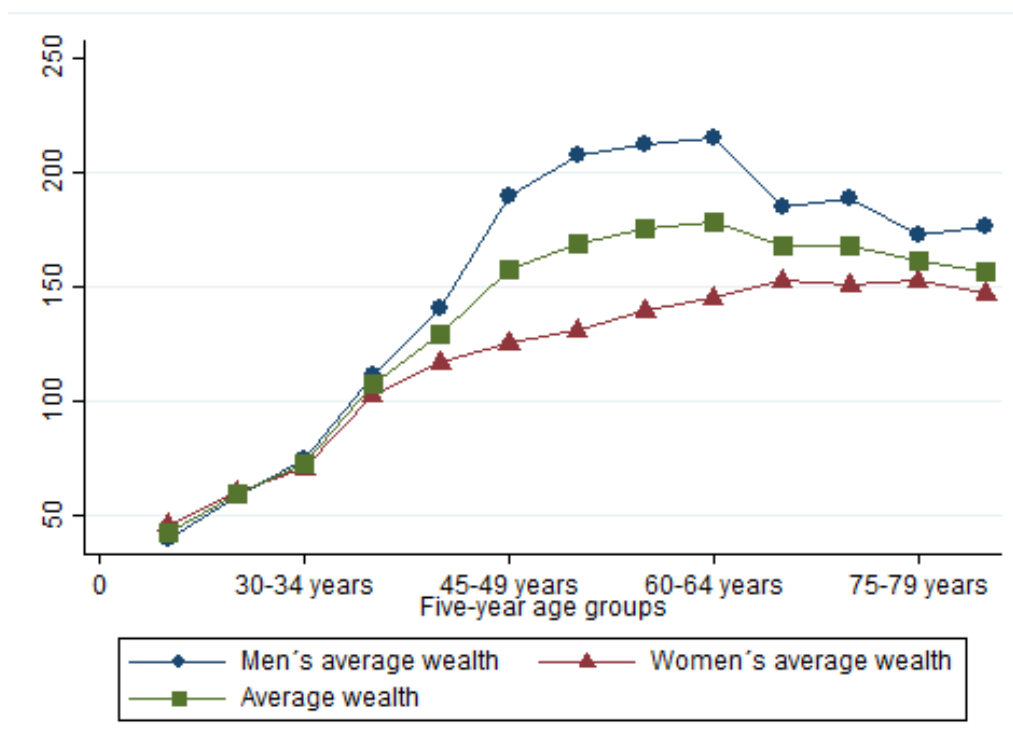


Source: own elaboration. Notes: Total wealth expressed in 2012's thousand US dollars. In the x axis, thirteen 5-year age groups are depicted. Estimations refer to 2012.

Mean wealth is higher for men in all age groups, but particularly in the 40-60 year old interval. It is interesting to observe how the difference increases as age grows, until approximately 60 years old, point in which both groups start to converge. This may be explained by the fact that women tend to live longer than men and they also may inherit their partners wealth when they die[18].

Inequality within age groups tends to increase up the retirement age, lowering afterwards, in the context of monotonously increasing wealth ownership (see Table A.6). The evolution of wealth inequality by age groups, therefore, appears to be explained by the type of wealth each group owns. Thus, business and financial wealth ownership (highly concentrated) rises in

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[18]In Table A.5 it may be observed how the proportion of women grows steadily from a 44,8% in the first age group until a 66,8% in the older one.

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the middle ages and lowers thereafter, whilst real estate ownership keeps increasing throughout life. Given its less unequal distribution, the real estate ownership constant increase somewhat offsets the unequalising effect of business and financial wealth.

Finally, it is possible to analyse if individuals are located in the same positions in wealth and income distributions at the micro-level. Given that wealth is estimated by capitalizing incomes, the question of why the two distributions differ may arise. Wealth and income distributions may not match for two reasons: (i) capitalized incomes are just a part of the income distribution, which includes in particular labour incomes and pensions, among others; (ii) heterogeneity in return rates for different types of wealth, entails that individuals with the same total capital income but different composition present different estimated wealth as well.

