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2021 DINA Regional Update for Australia, Canada and New Zealand

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Simplified DINA for Australia, Canada and New Zealand

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The purpose of this methodological note is to contribute a first estimation of distributional national accounts series for Australia, Canada and New Zealand, including preliminary estimates through the year 2019. Where extensive previous work has been based solely on fiscal income data from the tax authorities in each country, we now update these estimates and cover all sources of national income, including income that is not reported on tax returns. In brief, we build a 'simplified DINA' estimation.

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1 Introduction

Distributional national accounts (DINA) estimates have now been extended worldwide, thanks to a dedicated team of researchers at the World Inequality Lab, whose efforts produced a comprehensive global update to the World Inequality Database (Alvaredo et al 2020).

The purpose of this methodological note is to contribute a first estimation of distributional national accounts series for Australia, Canada and New Zealand, including preliminary estimates through the year 2019. These preliminary results are founded on the extensive earlier work to produce long-run series of top (fiscal) income shares in Canada (Saez-Veall 2005; Veall 2012; Wolfson et al 2016), Australia (Atkinson-Leigh 2007a and 2007b; and Burkhauser-Hahn-Wilkins 2015, 2016 and 2018), and New Zealand (Atkinson-Leigh 2007c and 2008; Alvaredo-Atkinson 2013 and 2014; Alvaredo 2017; and Alvaredo-Kergozou 2019a and 2019b).

Where those estimates were based on fiscal income data from the tax authorities in each country, we now update them and extend the estimates of the fiscal (taxable) income distribution to the national accounts—now covering all sources of national income, including non-fiscal (non-taxable) income that is not reported on tax returns. In short, we apply the techniques for a 'simplified DINA' laid out in Piketty-Saez-Zucman (2019),[1] in which non-taxable income concepts are harmonized with the taxable in a modified UN SNA (2008) framework, to produce consistent estimates of income distribution that account for 100 percent of annual income flows in the national accounts (including net domestic product and all foreign earned income).

This short note will proceed as follows: We describe the data sources and income concepts at play in each country, then walk through the methodological steps to move from fiscal income to national income concepts, and finally observe several caveats on these preliminary estimates. The last section concludes with a roadmap to augment and further develop these series and estimates.

2 Data

In each of the three countries under consideration in this note, we follow income concepts and data sources previously established by resident scholars and country experts in their earlier pioneering studies of top income shares for the World Inequality Database (WID) project of the World Inequality Lab (WIL).

Further data sources should become available again in the near future, particularly in nationwide representative repeated cross-section or longitudinal surveys (and the raw datasets used to produce national accounts figures), in authorized custom-data extracts, and in restricted-access

[1] Compare companion studies at wid.world for additional methodological notes on and worldwide estimates of distributional national accounts. See Alvaredo et al (2016) for the earliest efforts in this direction, and Alvaredo et al (2020) for the latest. For additional context on United States data and methods, see also Piketty-Saez-Zucman (2018); Fisher-Post (2020); and Saez-Zucman (2019), (2020a) and (2020b), as well as the extensive documentation available online at http://gabriel-zucman.eu/usdina/.

data enclaves for precise tax data and income composition.[2] For these preliminary estimates to date we make do strictly with public-use administrative data.

Australia

In Australia, we use Australian Tax Office microdata files representative of individual taxpayers, with a two-percent sample of all filers in the years since 2011. These files match the Atkinson-Leigh revised series presented in Burkhauser-Hahn-Wilkins (op. cit.) as the 'BHW1' series. However, for the further-adjusted Burkhauser-Hahn-Wilkins 'BHW2' series, the authors were able to obtain a customized sample from ATO which is not top-coded among the highest income earners. In lieu of this possibility we apply a simple generalized Pareto interpolation technique to retrieve the income distribution within the highest 1 percent of taxpayers (more on this below). For national accounts data and what Atkinson-Leigh called the 'control income total' we refer to UN SNA data available online (2020) and the global macroeconomic update of the WID (2020). As disaggregated national income data post-2016 remains unavailable for many countries on the UN SNA source, we referred to the Australian Bureau of Statistics (2020) for updated national accounts figures.

