

# DISTRIBUTIONAL NATIONAL ACCOUNTS FOR AUSTRALIA, 1991–2018

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# Distributional national accounts for Australia, 1991–2018

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## Abstract

We produce estimates of the full distribution of all national income in Australia for the period 1991 to 2018, by combining household survey with administrative tax microdata and making adjustments to match National Accounts aggregates. We find that inequality of post-tax national income is lower and increased less than inequality of survey-based (post-transfer, disposable) income between 1991 and 2018. International comparisons reveal that Australian inequality is much lower than that of the United States, while it is similar to that of France, with those at the bottom of the income distribution faring noticeably better in France and Australia than in the US.

**Keywords** Income inequality · National accounts

**JEL Codes** D31 · D33 · E01

## 1 Introduction

A recent literature led by researchers affiliated with the World Inequality Database (Bozio et al. 2018; Garbinti et al. 2018; Piketty et al. 2018, 2019; Blanchet et al. 2022) has attempted to provide a more complete picture of the distribution of income through allocating all of the income as measured in National Accounts to individual members of society.

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The guiding principle for these ‘Distributional National Accounts’ (DINA) is to allocate the entirety of national income to individuals in line with their ‘beneficial receipt’ of the income—that is, according to how much of the income effectively accrues to them.

By doing so, a new picture of the income distribution is obtained, which is an alternative to—and arguably more comprehensive than—those of traditional inequality studies using household survey or administrative tax data on their own. Traditional studies typically only capture cash incomes, thereby missing important income components such as in-kind benefits from government-provided goods and services, imputed rents on owner-occupied housing, and retained earnings of companies.<sup>1</sup> By accounting for these additional income components, the Distributional National Accounts approach therefore generates estimates of individuals’ incomes that are on average larger than obtained from household surveys or income tax data and which should more accurately reflect the distribution of all (cash and in-kind) income.

In this paper we attempt to produce statistics on the distribution of income in Australia as measured by the National Accounts.<sup>2</sup> Our approach is guided by Alvaredo et al. (2020), which details the income concepts and methods of implementation adopted by the World Inequality Database (WID). The guidelines are, however, not completely prescriptive because of the substantial variation across countries in institutional features and data availability. Our approach is therefore considerably influenced by the particular institutional features of Australia and the relative strengths and weaknesses of the available data sources.

Four main national income concepts are identified in Alvaredo et al. (2020) as being of interest: pre-tax factor income; pre-tax post-replacement income; post-tax disposable income; and post-tax national income. Pre-tax factor income approximately corresponds to total income accruing to capital and labour, where all of national income is attributed to capital and labour. Pre-tax post-replacement income is the same as pre-tax factor income, but with an adjustment made to account for the public pension system by allocating pension payments to recipients and deducting the contributions used to fund them (such that it still sums to national income). Post-tax disposable income deducts all taxes attributable to individuals and adds cash transfers. Consistent with the principle of distributed income aggregating to National Accounts totals, the total value of taxes deducted equals the total value of taxes collected by government (not just income taxes). However, government expenditure is not allocated to individuals and thus the sum of post-tax disposable income is less than national income. Post-tax national income addresses this deficiency by distributing all of government expenditure, inclusive of items not readily attributable to individuals, such as national defence.

We construct measures of all four income concepts, but the results we present are primarily for pre-tax post-replacement income and post-tax national income on the basis that these are the main pre-tax and post-tax income concepts of interest, respectively corresponding to measures of the distributions of market income and ‘post-government’ income (the latter corresponding to ‘beneficial receipt’ of income).

We are not the first to attempt to describe the distribution of income in Australia adopting a National Accounts income concept. In line with broader efforts by national statistical agencies that produce National Accounts, the Australian Bureau of Statistics (ABS) has, on four occasions since 2014, released distributional information by combining information

<sup>1</sup> Some earlier studies that have examined the effect of in-kind benefits on inequality include Garfinkel, Rainwater and Smeeding (2006); as well as Paulus et al. (2010).

<sup>2</sup> This paper builds on earlier work by Fisher-Post (2020).

from its biannual household income survey with the household income account of the National Accounts data (most recently in 2021; see ABS 2021a).<sup>3</sup> The methods have been refined over time. In the most recent release, for each of nine years between 2003–04 and 2019–20, statistics are presented on the distribution of various components of the national household income account across households.

While complementary to the analysis we undertake, the ABS approach is somewhat different to that advocated by Alvaredo et al. (2020). Most important is that the income concept differs. Under the ABS approach, only income captured in the household income account is distributed to households, and thus components of national income not captured in the household income account, including retained earnings of corporations and government expenditure, are excluded. Additionally, the distributional information produced by the ABS is limited, presenting only the total, mean and share of each income component of the household income account for broad groupings of households: by main source of income (five groups), by equivalised income quintile, by household type (seven groups), by age group of the household 'reference' person (six groups) and by wealth quintile.

