

Taxation and Redistribution in Australia and the UK – Evidence from Microsimulation Analyses

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Abstract

The last 60 years have seen Australia and the United Kingdom diverge, both socially and economically. This paper considers how the widening social gap between the two countries is reflected by their respective redistributive systems. The analysis is based upon two microsimulation procedures – one static and the other dynamic – both of which are used to consider the probable distributional effects that would arise if elements of the Australian and UK tax and benefits systems were exchanged. The static microsimulation analysis presented suggests that comparisons based purely upon cross-sectional survey data are affected by population heterogeneity, which tend to overstate the redistributive effect of the Australian transfer system in 1997/98 relative to the UK. The dynamic microsimulations are based on a cohort model, and extend the static analysis to consider distributional effects from a working-lifetime perspective. The analysis undertaken suggests that, on balance, the Australian transfer system is more redistributive than the UK system, and reflects a greater concern for social equity. The UK system, in contrast, reflects a greater concern for social insurance.

1 Introduction

“It only takes being in a roomful of Americans for the English and Australians to realise how much we have in common”, Stephen Fry.

This paper considers how the widening social gap between Australia and the UK is reflected by the transfer policies adopted in the two countries. Australian society essentially reflected the cultural characteristics and transfer policies of Britain for the first 150 years following colonisation.¹ The years after the Second World War have, however, seen Australia develop a growing sense of its own identity – one that is increasingly disparate from that of the Britain.² The current paper addresses the accompanying impact on transfer policy by considering the question: What would be the effect on the redistribution of income if selected Australian taxes, unemployment benefits, and family support schemes applicable during 1997 were replaced by comparable elements of the contemporary system applied in the United Kingdom?

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¹See for example, Robertson & Singleton (2001).

²See, for example, Rooth (1999) and Tsokhas (1994) on the distancing of the economic relationship between Australia and the UK at the end of the Second World War.

The transfer systems of Australia and the UK have evolved along paths that appear to mirror the changing social relationship between the two countries. At its inception, the Australian transfer system was based upon the British model, a correlation that culminated with the conclusion of a reciprocal agreement on social security between the two countries in 1953. However, the redistributive systems of Australia and the UK have since diverged, to the point where the reciprocal agreement was severed on the 1st of March 2001. Indeed, it has been claimed that reforms to Australian social security undertaken during the 1980s resulted in perhaps the ‘purest’ social *assistance* system in the industrialised world. The British system, in contrast, remains the epitome of a social *insurance* system, consistent with the values advocated by the Beveridge report.³ These two systems – social insurance and social assistance – while related, embody quite different value judgements. It is consequently interesting to consider how the redistributive effects of the Australian and UK transfer systems now compare, given the evolving social relationship.

The majority of papers that compare the redistributive effects of Australian and UK fiscal policy do so in the context of a broad international comparison that includes a range of alternative countries.⁴ These studies typically reveal that, in international terms, the transfer systems of Australia and the UK remain quite similar. OECD data presented by Fugeman (1999), for example, suggest a close correspondence between the size of the welfare state in the two countries. During the ten-year period between 1986 and 1996, the magnitude of the difference between the Australian and UK tax ratios to Gross National Product remained modest – varying between 6.5 and 3.2 per cent – with the UK always slightly higher than Australia. Furthermore, the data presented by Fugeman (1999) suggest that the structure of taxation is similar in the two countries. Both systems rely on indirect taxation for a high proportion of total revenue relative to other OECD countries, and both impose a similar burden of direct taxation as a proportion of total personal income.⁵ A principal objective of the current study is to look at this relationship from a redistributive perspective.

A detailed analysis of cross-sectional survey data suggests that the distributional similarities between Australia and the UK are deep and wide ranging. van de Ven (2004a), for example, considers data from the 1997 Australian Survey of Income and Housing Costs (SIHC) and the UK Family Expenditure Survey (FES), and finds a close correspondence between the distributional effect of alternative household income sources; earnings from employment is the single most important component of post-tax income in both countries, followed by direct taxes – benefits play a relatively minor role. Furthermore, household demographics appear to be remarkably similar; the proportions of each population identified in eight

³See Falkingham & Harding (1996), pp. 2-3.

⁴For recent papers based on data derived from the OECD, see Fugeman (1999), Förster (2000), and Wagstaff & van Doorslaer (2001). For studies based on data from the LIS (Luxembourg Income Study), see, for example, Gottschalk & Smeeding (2000), and Smeeding (2000).

⁵See Fugeman (1999), Tables 4 and 5.

categories distinguished by the numbers of adults and children in a household differ by less than 5 per cent between the two countries, and the proportions identified in five-year age groups differ by less than 3 per cent.⁶ Against the backdrop of these striking similarities, the most conspicuous difference between the two countries identified by van de Ven (2004*a*) is the larger redistributive effect that is observed for the Australian than the UK transfer system. This finding appears to be robust to the measure of inequality used to compare distributions, to the equivalence scales used to adjust for household need, and to the population subgroup considered (with a few isolated exceptions). Furthermore, the conclusion that the Australian transfer system is more redistributive than the UK system is also broadly consistent with results that have been published in the associated literature – see, for example, Förster (2000), Alvarez (2001), Bradley et al. (2001), and Wagstaff & van Doorslaer (2001).

Nevertheless, the conclusions derived from comparisons of cross-sectional survey data should be treated with some caution. For example, van de Ven (2004*a*) also observes that pre-tax household income inequality is greater in Australia than the UK, which suggests that the greater progressivity that is observed for the Australian transfer system may be attributable to the distributions of wages and salaries or investment returns, rather than the explicit specifications of the respective transfer systems.⁷ Furthermore, statistics reported in van de Ven (2004*a*) suggest that the UK transfer system gives rise to significantly larger horizontal inequities than the Australian system, which weakens the implied redistributive effect.

To address the limitations of survey data, the comparisons between the transfer systems that are made here are based upon static and dynamic microsimulation methods. The static microsimulation models are based upon the same SIHC and FES data that are considered in van de Ven (2004*a*). van de Ven (2004*a*) consequently serves the dual role of identifying the extent to which cross-sectional survey data may be used to undertake international redistributive comparisons, and of providing useful background for the static microsimulations that are discussed here. The static microsimulation analysis that is presented here focuses upon the extent to which the two major observations identified in van de Ven (2004*a*) – that the Australian transfer system is both more redistributive, and more horizontally equitable than the UK system – are attributable to heterogeneity of the survey populations used. Furthermore, the static microsimulations describe the impact effects of exchanged redistributive policies between Australia and the UK, consistent with the primary question of interest.

The dynamic simulation analysis that is presented in the second half of the paper explores two questions: How are the redistributive comparisons between the Australian and UK transfer systems affected when the income concept is extended to the working lifetime? And, what are the likely implications

⁶The proportions of the elderly (over the age of 64) are also projected to be similar until at least 2050.

⁷See Falkingham & Harding (1996) for evidence that the same is true with regard to distributions of lifetime income.

for the redistributive comparisons of observed demographic trends? The former subject is of interest because it captures the role played by the transfer systems of smoothing income during the life course, which cross-sectional studies cannot reflect. The latter provides some indication of the extent to which the observations made are affected by the period for which the analysis is undertaken.

A consideration of the working lifetime departs from most studies of redistribution, which typically focus upon income measured on an annual basis. An exclusive focus on annual incomes, however, does not permit important redistributive properties of a transfer system to be inferred. Most transfer systems are specified to address some combination of two fundamental redistributive functions – the *social insurance* and *social assistance* roles of government. The social insurance function of a redistributive system protects individuals from the hardship associated with temporal variation in circumstances. The consequent emphasis is upon transfers of income from periods in an individual’s lifetime when income is relatively high, to those when income for the same individual is low – an intra-personal redistribution. The social assistance function, in contrast, transfers income from individuals who are relatively rich (in a lifetime sense) to those who are poor – an inter-personal redistribution.⁸ It is clear that a different motivation and interpretation can be attached to each of these two redistributive roles, which motivates the current consideration of income measured on both an annual and working lifetime basis.

The static microsimulation models used are described in Section 2, and the associated redistributive analysis is presented in Section 3. The simulation analysis is extended to consider lifetime redistributive effects in Sections 4 and 5. Conclusions and implications of the analysis are drawn together in Section 6.

2 Static Microsimulation Models – Issues of Calibration

Two static microsimulation models are used to generate the counterfactual data that are considered in this paper; one for the Australian transfer system, and the other for the UK. Each static microsimulation model consists of two parts: a reference database that details the characteristics of each household in a population, and a procedure that determines the impact on each household of counterfactual policy regimes. These two parts are described separately below.

2.1 Reference Databases

The household reference databases that are used for Australia and the UK are drawn, respectively, from the SIHC and the FES. The nationally representative survey populations that are described by the SIHC and FES are limited here to focus upon the healthy, working aged population. Consequently,

⁸In other words, redistribution from the chronic haves to the chronic have-nots; Solon (1999). Various alternative definitions of social assistance and social insurance have been considered by the literature; see, for example, Krueger & Meyer (2002).

any household that includes a member over the age of 59, or earns at least 10 per cent of its pre-tax-post-benefit income from government benefits that are designed to support the sick or the aged are omitted from the respective microsimulation databases. This process of elimination reduces the number of households that are described by the FES and SIHC to 4,178 and 5,236 households respectively. Refer to Appendix A for a detailed description of the SIHC and FES data used.

2.2 Simulating Transfer Policy

The tax and benefit schemes considered are those that were relevant for healthy, working aged individuals in 1997/98:

- For Australia
 - *Newstart (NS)*: An unemployment benefit payable to individuals who are available for, capable of, and actively seeking work between the ages of 18 and 65.
 - *Family Payment (FP)*: A benefit that is structured to support low income families with dependant children.
 - *Parenting Payment (PP)*: A benefit paid instead of *Newstart* to one member of a married couple with at least one dependant child. It has a more generous income test than *Newstart* and does not require the recipient to be seeking employment.
 - *Sole Parent Payment (SPP)*: The sole parent equivalent of the *Parenting Payment*.
 - *Income Tax*: Income taxation is levied on individual rather than joint incomes, and takes a standard multi-step form with 5 progressive marginal rates.
 - *Medicare Levy (ML)*: Charged in addition to *Income Tax*, to fund the costs of a universal health care system.
 - *Family Tax Initiative (FTI)*: A scheme designed to support households with dependant children (in addition to the *FP*). It is comprised of two parts: Family Tax Assistance for households that earn a sufficiently high taxable income, and Family Tax Payment for low income families.
 - *Dependent Spouse Rebate (DSR)*: A tax rebate that can be claimed by individuals who have a spouse that earns a sufficiently low (or no) income.
 - *Sole Parent Rebate (SPR)*: A tax rebate that can be claimed by single parents with dependant children.
 - *Low Income Earner Rebate (LIR)*: A tax rebate that can be claimed by individuals who earn a sufficiently low income.

- For the UK
 - *Income Tax*: Income tax is levied on individual incomes via a standard multi-step function with 4 progressive marginal rates. The system also adjusts for marital status and age.
 - *National Insurance Contributions (NICs)*: Like the *Medicare Levy* for Australia, *NICs* are charged in addition to income tax to fund state run health care. The amount of *NICs* paid also determine an individual’s eligibility to a number of (contributions based) benefit schemes.
 - *Jobseeker’s Allowance (JSA)*: An unemployment benefit paid to individuals who are available for, capable of, and actively seeking employment. The payment is determined by an individual’s household status and their income.
 - *Child Benefit (CB)*: Non-contributory, non-taxable, not means-tested, and provides support for claimants with dependant children.
 - *Family Credit*: Designed to support working families with children. A family is eligible if they possess at least one adult working 16 hours per week or more, with a higher rate benefit payable if an adult works in excess of 30 hours per week.

In 1997–1998, these schemes accounted for 73.0 per cent of all Australian social security expenditures excluding benefits to the elderly, and 82.0 per cent of individual taxation liability. Similarly, the benefits listed above account for 50.0 per cent of all DSS support payments excluding benefits to the retired for 1997–1998, and 36.0 per cent of all UK taxation revenue.

These schemes are described at greater length in Appendix B, and the simulations are based on the formal specifications that are provided there.⁹ However, the official rates and thresholds that are defined in Appendix B provide an inadequate description of the redistributive impact that is observed in practice. Imperfect take-up rates for benefits, miscalculation and misrepresentation that are inherent in any actual tax and benefits system mean that, in practice, the post-tax distribution of income will rarely be allocated as the statutory rules imply. In addition, many of the mathematical expressions defined in Appendix B simplify some of the formal rules that are provided by official sources (which are not always fully transparent).

In the interests of analytical convenience, two factors are considered to have an important distorting influence on the simulations based upon the descriptions provided in Appendix B, relative to survey data. Firstly, it is not possible to include the various eligibility tests with respect to household assets,

⁹Direct consultations with the Australian Department of Social Security were undertaken to ensure a close reflection of the Australian transfer system. The UK specifications are based upon descriptions provided by the Institute for Fiscal Studies; <http://www.ifs.org.uk/taxsystem/contentstax.shtml>, and <http://www.ifs.org.uk/taxsystem/contentsben.shtml>.