The most recent microfiles in Australia (used in our estimates) reflect the 2018 tax year. 2019 tax return microdata should be available in June 2021.

Canada

For Canadian updates, from Statistics Canada (2020a) we have used detailed tax tabulations of high-income filers' income, as well as less detailed tabulations for the entire distribution (and income composition within the distribution). Similar to the Australian case, we refer to Statistics Canada (2020b) national accounts totals for updated recent annual estimates beyond what is already available on UN SNA and WID.

The most recent tabulations in Canada (used in our estimates) reflect the 2019 tax year, with data released in November 2021. The next release of data would cover the 2020 tax year.

New Zealand

For New Zealand data, we rely in the first instance on recent updates from Alvaredo and Kergozou (2019, op. cit.) that extended the earlier Atkinson-Leigh and Alvaredo series. These studies source comprehensive tabulations of fiscal income from New Zealand's Inland Revenue Department, matching national accounting concepts of personal household income. As in Australia and

[2] Examples of these complementary data sources include the HILDA survey and custom ATO data in Australia, Longitudinal Administrative Databank microfiles in Canada, and Household Economic Survey and Inland Revenue taxpayer microdata for New Zealand.

Canada, we update national accounts totals through 2019 according to the latest aggregates from Statistics New Zealand (2020a and 2020b), and we also refer to complementary macroeconomic statistics from the Reserve Bank of New Zealand [2020].

New Zealand has released tax return tabulated data for the 2018 tax year (see Statistics New Zealand 2021), but these tabulations contain a 'structural break' in data coverage on both people (tax filers) and (taxable) income, such that the 2018 distributional data is not comparable to previous years' distributions. The World Inequality Lab is in contact with national statistical authorities to request 2018 data in a format comparable to the previous years. In the meantime, the one-year extrapolation of fiscal income distributions against up-to-date national accounts datapoints does reflect any changes in inequality that map onto a change in the capital share of national income.[3]

3 Method

Fiscal income

We compute fiscal income shares as a proportion of the fiscal income control totals established in previous studies. While the income concepts differ slightly across countries and over time based on tax legislation, in broad strokes they are similar, especially after our adjustments to harmonize fiscal income as a consistent concept. In each country we exclude capital gains but include pension benefits, while excluding other forms of social assistance in cash or in kind.[4]

In New Zealand, the studies from Atkinson-Leigh through Alvaredo-Kergozou (op. cit.) have used the 'mean-split histogram' method to estimate top income shares. We are able to fill in the remaining gaps as an extension of this method, using the generalized Pareto interpolation technique developed by Blanchet-Fournier-Piketty (2017) and further discussed in Blanchet et al (2018).

In Australia, as discussed in Burkhauser-Hahn-Wilkins (2018, op. cit.), employer social contributions are not included in the fiscal income numerator of (tax return income), so we also exclude these incomes from the denominator fiscal income control total (adjusted personal income, from national accounts).[5] A further adjustment that Burkhauser-Hahn-Wilkins have made to the orig-

[3] Changes in inequality within the labor income distribution may not be captured until we are able to compare 2018 tabulations to the previous years.

[4] The exception here is New Zealand, where social benefits payments in cash could not be excluded from the fiscal income totals reported by the tax authorities. To do so will be one advantage of using microfiles.

[5] The fiscal income control total can be a fraught concept because it can be very difficult to match precisely the taxable income concepts (and their precise amount) across tax return totals and macroeconomic aggregates. Even if the income concepts can be matched perfectly, the reported amounts may differ (although there may not be a bias in this error) when tax data and national accounting amounts are not matched perfectly in the national statistical offices, e.g., if the seasonality of the fiscal year and national accounting year are not aligned, etc. Beyond their precise agreement on income concepts and the representativeness of the population of tax filers, the consistency of the two sources (tax return income and national accounts household sector income totals) depend on measurement instruments and the processing of these data at the national statistical offices.

inal Atkinson-Leigh series is the exclusion of capital gains from the definition of fiscal income, in order to neutralize spikes over time and in order to more easily harmonize with the national accounts control totals on personal income.[6]

Studying Canada, Saez-Veall (2005) put the fiscal income concept succinctly:

> We define income as gross income before all deductions and including all income items reported on personal tax returns: salaries and wages, self-employment and small business net income, partnership and fiduciary income, dividends, interest, other investment income, and other smaller income items. Because capital gains are realized infrequently in a lumpy way... we focus mainly on series excluding capital gains.