Compared with the ABS outputs, we therefore present distributional information that is based on income concepts more in line with the DINA guidelines, which are concerned with the total of national income, and not the total of income as measured in the household income account. Furthermore, we present more detailed distributional information, most notably at the top of the distribution, and information for a larger array of demographic groups than is produced by the ABS.<sup>4</sup>

## 2 Distributing national income to individuals

In building DINA estimates for Australia, we follow approaches taken for, *inter alia*, France, the US and China (Garbinti et al. 2018; Piketty et al. 2018; Piketty et al. 2019), as well as the DINA Guidelines (Alvaredo et al. 2020).

The goal is to distribute to individuals all of the National Accounts measure of income, defined as GDP plus net foreign income minus consumption of fixed capital. We construct four measures of income that are distributed to individuals, although only three of these sum to a National Accounts aggregate. In the following we briefly describe the data and methods used to produce each income distribution.

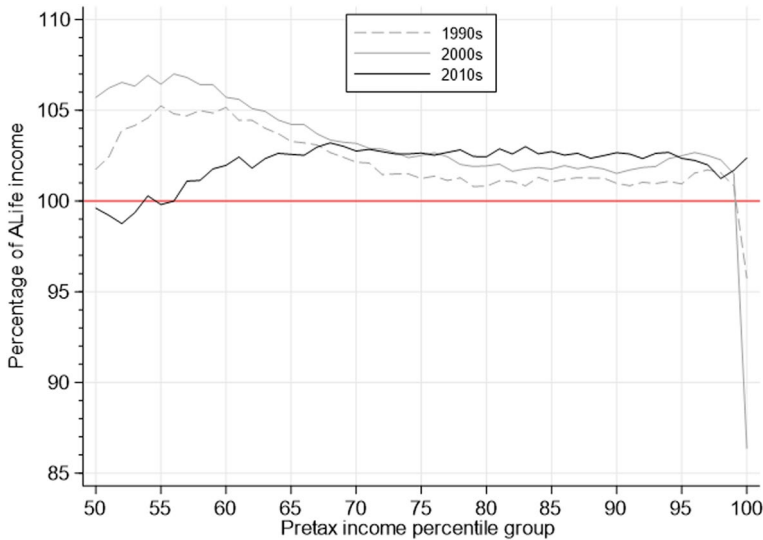
### 2.1 The use of tax and survey data

Our approach draws on both unit record tax data and income survey data. The tax data set, known as ALife, comprises a 10% random sample of tax returns covering the period 1991 to 2018. The income survey data come from the Australian Bureau of Statistics' Survey of Income and Housing (SIH), covering the period 1994 to 2018, but with some gaps.

After examining both ALife and the SIH, we determined that the best approach was to primarily base cash income estimates on the SIH, but with ALife tax data used to

<sup>3</sup> See also Zwijnenburg (2022) and OECD (2024) for further methodological discussions.

<sup>4</sup> We do not attempt to make direct comparisons with the ABS results because of the many differences in approach, including the unit of analysis, income concept, distributional measures of interest and time-period examined.



**Fig. 1** SIH survey data relative to ALife tax data income by percentile – Pre-tax income. *Notes:* This figure reports the ratio of total income in the survey data (SIH) to the total income in the tax data (ALife) for each income percentile group. A ratio of one (100%) means that the two sources are perfectly aligned. A ratio of 90% means that total income is 10% lower in the survey than in the tax data for that percentile group. *Source:* Authors' calculations based on ALife and SIH data

adjust incomes for the top 1%. This is because the tax data appear inferior in income capture for most of the distribution (Fig. 1). Although non-labour income is higher in ALife than in the SIH for people with above-median incomes, it is not enough to compensate for the undercoverage of labour income (see Figures B.1 and B.2 for a breakdown of Fig. 1 by income source).

Our approach is something of a departure from existing studies, which have given greater weight to tax records data. However, DINA need to be flexible to national circumstances. Australia is by no means unique in the finding that income survey data is at least as good as tax data for incomes below the top 1% (see Burkhauser et al. 2012 for the US and Burkhauser et al. 2018 for the UK). Perhaps requiring some explanation is why the survey data actually captures more income below the 99th percentile than the tax data. Two main explanations exist: some forms of income are nontaxable and are even received by high income earners; and there are incentives to minimise income reported to tax authorities that do not apply to statistical agencies.

Aside from better capture of the incomes of the bottom 99%, additional reasons to use the SIH include better flexibility to look at different income concepts and income units (including the household unit) as well as information on wealth.

We distribute incomes of households on an 'equal-split adults' basis, meaning each adult household member is assigned an equal share of the total household income, as per the 'broad equal-split series' in the DINA Guidelines (p23). Although our baseline estimates are based on these broad equal-split series, we also build and use the 'narrow-split series' to ensure consistency in the comparison with the US and France. The 'narrow-split series' distributes income to all adult individuals by splitting income equally within a couple, but not within the extended household.

