



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 adjusting to match National Accounts aggregates. From these estimates, we are able to rigorously document the shifts in income shares over the period, contrasting changes in the distribution of pre-tax and post-tax national income. Comparing Australia to the US and to France, we also compare our new results to traditional household survey-based estimates of inequality. Moreover, we exploit the richness of our unique microdata to shed light on the distribution of national income across and within various population groups not usually identifiable in the tax datasets that underpin reliable top-income estimates. Among our most surprising findings, inequality of post-tax national income is less than inequality of survey-based (post-transfer, disposable) income for Australia. The gender gap in income has stubbornly remained over the past three decades. Finally, we find that Australian inequality of national income is much lower than that of the United States, while it is similar to that of France, although those at the bottom of the income distribution fare better in France than in Australia.

Keywords: income inequality, national accounts.

JEL: D31, D33, E01.

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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 adjusting to match National Accounts aggregates. From these estimates, we are able to rigorously document the shifts in income shares over the period, contrasting changes in the distribution of pre-tax and post-tax national income. Comparing Australia to the US and to France, we also compare our new results to traditional household survey-based estimates of inequality. Moreover, we exploit the richness of our unique microdata to shed light on the distribution of national income across and within various population groups not usually identifiable in the tax datasets that underpin reliable top-income estimates. Among our most surprising findings, inequality of post-tax national income is less than inequality of survey-based (post-transfer, disposable) income for Australia. The gender gap in income has stubbornly remained over the past three decades. Finally, we find that Australian inequality of national income is much lower than that of the United States, while it is similar to that of France, although those at the bottom of the income distribution fare better in France than in Australia.

Key words: income inequality, national accounts.

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1. Introduction

A recent literature led by researchers affiliated with the World Inequality Database (Atkinson and Morelli 2018; Bozio et al. 2018; Garbinti et al. 2018; Piketty et al. 2018, 2020; Piketty et al. 2019) 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. The guiding principle for these ‘Distributional National Accounts’ 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 more accurate picture of the distribution of income is possible compared with traditional inequality studies using household survey or tax records data, which typically only capture cash incomes, thereby missing important components such as in-kind benefits from government-provided goods and services, imputed rents on owner-occupied housing, and retained earnings of companies. 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.¹ 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 nature of the available data, including the relative strengths and weaknesses of alternative 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

¹ This paper builds on earlier work by Fisher-Post (2020).

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 from its biannual household income survey with the household income account of the National Accounts data (most recently in 2021; see ABS 2021a). 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 WID 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.

2. Distributing national income to individuals

In building the Distributional National Accounts (DINA) for Australia, we follow approaches taken to produce DINA estimates for, *inter alia*, France, the US and China (Garbinti et al. 2018; Piketty et al. 2018; Piketty et al. 2019), as well as the Distributional National Accounts 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. Following the DINA Guidelines, 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 describe the methods and data used to produce each income distribution.

2.1. Pre-tax factor income

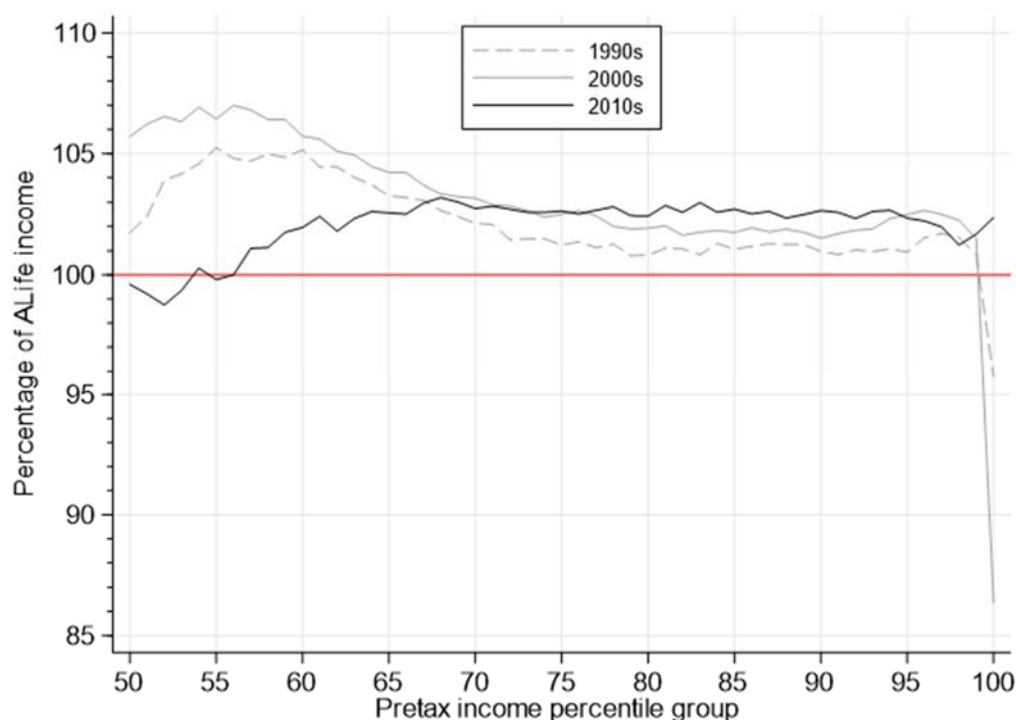
2.1.1. Pre-tax cash incomes

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. The SIH provides the longest time span of coverage for income survey data in Australia, the main other survey source being the Household, Income and Labour Dynamics in Australia (HILDA) Survey, a panel study that commenced in 2001.²

For pre-tax cash incomes of individuals, based on exploratory work with 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 adjust incomes for the top 1%. This is because the tax data appear inferior in income capture for most of the distribution (see Figure 2.1). Although non-labour income is higher in ALife than in the SIH for people with above-median incomes (see Figure 2.3), it is not enough to compensate for the undercoverage of labour income evident in Figure 2.2.

² The ABS has also conducted surveys that collected household income data (for which in unit record data is still available) in 1975, 1982, 1986 and 1990. Unfortunately, unit-record tax data is not available prior to 1991, but further extension back to the mid 1970s may be possible using tabulations of tax data and the household survey data that is available. Prior to the mid 1970s, the only broad-based distributional information comes from income tax tables. At this stage, we leave DINA estimation prior to the 1990s as a task for future research.

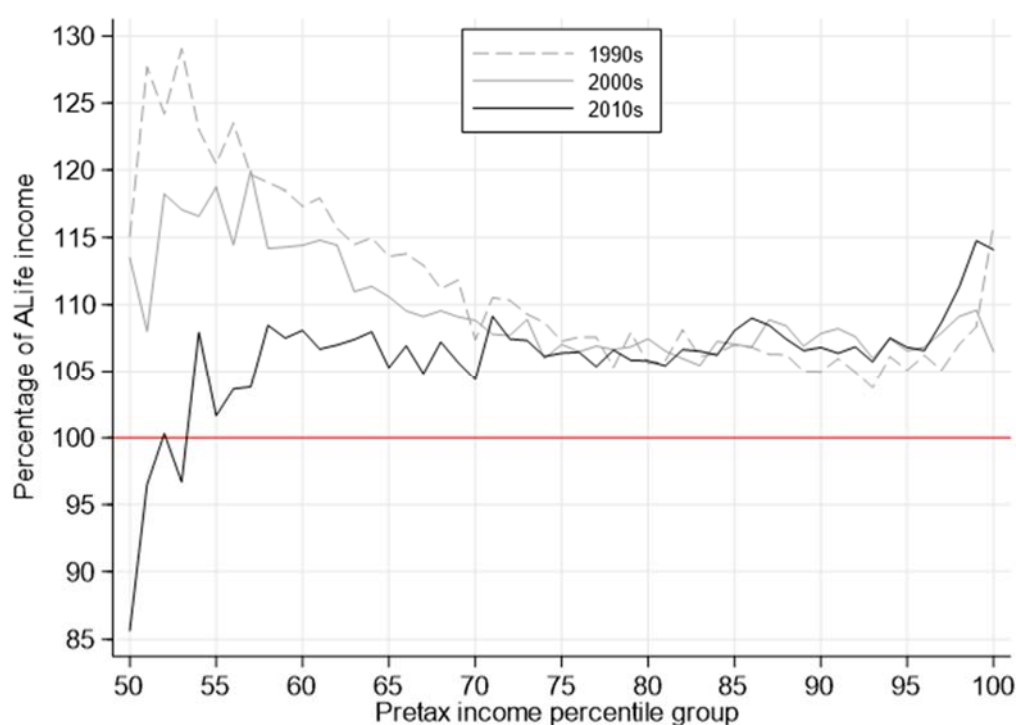
Figure 2.1: SIH survey data relative to ALife tax data income by percentile – Pre-tax income



Source: Authors' calculations based on ALife and SIH data.

Stata graph `DINAvsSIH_check_pretax_deca`

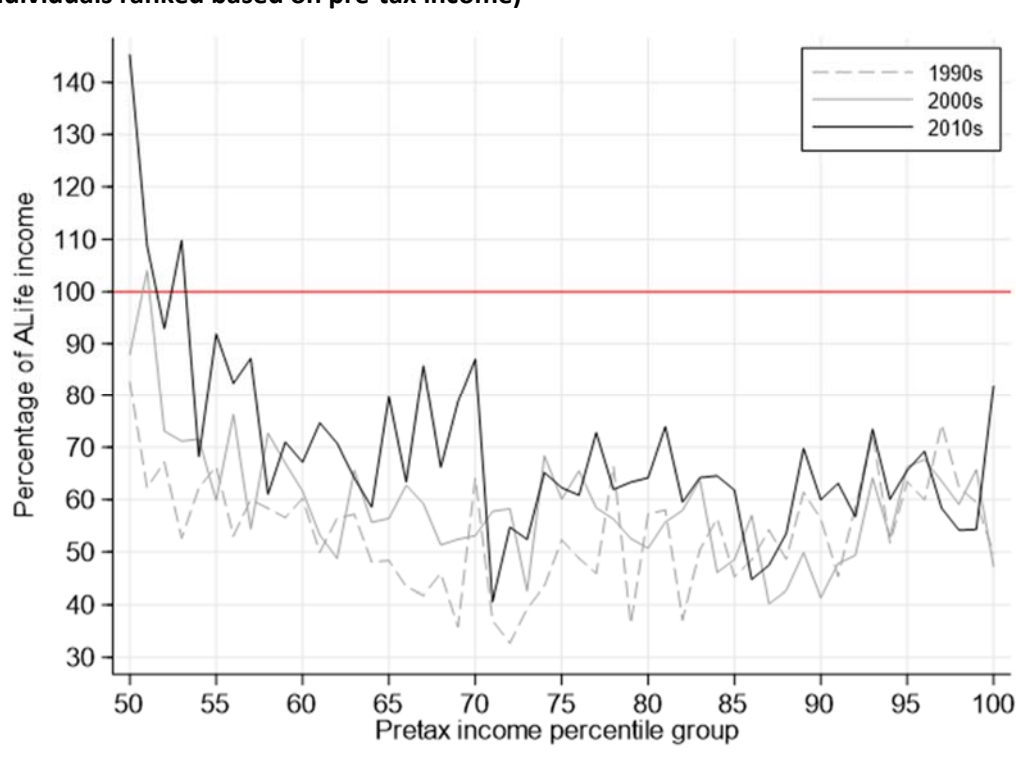
Figure 2.2: SIH survey data relative to ALife tax data by percentile - Labour income (with individuals ranked based on pre-tax income)



Source: Authors' calculations based on ALife and SIH data.

Stata graph `DINAvsSIH_check_labour_deca`

Figure 2.3: SIH survey data relative to ALife tax data by percentile – Non-labour income (with individuals ranked based on pre-tax income)



Source: Authors' calculations based on ALife and SIH data.

Stata graph *DINAvsSIH_check_nonlabour_deca*

Up until 2015-16, the SIH unit record data contain measures of both annual income (for the preceding financial year, 1 July to 30 June) and 'current weekly' income. We use the annual income estimates for these surveys. However, in the 2017-18 SIH, only current weekly income is available. We therefore use an annualised measure of this income measure for this survey.

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, and in Australia's case, survey data is preferable to tax records data for all but the top 1%.

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%. Burkhauser et al. (2012) found the US CPS matched income tax data up to the 99th percentile, and Burkhauser et al. (2018) similarly found the UK HBAI matched income tax data up to the 98th percentile. 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. Regardless of the explanation, the fact remains that macroeconomic aggregates are better

captured when income survey data is used for the bottom 99% and tax data is only used for the top 1%.

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 (including equivalised disposable cash incomes), income units (including the household unit) as well as information on wealth. That said, we focus on the four income concepts described in the DINA Guidelines.

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 consider two alternatives. First, we build ‘individualistic series’, which assume no sharing within households and distribute income to each person individually according to individual earnings and ownership. This is a useful comparison point with the ‘broad equal-split series’ when we further breakdown income shares by individual characteristics. Second, we 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; see below) 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 national income price index 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.

Top 1%: combining survey and tax data

As a growing literature has shown, survey data tend to undercover top incomes. Comparison of survey and tax data has revealed that this is the case in Australia too (Burkhauser et al. 2016) and that it mostly affects the top 1%. 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.³

To implement this method, we first rank individuals in the ALife unit record data by their 'tax gross income', which is total income subject to taxation prior to any allowable deductions or rebates. This is the closest variable to 'pre-tax income' available in the tax records data. Second, we select individuals in the top 1%, using the ABS estimate of the total adult population shown for the relevant year. Next, we allocate top 1% individuals to income groups, with the size of each group equal to $1/100,000^{\text{th}}$ of the total adult population, meaning we split the top 1% into 1,000 income groups. Third, we calculate the average income for each income group. Next, we repeat the first and second steps with the SIH data for the same year using our derived measure of individual gross income. We then duplicate each record according to its sample weight. Finally, for each of the 1,000 SIH income groups within the top 1%, we replace the individual-level SIH incomes with the mean income of the corresponding group in ALife.

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. An alternative assumption would be to use the income composition as determined by the survey data, but this tends to underestimate the importance of capital income for the top 1%. 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 of 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.

2.1.2. Labour income

Grossing up of labour incomes is required because of potential under-reporting in SIH as well as the failure of the SIH to capture (all of) salary sacrificed employment income, fringe benefits and fringe benefits tax, and 'employer social contributions' (i.e., employers' superannuation contributions and workers' compensation premiums). Employee incomes are grossed up by a constant factor so that total employee income in the SIH equals total employment income in the National Accounts.

Mixed income is grossed up separately, also by a constant factor. ABS National Accounts data do not report *net* mixed income. We therefore estimate net mixed income based on *gross* mixed income,

³ A few preliminary adjustments to ALife data are required: see Appendix A.1.

which is reported in the National Accounts data, by applying net-to-gross ratios for mixed income sourced from the WID for Australia.⁴

All grossing-up factors are provided in Appendix Table A.2. Total employee incomes have to be increased by between 10% and 26% to ensure consistency with National Accounts. The required increase is much larger and more volatile from year to year for mixed income, ranging from 25% to 226%, depending on the year.

2.1.3. Capital income

Capital income is estimated based on reported business and investment income and imputed rent. A ‘grossing up’ adjustment is done separately for each of superannuation, imputed rent and other capital income. The principle is that superannuation income is imputed based on observed or estimated superannuation balances. Net operating surplus of households and non-profit institutions serving households (NOSH) is distributed based on imputed rent. The remaining (i.e., non-pension non-imputed-rent) capital incomes not captured by the SIH are distributed according to reported non-pension non-imputed-rent capital incomes (hereafter called ‘other capital income’).

From the total capital stock (“National net wealth”) as measured in the National Accounts, we compute the share of the capital stock in superannuation funds (“Pension funds & life insurance”) and then use that share to allocate the appropriate proportion of total private capital income (other than NOSH) accruing to superannuation funds. The implicit assumption is that returns on superannuation are the same as the overall return on the national private capital stock. Total private capital income is obtained here from the National Accounts by adding “total net property income of households and non-profit institutions serving households” and “total net primary income of corporations”.

Superannuation income, NOSH and other capital incomes are thus allocated to each individual separately.

Superannuation income

We impute superannuation income proportionally to each individual’s superannuation balance. We use superannuation balances from the SIH for all years for which they are available (2003/04, 2005/06, 2009/10, 2011/12, 2013/14, 2015/16 and 2017/2018). For the years not covered by the

⁴ Alvaredo et al. (2020) discuss the disaggregation of total depreciation (consumption of fixed capital, CFC) where its components are missing in the official National Accounts statistics: A share of the total CFC corresponds to each component of gross operating surplus in the gross domestic product (viz. gross corporate operating surplus, gross mixed income, gross household operating surplus, and gross government operating surplus). Refer to <https://wid.world/> for data and methodology.

SIH, we estimate superannuation balances separately for those aged 60 and over and those aged under 60.

For those aged under 60, we estimate a regression model of superannuation balances on age, labour income and sex (as well as interactions). For those aged 60 and over, the model is enriched by including superannuation income. The coefficient estimates (see Appendix A.3) are then used to impute superannuation balances in the SIH data for years with no information, by using the set of estimated coefficients from the closest year available. This means that superannuation balances from 1991 to 2002 are all estimated based on the 2003 model. This approach is likely to generate some prediction errors. However, we note that superannuation wealth was limited in the 1990s, since compulsory contributions only commenced in 1992, initially at only 3% of gross earnings and gradually increased up to 9% as of 1 July 2002.⁵ Moreover, it is the relative distribution of superannuation balances that matters for imputation and not the absolute values, and relativities by labour income, age and sex are likely to have remained relatively stable between 1991 and 2003.