Though it was written for the case of Canada, this idea of fiscal income holds for Australia and New Zealand, as well. We aim to account for most income flows in the household sector in both the 'primary' generation and allocation and 'secondary' distribution of incomes (in the SNA2008 sense), without confounding concepts that would later make it difficult or deceptive to scale up from fiscal to pre-tax national income.

Fiscal labor and capital incomes

In Australia we use the ATO two-percent sample of individual tax returns, including disaggregated variables on income sources for each individual observation, so we are able to precisely estimate capital and labor income shares within the fiscal income distribution, and to track the national accounts control income total (as in Burkhauser-Hahn-Wilkins 2016 and 2018, op. cit.).[7]

In Canada and New Zealand, we have not yet had access to microdata tabulations for the recent years, so we are forced to sketch the labor and capital income split within fiscal income from complementary sources.[8]

For Canada, Saez-Veall (2005) and Veall (2012) sketched detailed information about the income components of top earners, but not of those below.[9] Until access to microdata becomes available, we use the split of capital and labor income from the most recent Saez-Veall estimates, as a

[6] It is useful to refer to Tables 1 and 2 in Burkhauser-Hahn-Wilkins (ibid.) for a detailed description of the income concepts and sources that comprise the 'BHW1' series. For now, we cannot extend their 'BHW2' series without access to customized data from ATO.

[7] In each case, we follow the treatment of the earlier studies to allocate unobserved income to the unobserved non-filers. Only in Australia is this a significant concern, as there are more non-filers in Australia (on the order of 25 percent of the adult population) than in Canada (roughly 10 percent) or in New Zealand (almost none; almost all adults appear in the tax statistics).

[8] We know what the components of income are, but not how they are distributed within the fiscal income distribution, so we appeal to tertiary but related sources, survey results and analysis from microdata, to draw inferences on the taxable income distribution.

[9] We retrieved labor and capital income composition of (and total levels for) the lower part of the distribution from the Statistics Canada (op. cit.) information on high-income tax filers, which in fact also includes information on the lower brackets of the income distribution. As pre-1982 data is not available from these tax tabulations (nor in the LAD), and no data below the 90th percentile of the fiscal income distribution was available from the earlier studies (see Saez-Veall, op.

placeholder for the labor share of recent years.[10] For the series prior to 1982, we also extrapolate the within-fiscal income labor and capital income distributions. Where Saez and Veall used microdata from the restricted-access Longitudinal Administrative Databank (LAD) to directly subtract all benefits and non-factor income components from their fiscal income totals, the tabulated data does not allow for this adjustment. We assume no re-ranking (monotonic proportions of cash benefits along the fiscal income distribution) and apply a scalar proportion from the most recent Veall estimates to the latest updates (proportional to fiscal income totals, and by tax bracket). When microdata access resumes, we can check the sensitivity of this assumption, but the parameter is stable within the earlier LAD microdata series.

In New Zealand, for now we use distribution information from the government-commissioned independent Tax Working Group (2018), whose analysis is based on custom data from Inland Revenue and sketches the labor and capital income distribution. For prior years, we scale this estimate to match the growth rates of labor and capital income compositions in the OECD EG-DNA (Statistics New Zealand 2018) dataset for the years 2006-2015.[11] For earlier years we correct the capital income share within fiscal income in proportion to the increase or decrease of dividends (which are both a part of corporate operating surplus, and also found in taxable fiscal income) as a share of national income, with 2018 as the reference year.

Non-fiscal factor incomes

Total labor and capital income in the national accounts are summarized in the calculation of factor shares.[12] The labor share is the share of domestic compensation of employees, net foreign labor income, and the labor component of mixed income (canonically 0.7, with 0.3 the capital share of mixed income), within (net, factor-price) national income. The capital share is the residual, or more specifically, the national income share of net operating surplus (of corporations, quasi-corporations, and of the household sector[13]), plus net foreign capital income, plus the capital share of mixed income.

cit.), we can only hold constant the fiscal income distribution below the 90th percentile—from 1981 back to the beginning of the series—for the moment, pending further study.