While the SIH is our preferred ‘core’ data source, it nonetheless has important limitations which need to be addressed. It is only available from 1994–95, and it has only been conducted every second year from 1997–98 to 2002–03 and from 2003–04 onwards. It also only has wealth data (and hence information on superannuation (private retirement account) balances and home equity required to distribute capital income in 2003–04, 2005–06 and 2009–10 onwards).

To produce estimates in non-SIH years, we interpolate distributions and adjust according to changes in the components of the National Accounts in those years. We use the GDP deflator to either inflate the distribution from the closest earlier year or to deflate it from the closest later year. If both an earlier and a later year are available, we apply both methods separately and compute the final DINA estimates by taking the average of the two series thus obtained.

We follow the cell-mean imputation method we developed for the UK in Burkhauser et al. (2018), using tax data (ALife) to impute incomes of the top 1% in the survey data.<sup>5</sup> In addition to imputing gross income from tax data for the top 1%, we also use the labour/capital income-source composition as is obtained from the tax data. However, the tax data offer less detail and thus less flexibility in then adjusting incomes to match National Accounts totals (e.g., mixed-income is not directly observable in ALife). We address this issue by maintaining the assumption that the income-source compositions *within* capital and labour incomes are as obtained from the survey data.

Our procedure ensures that total ‘tax gross income’ for the top 1% – and for each of the 1,000 groups within the top 1% – is the same in the (adjusted) SIH and ALife data.

## 2.2 The use of National Accounts

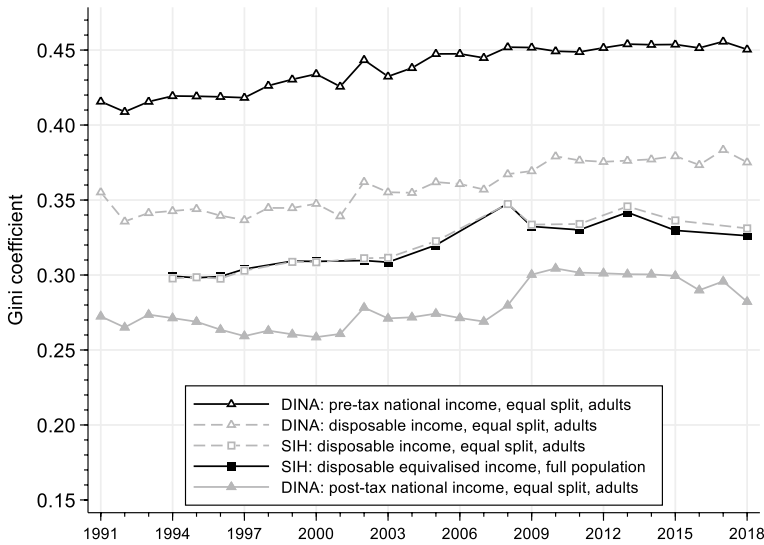
We align each income component in the adjusted SIH microdata to the National Accounts. We mostly proceed by adjusting the microdata proportionally and uniformly to the relevant National Accounts aggregates (see Appendix A.2 for a detailed discussion of the approach undertaken for each income component). We start with factor income, distinguishing labour income, mixed income, and capital income and, within the latter, superannuation, imputed rent and other capital income. We thus obtain pre-tax factor income, to which we add the Age Pension to obtain pre-tax national income. From pre-tax national income to post-tax disposable income we deduct all taxes and add all government cash transfers to individuals’ pre-tax incomes. Finally, we obtain post-tax national income by distributing government expenditure to individuals.

## 3 Income inequality in Australia 1991–2018

### 3.1 Comparisons of DINA estimates with household survey estimates of inequality

Of considerable interest is how inferences on levels and trends in inequality are affected by moving from traditional household-survey based estimates for household equivalised disposable income to DINA estimates of inequality. Figure 2 compares the Gini coefficient

<sup>5</sup> We use a cell size equal to 1/100,000<sup>th</sup> of the total adult population. A few preliminary adjustments to ALife data are required: see Appendix A.1.



