Extreme and Persistent Inequality:
New Evidence for Brazil Combining National Accounts, Surveys and Fiscal Data, 2001-2015

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Abstract
This research describes the methods used and the results obtained in the estimation of inequality across the entire income distribution in Brazil over the last fifteen years. We produce a new series of distributional national accounts (DINA) and fiscal income, combining annual and nationally representative household survey data with detailed information on income tax declarations recently released by the Federal tax office, in a consistent manner with macroeconomic totals. Our results provide a sharp upward revision of the official estimates of inequality in Brazil, while the decreasing inequality trends are reversed according to our benchmark national income series. The concentration of income at the top is striking, with the Top 1% income share increasing to 28% by the end of the period, from an initial share of 25%. The Top 10% increased their share of income from about 54% to 55% of pre-tax national income and captured 61% of total growth. The Bottom 50% share rose from 11% to 12%, experiencing higher growth than the top decile, but capturing only 18% of total growth due to its extremely low command of income. While elites and the poor made gains, the Middle 40% of the distribution decreased its share from about 34% to 32%, posting less growth than the average for the whole economy. The “squeezed middle” is a product of its relatively low share of income and poor growth performance. Thus, inequality among the bottom 90% declined at the expense of growing concentration at the top. While labour income inequality did register a decline according to our corrected series, it was insufficient to mitigate the deduced concentration of capital resources and reverse the growing concentration of national income among elite groups.

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1. Introduction

From a region historically characterized by high and persistent levels of income inequality – since at least the late 19th century (Williamson, 2015) – Brazil is no exception to being under the spotlight in this domain. In any official report on income distribution by an international organization, Brazil usually features near the summit of the inequality rankings, as measured by household survey data, alongside some of its regional counterparts such as Colombia, and South Africa. While most studies on income inequality in developing countries use either survey-based measures or tax-based measures of inequality (when available), this paper combines national accounts with nationally representative household survey data (from the national statistics office) with detailed tabulations on income tax declarations (recently released by the federal tax office) in a consistent manner to produce two new series of inequality for Brazil – a series of pre-tax fiscal income inequality and a series of national income inequality across the entire distribution. We thus construct a set of distributional national accounts (DINA) for Brazil. We compare these series with the series estimated from the raw survey data (prior to any correction) and with a new corrected series of labour income inequality, where we combine the same data sources to distribute labour incomes.

The last fifteen years in Brazil are an interesting period to study because it is when Brazilian economic growth picked up again after having been through a stagnant previous decade, fuelled by a boom in commodity exports and finance. Average adult incomes expanded by 18% in the world’s 8th largest economy and 3rd largest parliamentary democracy. Politically, it is also an interesting period due to the coming to power of the first left-leaning government in Brazil since the early 1960s, with the election of Lula da Silva to the presidency and his Worker’s Party (PT) compatriots into congress in late 2002. New innovations were brought about in the field of social policy to tackle poverty, such as the Bolsa Familia conditional cash transfer program, and a higher share of fiscal receipts were dedicated to social spending as the share of total government spending in the economy rose over the period. The PT government also brought about negotiations that increased the real value of the minimum wage by more than 50% during their mandate. These variables are strictly tied to the evolution of income inequality. Moreover, put into a historical perspective, the present can be instructive about inequality in the past given the distinct political regimes that can be identified between the present and past.

Our focus on pre-tax inequality is in contrast to most studies that concentrate on disposable (i.e. net) income inequality. While this focus is necessary to assess the role of the state in the redistribution of income in Brazil, its sole use detracts from the market distribution of income in the country, which can be seen as the precursor to the secondary (disposable) distribution of income. Thus by dealing with the original market distribution of income under the DINA framework, this paper provides a different angle from which to analyse income inequality in Brazil. But it also considers the impact that Brazil’s celebrated cash transfer programs have on the distribution of income, if we factor them into the estimates using a simple and transparent method.
A number of reasons may also motivate why we combine fiscal data and survey data to measure the distribution of income. The most obvious one is almost exclusive reliance on household self-reported surveys to assess income distributions in Brazil. While the true income distribution is unobserved, household surveys can approximate a personal income distribution by expanding the frequencies of a representative sample of the population. The problem with surveys is that they tend not to include complete information on the very rich in the studied country. Despite random sampling, their income is either not well measured or are not observed, due to the reluctance of the richest individuals to disclose all of their income sources, particularly their assets. Additionally, the rich may refuse to engage in the time-consuming task of answering a comprehensive household survey, assuming that interviewers manage to enter the gated communities in which they live. Moreover, statisticians may intentionally remove extreme observations, so as to top-code the distribution. Surveys are thus prone to over-represent the extent of labour income at the top of the distribution and underestimate the extent of capital income distributed to households compared to what the national accounts would imply. Income tax data, on the other hand, better captures richer individuals, as filing a declaration is obligatory above specified income thresholds, and in many cases there is third party reporting. Although not everybody declares income to the fiscal authorities and some people can be tempted to under-declare their income in order to pay less tax, we can be quite confident in thinking that the people appearing in tax data actually exist (as they are well identified by fiscal procedures) and earn at least what they declare.

This paper is thus among the first to use personal income tax records to study distributive issues, but it is not the only one. Medeiros et al. (2015) and Gobetti & Orair (2016) have also contributed to show that tax data convey a different picture of Brazilian inequality than that which was previously released using surveys. However, our study is the first to generate a series of distributional national accounts (DINA). This is important for two main reasons. First, by being anchored to the national accounts, DINA allow us to distribute the proceeds of growth as measured and diffused by official sources. This was not possible in previous studies because the income concept used had less of a direct relation with macroeconomic growth. Second, and more importantly, DINA allow us to see to whom in the hierarchy income originally flows. While it may be argued that fiscal income (i.e. income received by households subject to assessment by the tax authorities) or disposable income (i.e. income individuals actually dispose of after government taxes and transfers) are more relevant, the distribution of national income gives us insights into the distribution of economic resources, including corporations, pension funds, insurance funds and real estate. It is thus more intricately connected with the distribution of capital and power. This can often be more crucial than the distribution of disposable income as it precedes it in the flow of funds and can thus determine the society’s capacity for redistribution.

We present our main results in the form of income shares because the help to stratify the income-generating population into income classes, so that a “top”, for example, may be visible, as opposed to being confounded in a synthetic indicator like the Gini. Such an
indicator is synthetic in that it summarizes with one number the between-group dispersion of income across the whole population. It is difficult to understand how such an abstract indicator has been constructed and what it really means. We know is that when it is closer to 0 the distribution it describes is more equal, while when it is closer to 1 the distribution is more unequal. Yet when presented with a number like 0.44 or 0.65 it is not easy to grasp. Distribution tables depicting income shares, on the other hand, are a lot easier to understand as their construction is straightforward (the average income of a given fractile in the distribution divided by the average income received by the adult population) and their interpretation is transparent (an income share of 50% for the Top 10% of the distribution gives us a clear sense of how the pie is divided). A group that receives half of all distributed income when it only represents one-tenth of the population is a more concrete and visible claim on income concentration than saying that the Gini is 0.60, as the latter is without reference to any particular social group in the hierarchy. As such with an index like the Gini we are unable to observe the inequality between the top and the bottom of the hierarchy or between the middle and the bottom or the middle and the top or within the top. More importantly when presenting income levels in cash terms (instead of percentages) it makes it possible for people to appreciate their position in the social hierarchy, which is a useful exercise that has implications for policy demands.

Our results suggest that inequality levels are higher than previously estimated and that there has been little change in these levels over time. The distribution was compressed for labour incomes, which correlates with recent policy initiatives, but does little to wipe out the historical legacy of social distinction in Brazil. Overall, total income inequality in Brazil seems to be very resilient to change, at least over the medium run, principally due to the extreme concentration of capital and its flows of income. The remainder of the article is structured as follows. Section 2 presents the data, concepts and the methodology employed to calculate income shares across the entire adult population. Section 3 presents the principal results of the paper on income concentration, growth and compares Brazilian income shares to those of other selected countries. Section 4 discusses our results in terms of their levels and recent trends and in the context of Brazil’s history and related research. Finally, Section 5 concludes with a summary and lines of future research.