In Table 5, the proportion of individuals in each wealth group who belong to the corresponding group in the income distribution is depicted. On average, around 60% of the individuals belong to the same wealth and incomes groups, which shows that the overlapping is considerable but not perfect. Naturally, this match rate depends on how the groups are defined, hence the match rate tends to lower as wealth groups become smaller. It is interesting to note, however, that for a very small group such as the top 0.1%, the matching percentage is quite high, meaning that half of the individuals in the far end tail of the wealth distribution are also top earners. These results are consistent with findings by Sanroman and Santos (2017)).

Table 5: Wealth-income matching percentage .

| Wealth group | % match |
| --- | --- |
| Bottom 50% | 71.27 |
| Middle 40% | 56.23 |
| Top 10% (exc. top 1%) | 33.62 |
| Top 1% (exc. top 0.1%) | 19.13 |
| Top 0.1% | 49.77 |
| Average | 61.37 |

Notes: The percentage refers to individuals of each wealth group who belong to the same income group. For instance, 49.77% of individuals in the top 0.1% wealth group also belong to the top 0.1% income group. Estimations refer to 2012.

# 5   Robustness and sensitivity analysis

Given the somewhat exploratory nature of the estimates presented in section 4, it is necessary to contrast these results with secondary sources (section 5.1). Furthermore, it is important to understand how sensitive estimates are to the assumptions made by the capitalization method. Thus, section 5.2 presents a simple sensitivity analysis of the identical capitalization factors assumption.

## 5.1   Estimates comparison with alternative data sources

In 2012, the first -and only- household wealth survey of Uruguay was made (EFHU), which has not been systematically used for wealth distributional analysis yet. It is representative of the whole country and it over samples rich households[19](Ferre et al., 2016). Hence, it provides an important insight on wealth distribution and an key data source to contrast capitalization method-based estimations.

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[19]The sample over represents households from the fourth and fifth income quantiles and households with business property.

In Table 6, wealth shares are depicted for different wealth definitions and units of analysis. The first two columns depict household wealth distributions for "total net wealth" and "comparable net wealth", which considers the same assets as in the capitalization method estimations. Thus, the first column takes into account not only financial wealth, business wealth and real estate, but also durable goods and jewellery. Wealth shares are very similar, with a slightly higher concentration in the top 1% of the comparable wealth. This reflects that according to the survey these assets, excluded from the capitalization method estimations, do not have a significant impact on wealth distribution. The third column depicts per adult wealth shares which show, as expected, more wealth concentration than household based estimates, both relative to the top 10% and the top 1%. Column 4 replicates the capitalization method estimations of section 4.

Table 6: Wealth distribution: survey-capitalization method (in %)

| Wealth group | Tot. hous. net wealth | Tot. hous. net wealth(*) | Per adult net wealth(*) | Capit. method |
|---|---|---|---|---|
| Bottom 50% | 4.92 | 3.58 | -0.10 | 5.49 |
| Middle 40% | 36.96 | 36.68 | 32.53 | 34.89 |
| Top 10% | 58.11 | 59.74 | 67.57 | 59.61 |
| Top 10% (exc. top 1%) | 32.16 | 32.68 | 35.85 | 24.79 |
| Top 1% | 25.95 | 27.06 | 31.72 | 34.82 |

Source: own elaboration. Notes: (*) same assets as in the capitalization method estimations (real estate, business wealth and financial wealth). In all cases, liabilities are subtracted. Estimations refer to 2012.

The comparison with the capitalization methods' estimations is not straightforward. As explained in section 3, part of the capitalized incomes is accrued by individuals (typically dividends) and the rest is distributed between individuals within each household members of the survey (owner occupied rental income) and then imputed to tax records observations. Hence, even though the unit of analysis are the individuals, the imputation procedure entails that it actually reflects a distribution that is halfway between individual-based and household-based.