**Fig. 2** Gini coefficients for DINA series and household equivalised disposable income, 1991–2018. *Notes:* The figure compares the Gini coefficient estimates based on the DINA series (household income equally split among adults) to those obtained from the survey data alone (SIH)—using either equivalised income (for the full population) or broad equal-split income (for the adult population). See Section 2.1 for further discussion of these concepts

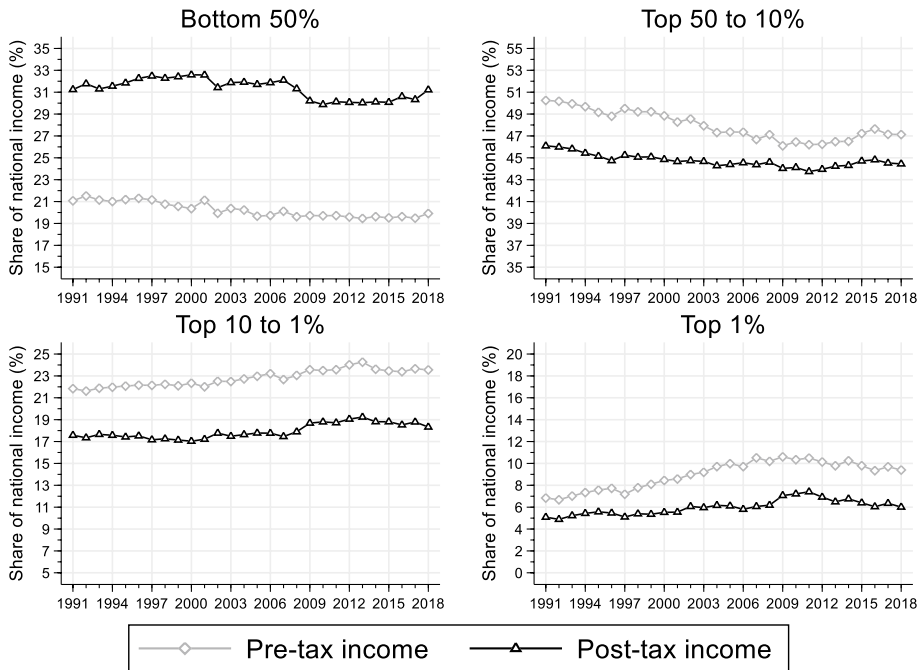
for three of the DINA income concepts with the Gini coefficient for equivalised disposable income captured in the SIH (where the modified OECD scale is used to equivalise income; see Hagenaars et al. 1994).

Comparing across the DINA income concepts, moving from pre-tax national income to post-tax disposable income and then to post-tax national income is associated with decreases in the Gini coefficient. Notably, the Gini coefficient for post-tax national income is consistently below the Gini coefficient for equivalised disposable (cash) income obtained from survey data. This is important because it shows that incorporating in-kind benefits such as health and education substantially reduces inequality in Australia. In fact, this reduction in inequality, as measured by the Gini coefficient, is similar in magnitude to that achieved by taxes and cash transfers.

We also note differences in trends between the DINA and survey series. Between 1994 and 2018, the Gini coefficient for (survey-based) equivalised disposable income increased from 0.30 to 0.33, whereas it remained stable for DINA post-tax national income (0.27 to 0.28). This appears mostly due to the redistributive effect of in-kind transfers, as the Gini coefficient for DINA disposable income (i.e., before in-kind transfers) also increased over the period, from 0.34 to 0.38.

Comparing SIH equivalised disposable income for the full population with SIH equal-split disposable income for adults only reveals very small differences in inequality as measured by the Gini coefficient. This suggests that going from equal-split income among adults, as per the DINA series, to equivalised adult among the full population, as per the standard SIH series, cannot explain much of the difference between the two series.

The significant remaining difference between DINA and SIH series (when both are measured as disposable income, among equal-split adults) can likely be attributed most of all, to the presence in DINA series of capital incomes (accruing to the highest-earning



**Fig. 3** Pre-tax and post-tax national income shares 1991–2018. *Notes:* Distribution of pre-tax national income (before all taxes and transfers, except age pensions) and post-tax national income (after all taxes and transfers) among adults. Broad equal-split adults series (household income equally split among adults). Note that people do not necessarily belong to the same pre-tax and post-tax income group

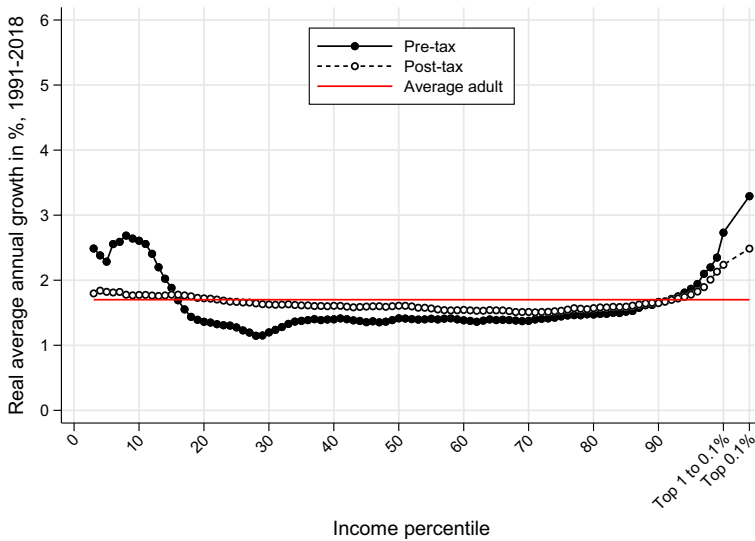
households) which are observed in national accounts data, but unobserved in the survey data. To fully account for capital income substantially increases the measure of inequality.