2. Data Sources, Concepts and Methods

2.1 Survey Data

This paper exploits three sources of data to estimate income shares across the entire distribution in Brazil. We begin with the Pesquisa Nacional por Amostra de Domicílios (PNAD), the large, nationally representative household survey organized by the IBGE (Brazil’s National Statistical Bureau). The survey runs annually from 1976 except in the years coinciding with the National Census (once per decade). It consists of a household wave and
an individual wave, the latter’s sample being approximately 350,000 people per year. Moreover, the survey is weighted by the population census. We use the individual-level micro-files for the PNAD between 2001 and 2015 to extract personal incomes, which are freely available on the IBGE’s website.¹

The data are nationally representative with the exception of the waves before 2004, which exclude the rural areas of six northern states (Rondônia, Acre, Amazonas, Roraima, Pará and Amapá). For these years we adjust the incomes and population in accordance with the observed ratios when including the rural north and excluding the rural north for 2004 estimation. The survey reports individuals’ gross monthly incomes (in the reference month) by source of income. Separate questions are asked about the value of income from work, pensions and property rent received by individuals. However, interests received on current accounts, financial investments, dividend income and income from social programs (including social assistance and unemployment transfers), are all included in the same question. To separate these components we follow guidelines from the Ministry of Social Development and the Ministry of Labour, such that values less than or equal to one monthly minimum wage are taken to be social assistance transfers (e.g. conditional cash transfers and welfare pensions), values greater than one minimum wage but less than or equal to two minimum wages are unemployment benefits, and all values above two monthly minimum wages are related to financial incomes. To get yearly incomes we multiply monthly values by twelve and add a 13th monthly salary (an annual bonus defined in Brazilian law). Incomes reported are gross of tax except for interests from financial investments, which are subject to an exclusive withholding tax.

2.2 Fiscal Data

We then exploit personal income tax declarations (DIRPF). The unavailability of income micro-data for the universe of tax filers means that we rely on detailed annual tabulations of the total number of declarants by ranges of total assessed income. The data come from Grandes Números DIRPF Ano Calendário 2007-2015, a series of yearly tax reports from the Receita Federal do Brasil (RFB, Brazil’s Federal Tax Office), released for the first time in 2015. There are 11 ranges of income in the reported tabulations over our period of interest, except for the 2014 and 2015 tabulations, which contain 17 ranges. This contrasts with the official number of brackets associated to the marginal income tax (varying between 2 and 4 over the period). The assessed amounts are in Brazilian Reais (BRL, R$). The ranges of assessed income are expressed in units of the minimum wage (from up to half a minimum wage to more than 160 times the minimum wage for 2007 to 2013 and more than 320 times the minimum wage for 2014 and 2015). These values are converted into total BRL by multiplying

¹ Due to the 2010 Census, the PNAD was not carried out in this year. All our estimates regarding 2010 are averages of 2009 and 2011. Future versions of this work will incorporate Census data for all years in which the PNAD was not run.
each unit by the statutory annual minimum wage (monthly minimum wage multiplied by 12).

The nice feature of these tabulations is that they report three legal categories of personal income per bracket: “taxable income”, “exclusively taxed income” and “non-taxable income”, such that we observe the total personal income of declarants and not just that which is strictly taxed.\textsuperscript{2} Taxable income is the portion of declared income subject to the progressive income tax schedule after the application of deductions. It comprises of wages of salaried and self-employed workers, pensions, property rent and royalties. Income taxed exclusively includes categories of income already taxed (at source) according to a separate schedule.\textsuperscript{3} Hence they are reported post-tax in the tabulations. These mainly concern capital income (other than rents and royalties), such as capital gains and interests from financial investments, but also labour incomes such as the 13\textsuperscript{th} salary (i.e. Christmas bonus) and worker participation in company profits. Over the 2007-2015 period, these incomes have accounted for about 10\% of total assessed income.

Lastly, non-taxable income refers to income exempt from the personal income tax. These include a host of labour income and social benefits, such as compensation for laid-off workers, the exempt portion of pension income for over 65s, the exempt portion of agricultural income and scholarships, among other items, and capital incomes such as distributed profits and dividends of all incorporated businesses and small unincorporated businesses, interests from savings accounts/mortgage notes, etc. Additionally, this category includes wealth transfers (donations and inheritances) and capital increases from the incorporation of company reserves and the disbursement of shares as bonuses, which are interpreted by the federal tax office as lump sum income payments, like lottery winnings, and used to track variations in personal wealth.\textsuperscript{4} In total these exempt incomes represent almost 30\% of total assessed income. All in all, we avail of between 25 and 28 million

\textsuperscript{2} Specifically, the criteria for resident individuals required to present an income tax return are: (1) that they have received taxable incomes over a defined value (e.g. R$ 28,123.91 in 2015, about US$ 15,200 PPP) and exempt incomes and exclusively taxed incomes whose combined value is over a defined threshold (R$ 40,000, about US$ 21,600 PPP); (2) that they have obtained capital gains from the sale of assets, or have realised trades in financial markets, or have opted for the exemption from the income tax levied on capital gains earned on the sale of residential properties, proceeds from which are used to buy residential real estate located in the country; (3) earned gross revenue from agricultural work over a defined amount (e.g. R$ 140,619.55 in 2015, about US$ 76,000 PPP); (4) possess property (financial and nonfinancial) whose value is greater than a defined amount on the 31\textsuperscript{st} of December of the given year (e.g. R$ 300,000 in 2015, about US$ 162,000 PPP). Individuals can choose to file as a dependent on someone else’s tax form, but if they do so they must report their income/assets on the condition that it too meets any of the above criteria.

\textsuperscript{3} In Brazil capital gains and interests on own capital are taxed at the flat rate of 15 per cent. Interests from variable income investments are taxed at 15 per cent for share funds and short-term operations, and 20 per cent for day trades. Interests from fixed income investments are taxed at a rate of 15 per cent for placements of over 24 months; at a rate of 17.5 per cent for placements between 12 and 24 months; at 20 per cent for placements between 6 and 12 months, and at 22.5 per cent for placements less than 6 months.

\textsuperscript{4} All filers must declare the value of their assets (if their total value exceeds a defined threshold) on 31\textsuperscript{st} of December in year \( t \) and on 31\textsuperscript{st} of December in year \( t-1 \) in order for the tax office to see if the change in the value of personal wealth declared by an individual/couple is consistent with the incomes declared over the same period.
declarations over the period, which provide us with information on approximately 20% of the adult population.

When using tax data, a valid concern is the presence of evasion. In the Brazilian case this is no different. However, the design of the system of personal income declarations merits some consideration in this context. Firstly, since some important components of capital income are exempt from the personal income tax, such as dividends, this reduces the incentives to under-declare dividend income. When comparing the dividends declared in the tax statistics with those in national accounts we find that the difference is around 3% on average. Moreover, capital income in the form of capital gains and interests from financial investments are withheld at source and taxed exclusively either at flat rates or at rates depending on the nature and maturity of the investments. This is facilitated by specific monitoring programs used by the federal tax office, which match declared personal incomes from tax records with financial information provided by banks (all individuals are required to provide their bank account details on their declarations), through the *Declaração de Informações sobre Movimentação Financeira* (DIMOF). Nevertheless, a certain amount of measurement error in the declaration of income should be expected, as well as the possibility of other income sources (typically property rent or self-employment income) to be under-declared.

### 2.3 National Accounts

The last source we exploit is the national accounts of Brazil. The integrated national accounts (*Contas Econômicas Integradas*, CEI) are available from the IBGE for the years 2000-2014 (IBGE, 2000-2014). For 2015 we use the Quarterly series (IBGE, 2015). The CEI follow the United Nations (UN, SNA 2008) classification of institutional sectors and variables. All variables we use are sourced from the CEI, except for values of imputed rents, which we take from the IBGE’s *Tabelas de Recursos e Usos* (TRU). Brazilian national accounts do not present information for fixed capital consumption of households, so we take an extrapolated estimate made by the World Wealth and Income Database (WID.world) based on a sample of other countries with observable data. In order to obtain fixed capital consumption for the different institutional sectors, we apply the division of fixed capital consumption between corporations, the government, households and non-profit institutions serving households

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5 The DIMOF is an obligatory declaration by banks (including credit cooperatives and savings and loan associations), through which information is passed on to the government about all financial operations undertaken by the banks’ clients. It was initiated in 2008. Prior to 2008 the government could avail of the financial transactions tax (the *Contribuição Provisória sobre Movimentação Financeira* – CPMF, in place between 1997 and 2007) to crosscheck the information about financial investments provided by contributors.

6 The under-declaration of self-employment income may not be as large as expected for two reasons. First the DIMOF program applies to all workers, independently of the nature of their occupation. Independent workers would have to carry out all of their transactions in cash for them to avoid a bank trace. Second most own-account workers, on the basis of anecdotal evidence, create a legal business under their name and register their income as profit withdrawals or dividends so that they appear on the declarations but avoid paying the income tax.
observed in Mexico over the same period and allocate it proportionally to gross operating surplus and gross mixed income of the household sector and directly to the gross operating surplus of the other sectors.