Net operating surplus of households and non-profit institutions serving households (NOSHN)

ABS National Accounts data report only gross and not net operating surplus of households and non-profit institutions serving households. We use the share of the consumption of fixed capital attributable to operating surplus in NOSHN from the WID Australian National Accounts data (see footnote 5 above) to derive net operating surplus from the ABS National Accounts data on gross operating surplus.

We then impute NOSHN proportionally to each household's net imputed rent. Where a household comprises more than one adult, the income is equally split. Gross and net imputed rents are directly provided in the SIH from 2005 onwards.⁶ For earlier years, we predict gross and net imputed rents. Using 2005 values, we estimate a model to predict gross imputed rents based on reported tenure type, state of residence, area of residence, number of bedrooms, household gross income decile and landlord type. The approach draws heavily on the approach developed by the ABS (ABS 2008a). For net imputed rent, all covariates listed above are interacted with (predicted) gross imputed rent and we add mortgage repayments and predicted gross imputed rent to the list of covariates. Coefficient estimates are reported in Appendix A.4. All models are estimated with and without tenure type as this variable was not available before 1995 in the SIH and thus cannot be used for imputation before

⁵ The minimum contribution rate is now 10% and is scheduled to gradually increase up to 12% by 1 July 2025.

⁶ According to the ABS (2008b, p.3), 'Gross imputed rent is the market value of the rental equivalent, and has been estimated using hedonic regression. Net imputed rent for owner occupiers has been derived by subtracting the housing costs normally paid by landlords (i.e., council rates, mortgage interest, building insurance premiums, repairs and maintenance) from gross imputed rent.'

that year. These models fit the data well with the adjusted R-square 0.97 for gross imputed rent and 0.69 for net imputed rent.

Other capital income

Other capital income has two components: that captured by SIH and that not captured by SIH, the latter of which is a residual equal to total capital income⁷ from the National Accounts minus superannuation income from the National Accounts minus non-pension capital income as measured in SIH. This non-captured capital income will primarily comprise corporate retained earnings. We distribute it assuming it has the same distribution as observed other (non-superannuation non-imputed rent) capital income. We take the same approach for adding foreign income received from tax havens and reinvested earnings on foreign portfolio investment. The latter captures retained earnings in foreign firms accruing to Australians whose shares comprise less than the 10% foreign direct investment threshold required to appear in the National Accounts. We use WID estimates of foreign income received from tax havens and reinvested earnings on foreign portfolio investment (see Zucman 2013).

Grossing-up factors reported in Appendix Table A.2 indicate that this captured capital income has to be multiplied by a factor of between 2 and 4.3 to match National Accounts totals.

2.1.4. Taxes on production

As Alvaredo et al. (2020) show, a pre-tax income measure not only requires that income taxes are not deducted from capital and labour income, but that taxes on production (and taxes on wealth, if they exist) need to be *added* to incomes to ensure all of national income is distributed to individuals. As per the guidelines, taxes on production are assumed to have the same distribution as total factor income. This is somewhat arbitrary, but means pre-tax income distributions among those with factor incomes are unaffected by these taxes other than via a scaling up factor applied to all incomes. Inequality measured over the total population increases, however, because people with zero factor incomes become relatively poorer.

2.2. Pre-tax national income

Following the approach adopted for the French DINA by Garbinti et al. (2018) and US DINA by Piketty et al. (2018), as well as the DINA Guidelines, we include the Age Pension as income to produce pre-tax national income. This presents no major difficulty as the Age Pension is reported in the SIH.⁸ We

⁷ Total capital income is defined here as 'total net property income of households and non-profit institutions serving households' plus 'total net primary income of corporations'.

⁸ Age Pension income is not directly reported in ALife, but we can combine information on receipt of government pensions and age to infer it. In addition, we use ALife only for the top 1%, a group almost certain not to receive the Age Pension given that it is subject to both an income test and an asset test.

distribute the total cost of Age Pension payments as a flat percentage of income tax liabilities. That is, we assume each individual's contribution to the funding of the Age Pension is in proportion of their income tax liabilities.

2.3. Post-tax disposable income

To move from pre-tax national income to post-tax disposable income requires deducting all taxes and adding all government cash transfers to individuals' pre-tax incomes. Deducting income taxes and adding cash transfers is straightforward since both are recorded in the SIH and ALife data. However, both income taxes and cash transfers need to be scaled up to match National Accounts totals.

As noted in the DINA guidelines (Alvaredo et al., 2020, p. 53), the aim is to "to describe post-tax, post transfer inequality for the population's actual perceived budget constraints, while excluding in-kind transfers such as health and education and other public spending (as these may impact purchasing power and disposable income only indirectly). For this reason, aggregate post-tax disposable income can be substantially less than aggregate national income."

Government pensions and allowances, as well as income taxes, are distributed according to the survey (and tax) data. For taxes on production (indirect taxes), which were distributed proportionally to factor income in pre-tax series, the DINA Guidelines advocate they are removed in proportion to *consumption*, proxied by disposable income (before the deduction of taxes on production) minus saving (where savings rates are based on external sources). In the absence of data on savings rates by level of income, we simply remove production taxes proportionally to household disposable income (as defined in the SIH).⁹ Corporate taxes are imputed proportionally to capital incomes after excluding imputed rent.

⁹ A potential refinement for future work is to estimate expenditure regression models using the ABS Household Expenditure Survey data (collected in 1993, 1998, 2003, 2009 and 2015) to impute household expenditure as a function of income (and perhaps other factors) and use this to distribute taxes on production.

2.4. Post-tax national income

Moving from post-tax disposable income to post-tax national income requires distributing government expenditure to individuals. This corresponds to total expenditure of the government adjusted for the surplus or deficit of the government (Alvaredo et al., 2020, p. 64). The DINA Guidelines' definition of government surplus or deficit differs from the usual definition "due to the exclusion of other current transfers and capital transfers" (Alvaredo et al., 2020, p51). Thus the government surplus or deficit is defined as net saving plus net other current transfers.

Three alternative approaches to distributing government expenditure are recommended by the DINA Guidelines: (1) assume health expenditures benefit all adults equally but that the benefits of other expenditures are proportional to disposable income; (2) assume everyone benefits equally from all government expenditure; and (3) assume the benefits of government spending are distributed in the same way as disposable income. The third approach means government spending can effectively be ignored since it doesn't affect the distribution other than to scale up everyone's income by the same fraction. Interestingly, the Guidelines do not allow for a scenario where government spending is redistributive.

In Australia, the biggest expenditure items—health and education—are somewhat redistributive to lower-income individuals (ABS, 2018, Table 1.1). Consequently, of the approaches the guidelines recommend, the most appropriate approach for the Australian context is Approach (2). This means average government expenditure per adult is added to disposable income. This acts to lower measured inequality compared with post-tax disposable income, but nonetheless is likely to overstate benefits to high-income earners and understate benefits to low-income earners and thus not reduce measured inequality as much as it should.

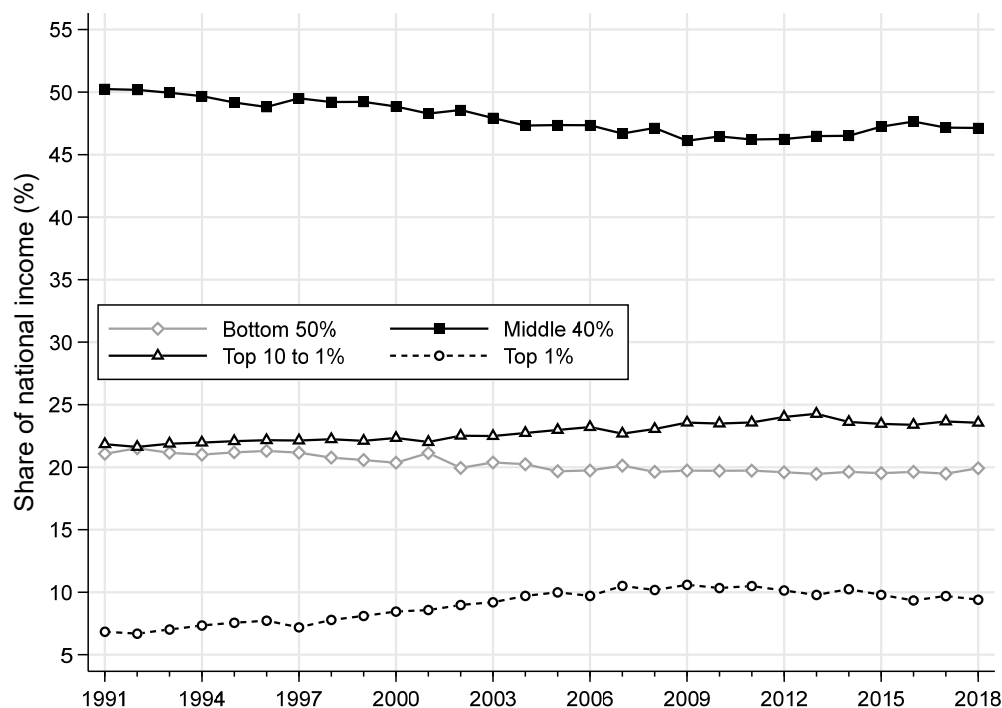
3. Inequality in Australia 1991-2018

3.1. Pre-tax national income

Figure 3.1 presents estimated shares of pre-tax national income over the 1991 to 2018 period of the bottom 50%, top 50% excluding the top 10% (referred to as the 'middle 40%'), top 10% excluding the top 1%, and the top 1%. As noted, this 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 middle 40% 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).¹⁰

Figure 3.1: Pre-tax national income shares 1991-2018



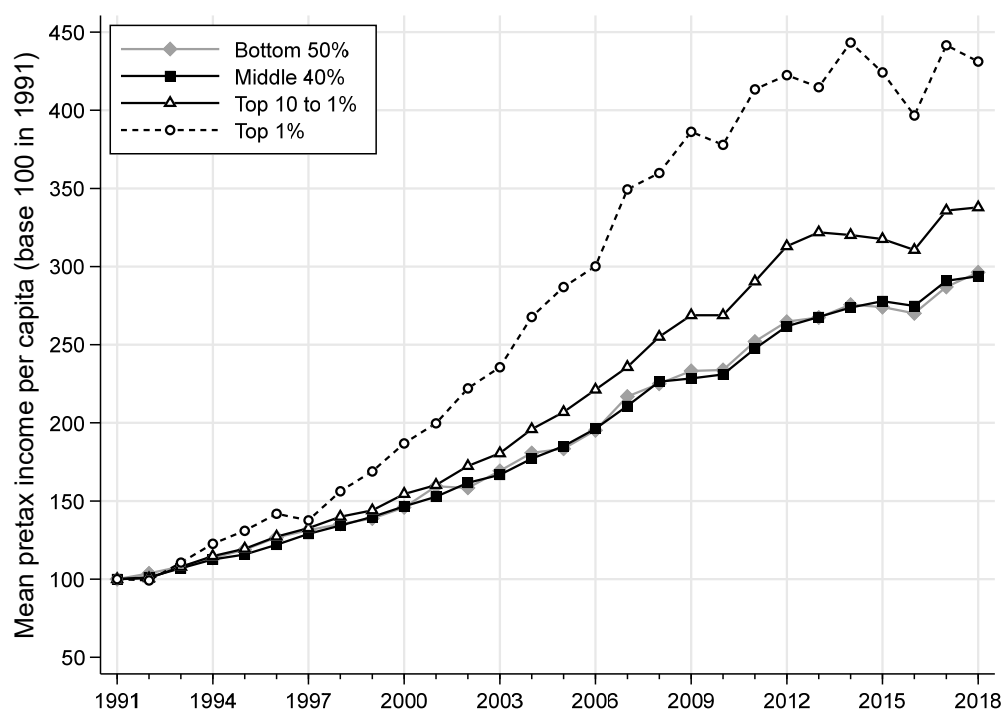
Notes: Distribution of pre-tax national income (before all taxes and transfers, except age pensions) among adults. Broad equal-split adults series (household income equally split among adults).

Stata graph pretax_split2_incs_h_a

Figure 3.2 compares the changes in mean income per adult of each of the four income groups examined in Figure 3.1. Since 1991, the mean 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%.

¹⁰ Data Appendix F (to be made available online) contains series (in Stata files) that describe thresholds, averages and shares for each of the 127 'generalised percentiles' (or g-percentiles) for each income concept, as recommended by the DINA Guidelines.

Figure 3.2: Mean adult pre-tax national income by income group 1991-2018



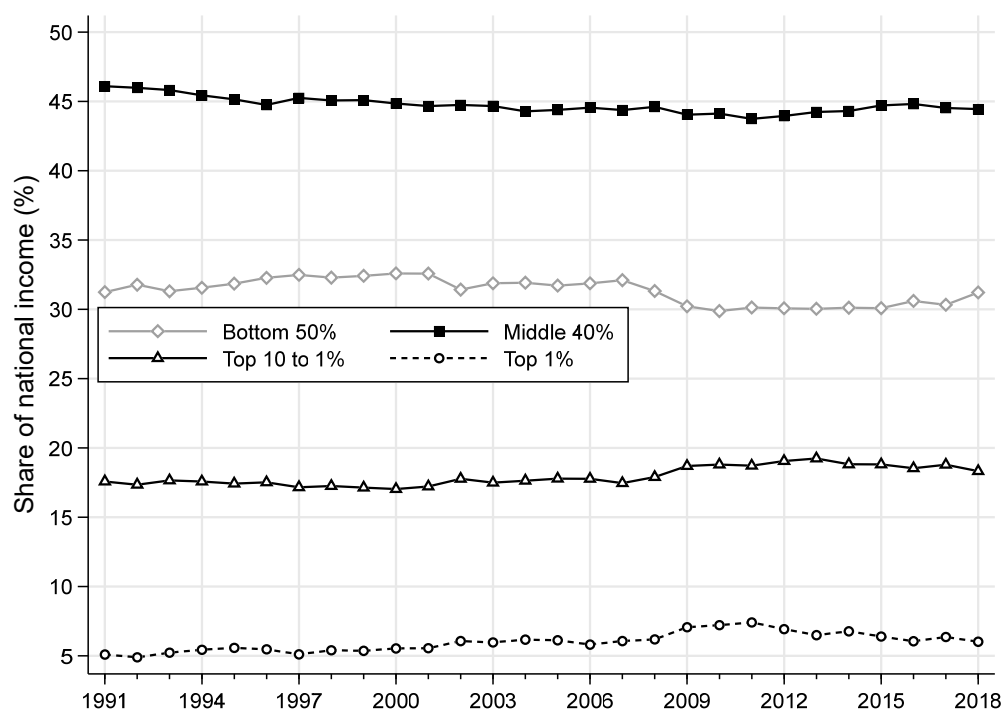
Notes: Distribution of pre-tax national income (before all taxes and transfers, except age pensions) among adults. Broad equal-split adults series (household income equally split among adults). Index based on mean incomes in current dollars.
Stata graph pretax_mean_split2_index_a

3.2. Post-tax national income

Figures 3.3 and 3.4 present the same information as Figures 3.1 and 3.2, but for post-tax national income. This provides information on the distribution across individuals of ‘beneficial receipt’ of total income in the National Accounts. The relative rise in top income shares is less pronounced for this income measure, but notable is that the income share of the bottom 50%, after rising slightly between 1991 and 2007, subsequently fell to 2010, and has largely not recovered.

Consistent with the findings of Figure 3.3, Figure 3.4 shows differences in income growth across the four income groups are more subdued for post-tax national income than for pre-tax national income.

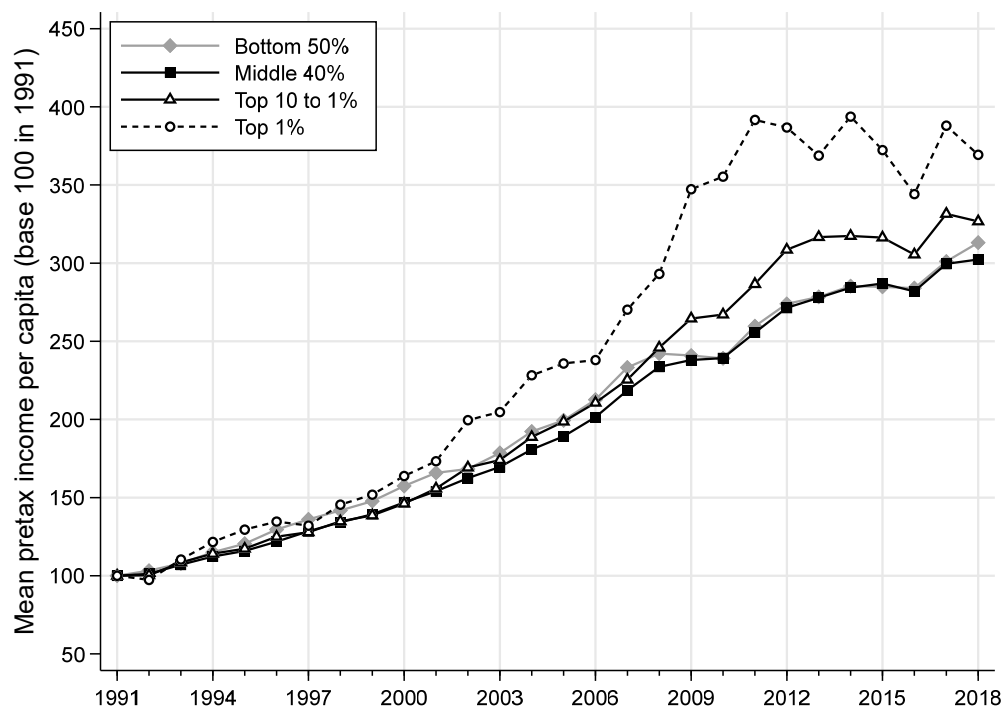
Figure 3.3: Post-tax national income shares 1991-2018



Notes: Distribution of post-tax national income (after all taxes and transfers) among adults. Broad equal-split adults series (household income equally split among adults).