### 3.2 DINA estimates of pre-tax and post-tax national income shares

Figure 3 presents estimated shares of pre-tax and post-tax national income over the 1991 to 2018 period of the bottom 50%, top 50% excluding the top 10%, top 10% excluding the top 1%, and the top 1%. Pre-tax income provides information on how a ‘market income’ concept of income is distributed across individuals. The share of the bottom 50% remained relatively steady, at approximately 20%, but the top 50 to 10% group experienced a decline from over 50% to 47.5%, with the decline occurring between 1991 and 2008, since when there has been no net change. The income share of the top 10% to 1% rose from 22% to 23.4%, while the top 1% income share rose from 7% to 9.4%, with all the increase occurring between 1995 and 2008 (and indeed there is a small decline evident after 2008).<sup>6</sup>

<sup>6</sup> Series (in Stata files) that describe thresholds, averages and shares for each of the 127 ‘generalised percentiles’ (or g-percentiles) for each income concept are available through the World Inequality Database website, <https://wid.world/>. Note that people do not necessarily belong to the same pre-tax and post-tax income group.





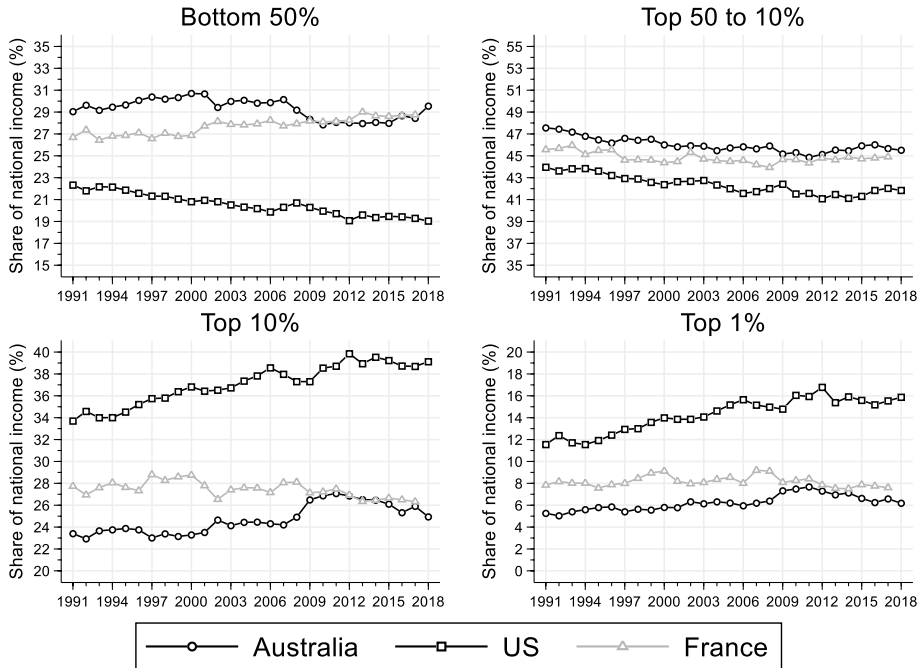
**Fig. 4** Real average annual growth per adult 1991–2018. *Notes:* Distribution of pre-tax national income (before all taxes and transfers, except age pensions) and post-tax national income (after all taxes and transfers) among adults. Broad equal-split adults series (household income equally split among adults). Index based on mean incomes in constant dollars. The red line shows the overall average per-adult real annual national income growth rate over the period, which is (by construction) the same for pre- and post-tax income series

Post-tax national income series provide information on the distribution across individuals of ‘beneficial receipt’ of total income in the National Accounts. Government redistribution in a broad sense, as captured by the comparison of pre-tax and post-tax national incomes, contributed to mitigate the changes in pre-tax income shares between 1991 and 2018. The relative rise in top income shares and the relative fall in the top 50 to 10% incomes shares are less pronounced for post-tax income. Notable, however, is that the income share of the bottom 50%, after rising slightly between 1991 and 2007, subsequently fell to 2010, and has only recovered its 1991 level.

We can also go beyond top income shares and estimate changes in mean real individual incomes by income group. Since 1991, the mean pre-tax income of the top 1% has increased by a factor of more than four. This compares with nearly 3.5 for the top 10% to 1% and approximately 2.9 to 3 for the two groups comprising the bottom 90% (Appendix Table B.1). Consistent with the findings of Fig. 3, differences in income growth across the four income groups are more subdued for post-tax national income than for pre-tax national income. The increase in mean pre-tax income increase ranged from a factor of 3 for the top 50 to 10% to 3.7 for the top 1% (Appendix Table B.2).