[10] In practice, this compositional difference does not matter very much for the bulk of the income distribution. Even up to the 95th percentile, a relatively stable 92 percent of all (tax return) income earned came from labor sources (wages and salaries, professional self-employment and the labor component of mixed or entrepreneurial income). Within the top 5 percent of income earners, fiscal income skews toward capital income, but not necessarily as a constant parameter over time. In 1982, the top 0.01 percentile of income earners could trace 48 percent of income to capital income sources (dividends, interest, investment income, and the capital share of mixed or entrepreneurial income), whereas by 1988 this was only 21 percent, then 32 percent again by 1991. However, for this very top portion of the income distribution, since 1992 the proportion of capital income within total tax return income has remained within the bounds of 20 and 25 percent. In that sense, these earlier estimates would not have been sensitive to the assumption of a stable parameter for capital income within the top of the distribution, and we extrapolate that parameter to the rest of the income distribution.

[11] While this dataset is based on households rather than tax units (individuals, in the case of New Zealand) as ours is, the trends of income composition should not vary widely across the distribution, and would of course be the same on aggregate. In pre-1953 New Zealand tax data, the observation unit is 'tax units' rather than 'individuals,' so we apply a simple scalar ratio in order to move between these units, for consistency in the long-run series.

[12] See, *inter alia*, Gollin (2002), Karabarbounis-Neiman (2014); Fisher-Post (2020); and Bengtsson-Rubolino-Waldenström (2020).

[13] i.e., imputed rent; net operating surplus of the government is zero

In each of the countries treated here, we have matched the pre-existing fiscal income series; these fiscal income concepts, in turn, carefully matched their income control totals to national accounts aggregates. What remains excluded from the tax return (fiscal) income total but included in national income total, then, is untaxed labor and capital incomes, and largely the following: untaxed labor income (especially under-reported mixed income[14]; operating surplus of the household sector; and retained earnings of corporations (dividends and transfers to the household sector are already included in fiscal income). In this sense, in Canada, Australia, and New Zealand (as in the United States), much of the national income that is not found on tax returns is actually capital income.

However, one point is worth noting here. If we disaggregate non-taxable capital income into capital income that accrues to pension accounts (or tax-advantaged retirement savings), vs. all other capital income, we find that the former is distributed more like (fiscal) labor income than is the rest of capital income (which is distributed like fiscal capital income). Following Piketty-Saez-Zucman (2019, op. cit.), we treat capital income accruing to pensions as a sort of labor income in the distributional sense, and allocate its distribution along the labor income distribution within the total fiscal income distribution. All other capital income we allocate to the capital income distribution within fiscal income.

Given that much of non-taxable income is capital income—even after adjusting for the labor-like distribution of capital income accruing to pensions—it is no surprise that total inequality as measured on pre-tax national income lines is higher than when measured along fiscal income lines, since capital income is more heavily concentrated at the top of the income distribution than is labor income.

The data for capital income accruing to pension plans we retrieve from wealth aggregates and distribution data for Canada, Australia, and New Zealand (Piketty-Zucman 2014; Bauluz 2020; Statistics New Zealand 2020c). For New Zealand, we have little firm data on the pre-KiwiSaver era of pension wealth, as much of retirement saving was not tax-advantaged via specific legislation and therefore has not been captured separately in the fiscal income data. Our preliminary estimate of capital income accruing to pension plans in New Zealand is based on the most recent KiwiSaver estimates, tied to an average of the growth rate of Australian and Canadian pension wealth for the prior periods. In practice, capital income accruing to retirement plans (and therefore distributed more like labor than capital income) represents roughly 20 percent of capital income in Canada, 30 percent in Australia, and we estimate it at 25 percent in New Zealand. It will be worth checking the sensitivity of these assumptions with finer grained examination of the wealth distribution in New Zealand, and of the return to pension assets versus the return to all other capital. For now, we are assuming that the return to pension wealth (capital income accruing to pension plans) has a similar rate of return to that of all other capital.

[14] See Cabral-Gemmell-Alinaghi (2020).