Stata graph ptninc_split2_incsch_a

Figure 3.4: Mean adult post-tax national income by income group 1991-2018

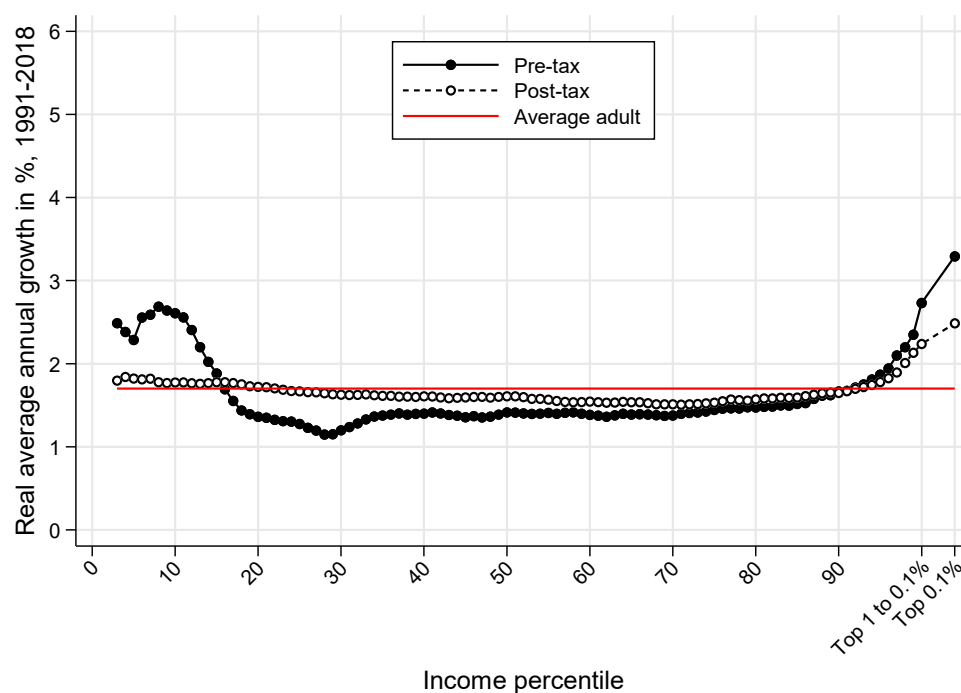


Notes: Distribution of post-tax national income (after all taxes and transfers) among adults. Broad equal-split adults series (household income equally split among adults). Index based on mean incomes in current dollars.

Stata graph ptninc_split2_mean_index_a

Figure 3.5 brings pre-tax and post-tax income series together to examine real income growth by percentile income group from 1991 to 2018. The figure reveals that, 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 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.

Figure 3.5: 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.
Stata graph DINA_percgrowth_split2_1991-2018

4. International comparisons: Australia, US and France

4.1. Pre-tax national income

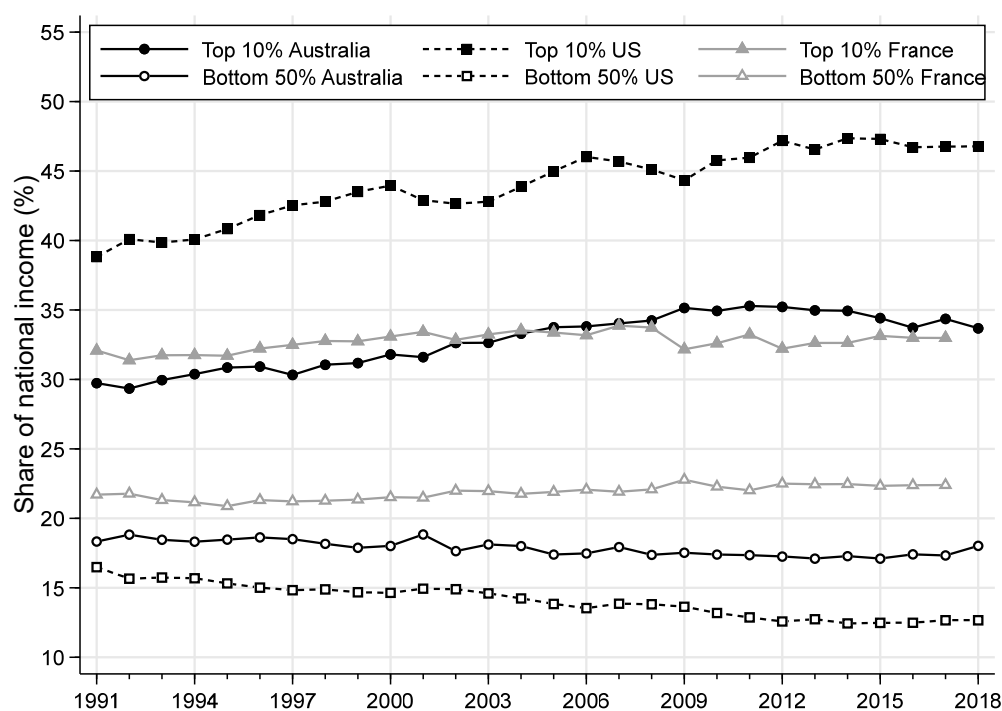
In this section we compare US, French and Australian income shares of four income groups: top 1%, top 10%, top 50% to 10% ('middle 40%') and bottom 50%.¹¹ Figures 4.1 and 4.2 examine pre-tax national income, the first figure examining the top 10% and bottom 50% and the second figure the top 1% and middle 40%. The top 10% income share is considerably higher in the US than in Australia and France, which have similar top 10% income shares. The income share of the top 10% has also risen considerably in the US. It has also risen in Australia, albeit to a smaller degree, while it has remained relatively stable in France, such that the top 10% income share has gone from being somewhat higher in France than in Australia in the early 1990s to slightly lower in the late 2010s. Similar patterns are evident for the top 1% in Figure 4.2, although the income share of the top 1% in France remains slightly above that of the top 1% in Australia throughout the 1991 to 2018 period.

For the bottom 50%, France and Australia are again relatively similar and somewhat different to the US. However, there is a slight but steady rise in the income share of the bottom 50% in France from the mid 1990s, compared with a slight decline in Australia. Across the entire period, the 'middle 40%' (top 50% to 10%) has had the highest income share in Australia and lowest income share in the US. In all three countries, this income group has experienced a decline in income share, with the drop greatest in the US and smallest in France.

In Figure 4.3, 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 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 the Australian (and French) pre-tax income levels are lower than their US counterparts for all adults above the median. For the bottom 50%, there has been a tremendous catch-up by Australia with respect to the US between 1991 and 2017. Worth noting is that French income levels are substantially higher than in the US for the bottom 50% in 2017 (and the bottom 35% in 1991).

¹¹ Results for Australia differ slightly from those presented in the previous section because we use the 'narrow equal-split' series in the comparison with the US and France to ensure comparability with these countries' estimates (see Section 2.1).

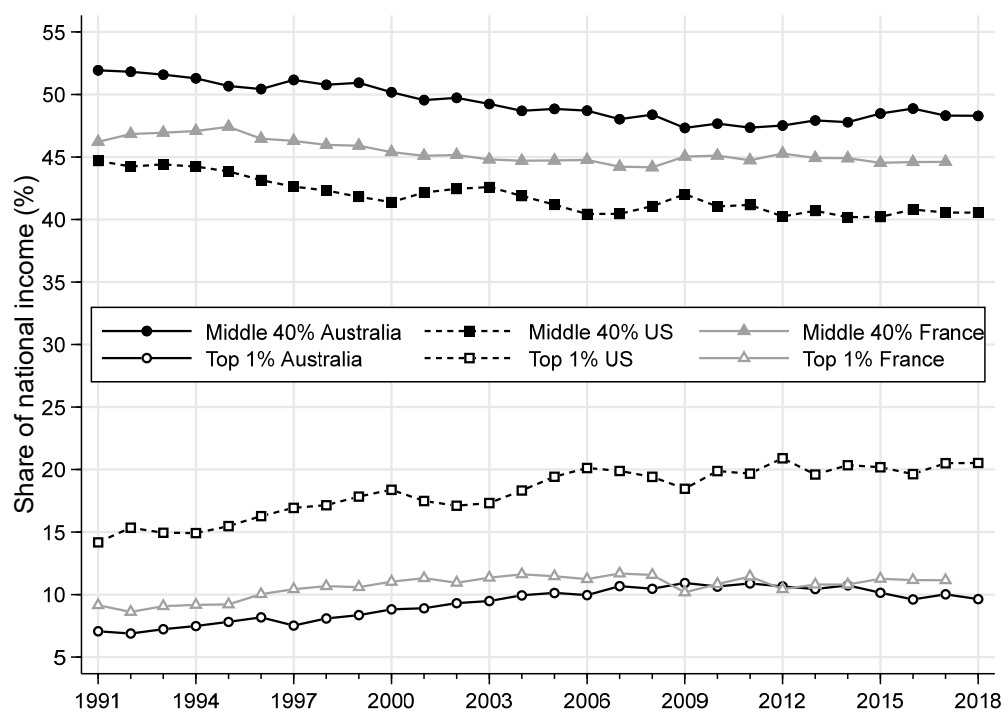
Figure 4.1: Top 10% and bottom 50% income shares: Australia, US and France 1991-2018



Notes: Distribution of pre-tax national income (before all taxes and transfers, except age pensions) among adults. Narrow equal-split adults series (income of married couples divided by two).

Stata graph intcomp_pretax_sh1

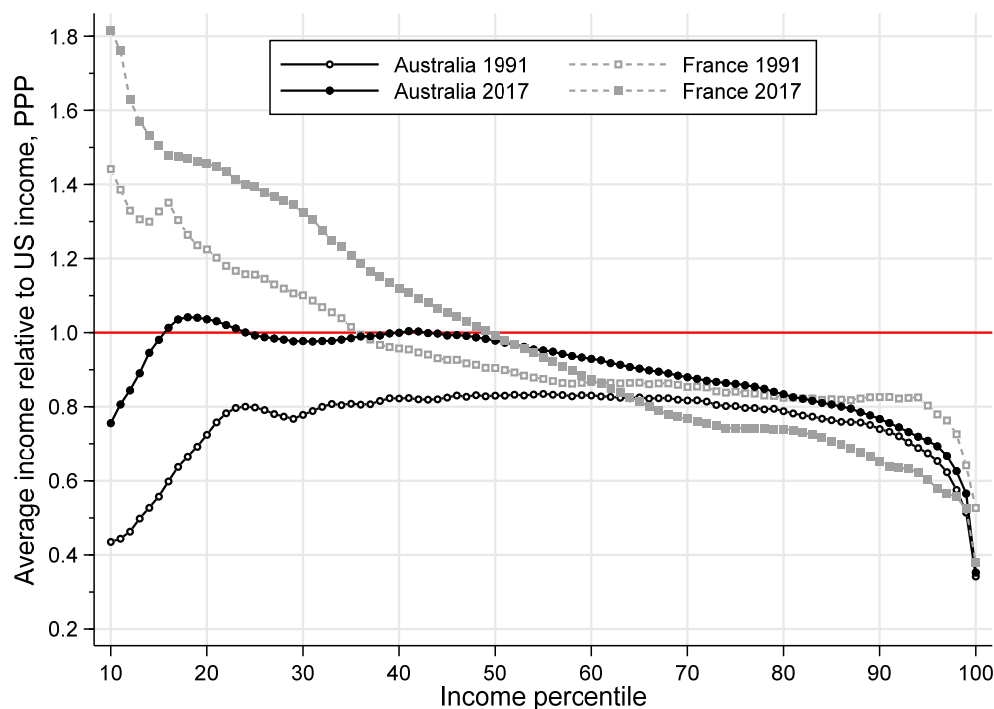
Figure 4.2: Top 1% and middle 40% income shares: Australia, US and France 1991-2018



Notes: Distribution of pre-tax national income (before all taxes and transfers, except age pensions) among adults. Narrow equal-split adults series (income of married couples divided by two).

Stata graph intcomp_pretax_sh2

Figure 4.3: Average adult pre-tax income by percentile income group: Australia and France relative to the US, 1991 & 2017



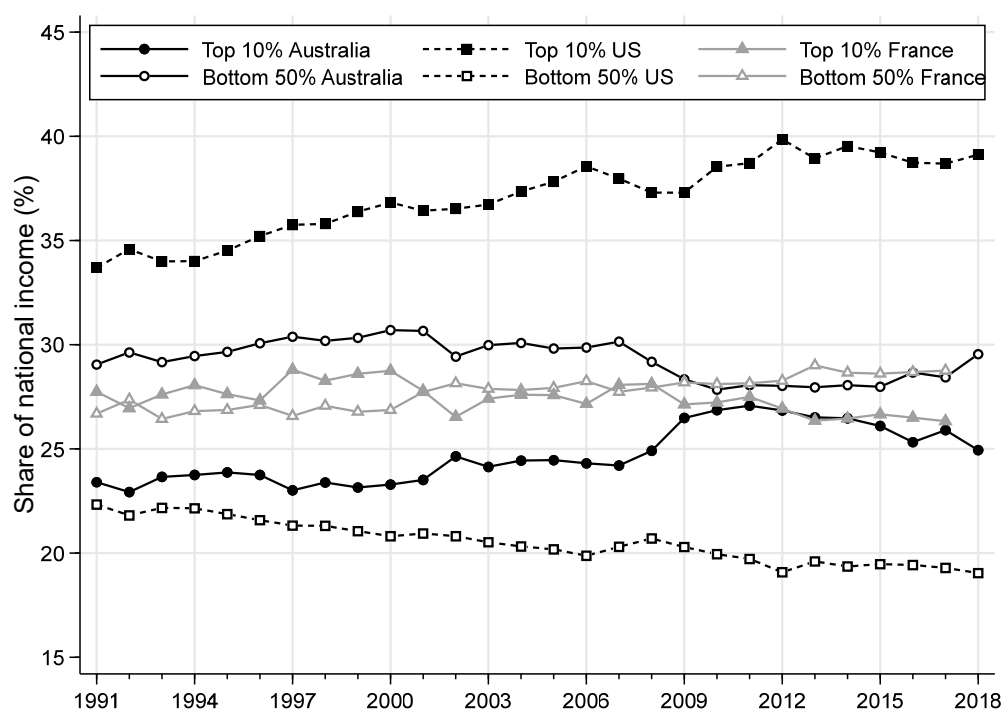
Notes: Distribution of pre-tax national income (before all taxes and transfers, except age pensions) among adults. Narrow equal-split adults series (income of married couples divided by two). Comparisons are based on purchasing power parity (PPP) exchange rates (source: World Inequality Database). 2017 is the latest year for which estimates are available for all three countries.

Stata graph intcomp_pretax_perc_1991_2017

4.2. Post-tax national income

Comparisons across the US, France and Australia in the distribution of post-tax national income are presented in Figures 4.4 and 4.5. Differences across the three countries are stark. The top 10% in the US received nearly 34% of income in 1991, and this had risen to nearly 39% in 2018. In France, the top 10% received approximately 27% of income in 1991 and this share fell slightly to approximately 26% in 2018. In Australia, the top 10% income share was approximately 23% between 1991 and 2001, but then increased to nearly 26% in 2010 and subsequently declined only slightly. For the top 1% (Figure 4.5), the US again has a much higher income share and greater growth in the income share than France and Australia. The top 1% share is higher in France than in Australia, with the gap being approximately 2 percentage-points in 1991 as well as in the most recent years.

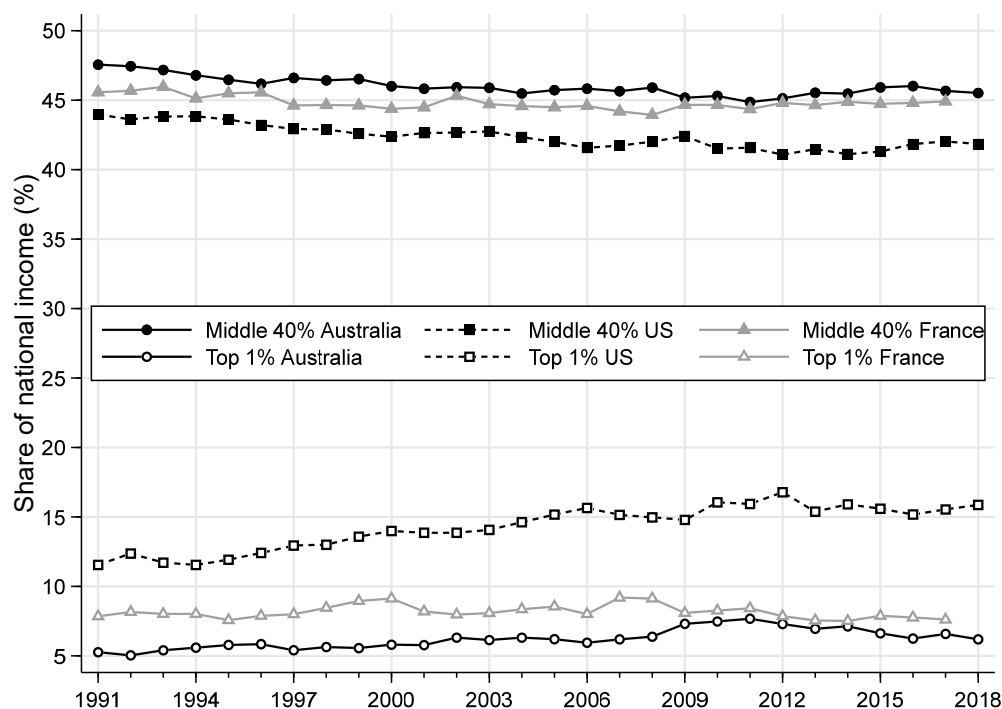
Figure 4.4: Top 10% and bottom 50% income shares: Australia, US and France 1991-2018



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).