A comparison of the equivalent income totals from our three data sources confirms that the surveys severely underestimate capital incomes, while they do a much better job at capturing labour incomes (salaries, pensions, and unemployment insurance). Despite its restricted population, the fiscal data is better equipped to capture the quasi-totality of capital incomes, but it does less well in capturing labour incomes as compared to the surveys (see Table 1). This reflects the concentration of capital income with respect to labour income, where almost half of all labour incomes registered in national accounts flows to non-filers i.e. the bottom 80% approximately. It must be stated that some measurement error is expected when computing the income totals across the three sources, such that certain values may be over/under-estimated. Only greater transparency from the tax office will improve the accuracy of these estimates.

2.3 Income Concepts

2.3.1 Fiscal Income

Our aim is to distribute total national income, as it appears in the national accounts, among households. Using the surveys we can first estimate a distributional series of survey income. Combing the survey data with tax data, we can then compute a series of fiscal income. The income captured in these two sets of series corresponds to the income received by the household sector in national accounts after employer payroll taxes (including social security contributions) and corporate income taxes have been paid. This covers labour income, mixed income and capital income. More precisely this includes salaries and pensions, self-employment income, net interests, rents, distributed business profits and dividends, and capital gains made from the sale of assets. It thus corresponds to the pre-tax post-replacement income, i.e. gross income received by individuals before personal income taxes, employee payroll taxes (including social security contributions), and legal deductions but after accounting for social security benefits in cash (unemployment insurance and social security pensions). All these items are included in order to make the income in the survey consistent with the definition of income in the personal income tax declarations.

“Fiscal income” is distinguishable from “national income” insofar as it only concerns distributed income received by persons that is (or should be) reported on income tax declarations. It should also be distinguished from “taxable income”, which is the income that is ultimately taxed after legal deductions. Some components of income can be reported on the tax returns but are not taxable. This may vary with countries. As we have seen, in the case of Brazil it is explicit, as the tax declarations include a section for declaring non-taxable incomes. This fiscal income concept also excludes business expenses of independent workers required to keep accountancy books (e.g. doctors, dentists, psychologists, lawyers,
independent commercial agents, etc.), as these expenses are incurred to generate their income. These expenses are can be identified in the deduction “livro caixa” in the tabulations, which we use to subtract from total assessed income. Such expenses are not identifiable in the household survey, but we know from the tax statistics that these generally affect higher incomes more, which the fiscal data does better to capture.

If we follow classification in the latest System of National Accounts (UN, 2008 SNA), we can compute total pre-tax fiscal income as follows:

**Total pre-tax fiscal income**

\[
= \text{Salaries (D11, S14)} + \text{Gross operating surplus, (B2, S14)-Consumption of fixed capital (P51c1, S14)} + \text{Gross mixed income (B3, S14)-Consumption of fixed capital (P51c1, S14)} + \text{Property income received by households (D4 resources, S14)} - \text{Property income paid by households (D4 uses, S14)}
\]

\[= \text{Net primary income of the household sector (B5n, S14)} + \text{Social security benefits in cash (D621 + D622, S14)} - \text{Imputed rent for owner-occupiers} - \text{Investment income attributable to insurance policyholders (D441, S14)} - \text{Investment income payable to pension entitlements (D442, S14)}
\]

### 2.3.2 National income

Moving from fiscal income to pre-tax national income implies that we factor in flows of income appearing in national accounts that (1) get attributed to households but are not included in fiscal income, such as imputed rents, investment income attributable to insurance and pension funds; and (2) do not end up in households, but rather in corporations or the government, such as undistributed corporate profits (corporate income taxes, retained earnings and current transfers) and government capital income. The subsequent sections describe how we build our distributional series.

### 2.4 Methodology to Combine Data Sources

To construct our total income distribution series we combine national accounts, surveys, and fiscal data. We begin by combining surveys and fiscal data. Broadly, we proceed in two steps: we start from survey data on household incomes (step 1), which we correct using income tax data and generalized Pareto interpolation techniques (step 2). We then reconcile these estimates with national income by taking non-fiscal capital incomes from national accounts and imputing their distributions using household surveys. We also construct a distribution of labour income using information from our three data sources.

#### 2.4.1 Combining Survey and Fiscal Data
**Step 1.** We define the unit of observation as the equal-split adult individual aged 20 and over, equally dividing the income of married couples. The advantage of this control total is that it facilitates international comparisons (see Alvaredo et al. 2017). Using the survey micro-files between 2001 and 2015 we estimate 127 percentiles in the distribution of annual income\(^7\), making the necessary adjustments to the original sample to match the concept of income defined previously.

**Step 2.** We then correct the portion of the survey distribution whose percentile average incomes are inferior to those that can be estimated using the tax data in two parts.

**Step 2.1.** We begin by estimating the distribution of equal-split adult income from the income tax tabulations using “generalized Pareto” interpolation techniques developed by Blanchet, Fournier and Piketty (2017).\(^8\) But beforehand we make three adjustments to the tabulations. First, we assign the “missing declarations” (if all adults were required to file) and the “missing income” (if total fiscal income from the national accounts were taken into account) to the lowest three brackets of the tabulations, which we group into one bracket. Thus, we are able to compute the distribution of fiscal income across the entire adult population and not just the tax population. We assume that the missing 30% of fiscal income is attributable to the missing (bottom) 80% of the adult population.

Second, in Brazil the tax unit is the adult individual or married couple (in cases when spouses opt to declare jointly).\(^9\) We deduce the share of single filers per bracket by using the total value of the deduction for dependents per bracket in the tabulations and its fixed value per dependent defined in the tax law to calculate the number of dependents per bracket. This number includes spouses, children and other relatives. In order to calculate the number of spouses appearing on a joint declaration, we use the share of spouses in total dependents per income range of household heads’ income from the surveys. This share varies from about 25% for the lowest bracket to 0.4% for the highest bracket. Given the condition that persons filed as dependents (with or without income) on a declaration cannot file a separate tax return, the resulting estimation gives us the share of single declarations per bracket, such

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\(^7\) 99 for the bottom 99 percentiles, 9 for the bottom 9 tenth-of-percentiles of the top percentile, 9 for the bottom 9 one-hundredth-of-percentiles of top tenth-of-percentile, and 10 for the 10 one-thousandth-of-percentile of the top one-hundredth-of-percentile.

\(^8\) These interpolation techniques, contrary to the standard Pareto interpolation, are non-parametric. They estimate the full “generalized Pareto curve” \(b(p)\) (with \(p\) being the full cumulative distribution function \(F(y)\)) by using a given number of thresholds \(p_i\). As such the Pareto distribution is given a flexible form, which overcomes the constancy condition of standard power laws, and produces more accurate estimates.

\(^9\) In Brazil this decision depends on the income differences between individuals in a couple. A jointly filed declaration takes the combined total income of the couple for the application of the tax schedule. Where a spouse has little income relative to his/her partner, there are more incentives to file jointly if the fixed allowance for dependents (including spouses with or without income) that is deductible from gross income is greater than the additional tax burden brought about by a joint declaration. But if the spouse has higher income then incentives increase for her to file separately, as her income would be subject to the different marginal tax rates (including the first exempt threshold) as opposed to being all subject to the highest rate if she filed jointly with her partner.
that we can calculate the equal-split adult income series. The share of single declarations falls with income, from 99% for the bottom (indicating virtually no joint filing), until it reaches about 62-66% for mid-range incomes, after which it rises slightly for the highest brackets to 66-72%.\textsuperscript{10} Overall joint declarations make up about 30% of all the filed declarations.

A third adjustment must be made, given that exclusively taxed incomes in the tabulations are reported after tax. To derive the pre-tax values we impute the labour and capital components of the declared withheld income per bracket, by distributing the labour component in accordance with the per bracket distribution of taxable income (which is mostly comprised of labour income). We subtract these values from total withheld incomes per bracket to deduce the capital component. We then impute an average tax rate per bracket on the labour component by taking the tax paid on taxable income per bracket (given in the tabulation), and a per-bracket average tax rate on the capital component (assumed to be 15%)\textsuperscript{11}.