NICs, or weekly labour hours that are applied by individual benefits schemes due to the limitations of the data that are provided by the SIHC and FES. Omitting these tests from the simulation models results in excessive numbers of simulated recipients, relative to the recipients that are observed in the survey data. Secondly, the Australian and UK benefits systems are means tested with regard to weekly measures of income so that they have sufficient flexibility to respond to brief changes in financial need. In contrast, the microsimulation analysis is based on annual (or normal) pre-tax income data to maintain consistency with the existing literature and the dynamic microsimulation analysis that is presented in Section 5. This restricts the flexibility of the simulated transfer systems, and consequently results in a smaller number of welfare recipients relative to the observed survey data. To identify the impact of each of these effects, the number of recipient households generated using the demographic and income tests described in Appendix B (the uncalibrated static simulation model), and the number of recipients observed in the associated survey data, are reported in Table 1.¹⁰

Table 1: Number of Recipient Households by Transfer Scheme, Simulated and Survey Data

| Australia | | | | |
|---------------------|-----------|-----------|---------|---------|
| | NS | PA | SPP | FP |
| RB>0 | 602 | 462 | 323 | 1398 |
| RB=0, GB>0 | 569 | 710 | 57 | 266 |
| RB>0, GB=0 | 195 | 38 | 49 | 135 |
| GB>0 | 976 | 1134 | 331 | 1529 |
| possible recipients | 2669 | 883 | 411 | 1949 |
| pr(RB=0 GB>0) | 0.58299 | 0.62610 | 0.17221 | 0.17397 |
| pr(RB>0 GB=0) | 0.08621 | 0.08279 | 0.35766 | 0.19679 |
| UK | | | | |
| | JSA(cont) | JSA (inc) | CB | FC |
| RB>0 | 38 | 228 | 1415 | 154 |
| RB=0, GB>0 | 0 | 229 | 134 | 227 |
| RB>0, GB=0 | 1 | 15 | 112 | 53 |
| GB>0 | 37 | 442 | 1437 | 328 |
| possible recipients | 653 | 615 | 1545 | 1545 |
| pr(RB=0 GB>0) | 0.00000 | 0.51810 | 0.09325 | 0.69207 |
| pr(RB>0 GB=0) | 0.00162 | 0.03731 | 0.46281 | 0.03670 |

1. RB>0 denotes number of beneficiaries identified by SIHC (Australia) or FES (UK)
2. RB=0 denotes number of non-beneficiaries identified by SIHC (Australia) or FES (UK)
3. GB>0 denotes number of recipients in generated data
4. GB=0 denotes number of non-recipients in generated data
5. (cont) denotes Contribution based JSA
6. (inc) denotes Income based JSA
7. pr(.) denotes probability of observation
8. Possible recipients identified in SIHC as individuals with appropriate demographic characteristics, and annual income less than \$40,000. In FES possible recipients for JSA identified as individuals with annual income less than £5,200, and for CB and FC households with children.
9. Australian statistics based on SIHC data, UK statistics on FES data

The first row of figures reported for the Australian, and for the UK data in Table 1 provide a useful frame of reference by indicating the number of recipients in recorded by the survey data. The second row of data for Australia indicates that *PA* and *NS* suffer most considerably from the omission of

¹⁰The *FTI* is not calibrated since relevant data are not provided by the SIHC.

associated assets tests, followed by *FP* and *SPP*. This observation is to be expected given that the assets tests of *NS* and *PA* are structured specifically to exclude the short term unemployed who possess some means of self support. The respective data reported for the UK indicate that *FC* and *JSA(inc)* are the benefits for which omission of relevant eligibility tests have the greatest effect relative to the associated numbers of survey recipients. The observation with regard to *FC* is in part attributed to the use of the minimum wage rate of £3.60 to identify individuals who satisfy the labour hours restriction, and to low associated take-up rates. A large proportion of the 227 generated *FC* recipients for whom no benefit is recorded by the survey data are likely to work less than 16 hours per week, and were consequently ineligible for the benefit.

The fact that all of the generated recipients of contribution based *JSA* also receive a benefit in the survey data is due to the (uncalibrated) simulation procedure adopted. Contribution based *JSA* depends upon the *NICs* paid over a two-year period, which are not specified by the FES (or the SIHC). For the data reported in Table 1, contribution based *JSA* recipients are generated by applying the relevant income test to raw data recipients.¹¹ Hence all of the generated beneficiaries of contribution based *JSA* identified in Table 1 are also raw data beneficiaries. The *CB* is non-contributory and not means tested. The 134 generated recipients for whom no *CB* is recorded by the FES may consequently be attributed to imperfect take-up rates and data inconsistencies.

The third row of statistics reported for Australia and the UK identify the effect of part-year recipients on the disparity between the generated and raw benefits. For all of the benefits, with the exception of contribution based *JSA*, part-year recipients have a smaller effect than the omitted eligibility tests. This result is of note, given the decision to base the simulation analysis on annual, rather than weekly data.

The probabilities reported in Table 1 are obtained from the associated numbers of recipients using equations (1) and (2):

$$pr(RB = 0 | GB > 0) = \frac{n(RB = 0 | GB > 0)}{n(GB > 0)} \quad (1)$$

$$pr(RB > 0 | GB = 0) = \frac{n(RB > 0 | GB = 0)}{n(pos) - n(GB > 0) + n(RB = 0 | GB > 0)} \quad (2)$$

where $n(\cdot)$ denotes the number of households reported in Table 1, and *pos* abbreviates ‘possible recipients’. With regard to the Australian benefits considered in Table 1, the number of possible recipients is equal to the number of households that possess the required demographic characteristics and have total annual income gross of transfers less than \$40,000; the income restriction is not imposed for *FP*. For

¹¹For the simulation analysis applied to data other than the FES, contributions based *JSA* recipients are identified by a Monte Carlo procedure for individuals who earn pre-tax incomes with a value of less than £10 per week, based on a probability of 0.01389 (that they receive contributions based *JSA*). This probability was calculated from the FES data, having observed that, of the 38 contributions based *JSA* recipients recorded by the FES data, only 4 had incomes in excess of £10 per week.

contribution based *JSA*, the number of possible recipients is equal to the number of households with annual pre-tax income less than £5,200. The same sample of possible recipients is used for the income based *JSA*, with raw data recipients of contribution based *JSA* deducted. The number of possible recipients of *CB* and *FC* is taken as the number of households with children 18 years of age or younger. The probabilities reported in Table 1 were used as a starting point for the calibration procedure.

The simulation procedure for individual benefits begins by considering the eligibility of each adult between 20 and 59 years of age based upon their income, the income of their spouse (if applicable), and the number and ages of any children in the household. A Monte Carlo procedure is then used, subject to an exogenously defined probability, to eliminate generated recipients to account for the omission of relevant eligibility tests. This is followed by a Monte Carlo procedure to identify part-year recipients from the population of households that are otherwise not provided with a generated benefit, but satisfy any demographic eligibility tests and comply with the income restrictions described for the ‘possible recipients’ recorded in Table 1. An additional income restriction is imposed on part-year recipients of *FC*, who must come from households in which at least one adult member earns a pre-tax income in excess of £57.60 per week. This restriction is adopted to account for the minimum 16 hours of labour per week that is required by the scheme.¹² The populations from which part-year benefits recipients are drawn includes individuals with incomes in excess of the relevant benefits cut-out, and individuals omitted by the first Monte Carlo procedure. The proportion of the year for which a part-year recipient receives the maximum benefit associated with their household’s demographic structure is generated by random selection from a normal distribution (censored to take values between 0 and 1). The statistics used by the simulation procedure are displayed in Table 2.

The probabilities reported in the top row for each country in Table 2 are used to exclude individuals due to omitted eligibility tests. The probabilities in the second row are used to identify part-year recipients. Each of these probabilities was manually adjusted to minimise the disparity between the distributions of generated benefits and the benefits observed in survey data. Furthermore, the mean and variance statistics that are used to generate the proportion of benefits received by part-year recipients (reported in the third and fourth rows of Table 2 respectively) are based on the benefits observed in survey data for households that are recorded as recipients in the survey data, but for whom no benefit was generated by the uncalibrated simulation model. Comparing the probabilities that are reported in Tables 1 and 2 reveals that it was necessary to increase the number of part-year relative to full-year recipients to improve the fit of the simulation model for many of the benefits considered. This observation is consistent with the fact that some of the households reported in Table 1 for which both

¹²The 30 hour credit provided by the scheme is generated for any recipient household that includes at least one adult with a weekly income in excess of £108.00.

Table 2: Calibrated Statistics for Static Microsimulations

| Australia | | | | |
|-----------------|-----------|-----------|---------|---------|
| | NS | PA | SPP | FP |
| pr(RB=0 GB>0) | 0.72000 | 0.73000 | 0.25000 | 0.17514 |
| pr(RB>0 GB=0) | 0.11000 | 0.31000 | 0.57837 | 0.21040 |
| mean | 0.19212 | 0.22770 | 0.43874 | 0.11747 |
| variance | 0.02772 | 0.04074 | 0.08255 | 0.01378 |
| G(Model) | 0.93722 | 0.94997 | 0.95201 | 0.87179 |
| G(Raw) | 0.92887 | 0.94904 | 0.95159 | 0.86303 |
| L(Model) | 0.01323 | 0.00470 | 0.01114 | 0.01262 |
| L(Raw) | 0.01572 | 0.00416 | 0.01147 | 0.01362 |
| n(Model) | 619 | 472 | 329 | 1361 |
| n(Raw) | 602 | 462 | 323 | 1398 |
| average(Model) | 5183.22 | 2480.42 | 6533.31 | 2628.31 |
| average(Raw) | 5197.24 | 2671.44 | 6921.28 | 2865.11 |
| UK | | | | |
| | JSA(cont) | JSA (inc) | CB | FC |
| pr(RB=0 GB>0) | 0.05000 | 0.53000 | 0.09500 | 0.60000 |
| pr(RB>0 GB=0) | 0.00500 | 0.07000 | 0.00000 | 0.00000 |
| mean | 0.50013 | 0.64645 | 0.00000 | 0.00000 |
| variance | 0.01440 | 0.05760 | 0.00000 | 0.00000 |
| G(Model) | 0.99329 | 0.96012 | 0.73159 | 0.97604 |
| G(Raw) | 0.99235 | 0.95998 | 0.73304 | 0.97246 |
| L(Model) | 0.00144 | 0.00947 | 0.00477 | 0.00474 |
| L(Raw) | 0.00143 | 0.01072 | 0.00392 | 0.00456 |
| n(Model) | 35 | 224 | 1403 | 156 |
| n(Raw) | 38 | 228 | 1415 | 154 |
| average(Model) | 3137.94 | 3318.56 | 981.20 | 2774.65 |
| average(Raw) | 2871.33 | 3451.92 | 979.01 | 2868.13 |

Model - refers to statistics generated from microsimulation model

Raw - refers to statistics derived from survey data

G(.) = Gini coefficients

L(.) = progressivity measured in terms of the Gini coefficient

n(.) = number of households

average(.) = average transfer payments

generated and survey benefits were observed, are part-year, rather than full-year, recipients.

The statistics reported for each country in the lower sections of Table 2 indicate that the distributions derived for each of the simulated benefits closely reflect the associated payments observed in the survey data. To examine the relation between the generated and survey distributions from another perspective, Table 3 displays statistics for aggregate tax and benefits payments. Three distributions of income are considered: unadjusted household income, equivalent income adjusted by tax implicit equivalence scales, and equivalent income adjusted by the OECD scale (which assigns a value of one to the reference person of a household, 0.7 to their partner, and 0.5 to any dependant children regardless of household income).¹³ The tax implicit equivalence scales are described at length in Muellbauer & van de Ven (2004), and are designed to capture the valued judgements implicit in transfer policy – see Appendix C for a graphical description of the tax implicit equivalence scales that are considered here. The equivalence scales considered differentiate household need with regard to the numbers of adults, children, and to pre-tax income. Furthermore, associated confidence intervals calculated at the 95 per cent level of significance are provided in Appendix D.¹⁴ Comparisons that are described anywhere as “significant” refer to the associated 95 per cent confidence intervals.

The statistics reported in Table 3 indicate that the aggregate simulated benefits provide a close reflection of the benefits observed in the survey data, consistent with the conclusions derived from Table 2. It is of particular note that, of all the statistics reported for aggregate benefits in Table 2, only the inequality statistics for the distributions of simulated UK benefits are significantly different from (and slightly greater than) their raw data counterparts. The same is not, however, true of the statistics calculated for aggregate tax payments. The statistics calculated for both countries suggest that the static simulation models generate significantly higher tax burdens than observed in survey data. This is particularly true for the UK, where the simulated tax burden exceeds the burden observed in survey data by more than 30 per cent for all three measures of income considered (as opposed to the 11 per cent difference observed for Australia). Furthermore, simulated taxes for the UK are distributed significantly more unequally than the associated survey data, whereas no significant difference is observed for Australia.