Stata graph intcomp_ptninc_sh1

Figure 4.5: Top 1% and middle 40% income shares: Australia, US and France 1991-2018

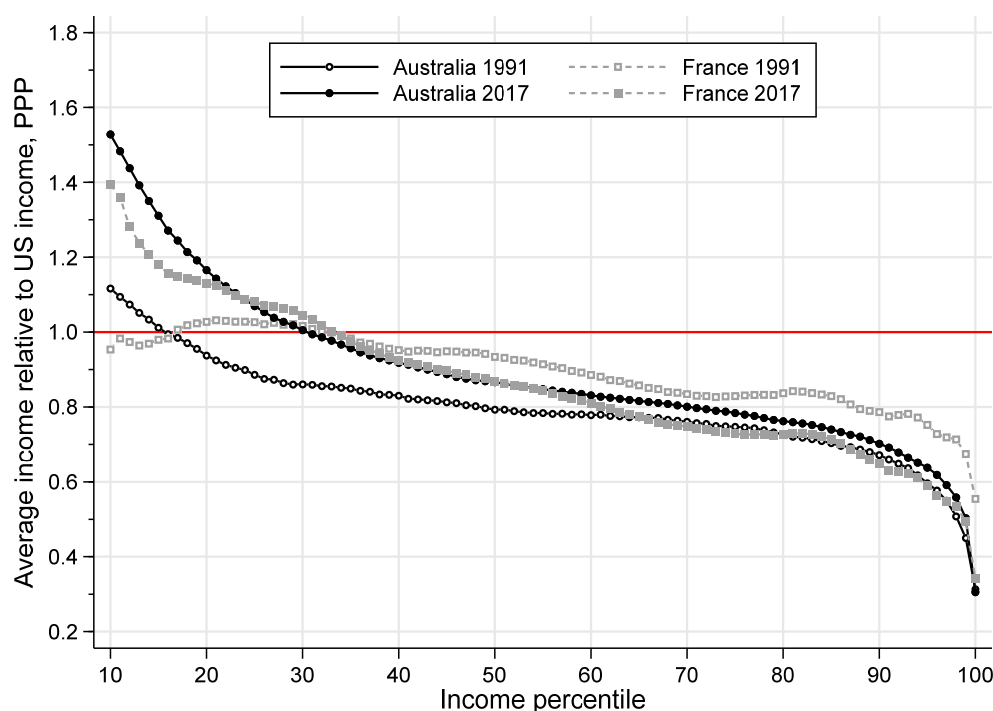


Notes: Distribution of post-tax national income (after all taxes and transfers) among adults. Narrow equal-split adults series (income of married couples divided by two).

Stata graph intcomp_ptninc_sh2

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 France and Australia, but a considerable decline for the US. At the end of the period, the income share of the bottom 50% was 33% in Australia, 29% in France and 19% in the US. For the middle 40%, income shares are very similar across the three countries, although across the entire period, France 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.

Figure 4.6: 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.
Stata graph intcomp_pretax_perc_1991_2017

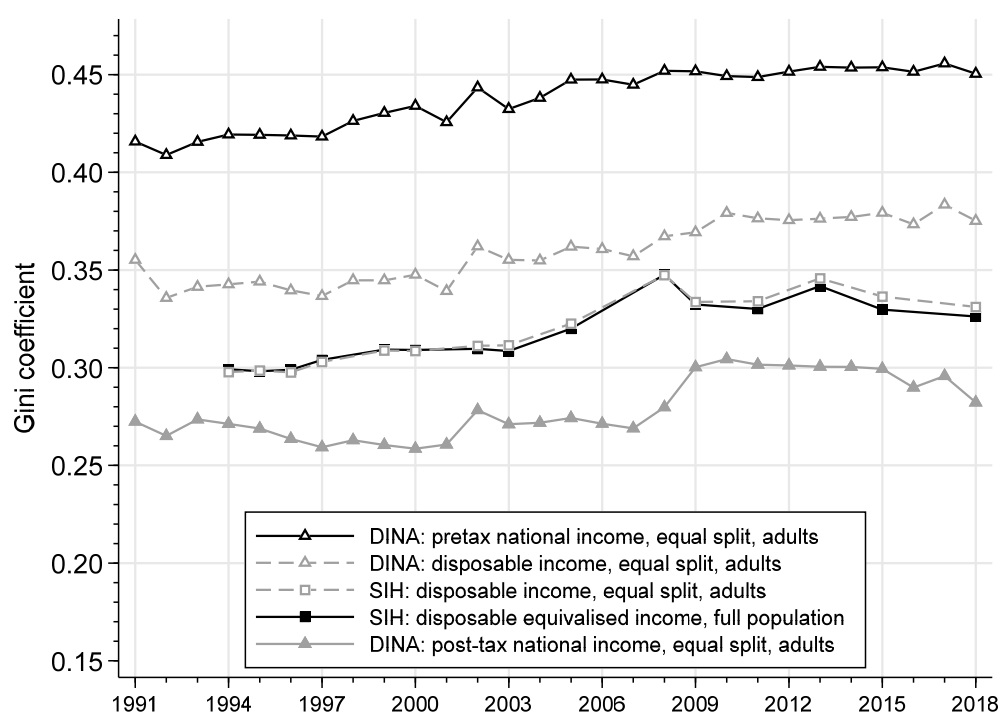
In Figure 4.6, we examine differences in PPP income levels by percentile income group across the three countries. Only those below the 15th percentile did better in Australian than in the US in 1991. By 2017, however, Australians below the 30th percentile have higher PPP-adjusted incomes than their US counterparts. There is a remarkable convergence of French and Australian distributions of post-tax national income, which by 2017 look very similar. The declining slope 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 30th percentile and keeps growing such that incomes at the top are markedly higher in the US.

5. 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 5.1 compares the Gini coefficient 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).

Figure 5.1: Gini coefficients for DINA series and household equivalised disposable income, 1991-2018



Notes: Broad equal-split adults DINA series (household income equally split among adults).
Stata graph Gini1a

As would be expected, 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. Between 1994 and 2018, Gini coefficients for both post-tax national income and equivalised disposable income increased, although more so for equivalised disposable income. Comparing SIH equalized 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 equivalized adult among the full population, as per the standard SIH series, cannot explain much of the difference between the two series.

6. Income levels and inequality disaggregated by demographic characteristics

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.

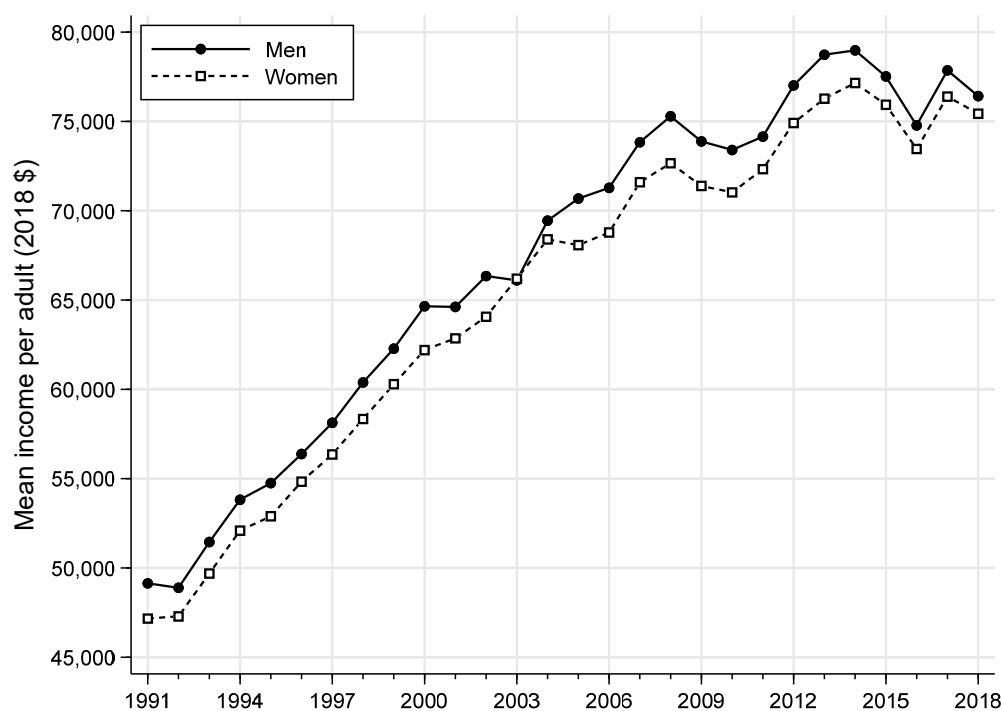
In what follows we consider sex, age, education, immigrant status and area of residence (i.e., cities versus regional areas). We focus on the post-tax national income series based on the equal-splitting of household income between all adult members (i.e., the ‘broad equal-split series’). However, we also bring in insights from the ‘individualistic series’ where it is most relevant, that is for sex and education, because equal-split series can mute differences across these groups.

For each demographic characteristic we consider, 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 men or among university graduates) are then presented to shed light on the levels and trends of inequality within each subgroup.

6.1. DINA by sex

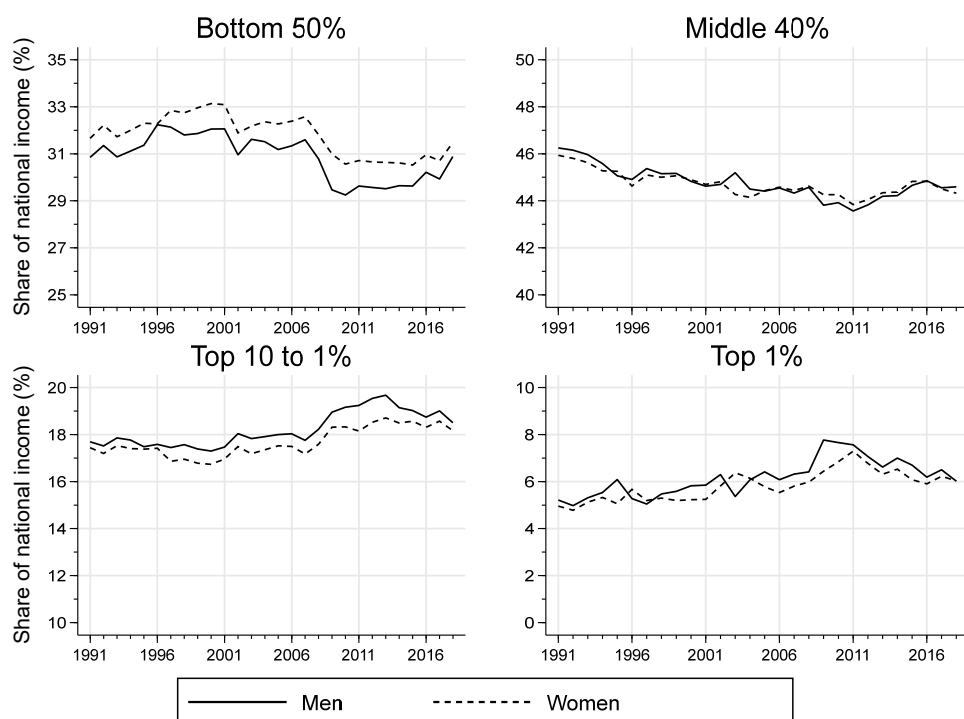
Figure 6.1 shows that mean post-tax national income does not differ much by sex. While men have slightly higher incomes, the difference is limited and has remained stable. However, gender differences are muted in these DINA series by the use of equal-split incomes, meaning that all incomes are equally split among adult household members. The implication is that any remaining gender difference is driven by differences between single men and single women. Appendix Figure E.1 shows exacerbated gender differences if we use ‘individualistic’ income series, with women’s mean incomes falling below men’s mean incomes by about \$25,000 throughout the period.

Figure 6.1: Mean real post-tax national income per adult by sex (1991-2018)



Notes: Broad equal-split adults series (household income equally split among adults).
Stata graph ptninc_mean_split2_sex_b

Figure 6.2: Post-tax national income shares among men and women (1991-2018)



Notes: Broad equal-split adults series (household income equally split among adults).
Stata graph pshares_split2_sexp_ptninc_b

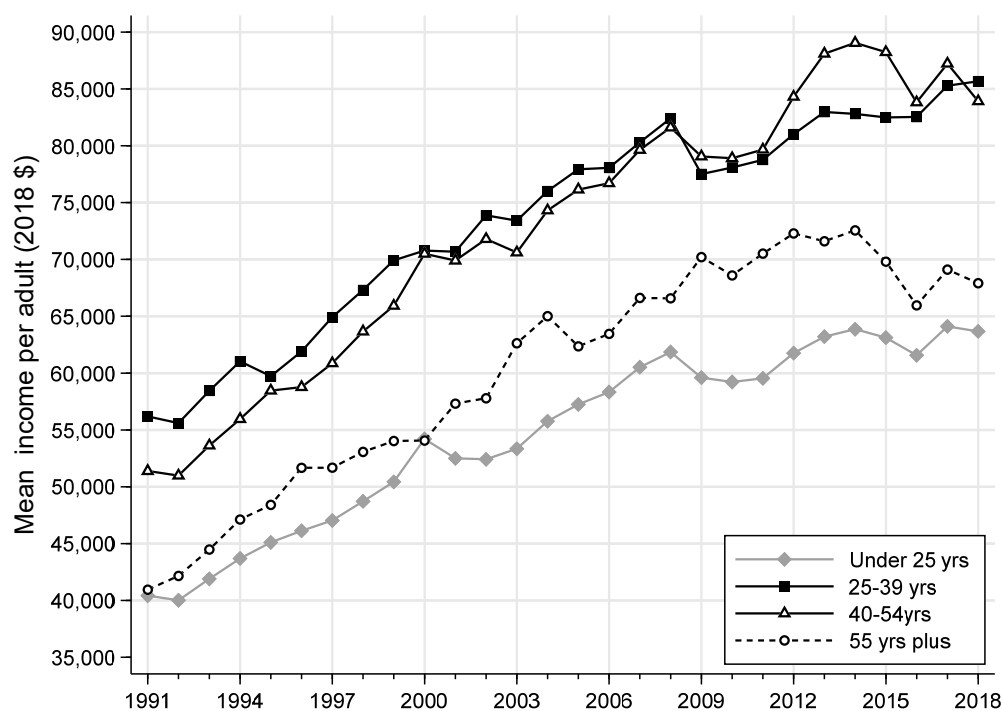
Figure 6.2 shows that the income shares among men and among women are largely similar. The income shares of the top 10% to 1% of men is slightly larger than the share of this group among women, whereas the bottom 50% of men have a smaller income share. Again, relaxing the equal-split assumption to consider individualistic series leads to larger differences (Appendix Figure E.2). Notably, the individualistic series reveal that top income shares (for the top 10% to 1% and the top 1%) were higher among women than among men in the early 1990s, and the bottom 50% income shares were smaller. This thus shows more inequality among women than among men. This is likely to reflect the lower labour market participation of partnered women, with a significant proportion not employed and therefore having low or no personal income. However, consistent with the rise in female employment participation over the period since 1991, the following decades saw a reversal. By 2018 the income share of the top 10% to 1% was larger among men than among women, while the bottom 50% of women had a larger income share than the bottom 50% of men. Hence, there appears to be more income disparities among men than among women in recent years.

6.2. DINA by age group

Mean post-tax national income is the highest among prime working-age adults—that is, those aged 25 to 39—and those aged 40 to 54, followed by those aged 55 and above. It is lowest for those under 25. Although, these differences in levels have been true since 1991, Figure 6.3 shows that the mean incomes of both the youngest and oldest age groups have been falling further behind that of the two prime working-age groups, particularly in the 2010s.

Figure 6.4 shows income shares within each age group. The share of the bottom 50% is the highest among those under 25 and the lowest among those 40 to 54 years of age. The share of the top 10% to 1% is higher among the two older age groups—that is, those above 40—and the lowest in the youngest two age groups. The same is largely true for the top 1% income shares, although there are more fluctuations, and the differences across age groups tend to be smaller.