It is interesting to note that in all estimations, the bottom 50% owns roughly between

0-5%, whilst the middle 40% owns 32-37%. Hence, both the capitalization method and the household wealth survey tell the same story for the bottom 90%. Within the top 10%, in general terms the capitalization method estimates shows a more concentrated distribution towards the top 1% . Thus, when considering the top 1%, the concentration is larger in the capitalization method estimations by 3-6 percentage points. This is expected, considering results of similar studies (see for instance Saez and Zucman (2016) or Toledano-Martínez (2015)). Considering these estimates form both sources, broadly speaking, the bottom half's share is 0-5%, the middle 40 owns a little more than one third, top 10%' share is 60-70%, whilst the top 1% owns between a quarter and a third of total net wealth.

Another possible concentration robustness check is to compare the results with the wealth-tax data(*Impuesto al patrimonio*). This is a relatively unimportant tax, by which only real estate is taxed[20] and very few people (some 8.500 individuals, less than 0.5% of the adults) actually pay it. Nevertheless, it is possible to use it compare at least the top 0.1% of real estates' distribution, as this population share represents 2.400 individuals. To do this, individuals from the tax records are sorted by their underlying real estate according to the wealth tax they pay, and the top 0.1%' share is computed comparing the fratiles' total real estate wealth to total survey's real estate. This share is 2.8%, whilst the top 0.1%' real estate share by the capitalization method is 2.5% (Table 3), showing that the two estimations do not defer substantially[21].

As for the distribution by asset type and wealth composition, general survey-based conclusions are again consistent with capitalization factors' estimations. Fractiles' shares are depicted in table 7, showing extreme concentration of business and financial wealth in the top 10%, similar results the ones observed in table 3. Within the top 10%, business wealth is concentrated in top 1% (86.3%, very similar to the 92.2% of the capitalization method), whilst half of the financial wealth is owned by the first 9% of tenth decile, being 15% in capitalization method.

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[20]It is a progressive real estate tax, with rates that originally ranged from 0.7% to 2.75%. However, the rates have a decreasing schedule which started in 2008 and ends in 2022, when there a single tax rate of 0.1% will exist. In 2012, rates ranged from 0.7% to 1.85%. For more details see art. 45, Tt. 14 of *Texto Ordenado 1996*.

[21]If total real estate estimations $W_r$ of section 3.2.2 are used, which also include land, the top 0.1% share is 1%.

In the case of real estate, survey-based estimations show a higher concentration profile than the capitalization method, with more than half of total real estate owned by the top 10% and one fifth by the top 1% (42.8% and 10.8% respectively in capitalization method).

Table 7: Wealth distribution by fractiles - survey (in %)

| Wealth group | Business wealth | Financial wealth | Real estate |
|---|---|---|---|
| Bottom 50% | 0.00 | 0.00 | 3.64 |
| Middle 40% | 0.00 | 4.71 | 41.88 |
| Top 10% | 100.00 | 95.29 | 54.48 |
| Top 10% (exc. top 1%) | 13.70 | 50.42 | 33.78 |
| Top 1% | 86.30 | 44.87 | 20.69 |

Source: own elaboration based on EFHU. Notes: Wealth types are net of liabilities. Estimations refer to 2012.

Wealth composition is depicted in table 8, and even though the shares are not the same, they show the same clear predominance of real estate and a very low share of financial wealth. Basically, financial wealth share is equally low, but the survey's real estate share is roughly 10-12 percentage points higher, compensated by a lower business wealth share. As for the asset portfolio of different wealth groups, the conclusions are very similar than the ones of section 4. For the bottom 99% of the population, the predominant type of wealth -if they have any- is real estate, whilst the rest, and very specially business wealth, become a significant part of the portfolio for the richest 1%.