In Fig. 4, we examine real income growth for the whole period but at a finer level by providing estimates by percentile income group.<sup>7</sup> For pre-tax income, both the bottom 20% and the top 5% have done better than the average adult, who saw income grow at an average of 1.7% per annum. However, differences between the bottom, middle and

<sup>7</sup> In addition, Appendix Figures B.3 and B.4 provide pre- and post-tax income shares by year and by quintile.



**Fig. 5** Post-tax income shares: Australia, US and France 1991–2018. *Notes:* Distribution of post-tax national income (after all taxes and transfers) among adults. Narrow equal-split adults series (income of married couples divided by two)

top of the distribution mostly disappear when moving from pre-tax to post-tax national income, with the notable exception that growth was still higher for the top 5%. Moreover, among the top 5%, the top 1%, and top 0.1% in particular, have clearly experienced growth rates that are larger than the average.

Attributing these changes in the Australian income distribution to specific events or policies is a difficult exercise and remains outside the scope of this paper. However, a few remarks can be made. While the top 10% has seen an increase in its income share at the expense of the rest of the population, the changes over nearly 30 years remain limited in scale. Nonetheless, the bottom 50% income group fared relatively well between 1991 and 2007, a period in which Australia experienced strong economic growth and a trend decline in unemployment. The Global Financial Crisis (GFC) of 2008 coincided with a sharp fall in the bottom 50% income share. The sluggish economic recovery experienced by Australia since then coincides with only a small increase in the bottom 50% share, which remains lower in 2018 than its average level before 2008. Finally, the main step-increase in the income share of the top 10% occurred in 2008 and 2009. As noted, this is the period of the GFC, which top income groups may have weathered relatively well compared with low-income groups. Also perhaps important is that 2008 was the last year that saw an increase in the income threshold above which the top marginal tax rate applies. This threshold was increased from \$60,000 in 2003 to \$180,000 in 2008 as part of an agenda of tax-transfer reforms implemented in the 10 years leading up to

the GFC. These reforms increased inequality through the reduction of the redistributive effect of the tax and transfer system (Hérault and Azpitarte 2015, 2016).

#### 4 International comparisons: Australia, US and France

In this section we compare our DINA estimates for Australia to those reported by Piketty et al. (2018) for the US and by Garbinti et al. (2018) for France for four income groups: top 1%, top 10%, top 50 to 10% and bottom 50%.<sup>8</sup>

Figure 5 reveals that differences in the distribution of post-tax national income across the three countries are stark.<sup>9</sup> The top 10% in the US received nearly 34% of income in 1991, and this had risen to 39% in 2018. In France, the top 10% received nearly 28% of income in 1991 and this share fell slightly to 26% in 2017, the latest year available. In Australia, the top 10% income share was 23 to 24% between 1991 and 2001, but then increased to 27% in 2011 and subsequently declined only to 25% by 2018. For the top 1%, the US again has a much higher income share and greater growth in the income share than France and Australia.<sup>10</sup> The top 1% share is higher in France than in Australia, though the gap which was 2 to 3 percentage-points in the 1990s has been declining since the early 2000s to 1 percentage-point in the most recent as the top 1% share increased in Australia while it remained stable in France.

The income share of the bottom 50% is highest in Australia and lowest in the US. There is little net change evident over the full period for Australia, but there is a slight increase for France and a considerable decline for the US. At the end of the period, the income share of the bottom 50% was 30% in Australia, 29% in France and 19% in the US. Here the contrast with pre-tax income shares is striking because the bottom 50% income shares are 4 to 5 percentage-points lower in Australia than in France (Appendix Figure B.5). The fact that post-income shares are similar in both countries reveals the more targeted nature of government expenditures in Australia than in France. Indeed, Australia is known for being one of the OECD countries with the most targeted welfare system (Whiteford 2013).

For the top 50 to 10%, income shares are more similar across the three countries, although across the entire period, Australia has the highest income share and the US the lowest, and the gap widened slightly between 1991 and 2018.

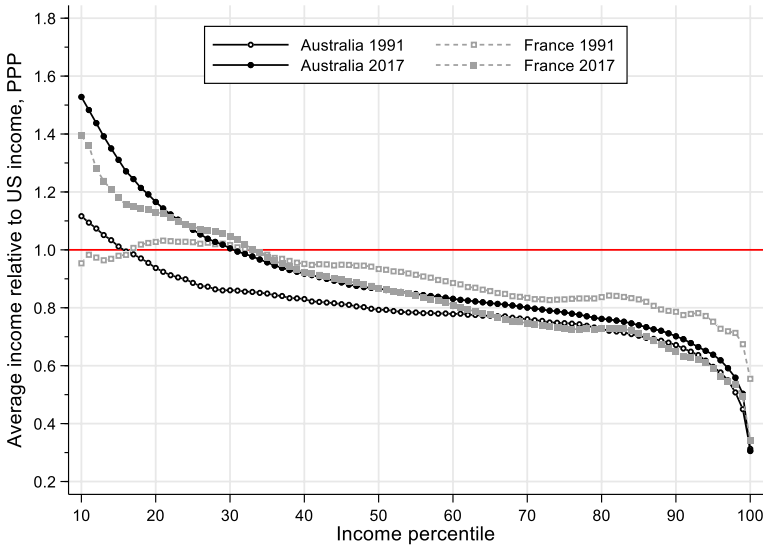
Recent work shows that if Europe is less unequal than the US, it has more to do with lower levels of pre-tax income inequality than with more equalizing tax-and-transfer systems (Blanchet et al. 2022). We can draw the same conclusion for Australia as the differences with the US are already clearly apparent in the pre-tax income distribution (Appendix Figure B.5).