The more substantial disparity between the simulated and survey data observed for taxes than for benefits is of little surprise given the effort that has been made to calibrate the simulation of benefits to raw data as described above. Taxes were not similarly calibrated due to the income dependence of the

¹³Where Australian income data are considered, equivalence scales estimated from Australian data are used, and similarly for the UK. The distribution of equivalent income is obtained by adjusting each household’s income by the relevant equivalence scale and then allocating the measure of equivalent income to all household members. Hence, the distribution of household income is comprised of fewer observations than the distributions of equivalent income.

¹⁴Following Efron & Tibshirani (1993), the confidence intervals reported here were calculated using the Bias Corrected and Accelerated Bootstrap. Confidence intervals are omitted for horizontal inequity H , due to the excessive computational burden involved.

Table 3: Aggregate Income Distributions – Simulated versus Survey Data

| Income Distribution | measure | Gross Income | Government Benefits (a) | Taxes (b) | Net Income | R+Hmin | Vmax |
|-----------------------|---------|--------------|-------------------------|-----------|------------|---------|---------|
| Australia - Simulated | | | | | | | |
| Hh(y) | Gini | 0.44805 | 0.81694 | 0.56328 | 0.35865 | 0.00872 | 0.09812 |
| | Average | 39085.30 | 2140.77 | 10277.30 | 30948.80 | | |
| Tax E(y) | Gini | 0.48059 | 0.72848 | 0.59178 | 0.38550 | 0.00258 | 0.09767 |
| | Average | 34558.60 | 1561.41 | 9617.83 | 26502.20 | | |
| OECD E(y) | Gini | 0.42057 | 0.76295 | 0.53693 | 0.31510 | 0.00564 | 0.11111 |
| | Average | 22372.40 | 1361.60 | 5916.53 | 17817.40 | | |
| Australia - Survey | | | | | | | |
| Hh(y) | Gini | 0.44805 | 0.81646 | 0.56418 | 0.36359 | 0.00877 | 0.09323 |
| | Average | 39085.30 | 2080.97 | 9247.81 | 31918.50 | | |
| Tax E(y) | Gini | 0.48059 | 0.73360 | 0.59246 | 0.39305 | 0.00281 | 0.09035 |
| | Average | 34558.60 | 1540.52 | 8639.05 | 27460.00 | | |
| OECD E(y) | Gini | 0.42057 | 0.76136 | 0.53927 | 0.31981 | 0.00463 | 0.10539 |
| | Average | 22372.40 | 1310.78 | 5314.63 | 18368.50 | | |
| UK - Simulated | | | | | | | |
| Hh(y) | Gini | 0.43387 | 0.78471 | 0.57854 | 0.35306 | 0.01141 | 0.09222 |
| | Average | 21707.71 | 716.18 | 6529.95 | 15893.90 | | |
| Tax E(y) | Gini | 0.46078 | 0.68807 | 0.60470 | 0.36601 | 0.00762 | 0.10239 |
| | Average | 17122.82 | 585.03 | 5476.74 | 12231.08 | | |
| OECD E(y) | Gini | 0.39525 | 0.69353 | 0.54338 | 0.30700 | 0.00988 | 0.09813 |
| | Average | 12508.70 | 457.41 | 3792.52 | 9173.58 | | |
| UK - Survey | | | | | | | |
| Hh(y) | Gini | 0.43387 | 0.77275 | 0.53544 | 0.38827 | 0.01037 | 0.05597 |
| | Average | 21707.70 | 692.48 | 4993.90 | 17406.28 | | |
| Tax E(y) | Gini | 0.46078 | 0.66721 | 0.56240 | 0.40300 | 0.00767 | 0.06545 |
| | Average | 17122.80 | 583.21 | 4086.07 | 13619.94 | | |
| OECD E(y) | Gini | 0.39525 | 0.66674 | 0.50075 | 0.33855 | 0.00972 | 0.06642 |
| | Average | 12508.71 | 443.09 | 2883.25 | 10068.55 | | |

(a) Australian Government Benefits include FTI, in addition to calibrated benefits

(b) Australian Taxes include ML and all rebates described in Section 8.2, UK taxes include NICs

Hh(y) = aggregate household income distribution

Tax E(y) = tax based equivalent income distribution

OECD E(y) = OECD equivalent income distribution

Vmax = Maximum progressivity observed after varying bandwidth used for measurement

R+Hmin = Estimate of inequity associated with tax and transfer payments

schemes considered.¹⁵ The disparity between the simulated and survey data observed for taxes can be attributed to a number of factors. These include the fact that a different tax scheme is applicable for income earned from investments and salaried employment, whereas alternative income sources are treated equivalently by the simulation model; the survey tax payments include the effects of rebates associated with health related characteristics that are not considered here; and the effects of misrepresentation and miscalculation. The implications of these differences are discussed below.

Differences between the simulated and survey distributions of post-tax income arise due to the effects of government benefits and taxes described above. Specifically, the averages reported for simulated post-tax income are significantly less than those derived from survey data for both countries due to the

¹⁵Consistent with the simulation framework adopted here, both HARDING and LIFEMOD adjust benefits receipt in response to imperfect take-up rates, but do not adjust for tax evasion. With regard to other static models, a range of alternative approaches are considered. In the case of EUROMOD, for example, adjustments for take-up or evasion issues are made by the simulations for 7 of the 15 countries considered; see Sutherland (2001), Table 3.10 for details.

impact of higher average simulated taxes. Furthermore, the statistics suggest that the progressive effect of the associated tax and benefits systems is exaggerated by the static simulation models, relative to observations drawn from survey data (statistically significant for the UK).

These observations provide the first important results of the paper. Comparing the redistributive effect of the Australian and UK transfer systems obtained from the survey data (measured as the difference between the pre-tax and post-tax Gini coefficients reported in Table 3) indicates that the Australian system is significantly more progressive, consistent with the observations reported in van de Ven (2004a).¹⁶ In contrast, the measures of progressivity obtained from the simulated data reported in Table 3 suggest that there is no significant difference between the two systems (although the redistributive statistics obtained for Australia remain slightly higher than those of the UK).¹⁷ This striking observation appears to be driven by the simulated effect of taxation – the effect on the distribution of post-tax income of taxes is exceeded only by the effect of pre-tax income, and the statistics reported in Table 3 suggest that the simulated taxes are significantly more progressive than taxes described by survey data (particularly for the UK). The implication is that there is very little difference between the redistributive effects of the Australian and UK transfer systems, as they are described by the rates and thresholds reported in Appendix B. Nevertheless, the survey data suggest that practical implementation of the UK transfer system – and the income tax system in particular – produces significantly less redistribution compared with the Australian transfer system. This conclusion is considered at greater length in the next section.

The statistics $R + H_{\min}$ and V_{\max} reported in the last two columns of Table 3 use the notation of van de Ven et al. (2001) to denote measures of minimum observed inequity and potential progressivity associated with the transfer systems. The statistics indicate that significantly lower potential progressivity is observed in the survey than the simulated data – particularly for the UK (consistent with the inequality measures observed for post-tax income). The inequity of the simulated transfer systems is attributable to two factors: intentional inequity associated with demographic differences between households, and the random adjustment used as part of the calibration procedure for transfer payments. The statistics obtained for $R + H_{\min}$ indicate that the Monte Carlo adjustment made to account for omitted eligibility tests and part-year recipients does a reasonable job of capturing the inequity observed in survey data.

The statistics reported in Table 3 for horizontal inequity are of particular interest. A number of reasons are listed above, which may explain why the simulated benefits based upon the rates and thresholds described in Appendix B depart from those described by the survey data. Some of these reasons are

¹⁶Progressivity using the tax based equivalence scales: Australia = 0.08754 [0.08461, 0.09061], UK = 0.05778 [0.05568, 0.06016], 95 per cent confidence intervals in square brackets.

¹⁷Australia = 0.09509 [0.09255, 0.09932], UK = 0.09477 [0.09131, 0.09847].

justifiable from an equity perspective (for example, part-year recipients and omitted eligibility tests), and others are harder to justify (imperfect take-up rates for benefits, miscalculation and misrepresentation). Since the data used do not permit these various effects to be identified individually, the model is calibrated on the assumption that all of the observed disparity is justifiable from an equity perspective. The fact that the measures of redistributive inequity that are generated by the simulation model – which are implicitly assumed to be consistent with horizontal equity – approximate the measures calculated from survey data, serves to highlight the difficulties of associated interpretation.

3 Static Microsimulation Analysis

Distributional statistics calculated for four alternative policy counterfactuals are presented in Table 4. Two sets of the redistributive statistics displayed in Table 4 restate statistics that are presented in Table 3 – the Australian static simulation model applied to the Australian reference database, and the UK simulation model applied to the UK reference database. These are restated here to facilitate inter-country comparisons. The remaining two cases presented in Table 4 consider the potential redistributive effect of exchanging the transfer systems of Australia and the UK – Australian taxes and benefits are generated for the UK reference database, and vice versa. 95 per cent confidence intervals associated with the statistics reported in Table 4 are provided in Appendix D. Distributional comparisons that are reported as “significant” in the text refer to the associated 95 per cent confidence intervals.

A number of broad observations can be made regarding each of the four simulations reported in Table 4. Firstly, inequality statistics calculated for benefits and taxes are significantly greater than the associated inequality statistics of pre-tax income. The distribution of benefits in each country is associated with the greatest measure of inequality, and the lowest average due to the relatively small proportion of the recipient population. The progressive nature of taxes and benefits result in significantly lower measures of inequality for the post-tax income distribution, and the fact that the populations considered are net tax payers is indicated by the smaller average of post-tax, relative to pre-tax income. The smallest measure of transfer inequity, $(R + H_{\min})$, is observed for the tax based equivalent income distribution, which is expected given that the tax based scales are specified to capture the value judgements implicit in transfer policy; see van de Ven & Creedy (2005).

Focusing on the distributions of pre-tax income reveals that a significantly lower average, and higher measure of inequality are associated with the Australian reference database compared with that of the UK. As noted above, these differences between the pre-tax income distributions of the two countries may be responsible for the higher measures of redistribution that are reported for the Australian transfer system. The importance of this conjecture is borne out by the distributional statistics that are reported for government benefits, taxes, and post-tax income in Table 4. With regard to the statistics reported

Table 4: Redistributive Effect of Taxes and Benefits – Static Microsimulation Results

| Income Distribution | measure | Pre-tax Income | Government Benefits (a) | Taxes (b) | Post-tax Income | R+Hmin | Vmax |
|--|---------------|----------------|-------------------------|-----------|-----------------|---------|---------|
| Australian system on Australian Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.44805 | 0.81694 | 0.56328 | 0.35865 | 0.00872 | 0.09812 |
| | Average | 39085.30 | 2140.77 | 10277.30 | 30948.80 | | |
| Tax E(y) | Gini | 0.48059 | 0.72848 | 0.59178 | 0.38550 | 0.00258 | 0.09767 |
| | Average | 34558.60 | 1561.41 | 9617.83 | 26502.20 | | |
| OECD E(y) | Gini | 0.42057 | 0.76295 | 0.53693 | 0.31510 | 0.00564 | 0.11111 |
| | Average | 22372.40 | 1361.60 | 5916.53 | 17817.40 | | |
| Australian system on UK Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.43387 | 0.82720 | 0.56635 | 0.35263 | 0.00717 | 0.08842 |
| | Average | 41032.71 | 1668.81 | 10726.47 | 31975.05 | | |
| Tax E(y) | Gini | 0.45010 | 0.74171 | 0.57670 | 0.36415 | 0.00202 | 0.08796 |
| | Average | 35982.37 | 1215.94 | 9918.69 | 27279.61 | | |
| OECD E(y) | Gini | 0.39162 | 0.77937 | 0.52653 | 0.29896 | 0.00511 | 0.09777 |
| | Average | 24076.12 | 1068.73 | 6327.72 | 18817.13 | | |
| UK system on Australian Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.44805 | 0.76278 | 0.57449 | 0.36503 | 0.01141 | 0.09443 |
| | Average (GBP) | 20677.49 | 870.18 | 6244.68 | 15302.98 | | |
| | Average (AUD) | 39085.36 | 1644.85 | 11803.93 | 28926.26 | | |
| Tax E(y) | Gini | 0.48941 | 0.67264 | 0.61597 | 0.39078 | 0.00778 | 0.10642 |
| | Average (GBP) | 16684.56 | 703.89 | 5376.12 | 12012.36 | | |
| | Average (AUD) | 31537.79 | 1330.52 | 10162.15 | 22706.22 | | |
| OECD E(y) | Gini | 0.41899 | 0.67919 | 0.54646 | 0.32689 | 0.00988 | 0.10198 |
| | Average (GBP) | 11719.76 | 538.59 | 3564.87 | 8693.46 | | |
| | Average (AUD) | 22153.13 | 1018.06 | 6738.44 | 16432.71 | | |
| UK system on UK Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.43387 | 0.78471 | 0.57854 | 0.35306 | 0.01037 | 0.08983 |
| | Average (GBP) | 21707.71 | 716.18 | 6529.95 | 15893.90 | | |
| | Average (AUD) | 41032.73 | 1353.75 | 12343.16 | 30043.25 | | |
| Tax E(y) | Gini | 0.46078 | 0.68807 | 0.60470 | 0.36601 | 0.00767 | 0.10038 |
| | Average (GBP) | 17122.82 | 585.03 | 5476.74 | 12231.08 | | |
| | Average (AUD) | 32366.20 | 1105.84 | 10352.35 | 23119.64 | | |
| OECD E(y) | Gini | 0.39525 | 0.69353 | 0.54338 | 0.30700 | 0.00972 | 0.09586 |
| | Average (GBP) | 12508.70 | 457.41 | 3792.52 | 9173.58 | | |
| | Average (AUD) | 23644.42 | 864.61 | 7168.77 | 17340.24 | | |