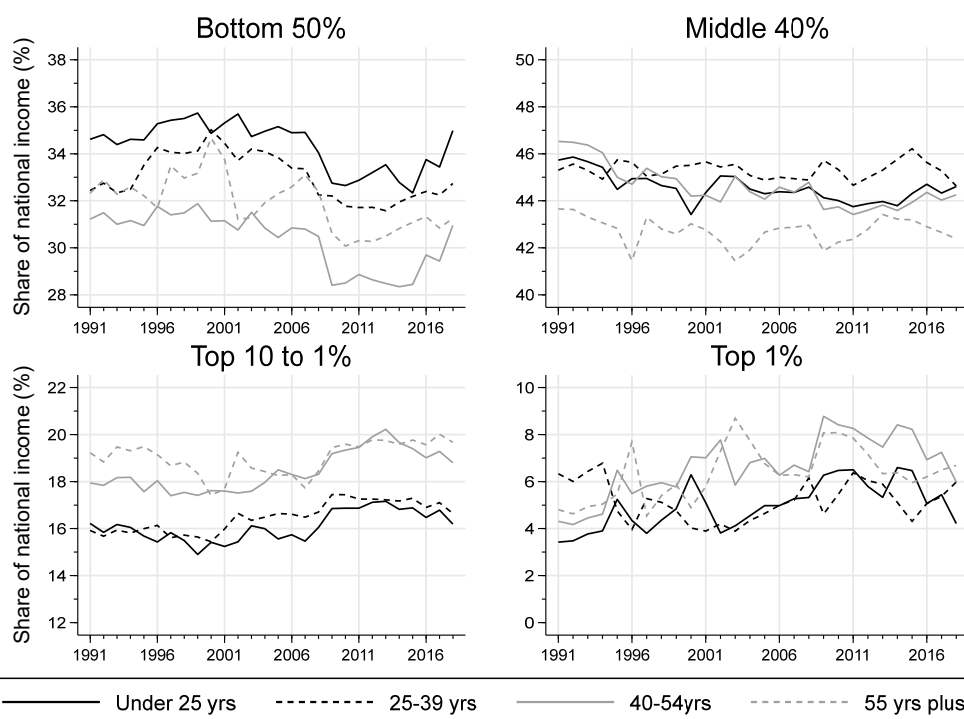
Figure 6.3: Mean post-tax national income per adult by age group (1991-2018)



Notes: Broad equal-split adults series (household income equally split among adults).

Stata graph ptninc_mean_split2_age_b

Figure 6.4: Post-tax national income shares within age groups (1991-2018)



Notes: Broad equal-split adults series (household income equally split among adults).

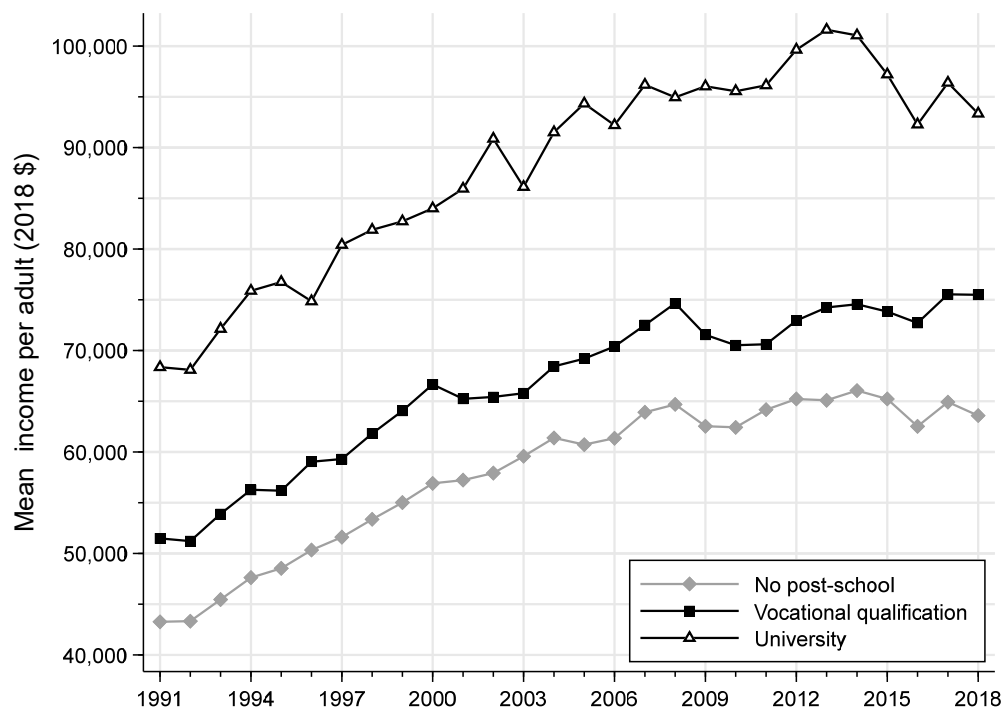
Stata graph pshares_split2_agecat2_ptninc_b

6.3. DINA by educational attainment

Figure 6.5, comparing across three levels of educational attainment, shows that mean post-tax national incomes are, unsurprisingly, ordered by educational attainment. Perhaps more interesting is that all three education groups seemed to equally benefit from the trend increase in post-tax national income per adult up until the GFC in 2008. However, since 2008 there has been no net growth in mean incomes for all three education groups.

To the extent that there is not complete assortative mating based on education, this DINA series based on equal-split incomes will show smaller education premia than the individualistic series. Indeed, Appendix Figure E.3 shows larger education premia, in particular for vocational qualifications. The individualistic series also reveals a trend increase in the university education premium, rising from approximately 47% (compared with no post-school qualifications) in 1991 to 57% in 2018.

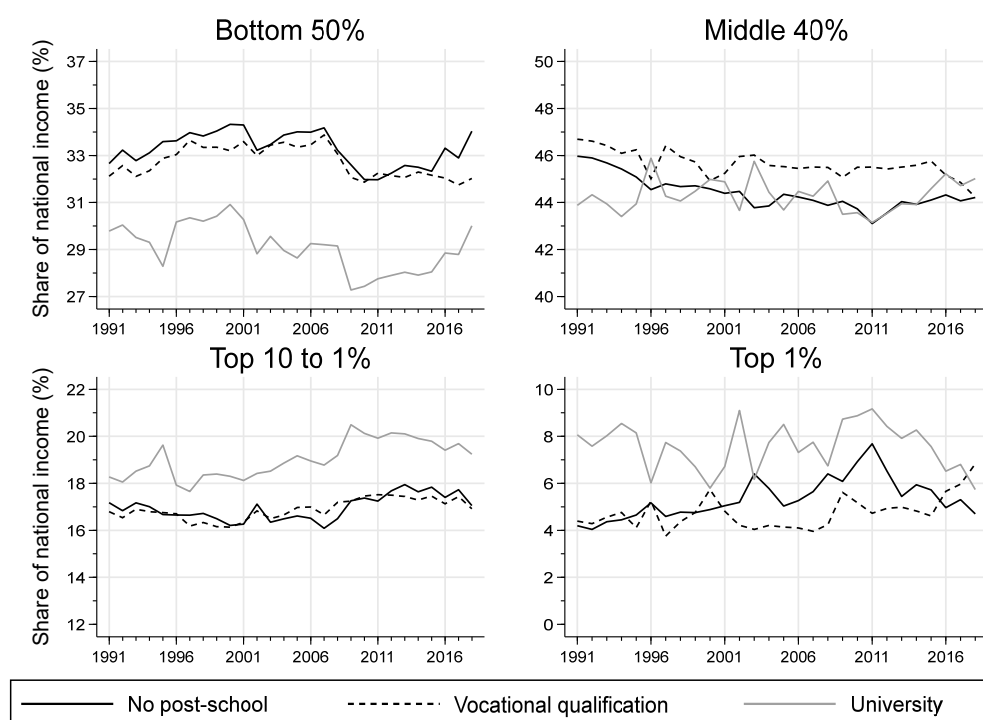
Figure 6.5: Mean post-tax national income per adult by educational attainment (1991-2018)



Notes: Broad equal-split adults series (household income equally split among adults).

Stata graph ptninc_mean_split2_edu_b

Figure 6.6: Post-tax national income shares within education groups (1991-2018)



Notes: Broad equal-split adults series (household income equally split among adults).
Stata graph pshares_split2_edu_ptninc_b

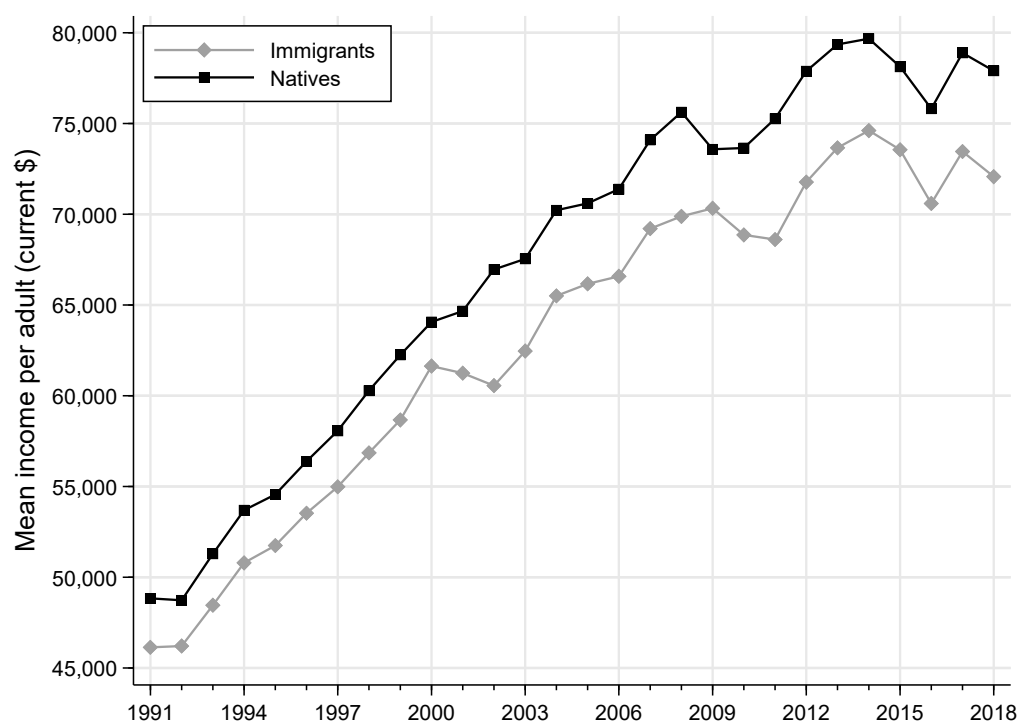
Figure 6.6 looks inside each of these three educational groups to reveal that inequality is the highest among university graduates, as measured by their higher top 10% to 1% and top 1% income shares, and their lower shares for the bottom 50%. Income shares among those with no post-school qualifications and those with vocational qualifications are comparable. Over the period as a whole, there is no clear trend in these income shares. As was the case with sex, inequality within each education group is exacerbated by the use of individualistic income series (Appendix Figure E.4).

6.4. DINA by immigrant status

The ABS SIH data allow us to distinguish foreign-born and native-born individuals.¹² Figure 6.7 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. Figure 6.8 shows that income shares are, perhaps surprisingly given the mean income differences, similarly distributed among immigrants and among the native-born.

¹² More detailed information on country of birth is available in some survey years, but not consistently across our period of analysis.

Figure 6.7: 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).

Stata graph ptninc_mean_split2_migrant_b

Figure 6.8: Post-tax national income shares among immigrants and natives (1991-2018)



Notes: Broad equal-split adults series (household income equally split among adults).

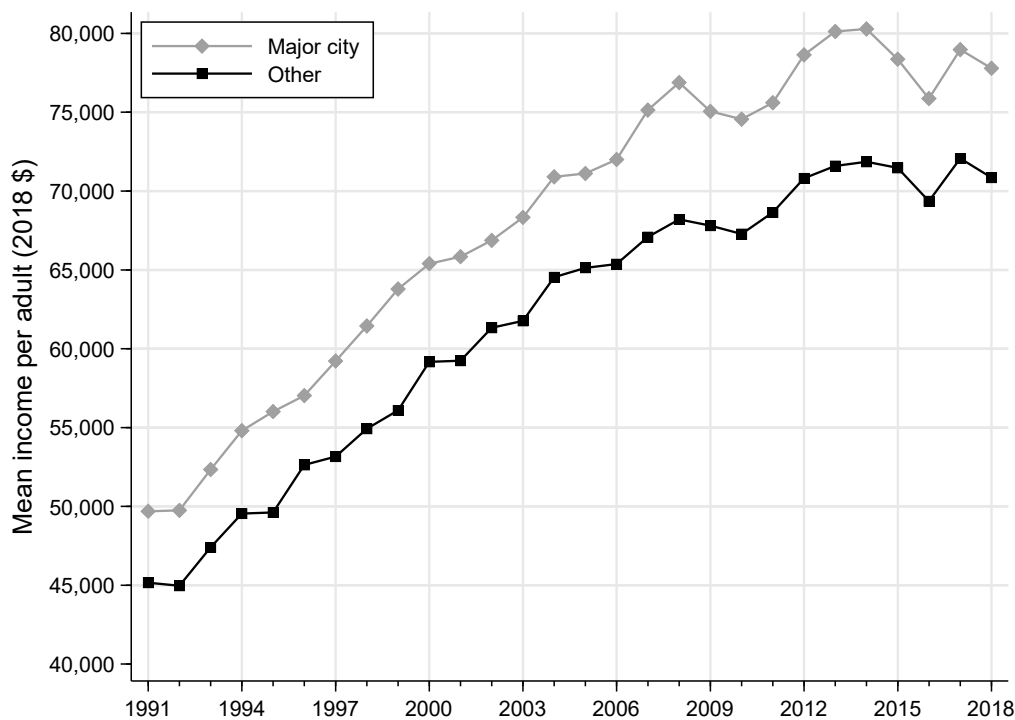
Stata graph pshares_split2_ausborn_ptninc_b

6.5. DINA by area of residence

We distinguish major cities and the rest of Australia. Figure 6.9 shows that mean post-tax national income is higher in major cities by about 10% and that this gap has remained stable in relative terms over the 1991-2018 period.

Figure 6.10 reveals some shifts in the distribution of post-tax national income in major cities and in the rest of Australia. Top 1% income shares are larger in major cities throughout the period but, while other income shares were similar across both types of region in the early 1990s, they have since diverged somewhat, driven by an increase in inequality in major cities. The result is that the income shares of the bottom 50% are now lower, and the income shares of the top 10% to 1% are larger, in major cities than in the rest of Australia.

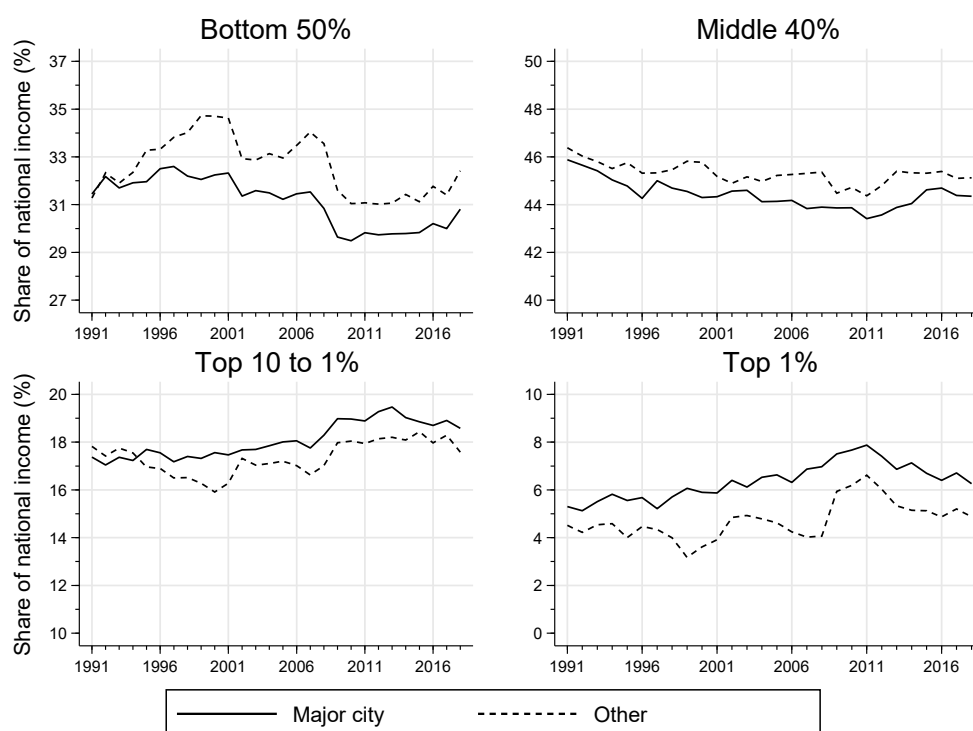
Figure 6.9: Mean post-tax national income per adult by area of residence (1991-2018)



Notes: Broad equal-split adults series (household income equally split among adults).

Stata graph ptninc_mean_split2_areahcf_b

Figure 6.10: Post-tax national income shares in major cities and other areas (1991-2018)



Notes: Broad equal-split adults series (household income equally split among adults).

Stata graph pshares_split2_areahcf_ptninc_b

7. Conclusion

We have produced the first DINA estimates for Australia consistent with the DINA Guidelines described in Alvaredo et al. (2020), 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 than the US. Australia has, however, had greater growth in inequality than France.

Significantly, our DINA estimates for Australia indicate that income inequality is somewhat lower 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 will be 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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Appendix A: Data appendix

Appendix A.1: Preliminary adjustments to top 1% in ALife

A few adjustments are performed in ALife before it is combined with survey data for the top 1%.

Incomes and income components are not top coded in ALife, with one exception: in each year, the 24 largest ‘employment termination’ (redundancy) payments in the entire tax filer population are reduced to the level of the 25th-largest payment value. Between 1991 and 2017, this represented a total adjustment of between \$8 million and \$57 million in total and (noting that ALife is a 10% sample) affected between 0 and 7 individuals in ALife each year (see Table A.1). We distribute the portion of Employment Termination Payment that was cut due to top-coding: we take 10% of the total shortfall and divide it between all top-coded observations in ALife.