\textbf{Step 2.2.} Upon retrieving the full distribution from the adjusted fiscal data, we compare the incomes with those estimated from the survey micro-files. Over the 2007-2015 period, the ratios between tax and survey incomes increase substantially the further up the distribution we look. Figures A.1 and A.2 present the ratios when we look at upper incomes $y(p)$ (i.e. the average income $y(p)$ above percentile $(p)$) over the portion of the distribution where we observe tax declarations (around P80). It can be seen that the discrepancy between the average incomes in tax data and in surveys becomes significant beyond percentile P90 (Figure A.1), when the ratios steadily rise above one until they reach double digits for the very highest percentiles (Figure A.2).\textsuperscript{12}

Our preferred correction is the following. Raw survey incomes are maintained up to the point where the ratios of $y(p)$ in the two distributions are equal to 1 for each year, while fiscal incomes are superimposed above this point. Specifically we apply the percentile re-scaling factors (i.e. the ratio between fiscal and survey average incomes) to the average incomes estimated from the survey micro-files for the 2007-2015 period when the overlap exits. For 2001-2006 we apply the re-scaling factors from the closest available year (i.e.

\textsuperscript{10}Since joint filing by couples is voluntary this brings forth the complication that not all single declarations are made by persons who are actually single. Thus our equal-split series assumes that these individuals are either single or married to other individuals whose income falls in the same bracket, which may not be true. This means that we may over-state inequality compared to the perfect equal-split case (where all couples’ income is divided by 2), and to under-state inequality as compared to the pure individualistic case (where each spouse is assigned his or her own income). If and when we obtain access to Brazilian micro-level tax data, we will refine this computation to estimate a separate equal-split and individualistic series.

\textsuperscript{11}This can be interpreted as a lower average bound of the exclusive tax rate applied to capital incomes withheld at source. In Brazil capital gains and interests on own capital are taxed at the flat rate of 15%. Interests from variable income investments are taxed at 15% for share funds and short-term operations, and 20% for day trades. Interests from fixed income investments are taxed at a rate of 15% for placements of over 24 months; at a rate of 17.5% for placements between 12 and 24 months; at 20% for placements between 6 and 12 months, and at 22.5% for placements less than 6 months.

\textsuperscript{12}Similar findings hold for the quantile function $q(p)$ (i.e. the income threshold $q(p)$ corresponding to percentile $p$).
in the absence of further information. The choice of the closest year as a reference for the extrapolation at least ensures that we maintain a certain degree of consistency with the macro data for the pre-2007 years (see Figure 1). In the end we adjust the incomes of our combined series to the national accounts total for fiscal income to be fully consistent with the macroeconomic evolution.

This method is simple and transparent. At the same time it produces statistical outcomes that appear consistent from an economic perspective. However, it is not without its limitations. One example is the assumption of the same treatment population in the two data sources, given the condition that the underlying total population remains the same. The Top 1% in the fiscal data may not be the same sample of people as the Top 1% in the survey data, such that the incomes of the latter are not strictly re-scalable to those of the former. These assumptions will be revised in future versions of this work.

2.4.2 Reconciling with national income

In the final step, we adjust our fiscal income series to account for the missing part of capital income included in national income. This allows us to arrive at a series of pre-tax post-replacement national income (i.e. net national income of the economy plus social security pensions and unemployment insurance, taken to be replacement income received by individuals). This procedure requires the identification and imputation of missing capital income. As stated in section 2.3.2, this missing income is income attributed to households but not declared to the tax authorities, and also income that does not get attributed to individuals, but rather to corporations or the government. The first part we can identify as investment income attributable to pension and insurance funds held by individuals and imputed rents, while the latter are the undistributed profits of privately owned corporations as well as income flowing to the government. It may be questionable to include monetary flows that are not directly captured by households in our concept of income. But to the extent that households privately own corporations and collectively own the property of the state, we think it makes sense to attribute corporate and government income to households. The distribution of primary income presents us with a finer picture of the control of resources (especially private resources) of the different groups in the economy than the income that actually flows regularly into their bank accounts. In other words, it has stronger links with the distribution of capital. And control over economic resources and decision-making has important connotations with the control over political resources. Furthermore, the decision to retain earnings in corporations represents an opportunity cost for individuals, as they are foregoing present income for future disbursements, which should not be ignored.

We use the system of national accounts between 2001 and 2015 to identify these categories of missing income. Investment income on pension and insurance funds owned by households are directly observable in the household sector of the national accounts, and they make up 1% of national income on average over our period of interest. So too are
imputed rents, which make up about 7% of national income. Since the household component of undistributed corporate profits are not directly observable in the national accounts, this must be estimated. However, we know the total net primary income of the corporate sector. The exercise thus requires us to estimate how much of this total flows to households, how much to the government and how much to foreigners. This imputation is made using the financial account of the national accounts, which details the stock of financial wealth held by each institutional sector. We use the distribution of the category equity and investment fund shares (AF5) between households, the government sector and the foreign sector to impute the household share of undistributed corporate profits. Doing this, we impute an average share of around 57% of undistributed profits to households (representing 6% of national income on average), around 27% to foreigners and around 12% to the government. The government share of undistributed profits forms part of its income, which also includes the balance on other capital incomes (interests and rents) and indirect taxes received.

The next step requires us to impute a distribution over these income categories that are missing from our fiscal income concept in order to arrive at an inequality series in terms of national income. Our initial benchmark estimation is the following. Regarding the household component of undistributed profits, we assume that it follows the distribution of financial incomes observed in the PNAD survey (as we cannot observe clear decompositions of income in the tax data). For income attributable to insurance and pension funds, we assume it follows the distribution of income from principle job in the survey, among those who report that they contribute to a pension fund. To distribute imputed rent, we use the micro-data of the survey on family budgets by the IBGE, the Pesquisa de Orçamentos Familiares (POF), which contains information on imputed rent for individuals. Taking 2015 as a reference, with these assumptions we distribute 33.4% of total imputed rent to the Top 10% (including 8.3% to the Top 1%), 45% to the Middle 40%, and 21.6% to the Bottom 50%. Concerning the personal component of corporate primary income and insurance/pension fund investment income, we distribute 97.8% of it to the Top 10% (including 90.6% to the Top 1%), 2% to the Middle 40%, and 0.2% to the Bottom 50% of the distribution. These shares are comparable to those estimated for the Top 10% and 1% in Chile by Fairfield and Jorrat (2016), but less extreme than the concentration of business wealth in Uruguay, where the Top 1% owns over 99% of the total business wealth (De Rosa, 2017). If and when we obtain access to Brazilian micro-level tax data or any data on the distribution of wealth, we will refine these estimates where necessary.

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13 In practice the net primary income of the corporate sector are the undistributed profits of corporations, which are the sum of corporate income taxes, retained earnings and net current transfers received by corporations.

14 The POF has national coverage and it is run every 5-6 years in Brazil. The last available wave was the 2008-2009 edition, which has a sample size of about 190,000 individuals and 56,000 households. The advantage of the POF, relative to the PNAD is that it collects information on a greater number of income concepts over a longer reference period (12 months rather than the 30 day reference period of the PNAD),
At this point we have a series of the distribution of personal income. In order to upgrade this to a national income series we must account for government income. We assume government income is distribution-neutral, that is, we allocate it in a proportional manner across the distribution of personal income. This has no impact on income shares. It only ensures that the income levels correspond to national income, which facilitates comparability across countries. It also allows for us to distribute the growth actually observed in the nationally economy.

2.4.3 Estimating the labour income distribution

To estimate the distribution of labour income we combine the surveys and tax data, following the steps described in section 2.4.1, except that we restrict our income concept to labour income rather than total income. This is a straightforward task with the survey microdata. However, using the fiscal tabulations is more challenging, as there is no decomposition of total income between labour income, mixed income and capital income. To extract a labour income series from the tax data we proceed as follows. We start from the tabulated distribution of taxable income (wages, pensions and property rent, from Table 7 of the tax publications), to which we add the labour incomes contained in “exclusively taxed income” (around 6% of total labour income in the fiscal data) and “non-taxable income” (around 11%). These labour incomes are sourced from the decompositions of total exclusively taxed income and non-taxable income (Tables 19 and 20 of the tax publications). We distribute these labour incomes in proportion to the tabulated distribution of taxable income by bracket. We then follow the procedures in step 2.1 and step 2.2, as described above. In step 2.2 we retain rental income both in our survey distribution and in our tax distribution. Our objective is to exclude property rent (about 2% of fiscal taxable income in national accounts) from our income shares of fiscal taxable income. To do so we must assume a distribution of rent among the population. Using both the PNAD and POF (2009 edition) surveys as rough guidelines we assume that 40% of total rental income belongs to the Middle 40% of fiscal taxable income and the remaining 60% to the Top 10%, including 20% to the Top 1%. Thus we deduct these amounts from the taxable income shares of each of these income groups to arrive at our estimates of labour income inequality. Modifying our assumptions on the distribution of rent does not change our results much due to the small share that rent represents in fiscal income.