## 5.2   Testing identical capitalization factors' assumption

One of the most important drawbacks of the capitalization method refers to the assumption that return rates -for each type of wealth- are identical for every individual. As explained in section 3.1, this may not be the case since identical individuals in terms of observable characteristics may face different return rates (idiosyncratic returns), or return rates may be positively correlated with wealth.

In Saez and Zucman (2016), this assumption is tested based on data on "Foundations", for

Table 8: Wealth composition - survey (in %)

| Wealth group | Real estate | Financial wealth | Business wealth |
|---|---|---|---|
| Top 1% | 58.48 | 2.57 | 38.95 |
| Top 10% (exc. top 1%) | 85.65 | 7.41 | 6.94 |
| Top 10% | 73.34 | 5.22 | 21.44 |
| Middle 40% | 93.78 | 3.50 | 2.72 |
| Bottom 50% | 83.71 | 10.59 | 5.70 |
| Average | 81.21 | 4.78 | 14.01 |

Source: own elaboration based on EFHU. Notes: Wealth types are net of liabilities. Estimations refer to 2012.

which both wealth and capital income flows are observable, concluding that the capitalization method "works well", at least in that context. In this study a different approach is used to put to test this key assumption. To assess the impact of identical return rates assumption, two simple sensitivity tests are performed. In the case of idiosyncratic returns, rates are randomly modified around the point estimation for each individual within a certain range. By repeating this procedure a large number of times, it is possible to estimate a 95% confidence interval. This procedure is repeated for different rates' variation ranges, from ±0.17% to ±1%. Considering that point estimations of return rates for the different wealth types is approximately 2%, these ranges depart from relatively small variation to very large ones (±50% variation range).

In Figure 2, these confidence intervals are depicted for different variation ranges for a set of top shares' estimation. In panels (a) and (b), top 10% and middle 40% share's are depicted. The first obvious observation is that the confidence intervals strongly depend on the variation range. Confidence intervals widen as variation range increases, and it seems to accelerate after ±0.5%. At that point, top 10% share's interval is 55.1%-63.4%, with a point estimation of 59.6%. When the rate's range is much larger, for instance ±1%, top 10% share's interval reaches 51.4%-71.1%. The same pattern is observed for the middle 40%'s top share. Hence, it seems that if idiosyncratic returns do exist, their effect would be rather moderate if the variation range is small, but could be larger if the return rates vary significantly from one

Figure 2: Idiosyncratic returns' sensitivity analysis
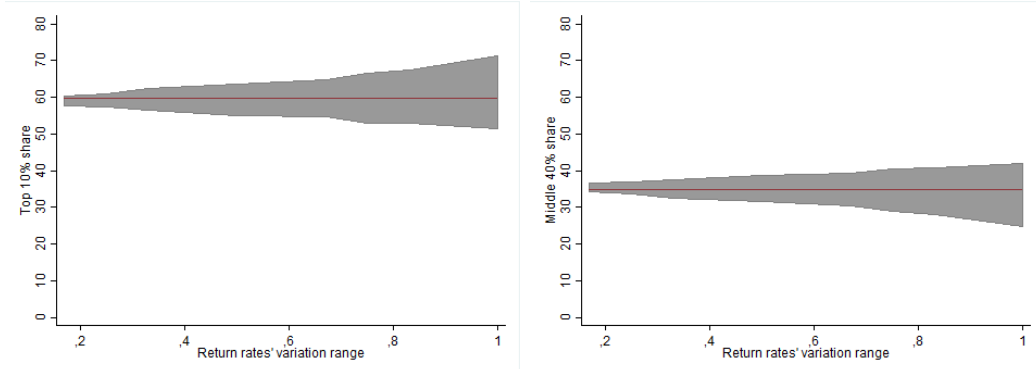