(a) The Australian benefits include the Family Tax Initiative in addition to the calibrated benefits

(b) Australian taxes include ML and all rebates described in Section 8.2, UK taxes include NICs

Hh(y) = aggregate household income distribution

Tax E(y) = tax based equivalent income distribution

OECD E(y) = OECD equivalent income distribution

Average (UK) = average of distribution measured in GBP

Average (Aus) = average of distribution measured in AUD = Average (UK)*41165.85/487.06

Vmax = Maximum progressivity observed after varying bandwidth used for measurement

R+Hmin = Estimate of inequity associated with tax and transfer payments

for each of the two transfer systems, average government benefits are significantly greater, and taxes are significantly smaller, when the simulation analysis is applied to the Australian reference database¹⁸. Put another way, the focus of each transfer system is shifted from taxation toward welfare benefits, when the Australian rather than the UK reference database is considered. In view of the fact that the benefits schemes are more progressive than the income tax schedules (in the sense that there is a stronger positive relationship between average withdrawal rates of benefits and pre-tax income, than with average tax rates and pre-tax income), the redistributive effect of each transfer system is higher when the focus shifts toward benefits. This conclusion is supported by the measures of post-tax income inequality that are reported in Table 4, which all reveal a greater redistributive effect for each transfer system when applied to the Australian reference database.¹⁹

The simulated statistics reported here fail to indicate a consistently larger redistributive effect for the Australian transfer system relative to that of the UK. The statistics derived from the simulated data suggest that any conclusion regarding the relative redistributive effects of the Australian and UK transfer systems depends upon the equivalence scale and measure of inequality used. Interestingly, the only consistent finding between the various distributional statistics that can be identified is that the simulated Australian transfer system is *less* redistributive than the UK transfer system when the tax based equivalence scales are adopted. It is of note that this observation opposes one of the prevailing findings of studies based upon cross-sectional survey data.

These observations have potentially important policy implications. If the descriptions used to simulate the Australian and UK transfer systems are correct, and if the comparisons are not driven by inaccuracies of the survey data, then it is possible to conclude from the observations made here that the official specifications of the Australian and UK transfer systems imply very similar redistributive effects – so similar, that any attempt to identify an associated ranking depends heavily upon the value judgements made. In contrast, the survey data suggest that practical application of the Australian tax and benefits system achieves a closer reflection of the associated formal specification than for the UK, such that a significantly larger redistributive effect is identified for the Australian system for a broad range of analytical value judgements.

In contrast to the above findings, the simulated measures of horizontal inequity reported in Table 4 are consistent with the observations made in van de Ven (2004a), in that they indicate significantly less inequity for the Australian transfer system than the UK system. This observation suggests that the relativities implicit in the UK transfer system are less consistent with the equivalence scales considered

¹⁸with the exception that there is no significant difference between the tax burdens observed, when adjusted by the tax implicit equivalence scales.

¹⁹It is of note, however, that only the redistributive statistics obtained for the Australian transfer system are significantly different when applied to the alternative reference databases.

here than the Australian system. As noted in the previous section, however, it is difficult to infer any normative conclusions from the measures of horizontal inequity reported here, due to the uncertainty that is associated with their underlying causes. All that may be confidently concluded – given the consideration of tax implicit equivalence scales – is that the UK transfer system appears to be less consistent than the Australian system with a value judgement that limits household heterogeneity to the numbers of adults, children, and to pre-tax income.

4 Generating Lifetime Tax and Benefits Payments

Although the calibrated simulation models described in Section 2 provide a close reflection of the cross-sectional distributions that are observed in the survey data, they fail to capture important age specific effects. The problem is attributable to the fact that the Monte Carlo adjustments incorporated into the procedures used to generate the benefits data considered in Section 3 do not take into consideration the age of a potential beneficiary. In the case of unemployment benefits, for example, young people may be less likely to receive a benefit because of low labour force participation, and older people may become less likely to receive benefits as they accumulate assets during their working lifetimes (see below). The focus of the analysis presented in Section 5 on lifetime redistribution means that age specific effects are a matter of some concern.

The procedures that are used to generate the benefits payments for the analysis reported in Section 5 are based upon the same procedures as adopted for the static simulations described in Section 2. Importantly, however, the adjustments made to account for omitted eligibility tests have been altered to reflect age specific effects. The simulating routines proceed by first applying the rules and regulations as described in Appendix B, then augmenting the recipient population to account for part-year beneficiaries as described in Section 2, and finally applying a Monte Carlo adjustment to account for omitted eligibility tests using transition probabilities calibrated with respect to the age of the reference person. The transition probabilities used to account for the omitted eligibility tests are calibrated using data derived from the SIHC and FES, which are aggregated by five-year age intervals to minimise the limitations imposed by small samples. The probabilities used are based upon the ratios of survey data recipients to generated recipients, which were obtained using procedures that do not adjust for omitted eligibility tests (but do adjust for part year receipt). These are reported in Table 5 by benefit and (reference person) age group.²⁰

The ratios of four benefits schemes reported in Table 5 indicate substantially different numbers of generated and survey recipients by age; *NS*, *PA*, *FC*, and income based *JSA*. These benefits

²⁰Contributions based *JSA* is not subject to an omitted eligibility test in view of the fact that eligibility is determined by the income of an individual, and their contributions history. This benefit is consequently generated using the rules described in Section 3.

Table 5: Ratios of Survey to Generated Recipients

| | Australia | | | |
|----------|-----------|---------|---------|---------|
| | NS | PA | SPP | FP |
| under 25 | 0.32007 | 0.25000 | 0.81250 | 0.83908 |
| 25-29 | 0.72500 | 0.38739 | 0.85246 | 0.86145 |
| 30-34 | 0.51282 | 0.48780 | 0.90141 | 0.91503 |
| 35-39 | 0.43056 | 0.47751 | 0.95181 | 0.90594 |
| 40-44 | 0.36364 | 0.34568 | 0.89655 | 0.88596 |
| 45-49 | 0.36036 | 0.28448 | 0.83333 | 0.90286 |
| 50-54 | 0.46575 | 0.35185 | 1.00000 | 0.79167 |
| | UK | | | |
| | JSA(inc) | FC | CB | |
| under 25 | 0.41975 | 0.45000 | 0.92593 | |
| 25-29 | 0.85714 | 0.45763 | 0.94118 | |
| 30-34 | 0.80000 | 0.47297 | 0.97924 | |
| 35-39 | 0.60870 | 0.54878 | 0.97922 | |
| 40-44 | 0.64000 | 0.30769 | 0.98496 | |
| 45-49 | 0.50000 | 0.48276 | 0.99468 | |
| 50-54 | 1.23810 | 0.31818 | 0.97436 | |

are consequently subject to an omitted eligibility test, whereas the remaining benefits are simulated by exactly the same procedures as considered for the static simulation analysis. Focusing upon the *NS* and *JSA(inc)*, the ratios displayed in Table 5 exhibit an intuitive relation with age (as noted previously in this section), taking low values for the under 25 age group, rising rapidly for the 25–29 age group and then falling away with successively higher age groups. The ratios displayed for *PA* exhibit a hump-shaped profile, peaking during the principal child-rearing years, and those for *FC* exhibit no obvious trend with age, a result that is consistent with the fact that the variation observed for *FC* is predominantly due to the omission of the 16 hour per week labour rule rather than an associated assets test.

In the case of *NS*, *PA*, and *JSA(inc)*, most of the disparity between the survey recipients and those with a generated benefit can be attributed to omitted assets tests. The simulation procedures used to generate these benefits for the simulated cohort considered in Section 5 consequently impose an additional eligibility test, based upon a weighted average of household income from preceding years. This test takes into account the relation between household income and the assets held by a household. Specifically, the following restrictions are imposed on household income for receipt of *NS*, *PA*, or *JSA(inc)*:

$$\frac{0.5hhw_{t-1} + 0.3hhw_{t-2} + 0.2hhw_{t-3}}{\mu(hhw_t)} < \alpha \quad (3)$$

where hhw_t is the pre-tax income of a household in year t , $\mu(hhw_t)$ denotes the mean income of households in year t , and α is a parameter that takes the value 0.6 for *NS*, 0.9 for *PA*, and 0.7 for *JSA(inc)*. These income tests are applied to simulated individuals after the third year of the simulated cohort. Benefits recipients in the first three years of a cohort are subject to a Monte Carlo procedure

Table 6: Probability of Retaining Generated Benefit by Age

| | NS | PA | JSA(inc) |
|-------|---------|---------|----------|
| 20 | 0.22000 | 0.05000 | 0.30000 |
| 21 | 0.22000 | 0.10000 | 0.41000 |
| 22 | 0.32000 | 0.15000 | 0.47000 |
| 23 | 0.42000 | 0.20000 | 0.57000 |
| 24 | 0.62000 | 0.41000 | 0.48000 |
| 25-29 | 0.92000 | 0.51000 | 0.92376 |
| 30-34 | 0.84500 | 0.85000 | 0.96873 |
| 35-39 | 0.81000 | 0.95000 | 0.74934 |
| 40-44 | 0.65500 | 0.72000 | 0.82078 |
| 45-49 | 0.64000 | 0.58000 | 0.64571 |
| 50-54 | 0.78000 | 0.65000 | 1.00000 |

based explicitly on the ratios reported in Table 5. Following the above income test, a Monte Carlo procedure is used to eliminate the additional recipients required to reflect the ratios displayed in Table 5 – Table 6 displays the associated age specific transition probabilities that were applied.

5 Redistribution During the Working Lifetime

The analysis presented in this section attempts to distinguish between the social insurance (intra-household redistribution) and social assistance (inter-household redistribution) effects of the Australian and UK transfer systems during the working lifetime. No attempt is made to identify the sources of inequality measured during the working lifetime, which remains an issue for further research.²¹ The analysis is based on distributional statistics calculated for a cohort of 5,000 individuals, for whom income and demographic characteristics are recorded for every year from age 20 to 55. The data were generated using the dynamic microsimulation model that is described in van de Ven (2004b), which is primarily calibrated to reflect demographic trends observed for the Australian cohort aged 20 in 1970.²² The focus is upon distributional implications for cohort members. Hence the distributions of equivalent income considered are obtained by allocating measures of household equivalent income to cohort members only, and not to all household members as in previous sections.

The analysis that is presented here focuses upon two measures of household income described by the cohort data: lifetime income and annual income. The cohort data can be used to determine household income for the working lifetime by aggregating annual income for each household over all 36 years described by the data set.²³ Alternatively, the annual income data can be considered as a set of

²¹See, for example, Harding (1993), Falkingham & Lessof (1992), Falkingham & Harding (1996), and Pettersson & Pettersson (2003) for studies that consider the sources of lifetime inequality.

²²The income and labour characteristics generated by the model are also described in van de Ven (2005).

²³Creedy (1997) considers four alternative concepts of lifetime income; annual average (as considered here), present value of real income, annuity value, and utility equivalent annuity value. The current framework of analysis is simplified by the fact that the simulations assume no growth, and no mortality during the working lifetime for cohort members. Furthermore, Creedy (1997) finds a substantial amount of agreement between the four alternative income concepts referred to above in making pairwise comparisons.

independent observations (of which, there are $5,000 \times 36 = 180,000$). This annual income distribution shares important similarities with the cross-sectional populations that are considered by the analysis presented in Sections 2 and 3, insofar as it provides a snapshot of households at different points of their respective lifetimes. This approach to analysing the data derived from the simulation model is also considered for the cohort study reported by Harding (1990).

Several studies have considered the redistributive effects of transfer policy from both an annual and lifetime perspective. Two of the earliest are Harding (1993), and Falkingham & Lessof (1992), which were later combined in Falkingham & Harding (1996) (F&H).²⁴ This last study is of particular interest because it is a redistributive comparison for Australia and the UK. Like the current study, F&H (and the contributing papers) use dynamic microsimulation methods to analyse lifetime redistribution. The analysis presented here, however, is different to F&H in three important respects. First, the measures of lifetime redistribution that are reported here were generated using the same underlying population. In contrast, F&H use two distinct microsimulation models to generate country specific demographic and income data for Australia (HARDING), and the UK (LIFEMOD). The inter-country redistributive comparisons presented by F&H are consequently subject to the same underlying population heterogeneity that is cited as a complicating factor for the statistical comparisons based on cross-sectional survey data. Second, F&H consider transfer systems observed for 1986 in Australia, and 1985 in the UK, ten years prior to the systems that are considered here. And third, the dynamic microsimulation models used to generate the data considered in F&H assume a steady state world that looks like Australia in 1986, and the UK in 1985. The model used to generate the data considered here is calibrated to capture observed demographic trends, and to consider sensitivity analysis with respect to those trends.