3. Results: Income Inequality in Brazil, 2001-2015

According to the PNAD, the Bottom 50% in the taxable income distribution (wages + pensions + rent) captures 13% of total rental income, the Middle 40% captures 32% and the Top 10% captures 56%, including 18% for the Top 1%. According to the POF, the shares are 12% for the Bottom 50%, 48% for the Middle 40%, 40% for the Top 10% and 12% for the Top 1%.

\[\text{Eq. 1}\]
3.1 Levels and Trends

Figure 2 presents our corrected estimates for the full distribution of national income in Brazil, separating the adult population into the Top 10%, Middle 40% and Bottom 50%. The first finding to highlight is the extent of income concentration in Brazil. The richest 10% in the population receive over half of all national income, while the bottom half in the population, a group five times larger, receives five times less. The Middle 40% in the distribution receives just less than one third of total income, less than its proportional share. This reveals that inequality in Brazil is about the large division between the top and the bottom of the income hierarchy. Second, the trends over the fifteen-year period show a steady increase in inequality. Despite the slight gains made by the Bottom 50%, which increased its share of national income from 11% to 12%, the Top 10% income share also evolved positively, from 54% to 55%, both at the expense of a continuously squeezed Middle 40%. Therefore, while inequality among the bottom 90% declined, it came at the expense of growing concentration at the top.

Table 2 presents the income thresholds and averages for these income groups as well as for more refined shares at the top in 2015 US Dollars PPP. In this year, to be one of the richest 10% of adults in Brazil you need to make the equivalent of at least 31,384 dollars per year. The average income of the top decile was just over 107,000 dollars. The magnitudes increase substantially as we move into the top percentile of the distribution, with the average income of the richest 1% being around 541,000 dollars. This is greater than the corresponding amount of the richest 1% in France (around 450,000-500,000 dollars).16 It is also noteworthy that the average income of the bottom 90% in Brazil is comparable to that of the bottom 20% in France, which only conveys the extent of income skewness in Brazil and the lack of a broad “middle class”.

Table 3 presents the 2015 shares for the same income groups and across our different income series previously defined. For instance, the Top 1% (about 1.4 million adults) in the surveys received 11% of income. However, when we factor in income from fiscal data and undistributed income from national accounts the share increases dramatically to 24% in the fiscal income series and to 28% in the national income series. In other words, the top percentile commands 28 times the average income of the country.17 The large share captured by the Top 1% seems to be feeding from the Middle 40% share over time, as Figure 3 shows. Higher up the distribution the story is the same, with elites capturing disproportionate shares of total income. Figure 4 puts the Bottom 50% (70 million adults) into perspective with the Top 0.1% (140,000 adults) over our time period. Starting at similar levels in 2001, the two groups quickly experienced different fortunes, even as both

16 See http://wid.world/
17 If all adults earned the average income of their economy then the share of income of the Top 1% should be 1%. The fact that in Brazil this group concentrates about 28% of income equates to them having 28 times the average income per year.
increased their shares over time. Prior to the 2008 crisis the gap in their shares was more than 4 percentage points. Since then it has been in the order of 2 percentage points.

Figures 5-9 plot the temporal comparison of the estimates from our three series, the raw estimates from the surveys, our corrected series for fiscal income (combining survey and fiscal data) and our benchmark national income series (combining national accounts, surveys and fiscal data). In all cases, what the survey allows us to estimate is a very distorted picture of reality. When compared to our benchmark national income series, the discrepancy is very large and increasing the higher up we move in the distribution. Relying exclusively on surveys or even ignoring undistributed income in national accounts flowing to corporates can distort the dynamics at play. For instance, according to the surveys inequality clearly fell over the last 15 years, while our national income series shows an increase in concentration at the top, less of an increase at the bottom and an ever-squeezed middle over the period. This is not to put into doubt the fact that labour income inequality did fall over the period as Figure 10 shows, when we combine survey and fiscal data to measure it. The Top 10% share falls by more than the fiscal income share, the Middle 40% share increases rather than falls, while the Bottom 50% share rises by more than the fiscal income series. Similarly, Figure 11 conveys that the Top 1% share in labour income falls by more than the equivalent fiscal income share (6% versus 4%). Section 4.2 discusses how we can understand these evolutions.

Despite the fact that we are mainly interested here in the evolution of primary income inequality, before the intervention of government transfers (except social security pensions and unemployment insurance), we can make a simple calculation to factor into our estimates the impact of the welfare system. Brazil’s cash transfers have received much media attention for their positive redistributive impact to the poor. Indeed, the published research on Brazil to date has placed much emphasis on the increased resources that have been dedicated to social assistance programs since the Worker’s Party (PT) have been in power. To better see their impact we make the following calculation. From the national accounts we obtain the annual amount of social assistance cash transfers received by households. These include Brazil’s flagship conditional cash transfer, Bolsa Família, and welfare pensions for the elderly or incapacitated poor (Benefício de Prestação Continuada). Over our period of analysis these programs accounted for about 1% of national income, varying from 0.3% in the early 2000s to 1.5% by the end of the period, which we add to the income share of the Bottom 50%. As such their share rises from 12.3% to 14% in 2015. In addition, the growth rate of the share of the poorest 50% increases from 9% to 21% over the period when adding in the transfers, as their share in national income rose substantially. See Figure A.3 in the Appendix. It can be seen that what matters for the income share poor is the size of these programs in national income. Although they make a big difference at the household level, in the aggregate distribution their contribution is still slim.

3.2. Growth Incidence
Between 2001 and 2015 the total cumulated real growth of national income per adult in Brazil was 18.3% (see Table 4). The question that arises from this evolution is how the average income growth of different income groups compares to these numbers. Consistent with evolution of income shares, the income growth rate of the Bottom 50% was strong, compared to the Middle 40% and the Top 10%. The Middle 40% was the only group to grow at a rate less than the average for the whole population. Growth was strongest among the top percentiles with the income of the Top 0.001% growing by 122%. Despite the gains made by the bottom, the top of the distribution continues to capture a disproportionate part of the income growth over the period, with the Top 10% capturing 61% of total average growth and the Top 1% capturing 43%. The bottom line is that even with the strongest growth performance over the period, the Bottom 50% did not capture most of the growth due to their extremely low levels of income and their subsequently low share of income. Thus over a short-to-medium run timeframe, the income growth of the poor seems to matter less than their share of total income. For the Middle 40% it is their weak growth performance that makes the difference.

Table 4 also presents the growth incidence subdivided by time period. During the pre-crisis period (2001-2007), all groups experienced strong positive growth as the economy expanded rapidly, with again the Middle 40% growing less than the average. Still the majority of the growth went to the top decile, and especially to the Top 0.1%, who captured 68% of the 10% growth of the period. Growth in the years between 2007 and 2015 was less strong and varied for the different groups in the population. Growth was negative for the richest groups, which reflects the effect of the financial crisis for those with highly volatile capital incomes. The Top 10% continued to capture most of the gains, but the very summit had not yet recovered from the financial crisis or from the domestic recession starting in 2015. For the richest 100,000 or so individuals their real annual income in 2015 was lower than what it was in 2007.

### 3.3. International Comparisons

The income disparities in Brazil revealed in the previous section can be emphasized further if they are placed in an international comparative perspective, with countries currently with comparable estimates for national income shares covering the entire distribution. Figures 12-14 present the shares of fiscal income going to the Top 10% (Figure 12), the Middle 40% (Figure 13) and the Bottom 50% (Figure 14) in Brazil, China, France and the USA over the last fifteen years. The inequality between the top and the rest in Brazil is even starker when compared to other countries. The Top 10% in Brazil consistently surpasses the share captured by the same group in all other countries, with a difference of 10 percentage points separating it from the equivalent group in the USA. The situation for the Middle 40% is the inverse, as the Brazilian share has fallen below one third of national income. Brazil’s Middle 40% is the only one among the countries to be below its proportion share. Comparing the Bottom 50%, Brazilian shares have been steadily moving closer to US levels, but are still far
from those of a developed European economy like France. Interestingly the evolution of the poorest half of Brazilian adults has been the opposite of that observed in the USA since the early 2000s. In sum, the Brazilian distribution is highly skewed, but the bottom seems to have made greater gains than in other countries since the new millennium.

Figure 15 presents the comparison of the Top 1% income share in Brazil and the same countries as the previous figures. While Top 1% shares in all countries have increased (with the exception of France), elites in Brazil have done better than their foreign counterparts in the last fifteen years. It is striking to note that the share of the Top 1% in national income Brazil is 10 percentage points higher than that of the same group in China. While these estimates do not allow for a comparison with other highly unequal developing counties, it is possible to draw some conclusions when comparing our fiscal income series. Figure 16 shows the evolution of the Top 1% fiscal income share in Brazil with the USA, China, Colombia and South Africa. Even when taking these latter countries into account, Brazil seems to mark record levels of concentration. Compared to the USA, the 2008 financial crisis did not seem to have as large an effect on inequality in developing countries.