(a) Top 10% share's 95% confidence interval

(b) Middle 40% share's 95% confidence interval
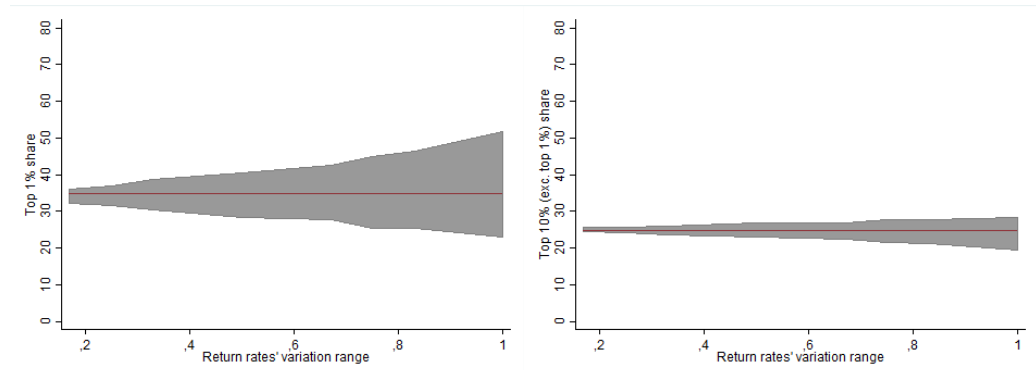
(c) Top 1% share's 95% confidence interval

(d) Top 10% (exc. top 1%) share's 95% confidence interval
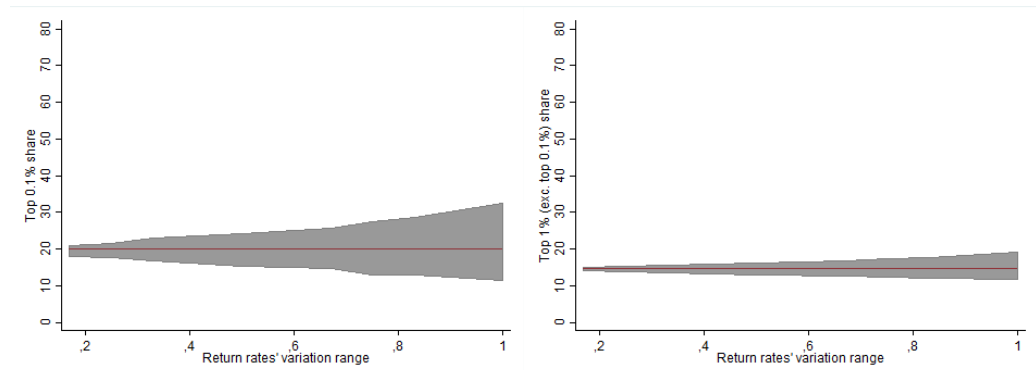
(e) Top 0.1% share's 95% confidence interval

(f) Top 1% (exc. top 0.1%) share's 95% confidence interval

Source: own elabooration. One hundred draws were used for the bootstrapped confidence interval estimation in each variation range. Estimations refer to 2012.

individual to the another. In this case, with a range of $\pm 0.5\%$ -which entails a relatively large 1% variation around a $\pm 25\%$ point estimation-, the distributional impact is very moderate and general conclusions do not change.

Panels (c) to (f) depict wealth shares' of smaller groups. In panels (c) and (d), the top 10% share is broken down into two groups, showing that much of the confidence interval widening of the top 10% actually refers to what happens with the top 1% share, as the rest of the tenth decile shows very narrow confidence intervals, even with very large return rates variations. When the same procedure is repeated within the top 1% share, it is possible to observe that most of the variation happens in the top 0.1% share estimation. Thus, a second important conclusion of this analysis is that idiosyncratic returns have larger impacts in small top wealth holders groups. For this reason, it does not seem to be adequate to zoom into very small fractile's shares estimations -such as the top 0.1% share- as estimates may not be as reliable. In the case of the top 1%, up to a $\pm 0.5\%$, estimations roughly fall into the 30-40% share of total wealth.