Given that the measures of lifetime income considered here are derived by a simple aggregation of the associated annual income measures, a relationship exists between the inequality of the respective distributions. Applying the analytical framework of van de Ven et al. (2001), it is useful to specify the Gini coefficient of annual income, $G(y)$, in terms of; the Gini coefficient of household lifetime income, $G(Y)$; a measure of household specific inequality, obtained by subtracting $G(Y)$ from the concentration index obtained by ordering household annual incomes by the associated lifetime income, and then by the annual income value, $H(y) = C(y) - G(Y)$; and a measure of inter-household mobility, $R = G(y) - C(y)$. $G(y)$ is then described by:

$$G(y) = G(Y) + H(y) + R \tag{4}$$

Although the decomposition of the Gini coefficient described by equation (4) has been recognised

²⁴The first study to consider the redistributive effects of transfer policy from a lifetime perspective was Wolfson (1979), which focuses upon pension policy in Canada. Davies et al. (1984) was the first study to consider the redistributive effect of transfer policy from both annual and lifetime perspectives.

for some time, its application to the distribution of lifetime income is new.²⁵ In the current context, lifetime income inequality $G(Y)$ relates specifically to the inter-household distribution, and so is useful for inferring the social assistance part played by a transfer system. In contrast, intra-household income differences produce $H(y) + R$, and the redistributive effect on this aggregate is consequently useful for inferring the social insurance role of a transfer system. Note that a close relationship exists between the measures of inter-household mobility R , and household specific inequality $H(y)$ – if there is no household specific inequality, then there will also be no inter-household mobility. The two measures $H(y)$ and R are distinguished by the implied relation between the income distributions of individuals. Specifically, the measure of inter-household mobility R arises because household A , with a higher lifetime income than some other household B , earns less income during at least one of the years of their lifetime than household B did during a (possibly different) year of their lifetime. Where an individual’s income varies between years, but the variation does not produce income cross-overs as described above, then the implied inequality is captured by $H(y)$.

The following discussion makes reference to four distributional measures associated with equation (4) – inequality of (annualised) lifetime incomes $G(Y)$, which is interpreted as a measure of inter-household inequality; household specific inequality $H(y)$ and inter-household mobility R , which together are interpreted as a measure of intra-household inequality ($G(y) - G(Y)$); and inequality of annual incomes $G(y)$. Table 7 reports $G(Y)$, $H(y)$, R , and $G(y)$ calculated for the standard Gini coefficient (denoted $G(2)$ in the table). Extended Gini coefficients specified to place more weight on observations at the lower end of the income distribution are also reported in Table 7 for annual and lifetime income (denoted $G(4)$). Furthermore, Table 7 reports household specific inequality statistics that were obtained by taking the arithmetic mean of annual income inequality (measured in terms of the standard Gini coefficient) for each household considered in isolation. In addition to the equivalence scales that are referred to above, the Henderson scale is also considered here.²⁶ Confidence intervals for the statistics reported here are provided in Appendix D.

The annual income statistics reported in Table 7 are similar to the statistics discussed in Section 3, consistent with the distribution’s interpretation as a pseudo cross-section. Comparing the statistics reported in Tables 7 and 4 reveals that the annual income distribution considered here is described by a significantly lower mean pre-tax income, significantly less pre-tax inequality, significantly greater

²⁵The study by Harding (1990) reports $G(y)$ and $G(Y)$, but does not relate the two; see also, Nelissen (1998). Alternatively, studies have used aggregation methods to measure the impact of the transfer system on the intra-personal and inter-personal distributions – see, for example, Pettersson & Pettersson (2003), and Falkingham & Harding (1996).

²⁶The Henderson equivalence scale is commonly used for analysis of Australian income data – see, for example, the Australian Bureau of Statistics publication, *Income Distribution, Australia 1997–1998*, ABS Catalog Number 6523.0. This scale allocates points depending upon household member characteristics, and the number of people in a household – see, for example See Henderson et al. (1970), and Appendix F of the Australian Government Commission of Inquiry into Poverty (1975) for further details.

Table 7: Distributional Statistics for Working Lifetime of Cohort – Includes Simulated Demographic Trends

| equiv scale | income | mean | Annualised lifetime | | Household Specific | | Mobility | Annual | | |
|-----------------------------|----------|----------|---------------------|---------|--------------------|---------|----------|---------|---------|--|
| | | | G(2) | G(4) | G(2) | mean | G(2) | G(2) | G(4) | |
| Australian Tax and Benefits | | | | | | | | | | |
| unadjusted | Pre-tax | 37079.58 | 0.26849 | 0.44173 | 1.071E-04 | 0.28575 | 0.12773 | 0.39633 | 0.65824 | |
| | Post-tax | 32620.81 | 0.18298 | 0.31684 | 8.821E-05 | 0.22533 | 0.11865 | 0.30172 | 0.52678 | |
| | Net | 4458.77 | 0.08550 | 0.12489 | 1.893E-05 | 0.06042 | 0.00908 | 0.09460 | 0.13146 | |
| Henderson | Pre-tax | 26402.69 | 0.27419 | 0.44804 | 1.082E-04 | 0.29017 | 0.12833 | 0.40263 | 0.66198 | |
| | Post-tax | 22544.97 | 0.17604 | 0.28897 | 8.023E-05 | 0.20117 | 0.10371 | 0.27983 | 0.47916 | |
| | Net | 3857.72 | 0.09815 | 0.15907 | 2.799E-05 | 0.08900 | 0.02461 | 0.12279 | 0.18281 | |
| OECD | Pre-tax | 21432.08 | 0.28372 | 0.46071 | 1.106E-04 | 0.29935 | 0.13211 | 0.41594 | 0.67694 | |
| | Post-tax | 18112.21 | 0.18614 | 0.30024 | 8.100E-05 | 0.20205 | 0.10405 | 0.29028 | 0.48338 | |
| | Net | 3319.87 | 0.09758 | 0.16047 | 2.963E-05 | 0.09729 | 0.02806 | 0.12566 | 0.19355 | |
| Aus tax | Pre-tax | 27816.22 | 0.31483 | 0.50547 | 1.174E-04 | 0.31518 | 0.13208 | 0.44702 | 0.70947 | |
| | Post-tax | 23150.86 | 0.22467 | 0.36248 | 9.183E-05 | 0.22817 | 0.11024 | 0.33500 | 0.54602 | |
| | Net | 4665.37 | 0.09016 | 0.14299 | 2.556E-05 | 0.08701 | 0.02183 | 0.11202 | 0.16345 | |
| UK Tax and Benefits | | | | | | | | | | |
| unadjusted | Pre-tax | 37079.58 | 0.26849 | 0.44173 | 1.071E-04 | 0.28575 | 0.12773 | 0.39633 | 0.65824 | |
| | Post-tax | 28619.05 | 0.18891 | 0.32761 | 8.951E-05 | 0.22762 | 0.11753 | 0.30652 | 0.52836 | |
| | Net | 8460.52 | 0.07958 | 0.11412 | 1.763E-05 | 0.05813 | 0.01020 | 0.08980 | 0.12988 | |
| Henderson | Pre-tax | 26402.69 | 0.27419 | 0.44804 | 1.082E-04 | 0.29017 | 0.12833 | 0.40263 | 0.66198 | |
| | Post-tax | 20184.00 | 0.19260 | 0.32571 | 8.785E-05 | 0.22117 | 0.11386 | 0.30654 | 0.51507 | |
| | Net | 6218.69 | 0.08160 | 0.12232 | 2.037E-05 | 0.06900 | 0.01447 | 0.09608 | 0.14691 | |
| OECD | Pre-tax | 21432.08 | 0.28372 | 0.46071 | 1.106E-04 | 0.29935 | 0.13211 | 0.41594 | 0.67694 | |
| | Post-tax | 16339.75 | 0.20426 | 0.34191 | 8.983E-05 | 0.22770 | 0.11566 | 0.32001 | 0.52962 | |
| | Net | 5092.33 | 0.07946 | 0.11880 | 2.081E-05 | 0.07165 | 0.01645 | 0.09593 | 0.14731 | |
| UK tax | Pre-tax | 27245.90 | 0.31523 | 0.49472 | 1.191E-04 | 0.31169 | 0.13172 | 0.44707 | 0.69749 | |
| | Post-tax | 20523.02 | 0.22963 | 0.37110 | 9.766E-05 | 0.23944 | 0.11762 | 0.34735 | 0.55057 | |
| | Net | 6722.88 | 0.08560 | 0.12362 | 2.139E-05 | 0.07225 | 0.01409 | 0.09972 | 0.14691 | |

Net = Pre-tax less Post-tax measure (net tax burden or redistribution)

G(v) = Extended Gini coefficient, inequality aversion parameter v

redistribution, and a significantly smaller average tax burden. These observations are consistent with the fact that the (Australian) cross-sectional survey data considered in Section 3 are weighted more heavily about the peak income earning ages of 35–45, than the pseudo cross-section considered here.

Annual income inequality is significantly greater than lifetime income inequality, which has been discussed extensively in the literature.²⁷ However, the disparity between the annual and lifetime measures of inequality reported here is somewhat less acute than the findings reported by comparable studies. For example, the study reported by Harding (1990) – which includes similar statistics to those reported in Table 7 for a simulated cohort that has also been calibrated to reflect the Australian population – suggests that the ratio of lifetime to annual income inequality for “Earnings” of the full population is 0.5667, and for disposable (post-tax) income is 0.5982.²⁸ These compare with ratios of 0.6694 and 0.6269 respectively, for the statistics reported in Table 7. The smaller disparity between the annual and lifetime inequality measures reported here can be attributed to the current focus on the working lifetime, which excludes observations for the retired. It is, however, possible to find a range of ratios reported in the literature that includes values that are both significantly lower and significantly higher than those reported here.²⁹

Comparing the statistics reported in Table 7 for the Australian and UK transfer systems reveals very similar redistributive effects. Both the Australian and the UK transfer systems reduce annual income inequality significantly more than they do working lifetime income inequality. This result is consistent with the associated literature³⁰, and reflects the influence of the social insurance role for each system. In terms of their impact on lifetime income inequality, the Australian transfer system appears to be significantly more redistributive than the UK system, reducing pre-tax inequality by between 22 and 33 per cent³¹ depending upon the equivalence scale and measure of inequality used, relative to a reduction of between 22 and 28 per cent for the UK. This finding is consistent with Falkingham & Harding (1996), who report a 26% redistributive effect for the Australian transfer system relative to a 25% effect for the UK system, based upon Gini coefficients of unadjusted lifetime income.³²

The statistics reported in Table 7 also suggest that the Australian transfer system achieves significantly more household specific redistribution (with regard to $H(y)$) than the UK system does, reducing pre-tax inequality by between 17 and 31 per cent (relative to 15 and 23 per cent for the UK system) depending upon the equivalence scale and method of aggregation used.³³ Furthermore, the Australian

²⁷See, for example, Lillard (1978) and Shorrocks (1981).

²⁸See Harding (1990), Table 8.4.

²⁹For example, Pettersson & Pettersson (2003) report a ratio of lifetime to annual inequality of 0.40 for Sweden. In contrast, the classic study by Lillard & Willis (1978) reports statistics drawn from United States survey data that suggest ratios of between 0.61 and 0.73.

³⁰See, for example, Layard (1977) for an early reference.

³¹percentages calculated with regard to the reported Gini ratios.

³²Gini coefficients of lifetime income reported by Falkingham & Harding (1996): Australia pre-tax income = 0.370, post-tax income = 0.273; UK pre-tax income = 0.327, post-tax income = 0.245.

³³The measure $H(y)$ referred to in equation (4) applies an aggregation that weights each household by their population

transfer system produces a significantly larger decrease in inter-household mobility than the UK transfer system for 3 of the four equivalised income distributions considered (which is consistent with the significantly larger decrease observed for $H(y)$ by the Australian system). It is of note, however, that the aggregate impact of the Australian transfer system on intra-household inequality ($H(y) + R$) is significantly greater than the UK system only when measured by the standard Gini coefficient. When measured by the extended Gini coefficient $G(4)$, intra-household redistribution measured using three of the four equivalence scales is larger for the UK transfer system, a finding that is consistent with statistics reported by Falkingham & Harding (1996).