4. Discussion

The exact precision of the above estimates rests on numerous methodological caveats, which have been mentioned. However, the broad magnitudes of the results can be taken as plausible give the data at our disposal. To make further sense of these results we must focus on two general components. Firstly, there is the need to comprehend the current levels of inequality in Brazil. For this we must re-assess its general social history. And secondly, we need to explain the trends in these levels over the past fifteen years. This requires greater attention to more recent political and economic history. The general narrative is of a country in which education took a long time to expand, where there were only marginal efforts at land reforms across political regimes and where there has been concentrated access to capital and political resources, given established economic and legal constraints. Pre-distribution policies, like minimum wage setting and education, have had an effect on labour income inequality, but all too small to make large in-roads into distributional outcomes over this timeframe. When measured against national income inequality, the effect of these policies has been absorbed by the importance of the capital income distribution, especially undistributed capital income. We start with the discussion of the origins of current levels, before moving onto the discussion of recent trends.

4.1 The Historical Persistence of Social and Regional Inequality

The current levels of inequality in Brazil bear the mark of country with very high skill and capital premiums for those in their possession, which given the size and division of the
country have always been a small group. The late and unequal development of the country has facilitated the persistence of these premiums over time.

Like in other countries, economic inequality has followed social distinction in Brazil, a process that began centuries ago. In Brazil this relationship is particularly acute. It was the last country in the Western hemisphere to abolish the institution of slavery in 1888, just before its transition from a monarchical empire to a federal republic in 1889. Prior to this, Brazil was subject to foreign colonial domination at least until the 1820s, when Portugal lost its formal links to the country after having controlled it for 300 years. But Brazil continued to be ruled by nobles of Portuguese ancestry (who were forced to flee to Brazil after Napoleon’s invasion of Portugal in 1807) until the proclamation of the republic. Thus class status dominated Brazil’s social landscape, as did the question of race. In the colonial and independent monarchical periods the law clearly instituted social and racial inequality. After gaining independence from Portugal in 1825, only domestically born, literate, male Catholics aged 25 and older with the requisite income could vote in Brazil. An electoral law of 1881 extended the suffrage to non-Catholics and naturalized citizens. Yet it still excluded the illiterate and slaves, who were estimated to represent about 80% and 30-35% of the population respectively, as well as the literate poor, who were not in the franchise until the 1891 constitution removed the income threshold on voting (Zweig, 1941; Love, 1970; Finley, 1980).

A further important form of discrimination present was the heavy geographical centralization of powers. Although for the moment we do not present any results by geographical area due to lack of data, the surveys indicate an income bias towards the more urbanized and industrial parts of the country in the South and Southeast. Indeed, these regions have historically concentrated the main administrative and economic functions of the country, including the control of the country’s principal commodities (and later heavy industries). This is in a context where 90% of the population lived in rural areas by the 1890s. Today these regions provide the bulk of fiscal incomes to the tax authorities. For instance the states of Rio de Janeiro and São Paulo provide around half of all national fiscal income reported to the federal tax office by Brazil’s 28 states.

After the proclamation of the republic, the new 1891 constitution pushed for greater decentralization. This gave state governors increased power and consolidated a patriarchal system of rural ward politics at the municipal level known as “coronelismo” – a coercive process in which votes for municipal councillors were exchanged for protections and favours of different kinds. This helped cement the persistence of mass inequality in the countryside. While the 1891 constitution removed the income threshold on voting, this had little impact on the share of voters at least until the 1930s (Love, 1970). After the abolishment of slavery, Afro-Brazilians were still discriminated against due to their low education, the absence of a system of public education, high illiteracy and restricted access to land (no significant land reforms followed the republic or any other subsequent constitutional change in Brazilian

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18 Comparable estimates of inequality for the historical period in Brazil are still in progress, but it is possible to recount episodes of Brazil’s tumultuous history and relate it to the inequalities we observe today.
Further decentralization was halted with the 1930 revolution and the coming to power of Gétulio Vargas, whose urban-backed armed revolt overthrew the *Paulista* government, which was strongly associated with the rural coffee interests (Furtado, 1965). Industrial growth and state-corporatist expansion followed up to and beyond World War II, which favoured highly skilled and well-connected urban formal sector workers. Nationalizations of railroads and subsidies to commodity production were other important features of this period. The institution of social security was formalized, and significant labour legislation was passed, including social security for workers in industry and commerce following the Bismarckian model, limits on working age and hours as well as paid holidays. The authoritarian *Estado Novo* constitution of 1937 was inspired from European dictatorships in Germany, Italy and especially Portugal. These autocratic-corporatist models sought to use social policy to co-opt the working classes and powerful interest groups (military, civil servants, and industrial unions), given the threat that industrialization and urbanization posed for political stability (Malloy, 1979).

During the 1950s, after the removal of the *Estado Novo* regime, the role of the state in the economy continued to expand, particularly in areas like infrastructural investment and heavy industries, along five-year national development plans. These were greatly assisted by the formation of the public National Economic Development Bank (BNDE) in 1952. In exchange for financing industrial projects, whose scale local private and government resources could not meet, the federal government received equity participation in the financed firms. Following the national experience, numerous state government development banks came into existence over the decade. In addition, large public industrial enterprises were formed during this time such as Petrobras, the mineral exploration and refinement company set up under Vargas’ democratically elected term as president between 1951 and 1954. Marginal income tax rates for the highest earners also increased dramatically from 20% to 50%. In 1960, Brasilia was inaugurated as the new capital city in place of Rio de Janeiro, in an effort to downsize the power of the Southeast. Nevertheless, Rio and São Paulo continued to concentrate economic power, despite the administration moving to the interior.

The military dictatorship (1964-1985), which overthrew the country’s first short-lived left-wing executive (1961-1964), presided over Brazil’s “economic miracle” phase of industrialization-led growth. It practiced greater centralization (which was a direct result of the limitation of state and municipal government autonomy expressed in the constitution of

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19 In fact Brazil’s *Estado Novo* (1937-1945) borrows its name and blueprint from the regime of the same name developed in Portugal under authoritarian leader António de Oliveira Salazar in 1933. State-corporatist associations flourished in Brazil during this period, with separate worker unions being set up at the federal and state levels for different economic sectors and subsectors in industry, commerce and in the public sector (Malloy, 1979). This naturally favored the better off and more organized workers in the most vital sectors for the economy’s development.
and a strong aversion to the more progressive urban labour unions in the deliberation of social policy (Baer, 2014; Weyland, 1996).

The end of the dictatorship and the new republican constitution of 1988 enabled greater decentralization of powers, as well as universal suffrage. By this stage illiteracy had fallen to less than 20% of the population, as public education spending more than doubled its share in the economy between 1950 and 1990 (from 2% to 4%). Between 1990 and the 2000s Brazil achieved a drastic rise in the general level of educational achievement, especially concerning enrolment and completion of secondary schooling, and a less but notable increase in tertiary education enrolment. At a time when deindustrialization was taking hold of Brazil, as in other developing countries, we can speculate that as the growth in the supply of more educated workers outstripped the growth in their demand, wage skill premiums declined by the 2000s all else equal.

The new constitution focused heavily on redistributive social policy rather than tax policy, the latter becoming even more regressive. Top marginal tax rates were slashed from 50% to 25%, after having fluctuated around 50-65% over the previous four decades. Moreover, dividends and other business withdrawals became exempt from the personal income tax from 1995 onwards, which most likely benefited richer individuals, who began to control a higher share of domestic corporations, following the privatisations characteristic of the period. The new constitution also ratified the indexation of social benefits to the minimum wage, which nevertheless lost value in real terms until the 2000s, as Brazil went through sluggish growth during the 1990s. We can further hypothesize that prior to the 2000s (with the help of survey reports) income inequality in Brazil was even higher, due to the time lag in the income benefits of greater education and the more “elitist” political regimes in power over the period.

In summary, access to skills and assets remained limited throughout the twentieth century for much of the population due to the slow progress of education for much of the period and the social inequality persisting from previous property and political regimes.

4.2. Explaining Recent Trends in Brazilian Inequality: 2001-2015

Our period of analysis covers four administrations – the end of the Fernando Cardoso's centre-right government until 2003, and the subsequent thirteen-year government of the centre-left Worker’s Party (PT), including two terms under President Lula da Silva and the first term and part of the second term of his successor, Dilma Rousseff. The period also covers the Latin American slump of 2002/2003, the global financial crisis of 2008/2009 and the domestic recession of 2014/2015. Over the first decade of the new century, Brazil’s growth was led by commodity production and exports, as well as finance. The global crisis only mildly halted this growth, in comparison to the domestic recession that ensued by the end of our period of analysis.