In Fig. 6, we abstract from yearly changes and examine differences in income levels by percentile income group across the three countries. We use purchasing power parity (PPP) exchange rates to convert French and Australian income levels to US dollars. For each

<sup>8</sup> Results for Australia differ slightly from those presented in the previous section because we use the 'narrow equal-split' series (see Section 2.1) and we report top 10% income shares rather than top 10 to 1% income shares to ensure comparability with estimates for the US and France reported by these two papers.

<sup>9</sup> Results for pre-tax national income presented in Appendix Figure B.5 also reveal stark differences.

<sup>10</sup> Our new series here provides additional compelling evidence to a growing consensus that the US remains (and is increasingly becoming) the outlier among its Anglosphere and OECD peers. To explain that trend, however, is beyond the scope of this paper.

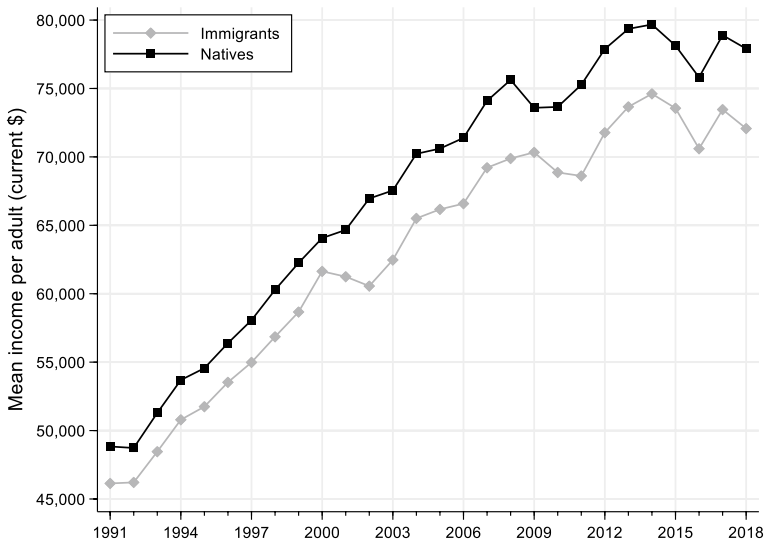


**Fig. 6** Average adult post-tax income by percentile income group: Australia, US and France 1991 & 2017. *Notes:* Distribution of post-tax national income (after all taxes and transfers) among adults. Narrow equal-split adults series (income of married couples divided by two). Comparisons are based on purchasing power parity (PPP) exchange rates (source: World Inequality Database). 2017 is the latest year for which estimates are available for all three countries

percentile of the income distribution, we plot the ratios of French and Australian incomes to US incomes. Thus, when the curve lies above one (i.e., the red line), incomes at those percentiles are higher than in the US. This exercise, with all its limitations, reveals that only those below the 15<sup>th</sup> percentile did better in Australia than in the US in 1991. By 2017, however, Australians below the 30<sup>th</sup> percentile have higher PPP-adjusted incomes than their US counterparts. There is a remarkable convergence of French and Australian distributions of post-tax national income, which by 2017 look very similar. Driving this convergence is the fact the Australian middle class has moved closer to the living standard of the US middle class, while the French middle class has moved farther away. The downward slopes indicate that as we go from the bottom to the top of the distribution, the differential initially in favour of Australia (and France) over the US reverses around the 30<sup>th</sup> percentile and keeps growing such that incomes at the top are markedly higher in the US. Thus, the majority of people in the US—the top 70%—are better off than their French and Australian counterparts.

### 5 Income levels and inequality disaggregated by demographic characteristics: an illustration with immigrant status

A valuable feature of the DINA series for Australia is that it is primarily based on survey data, which contains demographic information not typically available in administrative data sources such as tax records. Here, we exploit this extra richness of the survey data to shed further light on the distribution of national income across and within various population groups.