Sensitivity

This measurement issue on untaxed capital income accruing to retirement savings brings us to the first of three caveats worth highlighting. Broadly, it is not necessarily always and everywhere a safe assumption that capital income as a whole (in the annual national accounts) should be distributed like capital income in tax return data. We will need to test this assumption using micro-data when accessible. Another way to test the robustness of this assumption will be to compare the evolution of the fiscal capital income distribution to the evolution of the wealth distribution as a whole (also updated in conformity with Alvaredo et al 2020 [op. cit.], with data online at wid.world).[15]

However, if anything, the preliminary distributional national accounts estimates presented here may represent a lower bound on inequality, as higher-return investment vehicles including equity stake in undistributed corporate profits (retained earnings in the corporate sector, in national accounts) are often available to those with more wealth to invest (see Piketty 2014). In other words, there are economies of scale for investors, and sophisticated investors may favor non-taxable capital income over that which is reported to the tax authorities. In particular, retained earnings may be generally preferred to dividends, especially to the extent that top marginal personal income tax rates (on dividends, interest income, and/or capital gains) exceed corporate income tax rates.[16] In any case, that we exclude capital gains from our estimates of fiscal income also places greater weight on the role of retained earnings in pre-tax *non-fiscal* income (the residual, hard-to-observe difference between fiscal income and national income). For now, we maintain the estimate that labor and capital distributions overall follow the labor and capital distributions within fiscal income—but future research may examine these lacunae in greater depth.

A second caveat reflects the observation unit of this data. In the United States and many other countries, our benchmark inequality series splits income equally between adults within a household, while in the countries presented here the data does not currently allow such a split. In Australia, Canada and New Zealand the taxpayer is the adult individual, whereas in the United States and many other countries the taxpayer unit is often, essentially, the household.[17] For now, for the purposes of the World Inequality Database, we compare 'individualistic adults' in Australia, Canada, and New Zealand, to the 'equal-split adults' of other countries worldwide—simply adjusted by a ratio drawn from France data.[18] We apply the French average ratio, by g-percentile, to the Australia and Canada and New Zealand data, in order to arrive at an estimated distribution 'equal-split' distribution from the 'individualistic' one.

[15] Wealth distribution series have not yet been calculated for New Zealand.

[16] This would not necessarily hold in the cases where dividends are largely exempted from taxation via imputation credits, as in Australia and New Zealand (where the preference between retained earnings dividends may also depend on non-tax factors).

[17] Many high-earning married couples in America jointly file their tax return as a single household but do not actually earn equally high incomes across spouses. For example, a top 1 percent household does not necessarily have two top earners, but both spouses would remain *near* the top of the distribution after 'splitting': This 'equal split' would bias American (and other such countries') top income shares downward relative to the counterfactual observation strictly among individuals (not equal-split households), as in Australia, Canada and New Zealand. In these countries here, a top earner's spouse may be found much lower in the income distribution, while the top earner him/herself retains a greater share of the total. In sum, the comparison of Australian, Canadian and Kiwi inequality to inequality in, e.g., the United States (and other countries in the World Inequality Database) is not strictly equivalent in this respect.

[18] WID data is able to measure both 'individualistic' and 'equal-split' adults series for the period 1970-2014.

Our third noteworthy caveat reflects the preliminary estimates for 2018-19. Since tax data has only become available through 2017 for the three countries under consideration here, we are forceed to hold constant the fiscal income distribution (its level and composition within national income) while allowing the non-fiscal income distribution to float as the residual between fiscal income (unobserved) and national income (observed). After retrieving national income component data,[19] we allocate the evolving (non-fiscal) national income composition to the fiscal elements which have been held constant. Primarily, the weight of this income concept reflects on the share of national income that is held as retained earnings, and are distributed as capital income along the (interpolated) fiscal capital income distribution (as discussed above).

These 2018-19 estimates therefore should be considered preliminary, and subject to revision when tax data is released and microdata becomes accessible again.