Since the late 1990s, in the context of the millennium development goals and the in the absence of reliable inequality statistics, poverty reduction became central to the agenda
of governments in Brazil. With the election of Lula and the PT, this was given greater impetus. The general discourse of the PT, which was mirrored in their policies, can be described as pro-poor and neutral-rich. Without modifying the regressive tax system or property rights in any way, the focus of the PT centred around redistributing the proceeds of production and increasing the bargaining power of workers through unions and collective wage negotiations.

Given that we are interested in policies affecting market income distribution, the role of remuneration practices is important. Important among these is minimum wage policy. An explicit revalorization of the minimum wage occurred in the early 2000s, especially after the first Lula government. Between 2000 and 2015 the minimum wage increased by 64% in real terms, while average adult income grew by 18%. With the incidence of the minimum wage being concentrated in the Bottom 50% of the income distribution, it is no surprise that its share increased over the period (Ferreira et al., 2017; Brito et al., 2016). The indexation of the minimum wage to social benefits, particularly to pensions, also acted as a progressive lever. In fact, this channel is estimated to have been more important in terms of its contribution to income inequality than the labour market channel of the minimum wage (Brito et al., 2016).

While the PT government focused much attention on the bottom of the distribution, without infringing on the privileges of elites, the evolution of the Middle 40% income share may seem of residual importance, particularly as the share of the Middle 40% in labour income rose during the same time. But the importance of the Middle 40% in a developing country like Brazil should not be overlooked. By capturing little or no part of the capital income distribution, and by not capturing much of the fruits of social policy directly, “the squeezed middle” could be a product of elites wanting to put them in competition with the bottom. This evolution may also help to explain the decline in support for the Worker’s Party in recent years.

In what concerns the reduction in labour income inequality, which have offered evidence for, two main factors can be pinpointed. The first is the reduction of the skill wage premium, the first significant reduction in Brazil’s history. This was on the back of important educational targets in the 1988 constitution, which committed certain spending thresholds by different tiers of governments. Compared to other countries across different 20 year time periods, Brazil underwent one of the largest educational expansions in history from 1990 to the 2000s (Barro and Lee, 2013). Since 1990, enrolment rates in primary education increased from 85% to 100%, while for secondary education it increased remarkably from 16% to 86%. The enrolment rate in tertiary education increased from about 15% to 30%. The 2000s were met by an increase and equalization in the funding of basic education (primary and lower secondary schooling) across all regions and the creation of a program that subsidized the education for children from poor backgrounds, initiated as Bolsa Escola, but later integrated by the Lula government into the broader Bolsa Familia program (Bruns et al., 2011). We can only expect that these will wage skill premiums further in the future. We can add to the educational mix the increase in resources allocated to active labour market programs and
retraining since the 2000s. By 2015 the PT had doubled the share of spending to these areas. The second main factor linked to the fall in labour earnings inequality has been the decline in “horizontal wage inequalities”. These relate to the inequality between men and women; blacks and whites; rural and urban areas; and formal and informal sector workers (Ferreira et al. 2017).

Finally, while it is undeniable that labour income inequality fell over the period it is still not possible to fully disentangle the causes of the change. One the one hand, the factors outlined above, like the minimum wage, education and between-group inequalities, are very relevant. But it is also possible that the decline in wage inequality could be explained by a change in remuneration forms among individuals with a degree of control over their pay package (like self-employed workers, business owners and corporate executives). If these workers changed their remuneration away from wages to capital withdrawals like dividends, as it is possible to do with any unincorporated or incorporated enterprise, then inequality can be registered to have fallen if this behaviour were concentrated at the top of the distribution. In a context where distributed profits are exempt from the personal income tax, while top labour incomes are taxed at the top marginal tax rate of 27.5%, this type of behaviour should not be ruled out, especially as it seems common among Brazilian engaged in self-employed activities. This may help to explain why top shares of total fiscal income have been stable despite the factor that the shares in its main component, labour income (representing 75% of total fiscal income), have declined. This can be interpreted as a rise in the concentration of capital income, even if it is partly driven by changes in the definition of income (from labour to capital income) by a certain class of income recipients.

While the aforementioned factors are important in explaining the evolution of labour income inequality (after combining surveys and tax data), the evolution of national income takes into account other components, whose distributions should not be ignored. Primary among non-fiscal capital incomes are the undistributed profits of corporations belonging to households, which represent about 6% of national income. These have grown at over three times the rate of total employee compensation between 2000 and 2015 (231% vs. 74%), and are overwhelming concentrated in the top percentile of the distribution from what we can deduce about the distribution of financial incomes from surveys. This increase in corporate savings by household members can be put in a context of relatively steady growth amid periods of radical uncertainty (the Argentinian debt crisis of the early 2000s, the global financial crisis of 2008 and the domestic political tension after the 2014 election). In effect corporate owners preferred to accumulate wealth inside their corporations as opposed to distributing themselves profits in the form of dividends (which increased by only 18% over the period). The extent to which private corporations chose to do this may well have been influenced by the uncertain economic and political landscape their country was traversing. The general rise in the shares of the top percentiles in national income (shown in Figures 4 and 9) illustrates this.
5. Conclusions and Further Research

While most studies on income inequality in Brazil use either survey-based measures or (more recently) tax-based measures of inequality, this paper sought to combine these two sources to measure inequality over the last fifteen years. We produce new inequality series of fiscal income and national income, combining annual and nationally representative household survey micro-level data (from the national statistics office) with detailed tabulations on income tax declarations (recently released by the federal tax office) and national accounts in a consistent manner. Our results provide a sharp upward revision to the official estimates of inequality in Brazil. This confirms that surveys grossly underestimate the level of incomes at the top. The notable result is the exceptionally large concentration of income at the top of the distribution, which helps to pinpoint the structural origins of inequality in the country – high skill and capital premiums leading to capital extraction at the top, subsistence livelihood at the bottom, who are increasingly dependent on government intervention in the economy, either in the form of wage bargaining or cash transfers in the secondary distribution of income, and a squeezed middle. While the role of welfare cash transfers should not be diminished at the household level, their importance in the aggregate distribution is very limited due to their small share in the economy.

Income growth has also been unequal, with the Bottom 50% making gains, but not at the expense of top groups, who only experienced lower growth than the average since the global recession. Overall, elites still managed to capture disproportionate fractions of total growth due to their disproportionate share in total income. Over the short-to-medium term, it is the share of income that matters more than its growth. While labour income inequality has declined according to our corrected series – no doubt influenced by minimum wage re-valorisation and the lagged benefits of the educational expansion (but potentially contaminated by income switching by richer individuals) – the shares of top incomes in total income has either been relatively stable or increased. Income inequality among the bottom 90% decreased, influenced by the compression of labour incomes and the lack of capital resources held outside the Top 10%.

Further research will attempt to fill in the gaps of missing data. We will exploit the micro-data on income in the extracted samples of the population Census for the years 2000 and 2010, for which there is no survey. We will also make us of the 1976-1999 micro-files of the household survey, which we have recently been given access to, in order to estimate a full series back historically. In doing so we will also make us of historical income tax records published in the Annual Statistical Yearbook of the IBGE between 1976 and 1989 to compare the profiles of our re-scaling factors with those calculated from the 2007-2015 tax data. In this pursuit two things must be borne in mind. First, prior to 1995 dividends were no longer exempt from the income tax, and the tax office had less sophisticated monitoring programs compared to nowadays. Second inflation was rampant between 1976 and 1995, increasing from 100% to over 1000% along the period. Thus the use of income tax tabulations here is questionable given that nominal incomes were rising at a faster rate than that at which the
income tax brackets were adjusted. This would favour the use of surveys for this period. Moreover, we will further exploit the surveys and tax data to get a greater degree of decomposition by income categories and by occupations, where possible.
References


### Table 1: Comparison of Incomes in the System of National Accounts (SNA), Household Surveys (PNA), and Income Tax

<table>
<thead>
<tr>
<th>Year</th>
<th>PNA/DirP</th>
<th>SNA</th>
<th>Income</th>
<th>Income</th>
<th>Income</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NDP</td>
<td></td>
<td>Capital</td>
<td>Fiscal</td>
<td>Final</td>
<td>Income</td>
</tr>
<tr>
<td></td>
<td>PNA/DirP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PNA/DirP</td>
</tr>
<tr>
<td>2001</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>2002</td>
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<td>2003</td>
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<td>2006</td>
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<td>2008</td>
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<td>2015</td>
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</tbody>
</table>

**Notes:** The table shows the ratio of income to the total net national income of the economy. For each dataset, for instance in 2015, total incomes were measured in the survey.