As for the second potential bias, that is, that top wealth shares may be overestimated since return rates could be positively correlated with wealth, a very similar test was performed. In this exercise, return rates grew linearly with capital incomes (varying within the same ranges than the previous test), and thus generating positively correlated return's pattern. In Table 9, the results of this exercise are presented. Somewhat surprisingly, considering that this bias is often stated as one of the most problematic (Saez and Zucman, 2016; Alvaredo et al., 2015), the overestimation does not seem to be very large, even with a $\pm 1\%$ variation range. Top 10% share, for instance, is overestimated in this exercise at most by 7.07%. Moreover, again most of the of the bias is concentrated on top fractiles. Almost half of the overestimation of the top 10% share, refers to the top 0.1% share. The top 1% share is overestimated, in this exercise betwwen 1.73 and 5.09%, which is not be very large. Thus, at least in this particular framework, the positive correlation bias does not seem to be very problematic, and certainly does not change the main conclusions of this research.

Table 9: Wealth correlated returns' sensitivity analysis.

| Variation range | Top 10% | Top 90-99% | Top 1% | Top 99-99.9% | Top 0.1% |
|---|---|---|---|---|---|
| ±0.17% | -2.00 | -0.27 | -1.73 | -0.60 | -1.13 |
| ±0.25% | -2.67 | -0.48 | -2.20 | -0.78 | -1.41 |
| ±0.33% | -3.30 | -0.68 | -3.37 | -0.96 | -1.66 |
| ±0.5% | -4.42 | -1.05 | -3.37 | -1.26 | -2.11 |
| ±0.67% | -5.41 | -1.39 | -4.02 | -1.53 | -2.49 |
| ±0.75% | -5.86 | -1.54 | -4.31 | -1.65 | -2.67 |
| ±0.83% | -6.28 | -1.69 | -4.59 | -1.76 | -2.83 |
| ±1% | -7.07 | -1.97 | -5.09 | -1.97 | -3.13 |

Notes: The first column depicts different return rates' variation ranges. Return rates vary linearly from the ±0.17% to ±1% intervals. Columns 2 to 6 depict difference with the top shares point estimations in percentage points. Estimations refer to 2012.

# 6   Concluding remarks

This article presents the first estimations of wealth distribution for a developing country based on tax data and the capitalization method. Hence it contributes to the rapidly expanding inequality literature since most of the estimations up until the present refer exclusively to the developed world. Results show that wealth is extremely concentrated in Uruguay. Almost 60% of total wealth is owned by the top 10%, and the wealthiest 1% accounts for more than a third of it. The bottom 50%, on the other hand, owns virtually nothing, whilst the middle 40%'s share is about one third of total net wealth. This estimates locate Uruguay halfway between very high and low wealth inequality countries which have capitalization based estimations.

Scarcity of reliable data is the most important restriction for wealth distribution analysis in almost every country. In the Uruguayan framework, as well as in most of the developing world, the complete absence of wealth aggregates estimations posed an important information

restriction. Wealth aggregates are one of the key starting points of the capitalization method from a data viewpoint, as they are necessary for the estimations of return rates and assure full micro-macro consistency. Thus, in this study return rates, capitalization factors and wealth distribution were estimated *in the dark*, meaning that there were no official wealth aggregate estimations to be used as references to total wealth. This important data restriction was overcome based on a variety of information sources, yielding a preliminary wealth-income ratio of 545%, which holds resemblance to what is found in developed countries.