Table A.1: ATO adjustment of Employment Termination Payments (1991-2017, in current dollars)

| Tax year | Total adjustment | Mean adjustment |
|----------|------------------|-----------------|
| 1991 | -8,241,221 | -343,384 |
| 1992 | -14,613,357 | -608,890 |
| 1993 | -11,291,962 | -470,498 |
| 1994 | -15,332,505 | -638,854 |
| 1995 | -15,336,185 | -639,008 |
| 1996 | -10,649,353 | -443,723 |
| 1997 | -16,235,498 | -676,479 |
| 1998 | -16,477,313 | -686,555 |
| 1999 | -27,519,147 | -1,146,631 |
| 2000 | -42,319,718 | -1,763,322 |
| 2001 | -15,676,018 | -653,167 |
| 2002 | -27,836,179 | -1,159,841 |
| 2003 | -24,939,858 | -1,039,161 |
| 2004 | -18,548,200 | -772,842 |
| 2005 | -20,565,614 | -856,901 |
| 2006 | -21,123,878 | -880,162 |
| 2007 | -32,612,964 | -1,358,874 |
| 2008 | -47,913,907 | -1,996,413 |
| 2009 | -51,932,913 | -2,163,871 |
| 2010 | -51,184,871 | -2,132,703 |
| 2011 | -56,628,558 | -2,359,523 |
| 2012 | -34,672,593 | -1,444,691 |
| 2013 | -20,742,471 | -864,270 |
| 2014 | -36,156,344 | -1,506,514 |
| 2015 | -14,594,126 | -608,089 |
| 2016 | -23,385,390 | -974,391 |
| 2017 | -19,181,113 | -799,213 |

Notes: Employment termination payment is a lump sum payment made as a result of the termination of a person’s employment.

Source: ATO (private communication).

As ALife is a 10% random sample of tax filers, it is subject to sampling error. We address this issue by reconciling top income outliers (defined here the top 100 individuals in terms of taxable gross income in Australia each year) with the ATO full population for which the ATO has provided us mean

income values (separately for the top 100 to 50 and the top 50 individuals). We average income for top 100 to 50 and top 50 individuals in Australia to adjust incomes of the top 10 and top 5 individuals in ALife. All income components are scaled up by a constant factor. This approach fixes the top 0.001% but sampling error may still affect income groups below the top 0.001%, with the issue likely to be more important the smaller the income group. In practice, top income shares for groups smaller than 0.1% of the population and above the top 0.1% may not be reliable.

Appendix A.2: Grossing-up factors

Table A.2.1: Survey to National Account grossing-up factors (1991-2018)

| Year | Employee income | Mixed income | Non-pension capital income | Personal income tax | Cash benefits |
|------|-----------------|--------------|----------------------------|---------------------|---------------|
| 1991 | 1.11 | 1.74 | 2.93 | 1.14 | 0.98 |
| 1992 | 1.10 | 1.40 | 3.18 | 1.05 | 1.12 |
| 1993 | 1.14 | 1.58 | 3.51 | 1.06 | 1.20 |
| 1994 | 1.17 | 1.54 | 3.76 | 1.12 | 1.28 |
| 1995 | 1.18 | 1.24 | 3.87 | 1.14 | 1.25 |
| 1996 | 1.18 | 1.40 | 3.24 | 1.18 | 1.25 |
| 1997 | 1.19 | 1.32 | 3.51 | 1.19 | 1.26 |
| 1998 | 1.17 | 1.56 | 3.24 | 1.16 | 1.25 |
| 1999 | 1.18 | 1.41 | 2.69 | 1.17 | 1.28 |
| 2000 | 1.16 | 1.56 | 3.15 | 1.16 | 1.29 |
| 2001 | 1.16 | 1.02 | 3.34 | 1.02 | 1.38 |
| 2002 | 1.16 | 1.83 | 3.43 | 1.12 | 1.39 |
| 2003 | 1.17 | 1.49 | 3.40 | 1.12 | 1.33 |
| 2004 | 1.17 | 1.64 | 3.25 | 1.12 | 1.45 |
| 2005 | 1.18 | 1.86 | 2.70 | 1.12 | 1.44 |
| 2006 | 1.19 | 1.85 | 2.68 | 1.19 | 1.52 |
| 2007 | 1.23 | 1.47 | 2.60 | 1.15 | 1.53 |
| 2008 | 1.27 | 2.00 | 2.43 | 1.23 | 1.65 |
| 2009 | 1.16 | 2.02 | 3.36 | 1.22 | 1.46 |
| 2010 | 1.16 | 2.17 | 3.14 | 1.16 | 1.36 |
| 2011 | 1.17 | 2.24 | 3.35 | 1.16 | 1.44 |
| 2012 | 1.19 | 2.12 | 3.07 | 1.17 | 1.46 |
| 2013 | 1.19 | 2.09 | 2.40 | 1.14 | 1.47 |
| 2014 | 1.19 | 2.09 | 2.48 | 1.11 | 1.46 |
| 2015 | 1.17 | 2.80 | 2.34 | 1.12 | 1.39 |
| 2016 | 1.14 | 2.56 | 1.88 | 1.09 | 1.39 |
| 2017 | 1.14 | 2.90 | 2.19 | 1.11 | 1.34 |
| 2018 | 1.12 | 2.50 | 2.01 | 1.10 | 1.30 |

Notes: Constant factors by which each income component has to be multiplied in the survey data (complemented by tax data for the top 1%) to restore consistency with National Account. For instance, a factor of 2 means that incomes have to be doubled.

Appendix A.3: Superannuation balance regression estimates

Table A.3.1: Superannuation balance regression estimates (adults under 60 years of age)

| | 2003 | | 2005 | | 2009 | | 2011 | | 2013 | | 2015 | | 2018 | |
|-------------------------------------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|
| | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. |
| Age | 872*** | 66.3 | 992*** | 86.5 | 1,241*** | 80.3 | 1,496*** | 101.5 | 1,635*** | 109.4 | 2,266*** | 106.8 | 2,385*** | 122.3 |
| Labour income (in \$1,000s) | -1,092*** | 69.1 | -1,316*** | 77.1 | -1,307*** | 61.7 | -1,306*** | 68.5 | -1,439*** | 69.8 | -1,458*** | 70.2 | -1,147*** | 67.1 |
| Labour income (in \$1,000s) squared | -1.589*** | 0.15 | -1.026*** | 0.07 | -0.925*** | 0.04 | -0.577*** | 0.04 | -1.219*** | 0.05 | -0.214*** | 0.01 | -0.346*** | 0.02 |
| Age x labour income (\$1,000s) | 52.1*** | 1.6 | 58.5*** | 1.7 | 55.7*** | 1.4 | 57.0*** | 1.5 | 63.9*** | 1.6 | 56.4*** | 1.5 | 52.3*** | 1.4 |
| Female | 19,138*** | 3,023 | 16,908*** | 4,113 | 15,137*** | 3,729 | 20,744*** | 4,870 | 16,960*** | 5,171 | 23,683*** | 5,166 | 9,736* | 5,901 |
| Female x age | -755*** | 77.5 | -617*** | 104.3 | -618*** | 94.6 | -770*** | 122.7 | -632*** | 130.3 | -946*** | 129.1 | -463*** | 148.3 |
| Zero labour income | 9,600*** | 1,426 | 13,820*** | 1,854 | 7,525*** | 1,635 | 18,261*** | 2,215 | 12,849*** | 2,327 | 4,912** | 2,209 | 9,153*** | 2,680 |
| Constant | -23,828*** | 2,584 | -27,555*** | 3,439 | -29,054*** | 3,162 | -39,385*** | 4,049 | -41,409*** | 4,336 | -46,995*** | 4,372 | -54,929*** | 4,991 |
| Sample size | 17,491 | | 14,800 | | 23,666 | | 20,896 | | 19,783 | | 23,072 | | 18,883 | |
| Adjusted R ² | 0.273 | | 0.287 | | 0.271 | | 0.273 | | 0.322 | | 0.303 | | 0.347 | |

Notes: Ordinary Least Square estimates. 'x' denotes interaction terms. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table A.3.2: Superannuation balance regression estimates (adults over 59 years of age)

| | 2003 | | 2005 | | 2009 | | 2011 | | 2013 | | 2015 | | 2018 | |
|---|-------------|--------|------------|--------|-----------|--------|-----------|--------|-----------|--------|------------|--------|-----------|--------|
| | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. |
| Age | -2,066*** | 351.3 | -2,999*** | 496.8 | -2,677*** | 391.1 | -3,848*** | 577.8 | -5,273*** | 570.1 | -4,190*** | 492.3 | -4,743*** | 609.2 |
| Superannuation income (in \$1,000s) | 30,463*** | 1793.7 | 19,297*** | 2282.3 | 17,273*** | 1676.9 | 11,652*** | 1765.3 | 7,598*** | 1632.4 | 11,144*** | 1478.7 | 24,516*** | 1431.4 |
| Superannuation income (in \$1,000s) squared | -14.27*** | 2.66 | 5.69*** | 2.09 | -4.00 | 3.95 | -31.72*** | 1.65 | -24.73*** | 1.21 | -16.22*** | 2.16 | -17.38*** | 0.89 |
| Age x superannuation income (\$1,000s) | -358*** | 25.2 | -202*** | 33.0 | -132*** | 24.6 | -7 | 25.8 | 26 | 23.7 | -12 | 21.1 | -186*** | 20.3 |
| Female | -114,578*** | 30,515 | -105,355** | 42,529 | -26,962 | 34,548 | -93,112* | 49,348 | -83,279* | 49,324 | -35,430 | 43,155 | -96,150* | 53,620 |
| Female x age | 1,467*** | 434 | 1,369** | 603 | 273 | 488 | 1,159* | 705 | 1,054 | 704 | 482 | 607 | 1,347* | 757 |
| Zero labour income | 461 | 4,461 | 18,713*** | 6,927 | 3,658 | 4,477 | 5,796 | 6,834 | -12,831* | 6,628 | -22,210*** | 6,474 | -17,068** | 8,117 |
| Labour income (in \$1000s) | 1,804*** | 82 | 3,089*** | 146 | 2,027*** | 73 | 2,227*** | 93 | 1,841*** | 77 | 1,744*** | 84 | 2,035*** | 82 |
| Sample size | 4,792 | | 4,386 | | 10,265 | | 7,307 | | 7,479 | | 10,811 | | 7,952 | |
| Adjusted R ² | 0.314 | | 0.298 | | 0.307 | | 0.357 | | 0.356 | | 0.366 | | 0.468 | |

Notes: Ordinary Least Square estimates. 'x' denotes interaction terms. * p < 0.10, ** p < 0.05, *** p < 0.01.

Appendix A.4: Imputed rent regression estimates

Table A.4.1: Weekly imputed rent regression estimates (2005-06)

| | Gross imputed rent | | | | Net imputed rent | | | |
|--|--------------------|-------|--------------|-------|------------------|-------|--------------|-------|
| | (1) Coef. | S.E. | (2) Coef. | S.E. | (1) Coef. | S.E. | (2) Coef. | S.E. |
| Tenure type (ref. is owner without a mortgage) | | | | | | | | |
| Owner with a mortgage | -0.003 | 0.010 | | | -0.198*** | 0.009 | | |
| Renter | -1.361*** | 0.095 | | | 0.450*** | 0.096 | | |
| Other | -0.048* | 0.028 | | | 0.218*** | 0.023 | | |
| Has a mortgage | 0.000 | | 0.009 | 0.010 | | | -0.274*** | 0.010 |
| State of residence (ref. is NSW) | | | | | | | | |
| VIC | -0.121*** | 0.012 | -0.119*** | 0.012 | -0.001 | 0.010 | -0.003 | 0.010 |
| QLD | -0.093*** | 0.012 | -0.092*** | 0.012 | 0.004 | 0.010 | 0.006 | 0.010 |
| SA | -0.205*** | 0.013 | -0.204*** | 0.013 | -0.046*** | 0.012 | -0.049*** | 0.012 |
| WA | -0.244*** | 0.013 | -0.242*** | 0.013 | -0.013 | 0.012 | -0.017 | 0.012 |
| Tas | -0.184*** | 0.016 | -0.179*** | 0.016 | -0.016 | 0.016 | -0.021 | 0.016 |
| ACT & NT | 0.008 | 0.018 | 0.008 | 0.018 | 0.056*** | 0.013 | 0.057*** | 0.013 |
| Area of residence (ref. is Capital city) | | | | | | | | |
| Balance of State | -0.198*** | 0.009 | -0.198*** | 0.009 | -0.033*** | 0.008 | -0.035*** | 0.008 |
| Number of bedrooms | 0.128*** | 0.005 | 0.131*** | 0.005 | 0.028*** | 0.004 | 0.025*** | 0.004 |
| Household gross income decile (ref. is 1) | | | | | | | | |
| 2 | -0.005 | 0.017 | -0.001 | 0.017 | -0.001 | 0.016 | -0.004 | 0.016 |
| 3 | -0.043** | 0.017 | -0.036** | 0.017 | -0.017 | 0.016 | -0.026 | 0.016 |
| 4 | -0.018 | 0.017 | -0.019 | 0.017 | -0.037** | 0.016 | -0.042*** | 0.016 |
| 5 | 0.001 | 0.018 | 0.000 | 0.018 | -0.044*** | 0.016 | -0.052*** | 0.016 |
| 6 | 0.004 | 0.018 | 0.005 | 0.018 | -0.054*** | 0.016 | -0.057*** | 0.016 |
| 7 | -0.007 | 0.018 | -0.011 | 0.018 | -0.073*** | 0.016 | -0.080*** | 0.016 |
| 8 | 0.015 | 0.018 | 0.012 | 0.019 | -0.050*** | 0.016 | -0.055*** | 0.016 |
| 9 | 0.051*** | 0.019 | 0.048** | 0.019 | -0.058*** | 0.016 | -0.072*** | 0.016 |
| 10 | 0.109*** | 0.019 | 0.109*** | 0.019 | -0.022 | 0.016 | -0.042*** | 0.016 |
| Landlord type (ref. is real estate agent) | | | | | | | | |
| No landlord | 3.962*** | 0.095 | 5.313*** | 0.013 | 2.311*** | 0.381 | 1.862*** | 0.379 |
| State or territory housing authority | 5.140*** | 0.020 | 5.167*** | 0.020 | 1.596*** | 0.391 | 1.590*** | 0.379 |
| Parent | 5.300*** | 0.034 | 5.307*** | 0.035 | 1.423*** | 0.392 | 1.420*** | 0.380 |
| Other person | 0.053*** | 0.019 | 0.058*** | 0.019 | 1.682*** | 0.419 | 1.621*** | 0.418 |
| Other | 3.941*** | 0.029 | 3.946*** | 0.029 | 1.492*** | 0.392 | 1.492*** | 0.380 |
| Mortgage weekly repayments | | | | | -0.439*** | 0.005 | -0.396*** | 0.006 |
| Gross imputed rent | | | | | -1.636*** | 0.381 | -1.170*** | 0.379 |
| Sample size | 9,857 | | 9,857 | | 9,857 | | 9,857 | |
| Adjusted R2 | 0.969 | | 0.968 | | 0.690 | | 0.692 | |

Notes: Ordinary Least Square estimates. Model (1) is with tenure type, model (2) is without tenure type. In the net imputed rent models all variables are interacted with gross imputed rent, with the exception of mortgage weekly repayments and gross imputed rent. * p < 0.10, ** p < 0.05, *** p < 0.01.