**Detailed tabulations provided by the Secretaria de Receita Federal do Brasil.**
accounts, surveys, and fiscal data.

to pre-tax fiscal income. Percentiles are defined relative to the total number of adult individuals in the population. Corrected estimates combine national
top married couple is split into two; in 2015, 1 US dollar = 2.3 reais (market exchange rate of 1.85 reais per US dollar). Income corresponds
incomes over 100 yr-old and over. Income

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Income Share</th>
<th>Average Income (2015 US$ PPP)</th>
<th>Average Income (2015 US$ PPP)</th>
<th>Number of Adults</th>
<th>Adult Pre-tax Income Distribution of Per</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.9%</td>
<td>$75,429.360</td>
<td>$21,297.139</td>
<td>$1,425</td>
<td>$21,250.768</td>
<td>100.0%</td>
</tr>
<tr>
<td>7.5%</td>
<td>$14,546.744</td>
<td>$4,414.456</td>
<td>$1,422</td>
<td>$4,425</td>
<td>100.0%</td>
</tr>
<tr>
<td>14.4%</td>
<td>$2,802.979</td>
<td>$799.179</td>
<td>$1,422</td>
<td>$4,425</td>
<td>100.0%</td>
</tr>
<tr>
<td>27.8%</td>
<td>$541.421</td>
<td>$155,539</td>
<td>$1,422</td>
<td>$4,425</td>
<td>100.0%</td>
</tr>
<tr>
<td>55.3%</td>
<td>$107,601</td>
<td>$31,384</td>
<td>$1,422</td>
<td>$4,425</td>
<td>100.0%</td>
</tr>
<tr>
<td>32.4%</td>
<td>$13,705</td>
<td>$9,174</td>
<td>$1,422</td>
<td>$4,425</td>
<td>100.0%</td>
</tr>
<tr>
<td>12.3%</td>
<td>$4,765</td>
<td>$0</td>
<td>$1,422</td>
<td>$4,425</td>
<td>100.0%</td>
</tr>
<tr>
<td>100.0%</td>
<td>$19,447</td>
<td>$0</td>
<td>$1,422</td>
<td>$4,425</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 2. Income Thresholds, Averages and Shares in Brazil: 2015
Table 3: Income Shares in Brazil: 2015

<table>
<thead>
<tr>
<th>National Accounts Data</th>
<th>Survey + Tax Data</th>
<th>Fiscal Income Series</th>
<th>Income Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.0%</td>
<td>73.1%</td>
<td>57.1%</td>
<td>pre-tax income</td>
</tr>
<tr>
<td>3.9%</td>
<td>2.5%</td>
<td>0.1%</td>
<td>(survey + tax data)</td>
</tr>
<tr>
<td>7.5%</td>
<td>5.4%</td>
<td>2.2%</td>
<td>Fiscal Income Series</td>
</tr>
<tr>
<td>14.4%</td>
<td>11.0%</td>
<td>23.7%</td>
<td>Income Groups</td>
</tr>
<tr>
<td>27.8%</td>
<td>23.7%</td>
<td>10.7%</td>
<td>distribution of per adult</td>
</tr>
<tr>
<td>55.3%</td>
<td>53.4%</td>
<td>40.4%</td>
<td></td>
</tr>
</tbody>
</table>
Table 4. Income growth and inequality in Brazil: 2001-2015

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Full population</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Bottom 50%</td>
<td>18.3%</td>
<td>17.7%</td>
</tr>
<tr>
<td>Middle 40%</td>
<td>22.7%</td>
<td>21.6%</td>
</tr>
<tr>
<td>Top 10%</td>
<td>10.0%</td>
<td>9.5%</td>
</tr>
<tr>
<td>Incl. Top 1%</td>
<td>4.0%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Top 1%</td>
<td>4.0%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Ind. Top 0.1%</td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Ind. Top 0.01%</td>
<td>0.2%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Growth captured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cumulative fraction of total income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth captured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cumulative fraction of total income</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Distribution of pre-tax national income among adult-equal-split adults. The unit is the adult individual (27-year-old and over). Income of married couples is split into two. Fractions are derived relative to the total number of adult individuals in the population. Corrected estimates (combining survey, fiscal and national accounts data).
Notes: The figure shows the evolution of real average income across datasets and income concepts. The denominator is our adult population.
Notes: Distribution of pretax national income (before taxes and transfers, except pensions and unemployment insurance) among adults. Corrected estimates (combining survey, fiscal and national accounts data). Equal-split-adults series (income of married couples divided by two).
Notes: Distribution of pretax national income (before taxes and transfers, except pensions and unemployment insurance) among adults. Corrected estimates (combining survey, fiscal and national accounts data). Equal-split-adults series (income of married couples divided by two).
Notes: Distribution of pretax national income (before taxes and transfers, except for pensions and unemployment insurance) among adults. Corrected estimates (combining survey, fiscal, and national accounts data). Equal-split-adults series (income of married couples divided by two).

Figure 4. Top 0.1% vs bottom 50% in Brazil: 2001-2015
Notes: Distribution of income (before taxes and transfers, except pensions and unemployment insurance) among adults in our three series, raw estimates from surveys, a fiscal income series (combining surveys and fiscal data) and a national income series (combining national accounts, surveys and fiscal data) and a national income series (combining national accounts, surveys and fiscal data) and an equal-split-adults series (income of married couples divided by two).
Notes: Distribution of income (before taxes and transfers, except pensions and unemployment insurance) among adults in our three series: raw estimates from surveys, a fiscal income series (combining surveys and fiscal data) and a national income series (combining national accounts, surveys and fiscal data). Equal-split-adults series (income of married couples divided by two).
Notes: Distribution of income (before taxes and transfers, except pensions and unemployment insurance) among adults in our three series, raw estimates from surveys, a fiscal income series (combining surveys and fiscal data), and a national income series (combining national accounts, surveys and fiscal data). Equal-split-adults series (income of married couples divided by two).
Notes: Distribution of income (before taxes and transfers, except pensions and unemployment insurance) among adults in equal-split-adults series (income of married couples divided by two), fiscal income series (combining surveys and fiscal data) and a national income series (combining surveys, fiscal data and national accounts). Fiscal and national series are raw estimates from surveys. All three series correspond to the same equivalent income.
Notes: Distribution of income (before taxes and transfers, except for pensions and unemployment insurance) among adults in our three series: raw estimates from surveys, a fiscal income series (combining surveys and fiscal data), and a national income series (combining national accounts, surveys and fiscal data). Equal-split-adults series (income of married couples divided by two).
Notes: Distribution of pretax fiscal labour income (before taxes and transfers, except pensions and unemployment insurance) among adults. Corrected estimates (combining survey, fiscal and national accounts data). Equal-split-adults series (income of married couples divided by two).

Figure 10. Labour income shares in Brazil, 2001-2015: corrected estimates.
Notes: Distribution of fiscal labour income (before taxes and transfers, except pensions and unemployment insurance) among adults compared to a fiscal total income series (combining surveys and fiscal data) and a national income series (combining national accounts, surveys and fiscal data). Equal-split adults series (income of married couples divided by two).
Notes: Distribution of pretax national income (before taxes and transfers, except pensions and unemployment insurance) among adults. Corrected estimates (combining national accounts, surveys and fiscal data). Equal-split-adults series (income of married couples divided by two).

Estimates for USA, France and China are from http://wid.world.
Notes: Distribution of pretax fiscal income (before taxes and transfers, except pensions and unemployment insurance) among adults. For Colombia and South Africa, the unit of observation is the adult individual, while for Brazil, China, and USA earned adults. For Colombia and South Africa the unit of observation is the adult individual, while for Brazil, China, and USA earned adults.

Estimates for Colombia, South Africa, USA, and China are from http://wid.world.
Notes: The figure shows ratios between average incomes in the tax data and average incomes in surveys for each percentile up to P99. Fiscal data start at around P80 for all years.
Notes: the figure shows ratios between average incomes in the tax data and average incomes in surveys for each percentile of the two respective distributions beyond P99. Fiscal data start at around P80 for all years.
Notes: Distribution of pretax national income (before taxes and transfers, except pensions and unemployment insurance) among adults. Corrected estimates (combining survey, fiscal and national accounts data) Equal-split-adults series (income of married couples divided by two). The annual share of social assistance transfers in national income are added to the share of the Bottom 50% in a simple step to illustrate their relative magnitude.

Figure A.3 Income inequality in Brazil: DINA estimates (incl. cash transfers)