The lack of adequate National Accounts' information makes wealth distribution estimates necessarily preliminary. That being said, the extremely high concentration of wealth seems to be a robust fact, for three sets of reasons. First, as shown above, capital income is highly concentrated, and this is a very well documented fact (Burdín, G. et al., 2014; De Rosa et al., 2017; De Rosa and Vilá, 2017). Thus, even if aggregate wealth is not precisely estimated and so true return rates differ with the ones presented in this study, the high concentration of capital income will most certainly yield an also heavily concentrated wealth. Second, the main assumption of the capitalization method, that is, that return rates for each type of wealth are assumed to be the same for all individuals, was put to test, showing that within reasonable variations ranges, the main conclusions hold. Third, alternative data sources available, such as household wealth surveys and wealth tax data, show consistent results both in terms of wealth distribution and composition.

Finally, if economists so apart in time such as Adam Smith and Tony Atkinson were right in considering that wealth and power were related, these results entail a huge concentration of the latter as well. This is particularly so considering that most of financial and business wealth are owned by the top 1%. Given Uruguay's reduced population, this means that less than 25.000 individuals control most of the countries private productive assets, and hence considerable economic and political power. Thus, from a political economy viewpoint, this should be noted if wealth and income inequality are to be brought down.

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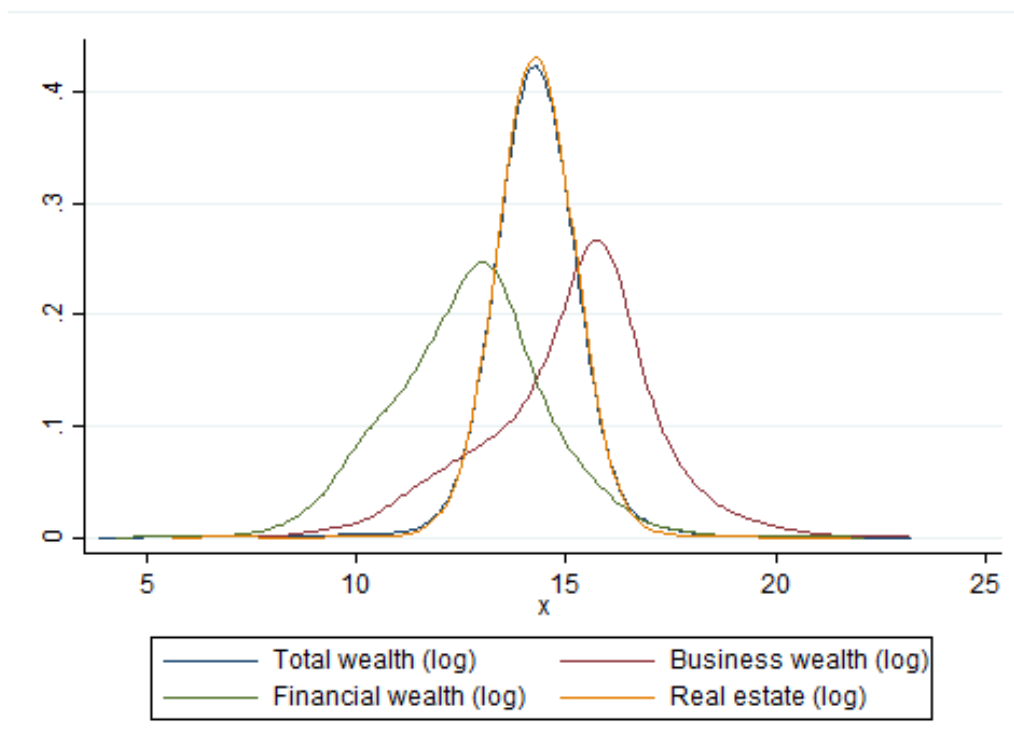
# A    Appendix

Table A.1: Top wealth fractiles thresholds

| Wealth fractiles | Wealth thresholds |
|------------------|-------------------|
| Top 0.1%         | 6242              |
| Top 1%           | 781               |
| Top 10%          | 185               |

Notes: Thresholds expressed in 2012 thousand US dollars. For instance, to be part of Uruguay's wealthiest 1%, estimates show that US$ 781.000 of total wealth are necessary. Estimations refer to 2012.