Redistribution of lifetime income accounts for between 77 and 86 per cent of the total redistributive effect calculated for annual incomes, with regard to the transfer systems of both countries. The remaining redistribution is attributed mainly to reduced mobility between households. These findings imply that both transfer systems focus more upon inter-household reallocations than they do upon a social insurance role during the working lifetime – a conclusion that is not particularly surprising, given that the analysis omits retirement when the intra-household redistributive effect is likely to be most evident. Nevertheless, a small intra-household redistributive effect is observed, consistent with the adjustments made by each transfer system in response to household need during the peak child-rearing years, and during the period of entry into the labour-force at younger ages. In contrast, most studies that consider a longer period income concept focus upon the full lifetime. Statistics reported by Harding (1990), for example, suggest that approximately 50 per cent of the Australian transfer system’s redistributive effect is explained by intra-household redistribution. Falkingham & Harding (1996) suggest that intra-personal redistribution accounts for between 47 and 52 per cent of total redistributive effect for the Australian transfer system, and between 62 and 71 per cent for the UK system.³⁴

It is clear that an analysis of lifetime inequality omits many of the complications that can arise when the distribution of annual incomes is considered.³⁵ Lifetime income bears upon the welfare of an individual in a way that transitory factors which affect annual income may not. This endows measures of lifetime income inequality with a particular significance. Nevertheless, observations regarding the intra-household measures of inequality ($H(y) + R$) reported in Table 7 suggest a number of interesting interpretations.

Consider, for example, the labour market effects of the relationship between individual wages and age. Intra-household inequality will arise where individual incomes increase with experience, and hence with age. If greater experience implies higher wages in the future, then this may be an important

and income share. The statistics denoted “Household Specific / mean” apply an equal weighting to all households.

³⁴Pettersson & Pettersson (2003) suggest that 68 per cent of the Swedish transfer systems redistributive effect is due to intra-household redistribution.

³⁵See Nelissen (1998), Section 2 for an extended discussion regarding the merits of analysing lifetime rather than annual income inequality.

factor to encourage labour force participation of the young; see, for example, Sefton & van de Ven (2004). A transfer system that reduces the mobility implied by these income dynamics would evidently dampen the associated labour market incentives.³⁶ In contrast, it is possible to argue that an excessively high experience effect on wages could encourage individuals to enter the labour market *too* early, and consequently forego valuable education. Alternatively, intra-household inequity can also arise due to transitory departures from the lifetime trend. Solon (1999), p. 4, suggests that inequality that arises due to this transitory variation “can have serious welfare consequences. For example, a transitory earnings drop can force a liquidity-constrained worker to cut back his or her current consumption.” It is clear that interpretation of intra-household inequality is far from straight forward.

In absolute terms, the difference between the redistributive effects on annual income of the Australian and UK transfer systems is most attributable to the redistributive effect on the lifetime distribution. This may reflect a stronger preference for inter-household redistribution in Australia than the UK. The larger redistributive effect on lifetime incomes reported for the Australian transfer system feeds through to significantly larger reductions of annual income inequality, for all equivalence scales and inequality measures considered, with the exception of the extended Gini coefficient for unadjusted incomes. This is despite ambiguities regarding the relative size of the redistributive effect of the Australian and UK transfer systems on the intra-household income distribution. The larger reductions in annual income inequality observed for the Australian transfer system relative to the UK system are consistent with the prevailing observations reported in analyses of cross-sectional survey data.

5.1 The Distributional Effect of Demographic Trends

The current focus on the influence of demographic trends is in the spirit of a study by Nelissen (1998). Nelissen (1998) uses a dynamic cross-sectional microsimulation model (NEDYMAS) to examine the redistributive effect of the Dutch transfer system on annual and lifetime income. Lifetime effects are measured using two alternative cohorts (the 1930 birth cohort, and the 1950 birth cohort), and these are compared with annual income effects generated for the 1999 cross-section. Demographic effects on the lifetime distribution are reflected by the differences between the 1930 and 1950 cohorts. However, the analytical framework used by Nelissen is quite different to the one adopted here, in that the simulation model NEDYMAS incorporates an evolving tax and benefits structure (to reflect historical variation in the Netherlands). Hence, some of the redistributive differences between the 1930 and 1950 cohorts reported in Nelissen (1998) are attributable to the evolving tax structure, rather than the demographics. In contrast, the current study considers how alternative demographic trends can affect lifetime

³⁶Paglin (1975) suggests that inequality that arises due to the age profile of the population need not imply any fundamental inequity, suggesting that it is of less concern than other sources of inequality.

redistributive effects observed for a *given* transfer system. Furthermore, the population cross-section considered in Nelissen (1998) is comprised of a large number of cohorts in addition to the 1930 and 1950 cohorts. Hence the cross-sectional and lifetime distributions reported in Nelissen (1998) are based upon different underlying data, whereas they are based upon the same data in the current study.

The population used to calculate the statistics reported in Table 7 was generated to reflect the demographic trends observed in survey data. To consider the influence of these demographic trends on the distributional observations made, the analysis is repeated here holding demographic transition probabilities fixed at rates prevalent for 1986. This year is of particular interest in light of the study reported by Harding (1990), which considers data derived from a model that generates a cohort of (Australian) individuals who are “‘born’ in 1986 and live for up to 95 years in a world which remains exactly as it was in their birth year”, p. 39. In the current context, marital rates, divorce rates, probable age of spouse, and probability of death – all aspects that are concerned with the potential partner of a cohort member – are fixed at the values applicable for 1986. This has a substantial impact on the household demographics generated by the model, as is indicated by the two panels of Figure 1. The model that includes observed demographic trends is hereafter referred to as the “trend model”, while the model that holds transition probabilities fixed at their 1986 values is referred to as the “steady-state model”.

The upper panel of Figure 1 indicates that holding transition probabilities fixed at their 1986 values substantially reduces the proportion of the simulated cohort identified as married, relative to including observed demographic trends. This is because, at low cohort ages, marital probabilities were higher during the 1970s than they were in 1986. In contrast, after the cohort age of 36, the transition probabilities of the trend model capture survey observations for households after 1986. During these years, higher divorce rates were observed relative to 1986, and so the average number of adults per household under the two simulated scenarios begin to reconverge. The lower panel of Figure 1 reveals that fewer births are generated by the steady-state model relative to the trend model, which reflects the lower marital rates observed. The lower fertility rates generated by the steady-state model are also consistent with the reduced fertility rates that have been observed in practice, and are the subject of considerable popular debate.

It is clear that the demographic differences between the populations generated by the steady-state and trend models are likely to have important distributional implications. These can be inferred with reference to the statistics that are reported in Table 8.

Perhaps the most striking observation drawn from a comparison of Tables 8 and 7 is the similarity between the statistics calculated for the two simulated populations. Some important differences can, however, be identified. Relative to data derived from the trend model (hereafter referred to as the trend

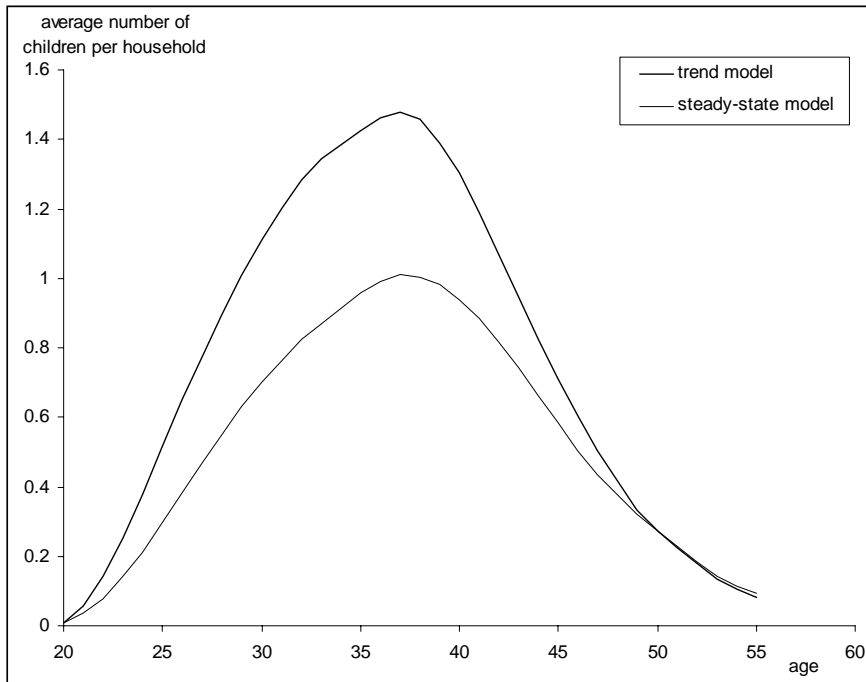
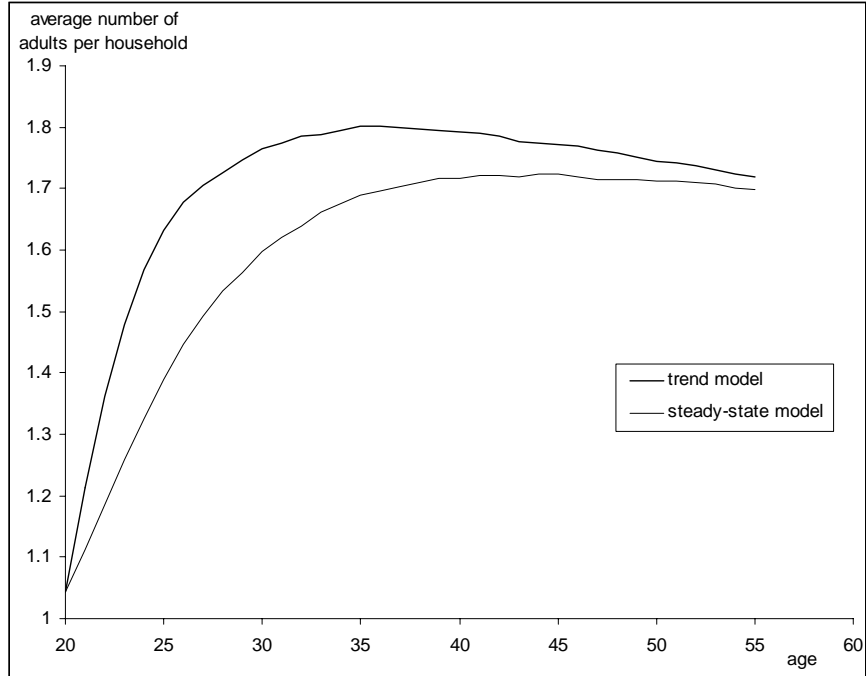


Figure 1: Average Household Size for Alternative Demographic Trends

Table 8: Distributional Statistics for Working Lifetime of Cohort – Transition Probabilities Relevant for 1986

| equiv scale | income | mean | Annualised lifetime | | Intra-household | | Mobility | Annual | |
|-----------------------------|----------|----------|---------------------|---------|-----------------|---------|----------|---------|---------|
| | | | G(2) | G(4) | G(2) | mean | G(2) | G(2) | G(4) |
| Australian Tax and Benefits | | | | | | | | | |
| unadjusted | Pre-tax | 34925.94 | 0.26889 | 0.44811 | 1.089E-04 | 0.29099 | 0.13270 | 0.40170 | 0.66903 |
| | Post-tax | 29891.79 | 0.19957 | 0.34736 | 9.052E-05 | 0.23015 | 0.11870 | 0.31836 | 0.54856 |
| | Net | 5034.15 | 0.06931 | 0.10075 | 1.840E-05 | 0.06084 | 0.01401 | 0.08334 | 0.12047 |
| Henderson | Pre-tax | 26442.80 | 0.26670 | 0.44199 | 1.068E-04 | 0.28720 | 0.13110 | 0.39791 | 0.66310 |
| | Post-tax | 22118.12 | 0.17979 | 0.30136 | 8.151E-05 | 0.20510 | 0.10781 | 0.28769 | 0.49642 |
| | Net | 4324.68 | 0.08691 | 0.14062 | 2.532E-05 | 0.08210 | 0.02329 | 0.11022 | 0.16668 |
| OECD | Pre-tax | 22299.09 | 0.27614 | 0.45249 | 1.078E-04 | 0.29201 | 0.13237 | 0.40861 | 0.67478 |
| | Post-tax | 18501.23 | 0.18780 | 0.30669 | 8.102E-05 | 0.20282 | 0.10673 | 0.29461 | 0.49660 |
| | Net | 3797.86 | 0.08834 | 0.14580 | 2.673E-05 | 0.08919 | 0.02563 | 0.11400 | 0.17819 |
| Aus tax | Pre-tax | 27473.35 | 0.29913 | 0.48863 | 1.150E-04 | 0.30846 | 0.13500 | 0.43424 | 0.70148 |
| | Post-tax | 22560.60 | 0.21873 | 0.35948 | 9.140E-05 | 0.22751 | 0.11356 | 0.33238 | 0.54854 |
| | Net | 4912.75 | 0.08041 | 0.12915 | 2.355E-05 | 0.08095 | 0.02144 | 0.10187 | 0.15294 |
| UK Tax and Benefits | | | | | | | | | |
| unadjusted | Pre-tax | 34925.94 | 0.26889 | 0.44811 | 1.089E-04 | 0.29099 | 0.13270 | 0.40170 | 0.66903 |
| | Post-tax | 26776.90 | 0.19980 | 0.35029 | 9.269E-05 | 0.23488 | 0.12147 | 0.32136 | 0.54995 |
| | Net | 8149.04 | 0.06909 | 0.09781 | 1.622E-05 | 0.05612 | 0.01124 | 0.08034 | 0.11908 |
| Henderson | Pre-tax | 26442.80 | 0.26670 | 0.44199 | 1.068E-04 | 0.28720 | 0.13110 | 0.39791 | 0.66310 |
| | Post-tax | 20135.81 | 0.19070 | 0.32947 | 8.818E-05 | 0.22245 | 0.11698 | 0.30777 | 0.52430 |
| | Net | 6307.00 | 0.07600 | 0.11252 | 1.865E-05 | 0.06475 | 0.01412 | 0.09014 | 0.13880 |
| OECD | Pre-tax | 22299.09 | 0.27614 | 0.45249 | 1.078E-04 | 0.29201 | 0.13237 | 0.40861 | 0.67478 |
| | Post-tax | 16944.57 | 0.20060 | 0.34099 | 8.850E-05 | 0.22462 | 0.11598 | 0.31667 | 0.53332 |
| | Net | 5354.51 | 0.07554 | 0.11150 | 1.924E-05 | 0.06738 | 0.01638 | 0.09194 | 0.14147 |
| UK tax | Pre-tax | 27108.84 | 0.29775 | 0.47778 | 1.158E-04 | 0.30456 | 0.13456 | 0.43243 | 0.69048 |
| | Post-tax | 20428.91 | 0.21915 | 0.36397 | 9.626E-05 | 0.23712 | 0.12051 | 0.33976 | 0.55131 |
| | Net | 6679.94 | 0.07860 | 0.11381 | 1.954E-05 | 0.06745 | 0.01405 | 0.09267 | 0.13917 |