Appendix B: Supplementary results

Table B.1: Mean pre-tax adult income by income group (current dollars, 1991-2018)

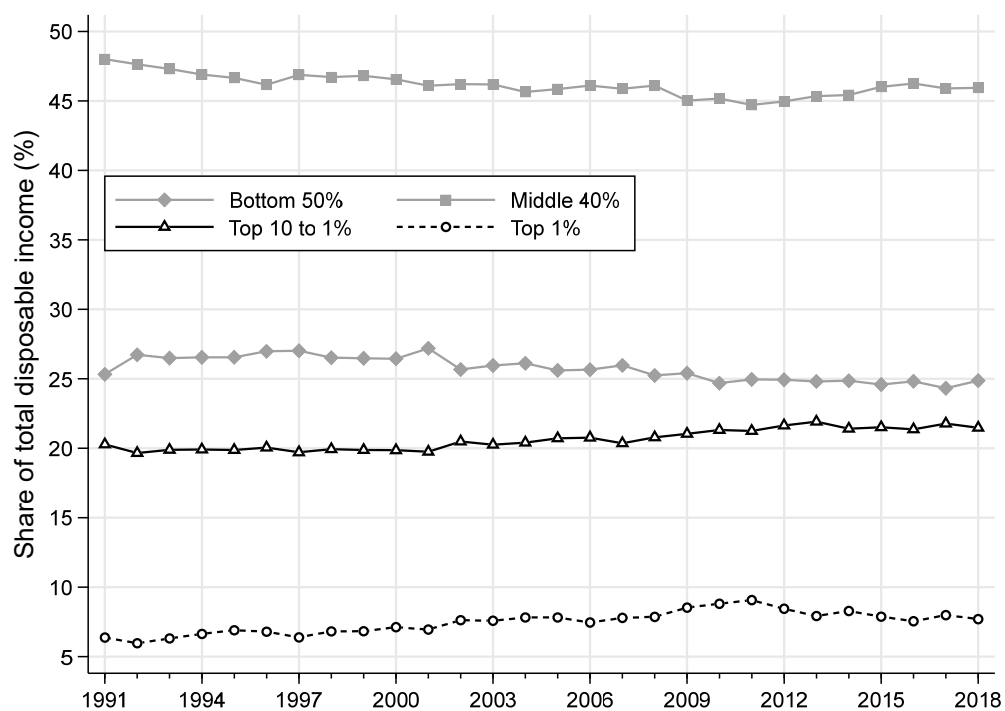
| | Income group | | | | All |
|------|--------------|------------|---------------|---------|--------|
| | Bottom 50% | Middle 40% | Top 10% to 1% | Top 1% | |
| 1991 | 10,197 | 30,406 | 58,550 | 162,852 | 24,141 |
| 1992 | 10,823 | 30,620 | 58,278 | 161,773 | 24,511 |
| 1993 | 11,337 | 32,337 | 62,629 | 182,177 | 26,037 |
| 1994 | 11,927 | 33,992 | 66,201 | 201,152 | 27,528 |
| 1995 | 12,532 | 35,053 | 69,946 | 195,753 | 28,523 |
| 1996 | 13,324 | 36,809 | 73,666 | 225,678 | 30,266 |
| 1997 | 13,812 | 38,918 | 76,736 | 221,114 | 31,538 |
| 1998 | 14,223 | 40,462 | 80,723 | 248,906 | 33,043 |
| 1999 | 14,561 | 42,077 | 83,216 | 269,915 | 34,283 |
| 2000 | 15,439 | 44,256 | 89,952 | 284,875 | 36,361 |
| 2001 | 16,834 | 46,084 | 92,993 | 308,709 | 38,301 |
| 2002 | 16,670 | 48,744 | 99,508 | 349,734 | 40,277 |
| 2003 | 17,251 | 50,659 | 105,894 | 379,418 | 42,199 |
| 2004 | 18,409 | 53,773 | 114,852 | 427,802 | 45,316 |
| 2005 | 18,658 | 56,123 | 121,404 | 455,394 | 47,248 |
| 2006 | 20,238 | 59,310 | 128,463 | 472,402 | 50,114 |
| 2007 | 22,497 | 63,609 | 137,018 | 558,410 | 54,534 |
| 2008 | 23,864 | 68,142 | 147,157 | 579,469 | 58,208 |
| 2009 | 23,765 | 69,375 | 157,164 | 634,094 | 60,103 |
| 2010 | 23,821 | 70,147 | 156,412 | 622,404 | 60,258 |
| 2011 | 25,685 | 75,252 | 168,774 | 689,945 | 65,029 |
| 2012 | 26,993 | 79,637 | 182,466 | 706,888 | 68,830 |
| 2013 | 27,259 | 81,324 | 187,210 | 685,060 | 69,827 |
| 2014 | 28,025 | 82,976 | 186,245 | 709,438 | 71,037 |
| 2015 | 27,842 | 84,142 | 185,418 | 671,095 | 70,946 |
| 2016 | 27,451 | 83,336 | 181,216 | 640,997 | 69,765 |
| 2017 | 29,186 | 88,220 | 195,828 | 712,084 | 74,601 |
| 2018 | 30,125 | 89,235 | 196,108 | 702,775 | 75,417 |

Table B.2: Mean post-tax national adult income by income group (current dollars, 1991-2018)

| | Income group | | | | All |
|------|--------------|------------|---------------|---------|--------|
| | Bottom 50% | Middle 40% | Top 10% to 1% | Top 1% | |
| 1991 | 15,131 | 27,911 | 47,320 | 123,522 | 24,221 |
| 1992 | 15,621 | 28,254 | 47,442 | 120,227 | 24,582 |
| 1993 | 16,318 | 29,867 | 51,326 | 136,344 | 26,079 |
| 1994 | 17,411 | 31,344 | 53,972 | 150,189 | 27,596 |
| 1995 | 18,227 | 32,333 | 55,481 | 159,939 | 28,630 |
| 1996 | 19,601 | 34,009 | 59,151 | 166,351 | 30,386 |
| 1997 | 20,590 | 35,840 | 60,493 | 163,170 | 31,694 |
| 1998 | 21,451 | 37,459 | 63,788 | 179,679 | 33,237 |
| 1999 | 22,352 | 38,890 | 65,559 | 187,608 | 34,487 |
| 2000 | 23,819 | 40,992 | 69,169 | 202,323 | 36,552 |
| 2001 | 25,090 | 42,992 | 73,715 | 214,010 | 38,511 |
| 2002 | 25,464 | 45,333 | 80,060 | 246,504 | 40,526 |
| 2003 | 27,016 | 47,331 | 82,365 | 252,877 | 42,380 |
| 2004 | 29,096 | 50,453 | 89,305 | 281,936 | 45,578 |
| 2005 | 30,174 | 52,799 | 93,993 | 291,275 | 47,576 |
| 2006 | 32,171 | 56,219 | 99,703 | 293,952 | 50,476 |
| 2007 | 35,292 | 60,995 | 106,681 | 333,825 | 54,975 |
| 2008 | 36,634 | 65,215 | 116,352 | 362,085 | 58,488 |
| 2009 | 36,442 | 66,421 | 125,183 | 428,971 | 60,319 |
| 2010 | 36,171 | 66,782 | 126,392 | 438,939 | 60,544 |
| 2011 | 39,284 | 71,313 | 135,625 | 483,792 | 65,201 |
| 2012 | 41,446 | 75,736 | 146,016 | 477,770 | 68,926 |
| 2013 | 42,121 | 77,541 | 149,839 | 455,603 | 70,114 |
| 2014 | 43,167 | 79,345 | 150,176 | 486,384 | 71,673 |
| 2015 | 43,100 | 80,091 | 149,701 | 459,942 | 71,645 |
| 2016 | 42,973 | 78,695 | 144,544 | 425,162 | 70,217 |
| 2017 | 45,552 | 83,598 | 156,873 | 479,191 | 75,107 |
| 2018 | 47,380 | 84,389 | 154,612 | 456,248 | 75,918 |

Appendix C: Results for post-tax disposable income

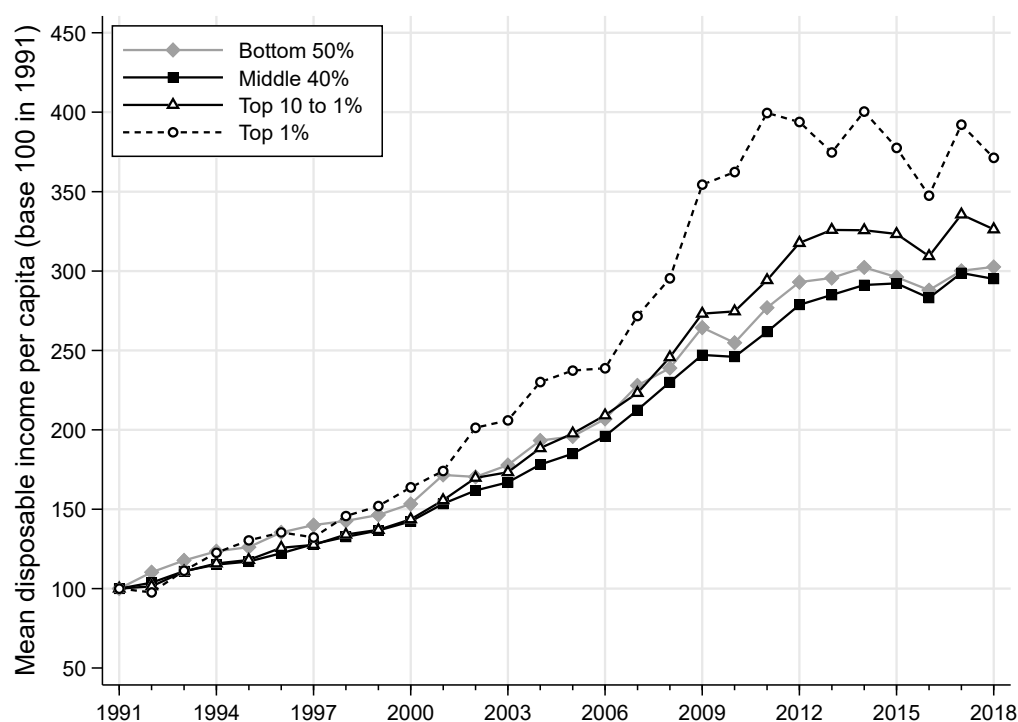
Figure C.1: Income shares 1991-2018



Notes: Distribution of post-tax disposable income (after all taxes and transfers) among adults. Broad equal-split adults series (household income equally split among adults).

Stata graph net_split2_incsh_a

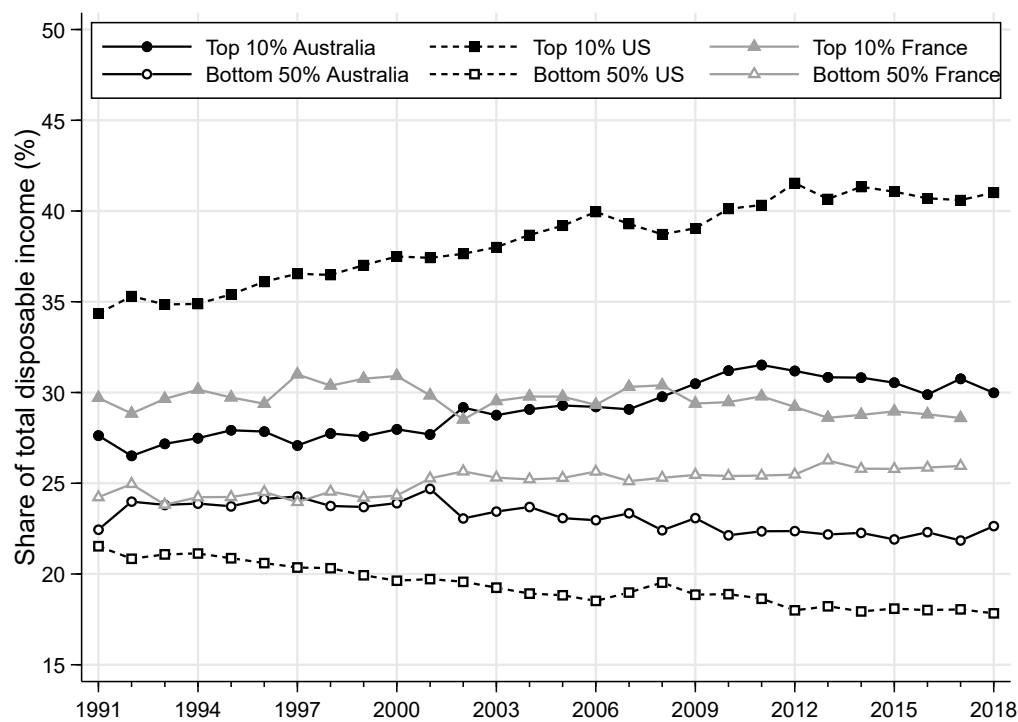
Figure C.2: Mean adult income by income group 1991-2018



Notes: Distribution of post-tax disposable income (before all taxes and transfers, except age pensions) among adults. Broad equal-split adults series (household income equally split among adults). Index based on mean incomes in current dollars.

Stata graph net_split2_mean_index_a

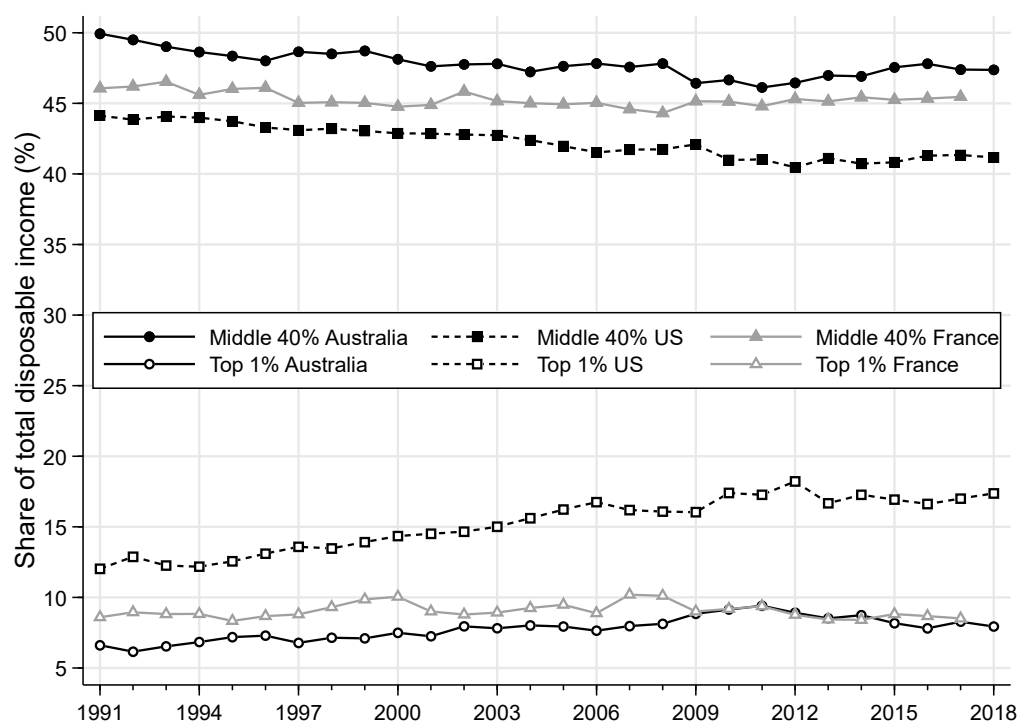
Figure C.3: Top 10% and bottom 50% income shares: Australia, US and France 1991-2018



Notes: Distribution of post-tax disposable income (after all taxes and transfers) among adults. Narrow-equal-split adults series (income of married couples divided by two).

Stata graph intcomp_net_sh1

Figure C.4: Top 1% and middle 40% income shares: Australia, US and France 1991-2018



Notes: Distribution of post-tax disposable income (after all taxes and transfers) among adults. Narrow-split-adults series (income of married couples divided by two).

Stata graph intcomp_net_sh2

Table C.1: Mean post-tax disposable adult income by income group (current dollars, 1991-2018)

| | Income group | | | | All |
|------|--------------|------------|---------------|---------|--------|
| | Bottom 50% | Middle 40% | Top 10% to 1% | Top 1% | |
| 1991 | 9,327 | 22,107 | 41,517 | 117,719 | 18,417 |
| 1992 | 10,291 | 22,925 | 42,113 | 114,898 | 19,252 |
| 1993 | 10,986 | 24,536 | 45,995 | 131,012 | 20,747 |
| 1994 | 11,522 | 25,454 | 48,082 | 144,299 | 21,706 |
| 1995 | 11,765 | 25,871 | 49,019 | 153,476 | 22,167 |
| 1996 | 12,630 | 27,037 | 52,179 | 159,379 | 23,415 |
| 1997 | 13,055 | 28,304 | 52,957 | 155,635 | 24,159 |
| 1998 | 13,301 | 29,309 | 55,637 | 171,529 | 25,087 |
| 1999 | 13,652 | 30,190 | 56,859 | 178,908 | 25,787 |
| 2000 | 14,297 | 31,470 | 59,647 | 192,801 | 27,030 |
| 2001 | 16,004 | 33,906 | 64,628 | 204,923 | 29,424 |
| 2002 | 15,890 | 35,759 | 70,486 | 236,930 | 30,952 |
| 2003 | 16,587 | 36,902 | 71,936 | 242,448 | 31,951 |
| 2004 | 18,028 | 39,384 | 78,236 | 270,868 | 34,510 |
| 2005 | 18,264 | 40,889 | 82,083 | 279,365 | 35,667 |
| 2006 | 19,290 | 43,338 | 86,822 | 281,070 | 37,594 |
| 2007 | 21,260 | 46,963 | 92,650 | 319,793 | 40,944 |
| 2008 | 22,282 | 50,862 | 102,000 | 347,733 | 44,135 |
| 2009 | 24,656 | 54,635 | 113,397 | 417,185 | 48,533 |
| 2010 | 23,769 | 54,381 | 113,990 | 426,537 | 48,142 |
| 2011 | 25,825 | 57,854 | 122,167 | 470,334 | 51,743 |
| 2012 | 27,327 | 61,617 | 131,897 | 463,651 | 54,806 |
| 2013 | 27,571 | 62,990 | 135,288 | 441,052 | 55,563 |
| 2014 | 28,194 | 64,373 | 135,203 | 471,410 | 56,701 |
| 2015 | 27,619 | 64,610 | 134,219 | 444,461 | 56,163 |
| 2016 | 26,855 | 62,577 | 128,426 | 409,045 | 54,099 |
| 2017 | 27,995 | 66,040 | 139,315 | 461,633 | 57,550 |
| 2018 | 28,219 | 65,227 | 135,450 | 437,086 | 56,756 |

Appendix D: Population shares by demographic group

Figure D.1: Adult population shares by age group (1991-2018)

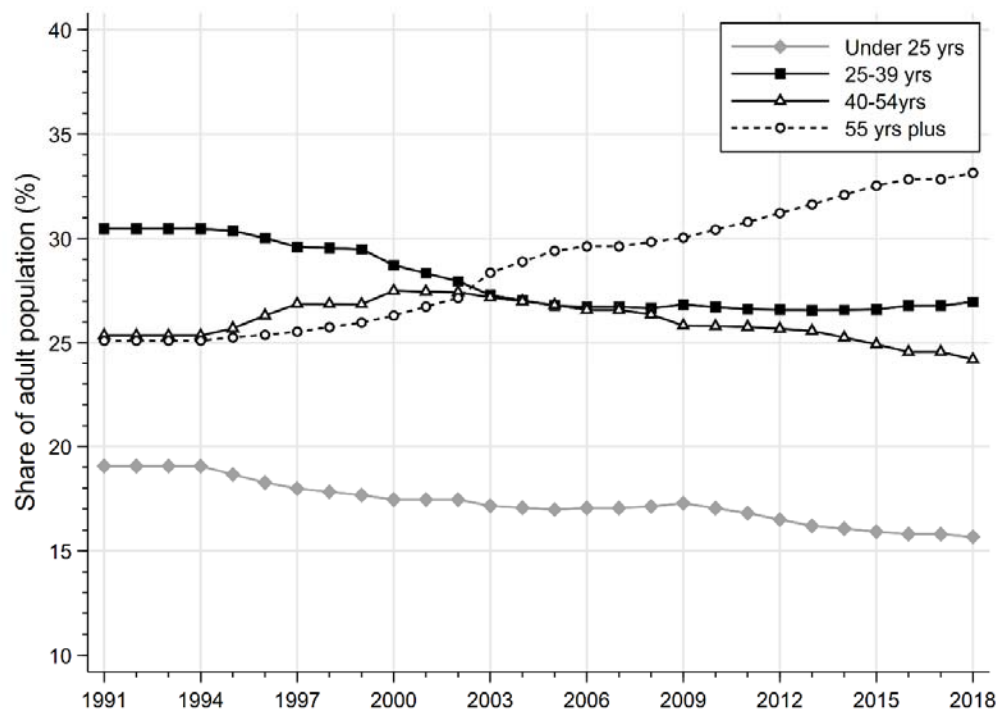


Figure D.2: Adult population shares by education attainment (1991-2018)