Figure A.1: Wealth density function by source



Notes: Own elaboration. Logs of net wealth by source are depicted. Estimations refer to 2012.

Table A.2: Tax and survey data merger

|  | Number of adults | % of total population |
|---|---|---|
| Total population* | 2.410.384 | 75,1 |
| Population in tax records | 1.810.433 | 44,8 |
| Labour income | 1.080.182 | 1,1 |
| Labour and capital income | 26.536 | 3,0 |
| Labour income and pensions | 72.031 | 0,2 |
| Labour, capital income and pensions | 4.117 | 23,4 |
| Pensions | 563.178 | 0.29 |
| Pensions and capital income | 24.147 | 1,0 |
| Only capital income | 27.455 | 1,1 |
| Population with zero income | 12.787 | 0,5 |
| Non earners and informal-untaxed incomes earners from survey | 614.893 | 25,5 |
| Non earners adjusted | 599.951 | 24.9 |

Source: own elaboration. Notes: 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. (*) Official population projections. Estimations refer to 2012.

Table A.3: Tax and survey data merger (in %)

| Wealth fractile | Total taxable capital income | Dividends |
|---|---|---|
| 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 DGI. First column depicts distribution of the sum of all taxed capital incomes, whilst the second depicts the distributions of dividends. Estimations refer to 2012.

Table A.4: Shorroks inequality decomposition (%)

| Wealth type | Inequality contribution | Share in total wealth |
|---|---|---|
| Business wealth | 87.07 | 27.11 |
| Financial wealth | 8.10 | 2.68 |
| Real estate | 4.81 | 70.05 |
| Capital gains | 0.02 | 0.16 |

Source: own elaboration. Notes: Business wealth, financial wealth and real este (including land and housing), are net of liabilities in all cases. Estimations refer to 2012.

Table A.5: Proportion of women (in %) by age group

| Age group | % of women |
|-----------|------------|
| 20-24 | 44.82 |
| 25-29 | 46.08 |
| 30-34 | 47.32 |
| 35-39 | 48.17 |
| 40-44 | 48.96 |
| 45-49 | 49.83 |
| 50-54 | 50.11 |
| 55-59 | 50.90 |
| 60-64 | 52.31 |
| 65-69 | 53.04 |
| 70-79 | 56.94 |
| 80+ | 66.77 |

Source: Own elaboration. Notes: Estimations refer to 2012.

Table A.6: Wealth inequality and wealth ownership (in %) by age groups

| Age group | Gini index | Total wealth | Businsess wealth | Finanacial wealth | Real estate estate |
|-----------|------------|--------------|------------------|-------------------|--------------------|
| 20-24 | 0.74 | 47.79 | 0.46 | 0.85 | 47.46 |
| 25-29 | 0.69 | 58.20 | 0.89 | 1.58 | 57.57 |
| 30-34 | 0.70 | 60.63 | 1.48 | 2.39 | 59.65 |
| 35-39 | 0.69 | 68.77 | 2.51 | 3.20 | 67.42 |
| 40-44 | 0.71 | 71.02 | 3.70 | 4.32 | 69.30 |
| 45-49 | 0.75 | 71.95 | 4.64 | 5.33 | 69.97 |
| 50-54 | 0.75 | 75.04 | 4.99 | 6.01 | 73.22 |
| 55-59 | 0.76 | 75.48 | 5.32 | 6.37 | 73.57 |
| 60-64 | 0.78 | 75.50 | 5.23 | 6.13 | 73.73 |
| 65-69 | 0.76 | 74.07 | 5.15 | 5.95 | 72.32 |
| 70-79 | 0.73 | 76.04 | 4.55 | 5.33 | 74.84 |
| 80+ | 0.69 | 76.60 | 4.74 | 5.53 | 75.74 |

Notes: The first column depicts the Gini index for total wealth. The remaining columns depict % of wealth ownership by type of wealth. Estimations refer to 2012.

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