Net = Pre-tax less Post-tax measure (net tax burden or redistribution)

G(v) = Extended Gini coefficient, inequality aversion parameter v

data), the steady-state data indicated a significantly higher tax burden on average for Australia. This is consistent with the smaller average household sizes generated by the steady-state model (as indicated by Figure 1), given the allowances for additional family members. The observation that there exists no such clear effect on the tax burden generated by the UK transfer system suggests that the Australian system is more sensitive to household size, and hence to the particular survey population considered.

A (significantly) smaller redistributive effect is indicated by the steady-state statistics, compared with those calculated for the trend data. Again, this is particularly true for the Australian system, which reinforces the conclusion that the redistributive effect of the Australian transfer system is focussed upon couples with children more than the UK system is. This implies that the steady state data reveal a smaller difference between the redistributive effects of the Australian and UK transfer systems, although most of the statistics reported in Table 8 continue to identify significantly more redistribution for the Australian system.³⁷

The redistributive statistics reported for lifetime incomes in Table 8 are, on average, 12.6 per cent lower than those in Table 7 for Australian transfer system, and 8.7 per cent lower for the UK system. This variation is smaller than the variation reported by Nelissen, where the redistribution (measured using the Gini coefficient) of lifetime incomes of the 1930 birth cohort is more than two times the redistribution of the 1950 birth cohort. Furthermore, the redistributive statistics reported for annual incomes in Table 8 are, on average, 9.0 per cent lower than those in Table 7 for Australian transfer system, and 6.4 per cent lower for the UK system. These observations serve to underscore the importance of the population used for making distributional comparisons, and highlight the need to exercise care when drawing inferences from the analysis presented here.

6 Summary and Implications

This paper presents redistributive analysis for the Australian and UK transfer systems based on static and dynamic microsimulation models. The static analysis suggests that differences between the Australian and UK survey populations used for the analysis have an important bearing on the derived observations. In particular, the static simulations imply that statistically significant differences between the survey populations considered tend to exaggerate the redistributive effect observed for the Australian transfer system relative to that of the UK. This conclusion off-sets the predominant findings reported by studies based upon cross-sectional data that the Australian transfer system is more redistributive than the UK system. Furthermore, the static simulation results suggest that survey data understate the redistributive effect of both the Australian and UK tax systems, with the largest difference observed for

³⁷Two of the redistributive statistics for Australia and the UK are found to be insignificantly different from one another: redistribution measured by the standard Gini, for the unadjusted Annualised lifetime income distribution; and redistribution measured by the extended Gini, for the unadjusted Annual income distribution.

the UK. These two effects contribute to the most important difference between the observations based upon survey and simulated data: *the static simulations fail to indicate a consistently larger redistributive effect for the Australian transfer system relative to that of the UK*. In contrast, the measures of horizontal inequity calculated from the static simulations are consistent with observations based upon survey data, in that they indicate significantly less inequity for the Australian transfer system, relative to the UK system. In the context of the static simulations, however, horizontal inequity is explicitly generated to account for unobserved characteristics that are assumed to be justifiable from an equity perspective (for example, due to part-year recipients and omitted eligibility tests). This observation highlights the difficulties that are associated with interpreting measures of redistributive inequity.

It is interesting to ask why the UK tax payments generated by the simulation model exhibit greater disparity from associated survey data than the Australian tax payments do. Are the differences observed attributable to inaccuracies of the survey data used, or to the practical administration of the respective transfer systems? This question has clear policy implications, and would appear to warrant further research.

The dynamic simulations suggest that both transfer systems tend to achieve more inter-household redistribution during the working lifetime, than they do intra-household redistribution. This observation supports the conjecture that each transfer system reflects a greater concern for social equity (equality between households), than for social insurance (smoothing of income across the working lifetime). Of course, it is important to bear in mind that the analysis has been undertaken for the working lifetime, which excludes retirement and hence omits a large part of each system's social insurance effect.

The statistics reported for inter-household inequality suggest that the Australian transfer system is more redistributive than the UK transfer system. In contrast, the statistics reported for intra-household inequality indicate that comparisons between the redistributive effects of the two transfer systems depend upon the equivalence scales and measures of inequality used. Furthermore, the results are shown to be sensitive to the survey population used. In particular, restricting the simulation model to reflect transition probabilities for 1986 rather than for observed demographic trends reduces the proportion of married households and the average number of children per household. This is found to reduce the redistributive effects observed for both the Australian and the UK transfer systems, with a more pronounced reduction observed for Australia. Subject to the non-trivial limitations of the analysis, the redistributive statistics reported here suggest that the Australian transfer system reflects a greater concern for social equity, and that the UK system may reflect a greater concern for social insurance. Interestingly, these conclusions are consistent with results reported in a similar study by Falkingham & Harding (1996).

It is consequently possible to conclude that, on balance, the Australian transfer system is slightly

more redistributive than the UK system; that a slight fall in redistribution would be observed if selected Australian taxes, unemployment benefits, and family support schemes were replaced with comparable elements of the system applied in the United Kingdom. It is, however, important to stress that the similarities observed between the two transfer systems far outweigh the redistributive differences.

It is commonly believed, if not stated explicitly, that a reduction of existing income inequality would generally be a good thing. From this perspective it is unlikely that replacing selected Australian taxes, unemployment benefits, and family support schemes with comparable elements of the system that is applied in the United Kingdom would be viewed positively, given the previously stated observations. Nevertheless, assigning a normative interpretation to the redistributive differences observed is a highly complicated issue that depends upon a range of underlying social aspects³⁸, and consequently lies outside the scope of the current study. It is, however, interesting to consider the cultural interpretations that can be assigned to the observations that are reported here. The prevailing similarities observed between Australia and the UK suggests that the two countries continue to share strong cultural parallels, consistent with their historical relationship. This is despite the pressures of geography, migration, and social evolution that are referred to in the introduction as influences which may have seen a ‘restrained divergence’ between the two countries during the past 60 years.

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³⁸see, for example, Mirrlees (1971)

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A Survey Data

The data used are from the Confidentialised Unit Record Files (CURFs) of the 1997–1998 Survey of Income and Housing Costs (SIHC) for Australia, and the Family Expenditure Survey (FES) for the UK. This appendix provides a brief description of the data used. For a more detailed discussion of the SIHC and FES refer, respectively, to the *Survey of Income and Housing Costs User Guide* (Canberra: Australian Bureau of Statistics, ABS, Catalog Number 6553.0), and the *Family Expenditure Survey 1997–98 User Guide* (London: Office for National Statistics, ONS).

The SIHC and FES were selected because of their underlying similarities. Both surveys are collected on a continuous basis and provide cross-sectional data that describe household expenditure, income, and demographic characteristics for a nationally representative sample. Furthermore, both surveys gather income and demographic data in the same way, using face-to-face interviews in the first instance, and follow-up telephone enquiries thereafter.

The statistical unit considered by the analysis is defined as the nuclear family, which is comprised of a single adult or married (registered or de facto) couple and any of their dependant children.³⁹ This unit was selected because it focuses upon groups of individuals in each survey who are most likely to pool a substantial proportion of their incomes. The nuclear family is referred to as the *household* throughout the analysis.

³⁹The nuclear family is referred to as an ‘income unit’ by the SIHC, and as a ‘benefits unit’ by the FES.

The 1997–1998 SIHC provides data for 8,765 households that were randomly drawn from the multi-stage sample of private dwellings considered by the *Monthly Population Survey* (undertaken by the ABS).⁴⁰ Similarly, the 1997–1998 FES provides data for 7,713 households that were randomly drawn from the Small Users file of the Post Office’s list of addresses. Despite the best efforts of the responsible statistical offices, it is known that both the SIHC and the FES provide an imperfect picture of national aggregates. People in institutions or of no fixed address – such as those in retirement homes, the military, prison or the homeless – are not included. Furthermore, due to the excessive survey costs involved, the SIHC excludes some 175,000 people who live in remote and sparsely settled parts of Australia. The ABS suggests that the “exclusion of these persons will have only a minor impact on any aggregate estimates that are produced for individual States and Territories, with the exception of the Northern Territory where such persons account for over 20% of the population” (ABS Catalog Number 6553.0 p. 14).

The representative nature of the SIHC and FES sample populations are also affected by imperfect response rates that are not uniform across the respective populations. Specifically, the response rate of those initially approached for the 1997–1998 SIHC is 83.2 per cent, and for the FES is 61.5 per cent. Foster (1996) compares the characteristics of households responding to the 1991 FES with information derived from the 1991 (UK) Census, and finds that response was lower than average in Greater London, higher in rural areas, and that the response rate tended to increase with the age of the household reference person. Low response rates are also identified for ethnic minorities, the lower educated, self-employed, and the manual social class.

Despite these complicating issues, data from the SIHC and the FES appear to provide a reasonably comprehensive picture of household income and expenditure in Australia and the UK. Analysis by Banks & Johnson (1998) suggests that the FES accounts for approximately 90 per cent of income and 85 per cent of expenditure estimated in the (UK) National Accounts.⁴¹ It is well known, however, that the FES does not report income adequately for the self-employed or from investments. As is common practice for studies that use FES data, households that earn a significant proportion of their income from self-employment are omitted from the analysis.⁴² After further editing the data to omit households with inconsistent data or negative aggregate annual pre-tax income, the SIHC and FES were reduced, respectively, to 7,858 and 6,939 households.

⁴⁰See *Information Paper: Labour Force Survey Sample Design* (Canberra: ABS Catalog Number 6269.0) for further details.

⁴¹For further detail, see Appendix C of *Family Spending 1997–98* (CSO publication).

⁴²Households are omitted from the analysis if income earned from self-employment is greater than or equal to 10 per cent of income earned as an employee.

B Specification of the Australian and UK Transfer Systems

B.1 The Australian Tax and Benefits System

B.1.1 Newstart

The Newstart Allowance, NS , is payable to individuals between the ages of 18 and 65 years who are capable of, available for, and actively seeking employment, or who are temporarily incapacitated.⁴³ Although the benefit may be received by both spouses, individuals who have a spouse claiming NS typically apply for either the Parenting Allowance or the Partner Allowance, depending on the existence of dependant children. The Partner Allowance has the same income test and benefits as Newstart, but does not require the recipient to be in the labour force. The Parenting Allowance is more generous than Newstart and is consequently described below.

For an unemployed person the basic Newstart rate, NS_B per week, depends on demographic characteristics such as age and family status. Three basic rates are considered in the present analysis. These are; \$120.00 per week for single individuals under the age of 21 who have no dependant children; \$160.75 per week for single individuals who are at least 21 years of age and have no dependants; and \$145.05 per week for couples with or without dependant children.⁴⁴ Sole parents with dependant children may receive a NS_B of \$173.90 per week, which is the same as the basic rate received under the Sole Parent Pension. The pension, however, carries additional benefits, such as subsidised medical care, and the income test is less stringent than for NS . Given that NS and the Sole Parent Pension cannot be received concurrently, the simulation analyses consequently assume that the Sole Parent Pension is paid in preference to NS where applicable.