**Fig. 7** Mean post-tax national income per adult for immigrants and natives (1991–2018). *Notes:* Broad equal-split adults series (household income equally split among adults)

In what follows we consider immigrant status as illustrations of the value of this feature. We focus on the post-tax national income series based on the equal-splitting of household income between all adult members (i.e., the ‘broad equal-split series’).<sup>11</sup>

We first present and discuss differences in mean incomes before turning to the income shares of national income within each subgroup. Mean incomes are useful to show differences in levels across groups, regardless of the size of each group. Mean income is preferred over income shares because the latter are a reflection of both mean incomes and population shares. The income shares within each subgroup (e.g., among immigrants) are then presented to shed light on the levels and trends of inequality within each subgroup.

Approximately one-quarter of the Australian population is foreign-born. The ABS SIH data allow us to distinguish foreign-born and native-born individuals.<sup>12</sup> Figure 7 shows that mean post-tax national income is greater for native-born Australians than for immigrants throughout the 1991–2018 period. The gap increased after the 1990s to reach almost 8% (or about \$6,000) in 2018, compared to 6% (\$3,000) in 1991. This trend may in part reflect changes over time in the source-country composition of immigration, which has increasingly comprised people of diverse cultural and linguistic origins. Labour market conditions may also be part of the explanation. Strong labour market conditions in the 1990s may have contributed to immigrants closing the gap to natives, while the weak labour market of the

<sup>11</sup> See Fisher-Post et al. (2022) for a discussion of results by age, sex, education and area of residence (i.e., cities versus regional areas) and for results based on individualistic series.

<sup>12</sup> More detailed information on country of birth is available in some survey years, but not consistently across our period of analysis. Over this period, the source-country composition of immigrants shifted from predominately European countries to predominately Asian countries. As a result, while in 1991 approximately 64% of immigrants living in Australia were born in European countries and 20% were born in Asian countries, by 2021, the corresponding proportions were 30% and 43%, respectively (ABS 1993 and ABS 2021b).



**Fig. 8** Post-tax national income shares among immigrants and natives (1991–2018). *Notes:* Broad equal-split adults series (household income equally split among adults)

late 2000s and 2010s may have had the opposite effect. However, labour market conditions cannot explain why immigrants fared relatively badly in the early 2000s, when conditions were very favourable.

Figure 8 shows that income shares are, perhaps surprisingly given the mean income differences, similarly distributed among immigrants and among the native-born.

## 6 Conclusion

We have produced the first DINA estimates for Australia, spanning the period 1991 to 2018. Our estimates suggest Australia has a somewhat similar distribution to France, with both countries having considerably more equitable distributions but also lower PPP-adjusted incomes than the US. Australia has, however, had greater growth in inequality than France.

Significantly, our DINA estimates for Australia indicate that income inequality is lower and has increased less between 1991 and 2018 when all income as measured in the National Accounts is distributed to individuals compared with a focus on cash incomes as is conventional in household survey-based studies of income inequality.

In contrast to other DINA studies internationally, our reliance on household survey data to anchor our distributional analysis has allowed us to consider income differences between and within demographic groups. The analysis presented in this paper has only investigated these

differences in a cursory fashion, but clearly there is considerable potential to exploit this feature of our series in future research.

While in the long run it would be ideal to publish synthetic microfiles for public research consumption, the confidentiality requirements of ABS and ALife data access currently preclude this. However, detailed distributional information has been made available through the World Inequality Database website, <https://wid.world/>.

A further important future research direction is to attempt to extend the DINA estimates back to earlier years. Unit record income survey data is sparser prior to the 1990s, and indeed non-existent prior to 1975. Similarly, unit record tax data only extends back to 1991. Methods for producing DINA estimates will therefore need to rely on more aggregated forms of data, such as the tax tables used to produce the original (cash income) top income shares for WID.

Further refinement of Australian DINA estimates is also possible and should be a priority for further research. For instance, our assumption that in-kind income from government expenditure is equally distributed across the population is consequential but almost certainly not accurate. On balance, government expenditure is likely to be progressive in its effects, as evidenced by the ABS in its periodic ‘fiscal incidence’ studies (ABS, 2018). However, while it is easy to come up with alternative choices and assumptions, implementation is often impeded by the lack of data. In addition, further refinements should ideally occur through refinements and extensions to the DINA guidelines in order to facilitate comparability of DINA estimates across countries.

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**Data availability** Information on the Australian Bureau of Statistics’ (ABS) Survey of Income and Housing (SIH) is available at <https://www.abs.gov.au/statistics/detailed-methodology-information/concepts-sources-methods/survey-income-and-housing-user-guide-australia>.

Information on the Australian Tax Office (ATO) Longitudinal Information Files (ALife) is available at <https://alife-research.app/info/overview>.

The pre- and post-tax income distribution estimates of this article are available in the World Inequality Database at <https://wid.world/>.

## Declarations

**Ethical approval** This research did not contain any studies involving animal or human participants, nor did it take place on any private or protected areas.

**Competing interests** The authors declare no competing interests.

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