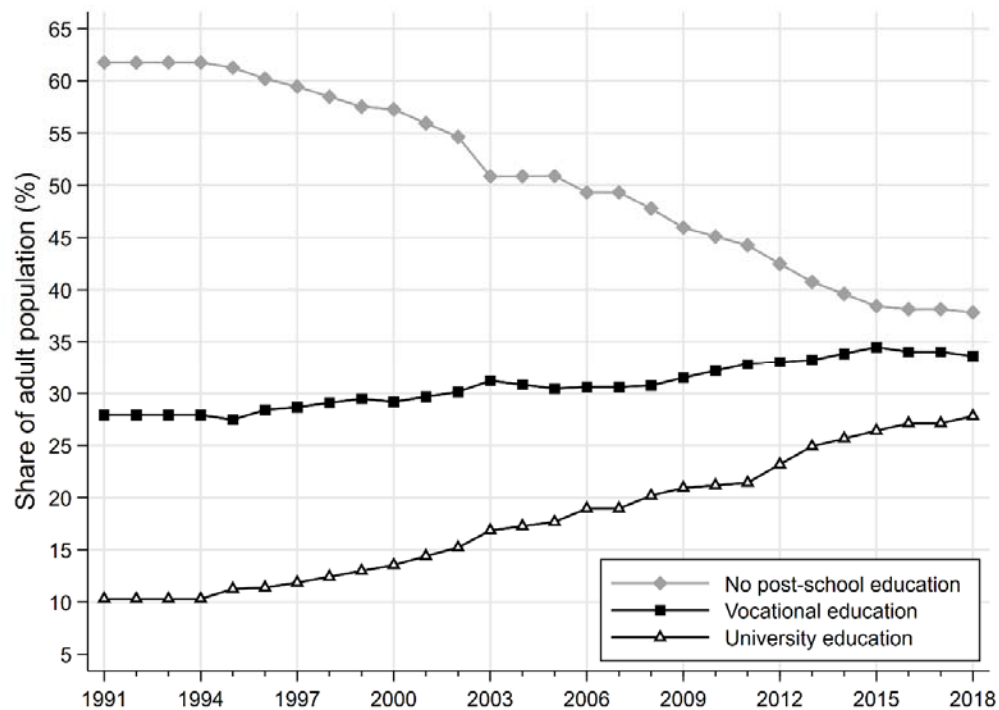


Figure D.3: Adult population shares for natives and immigrants (1991-2018)

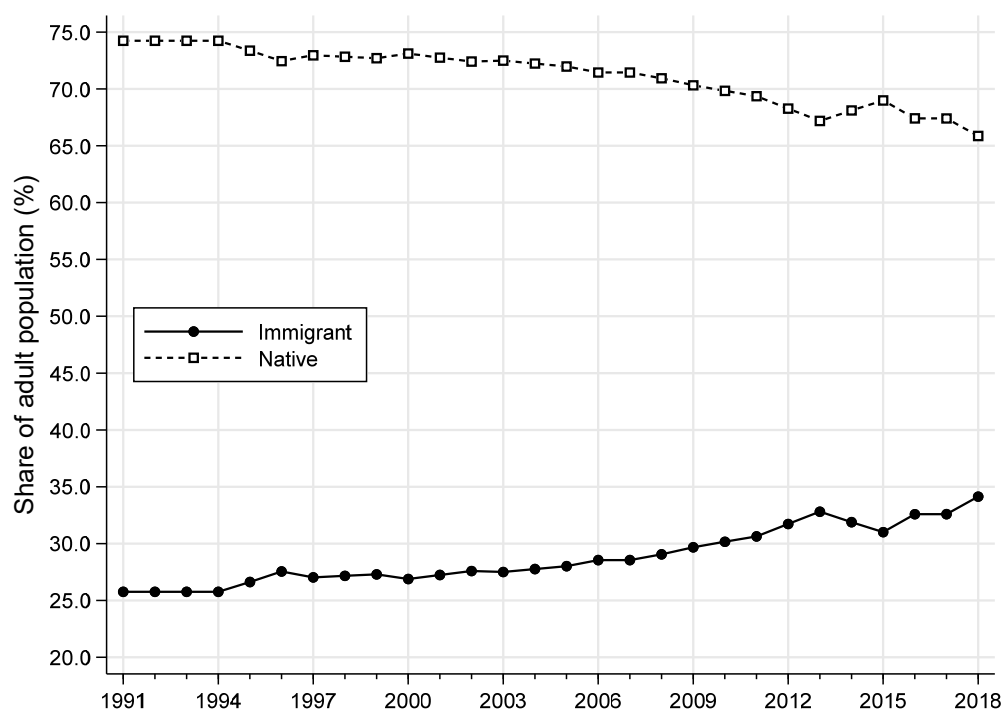
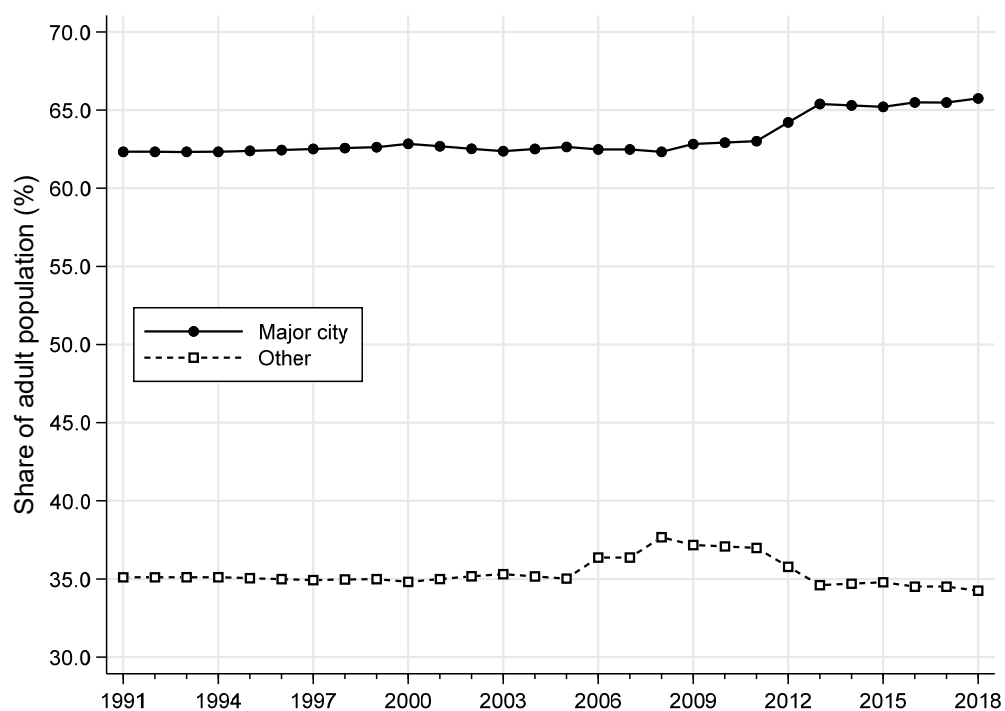
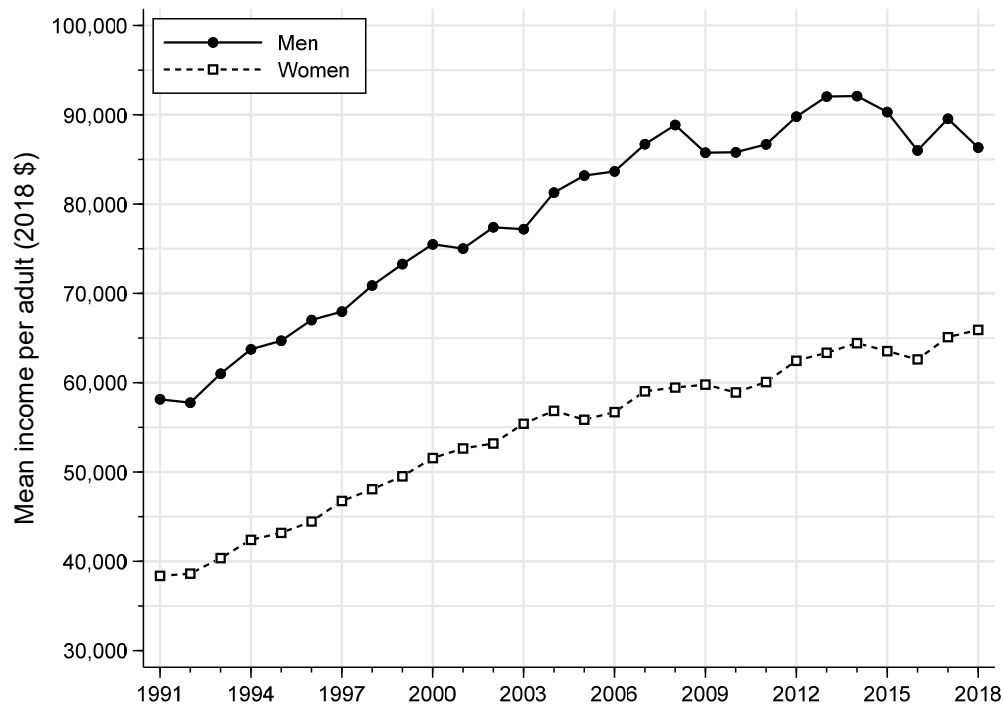


Figure D.4: Adult population shares by area of residence (1991-2018)



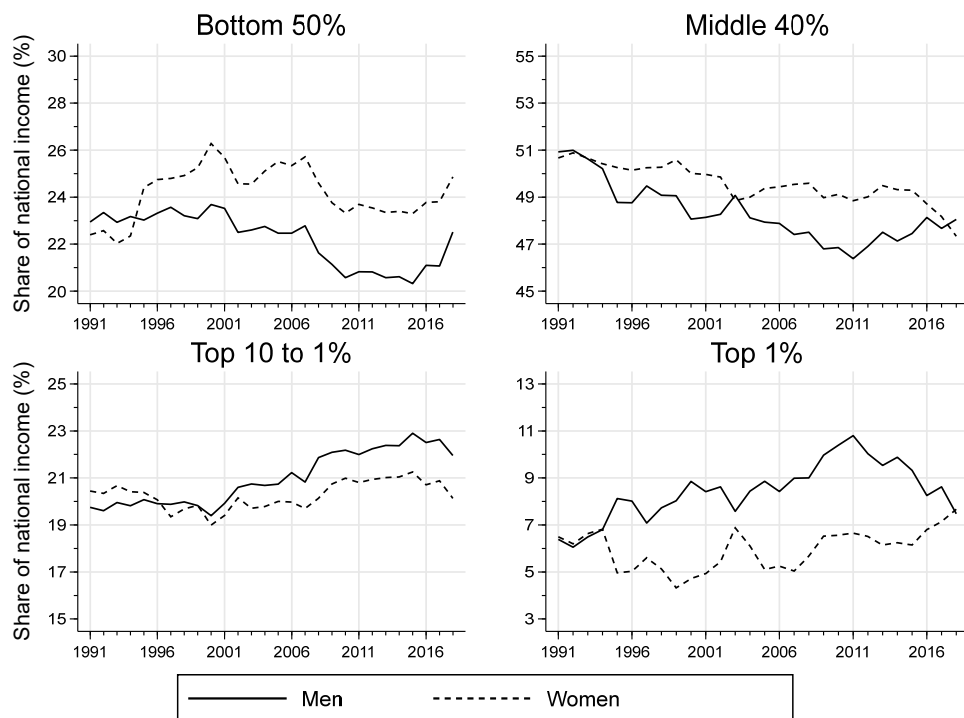
Appendix E: Inequality by demographic group: Individualistic series

Figure E.1: Mean post-tax national income per adult by sex (1991-2018)



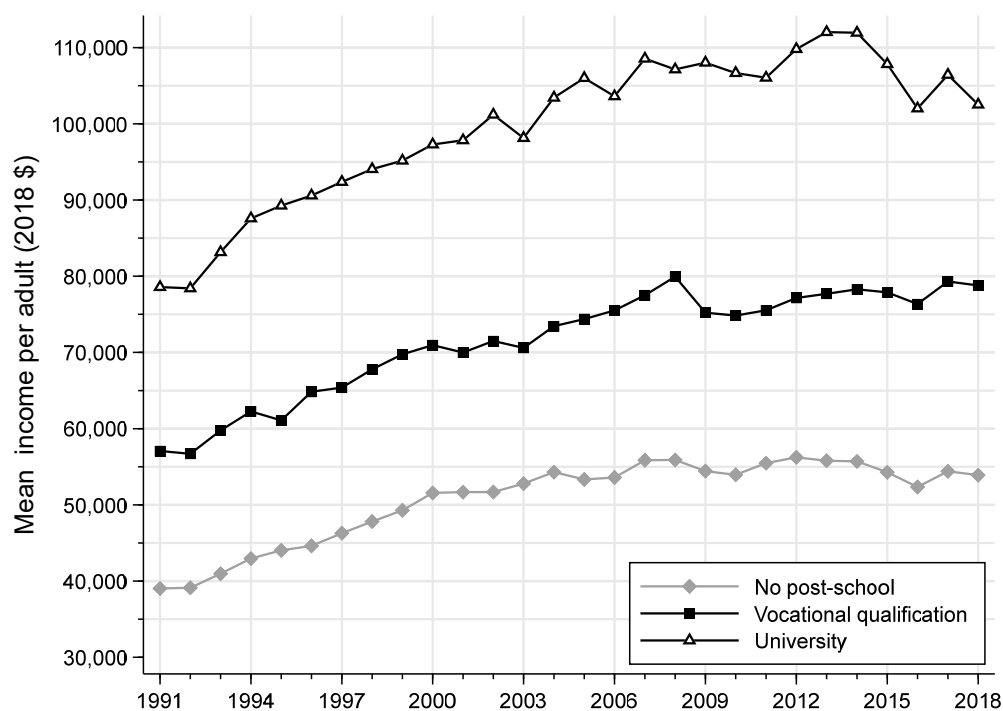
Stata graph ptninc_mean_split0_sex_b

Figure E.2: Post-tax national income shares among men and women (1991-2018)



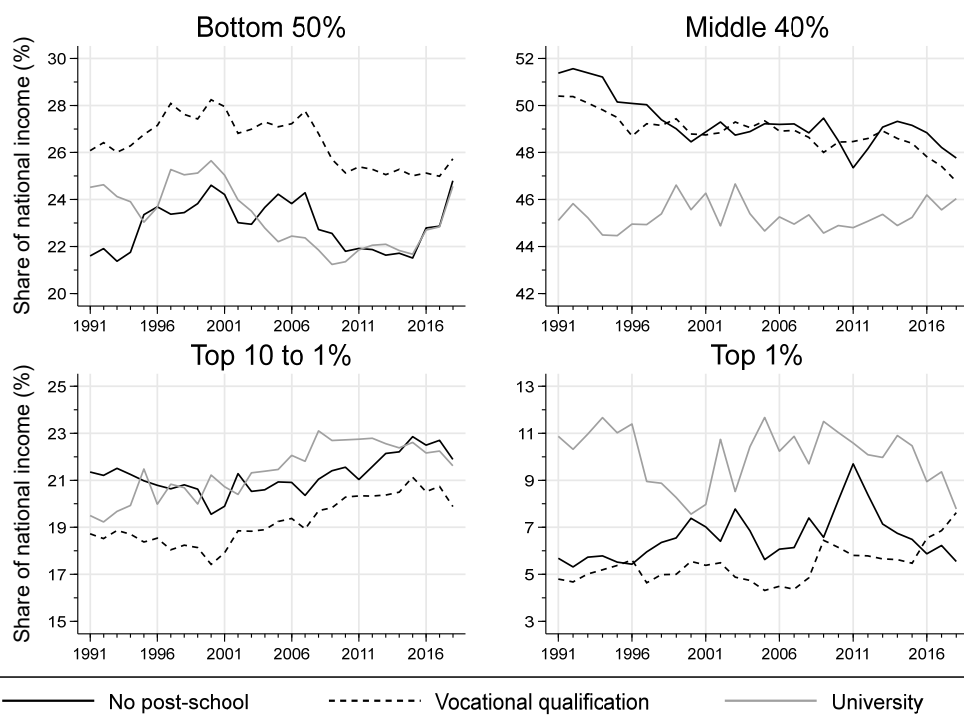
Stata graph pshares_split0_sexp_ptninc_b

Figure E.3: Mean post-tax national income per adult by educational attainment (1991-2018)



Stata graph ptninc_mean_split0_edu_b

Figure E.4: Post-tax national income shares within education groups (1991-2018)



Stata graph pshares_split0_edu_ptninc_b

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