Finally, we should note a few steps that were required with regard to historical data. In Australia, Canada and New Zealand, the fiscal income top shares estimates (from earlier studies, op. cit.) did not always cover the top 10 percent of adult individuals, particularly in the era pre-1950, and rather only the top 5 percent or top 1 percent. For eras where, e.g., the top 1 percent share was present in fiscal income distributional estimates but the top 5 percent share was missing, we extrapolated (as constant) the top 5-to-top 1 bracket share ratio from the earliest available year, to fill in the top 5 percent share in the missing years.[20] The same is true for the top 10 share, and the 'middle 40' vs. 'bottom 50' shares—such that in years where information on the lower part of the distribution is missing, we rely heavily on the information regarding the top of the distribution (and information in surrounding years), in order to estimate the shape of the rest of the distribution. More importantly, perhaps, we assumed a constant ratio of non-fiscal income to fiscal income, along the entire distribution, in the years prior to SNA2008 data (i.e., before 1960 in Australia, 1970 in Canada and New Zealand).

4 Further Research

Our preliminary estimates here are thus constrained by data access. With resumed microdata access in Canada, forthcoming microdata results in New Zealand, and custom tax data and survey data access in Australia,[21] we will soon be able to more robustly test sensitivities to our principal simplifying assumptions above, to make finer-grained estimates on incomes below (and perhaps even within) the top percentiles.

This data access will also allow us to move from the individualized observation unit, to the household (or within-household 'equal-split adult') observation unit. While the change in observation unit is rarely the cause of large swings in inequality trends across countries or over time, the

[19] At the time of this writing, only New Zealand has not yet released 2019 national accounts totals by the 'income' or production approach. These statistics will be available in November 2020.

[20] Missing years within a series would be interpolated, but this is only the case in 1961 New Zealand and a few inter-war years in Australia and New Zealand.

[21] One could also imagine a more intensive treatment of the historical eras with complementary data sources on the left-hand side of the income distribution and/or historical national accounts and factor share estimates prior to the SNA2008 data series.

density of two-earner households does vary along the income distribution within and across countries, and over time. To examine household inequality series alongside the individual series will facilitate additional studies and policy analysis using survey data.

In fact, to put our series in the household observational unit will also enable us to compare results with those of the OECD Expert Group on Disparities in National Accounts.[22] Statisticians at the national accounting offices from each of the three countries discussed in this note do participate in the OECD EG-DNA project, and produce regular estimates of disposable income at the household level, for five income quintiles. The income concepts in this OECD EG-DNA framework do differ from those observed in WID (e.g., to name only two such confounds, the 'disposable income' concept excludes retained earnings and mixes some post-tax concepts such as cash benefits receiveable). Furthermore, the top quintile does not show granular results for the concentration of income at the very top of the distribution (within the top decile, and within the 99th percentile), which to some extent obscures the precise measurement of inequality trends and their most dangerous consequences (especially the decline in social mobility and equality of opportunity that may accompany hereditary wealth and the concentration of fortunes at the top). Nonetheless, these official estimates are valuable contributions toward a common goal in national accounting, to bring distribution back into the discussion of growth.[23]

To build a post-tax income distribution will also be a further step in the project for these three countries, and will also be more feasible using microdata from surveys and tax returns. It would indeed be possible to estimate the rough tax and transfer components along our existing fiscal and pre-tax distributions here described, but we will better observe taxes paid and transfers/benefits received when we observe them from microdata tax return files and/or harmonized survey data, not imputed to a distribution from fiscal income tabulations.

The end goal will be to create robust synthetic microfiles, representing not only 100 percent of national income and wealth, but also along finer lines of socioeconomic, geographic or political 'cleavages' (Piketty 2020), including distributional estimates by province or population density, age, gender, ethnicity, occupation, and other individual or household indicators.

In sum, these distributional national accounts estimates should leave us well placed for further estimation of comprehensive income and wealth distributions in the wake of the worldwide health and economic shocks of 2020.

[22] See, for example, Zwijnenburg (2019).

[23] In the scope of the OECD EG-DNA project and our parallel work, a comparison across anglophone countries would be perhaps particularly poignant, given their historical ties not only in social and political economic development, but also in the study of inequality (see Atkinson-Piketty 2007)—and even to compare anglophone countries with their continental European counterparts within the OECD, and worldwide. Therefore, to compare methodologies would be interesting, but so would the results on levels and trends in their own right.