The income test relating to NS reduces the benefit received at a progressive rate up to a ‘cut-out’ income, c_{nsc} . Let x_i define the pre-tax weekly income of an individual, and assume that they are otherwise eligible for NS . Let x_s define the weekly income of their spouse (if applicable). The income test is comprised of three threshold rates, $c_{ns1} < c_{ns2} < c_{nsc}$. For all x_i between c_{ns1} and c_{ns2} , the NS benefit received falls by $0.5(x_i - c_{ns1})$, and for all $x_i > c_{ns2}$, the NS benefit is reduced by $0.7(x_i - c_{ns2}) + 0.5(c_{ns2} - c_{ns1})$. This last expression defines the cut-out income:

$$c_{nsc} = \frac{NS_B - 0.5(c_{ns2} - c_{ns1})}{0.7} + c_{ns2} \quad (5)$$

It is evident from equation (5) that when $x_i = c_{nsc}$, the NS benefit is reduced to zero. In addition any income earned by an individual’s spouse over c_{nsc} reduces the benefit by $0.7(x_s - c_{nsc})$. Given that

⁴³Recipients may do training and voluntary work, and must be willing to enter into an Activity Agreement if required. There are also Australian residence requirements. It is possible to be working in casual or part-time employment and to receive NS payments so long as income earned is less than a threshold rate and individuals can prove that they are actively seeking employment.

⁴⁴The Mature Age Allowance pays an extra \$13.15 to individuals aged 60 years and over after 9 months on NS .

$c_{ns1} = \$30.00$, and $c_{ns2} = \$70.00$ per week, the NS benefit can be calculated by:

$$NS = \max[0, NS_1] \quad (6)$$

where;

$$NS_1 = NS_B - \max[0, 0.5(x_i - 30)] - \max[0, 0.2(x_i - 70)] - \max[0, 0.7(x_s - c_{nsc})] \quad (7)$$

The NS allowance is taxable.

B.1.2 Family Payment

Family payments, FP , are made to households with dependant children 16 years of age and younger.⁴⁵ The amount paid depends on the number and age of children in a household.

Let n_j be the number of dependant children in age group j , where j takes values 1, 2 and 3 respectively for children 0–12, 13–15 and 16 years. The standard rate per child is $d_{FP,j}$ in group j , where the values of $d_{FP,j}$ are \$48.20, \$62.70 and \$30.10 per week. There is a large-family supplement of s per child for the fourth and each subsequent dependant, where $s = \$3.85$ per week. The maximum amount paid, R , is given by:

$$R = \sum_j d_{FP,j} n_j + \max\left[0, 3.85 \left(\sum_j n_j - 3\right)\right] \quad (8)$$

The payments are subject to an income test that is based on the weekly income of the household, x_h .⁴⁶ There are two relevant income thresholds: the first, $c_{fp1} = \left[23,400 + 624 \left(\sum_j n_j - 1\right)\right] \frac{1}{52}$, and the second $c_{fp2} = \left[65,941 + 3,298 \left(\sum_j n_j - 1\right)\right] \frac{1}{52}$. The benefit, paid per week is:

$$P_F = \begin{cases} R & \text{if } x_h \leq c_{fp1} \\ \max\left[\begin{array}{l} 11.75 \sum_j n_j, \\ R - 0.5(x_h - c_{fp1}) \end{array}\right] & \text{if } c_{fp1} < x_h \leq c_{fp2} \\ 0 & \text{if } c_{fp2} < x_h \end{cases} \quad (9)$$

The non-taxable payment is made to the spouse with $\min(x_i, x_s)$.

B.1.3 Parenting Allowance

The Parenting Allowance, PA , is paid to one member of a married couple with at least one dependant child under the age of 16.⁴⁷ It consists of a basic rate, $PA_B = \$32.55$, and an additional rate,

⁴⁵From 1 April 1998 Family Payments became known as Family Allowances. Family Payments can be received for dependant children under the age of 16 and up to the age of 18 in relation to full-time secondary students. There are also residency requirements.

⁴⁶This income test is applied only if a benefits payment such as a DSS pension benefit or allowance is not received. There are also tests relating to any income earned by a dependant child.

⁴⁷This is interpreted as less than or equal to 16, for consistency with the age limit regarding other taxes and benefits. The recipient must be an Australian resident and be present in Australia, except for up to 13 weeks of temporary absence if the person was resident for at least 13 weeks before departure. It is available to new migrants after 104 weeks in Australia.

$PA_{AD} = \$112.50$ per week.⁴⁸ The full allowance of $(\$32.55 + \$112.50) = \$145.05$ per week is given if $\min(x_i, x_s) = x_{\min} \leq c_{ns1}$ and $\max(x_i, x_s) = x_{\max} \leq \c_{nsc} per week, where c_{ns1} , and c_{nsc} take the same definitions and values as defined for NS .

Also, an income test similar to the one described for NS is applied to the additional component of the parenting allowance, where PA_{AD} is reduced as follows:

$$PA_{AD} = 112.50 - \max [0, 0.5 (x_{\min} - 30)] - \max [0, 0.2 (x_{\min} - 70)] - \max [0, 0.7 (x_{\max} - c_{nsc})] \quad (10)$$

PA is subsequently obtained using the expression:

$$PA = \begin{cases} PA_B + \max [PA_{AD}, 0] & x_{\min} \leq c_{nsc} \\ 0 & x_{\min} > c_{nsc} \end{cases} \quad (11)$$

The parenting allowance in excess of PA_B is taxable and payment is made to the spouse with x_{\min} .

B.1.4 Sole Parent Pension

The Sole Parent Pension, SPP , is received by single parents with the sole care of at least one dependant child under the age of 16.⁴⁹ There is a basic rate of \$173.90 per week, and an income test that reduces the benefit received according to equation (12):

$$SPP = \max \left\{ 0, 173.90 - \max \left[0, 0.5 \left(x_i - 50 - 12 \sum_j n_j \right) \right] \right\} \quad (12)$$

The SPP is taxable.

B.1.5 Maternity Allowance

Maternity Allowance assists families with the costs of a new baby. The benefit is equal to six times the weekly maximum rate of the PA , and is paid to families who meet the FP income test.⁵⁰

B.1.6 Income Taxation

Income taxation is imposed on individual rather than joint incomes. The income tax function takes the standard multi-step form with 5 marginal rates, t_0, \dots, t_4 . If x_i (redefined as *annual income*) falls into the k th tax bracket, so that $b_k \leq x_i \leq b_{k+1}$, and $b_0 = t_0 = 0$, the tax paid, $T(x_i)$, can be written for $k \geq 1$ as:

$$T(x_i) = t_k (x_i - b_k) + \sum_{j=0}^{k-1} t_j (b_{j+1} - b_j) \quad (13)$$

The income tax schedule for the 1997–1998 tax year is shown in Table 9.

⁴⁸There is a pharmaceutical allowance for some people aged over 60, and an education entry payment may be available; these are ignored here.

⁴⁹This is extended to include 16-year-old dependant children here.

⁵⁰The FP residency test is also applied.

Table 9: Australian Income Tax Schedule: 1997–1998

| | Threshold | Marginal |
|-----|---------------|-----------------|
| k | Income, b_k | Tax Rate, t_k |
| 0 | 0 | 0.00 |
| 1 | 5,400 | 0.20 |
| 2 | 20,700 | 0.34 |
| 3 | 38,000 | 0.43 |
| 4 | 50,000 | 0.47 |

B.1.7 Medicare Levy

In addition to the standard marginal tax rates charged under the income tax system, income is also deducted for the Medicare levy, ML , which is used to provide universal health care. The amount depends on whether an individual is covered by private health insurance.⁵¹ For single adults without dependant children who earn an annual income of x_i , the medicare levy is given by:

$$\begin{aligned}
 ML &= \max(0, 0.2(x_i - 13,389)) && \text{if } x_i \leq 14,475 \\
 &= 0.015x_i && \text{if } 14,475 < x_i \leq 50,000 \\
 &= 0.025x_i && \text{if } x_i > 50,000
 \end{aligned} \tag{14}$$

Similarly, redefining x_s and x_h as annual measures of income, married couples and single parents with dependant children are required to pay a medicare levy equal to:

$$\begin{aligned}
 ML &= 0 && \text{if } x_i \leq 13,389 \\
 &= 0 && \text{if } x_h \leq c_{mLL} \\
 &= \max(0, 0.015x_i - D) && \text{if } c_{mLL} < x_h \leq c_{mLU} \text{ and } x_s \leq 13,389 \\
 &= \max\left[0, 0.015x_i - \frac{x_i D}{x_h}\right. && \\
 &\quad \left. - \max\left(0, \frac{x_s D}{x_h} - 0.015x_s\right)\right] && \text{if } c_{mLL} < x_h \leq c_{mLU} \text{ and } x_s > 13,389 \\
 &= 0.015x_i && \text{if } c_{mLU} < x_h \leq c_T \\
 &= 0.025x_i && \text{if } x_h > c_T
 \end{aligned} \tag{15}$$

where $c_T = 100,000 + \max\left[0, 1500\left(\sum_j n_j - 1\right)\right]$, $c_{mLL} = 22,594 + 2,100\sum_j n_j$, $c_{mLU} = 24,425 + 2,270\sum_j n_j$, and $D = 0.2c_{mLL} - 0.185x_h$.

B.1.8 Family Tax Initiative

The Family Tax Initiative is a scheme designed to support households with dependant children. It is comprised of two parts. Family Tax Assistance, FTA , provides an increase in the tax-free threshold for one of the supporting parents of dependant children and is consequently administered by the Australian Taxation Department. Low-income families that are unable to take advantage of FTA can obtain equivalent assistance through the Family Tax Payment scheme, FTP , which is administered by the Department of Social Security (now Centrelink). For families who satisfy the eligibility criteria of both Family Tax Assistance and Family Tax Payment programmes, any payment received under Family Tax

⁵¹The simulation analysis presented in here assumes that there is no private insurance.

Payment reduces the effective benefit received from Family Tax Assistance dollar for dollar.⁵²

- Family Tax Assistance

There are two parts to *FTA* that are allocated on the basis of household income and family size. Part *A* increases the tax-free threshold, that is the threshold b_1 in equation (13), of the parent receiving the benefit by Δb_{1A} , given by:

$$\Delta b_{1A} = \begin{cases} 1,000 \sum_j n_j & \text{if } x_h \leq 70,000 + 3,000 \left(\sum_j n_j - 1 \right) \\ 0 & \text{if } x_h > 70,000 + 3,000 \left(\sum_j n_j - 1 \right) \end{cases} \quad (16)$$

where x_h is annual household income.

Part *B* of the benefit is paid to families with at least one dependant child under the age of 5 and is received in addition to Part *A*. Unlike Part *A*, Part *B* of the benefit increases the tax-free threshold by $\Delta b_{1B} = \$2,500$, which is unaffected by the number of dependant children. It can be received only if:

$$\max(x_i, x_s) < 65,000 + 3,000 \left(\sum_j n_j - 1 \right) \quad (17)$$

and:

$$\min(x_i, x_s) < 4,573 \quad (18)$$

Family Tax Assistance is paid to the spouse with $\max(x_i, x_s)$.

- Family Tax Payment

The *FTP* is designed for low-income households and can consequently only be received if a family payment equal to the base rate is received; if $FP = R$. As with *FTA*, *FTP* is split into two components. Part *A* provides weekly payments of $P_A = 3.85 \sum_j n_j$, and part *B* is paid if there is at least one child under the age of 5, in which case an additional payment of $P_B = 9.62$ is received.

Comparing P_A with the relevant increase in the tax-free threshold under *FTA*, it can be seen that $P_A = (0.2\Delta b_{1A}) \frac{1}{52}$, and similarly for part *B*, $P_B = (0.2\Delta b_{1B}) \frac{1}{52}$. Hence, for those who are eligible for Family Tax Assistance *and* Family Tax Payments the benefit obtained under both programmes is the same.

B.1.9 Dependant Spouse Rebate

The dependant spouse rebate is given to married couples when one spouse earns a sufficiently low ‘separate net income’, *SNI*. *SNI* is the sum of wages from employment and all benefits defined above

⁵²Consequently, for the simulation analyses, families are assumed only to receive benefits from one of the programmes in any given year.

that have been identified as taxable. The dependant spouse rebate for an individual, DS , can be calculated as:

$$\begin{aligned}
 DS &= c_{ds1} - PA_B && \text{if } SNI \leq c_{ds2} \\
 &= c_{ds1} - 0.25(SNI - c_{ds2}) - PA_B && \text{if } c_{ds2} < SNI \leq c_{ds3} \\
 &= 0 && \text{if } SNI > c_{ds3}
 \end{aligned} \tag{19}$$

where PA_B is the basic Parenting Allowance defined above, c_{ds1} and c_{ds3} are respectively \$1,324 and \$5,577 if there are no dependant children and \$1,452 and \$6,089 if there are, and $c_{ds2} = \$282$.

B.1.10 Sole Parent Rebate

The sole parent rebate, SP , is given to single parents responsible for the care of at least one dependant child who is 16 years of age or younger. When dependant children earn less than \$1,785 per year, the SP received by a single parent is equal to \$1,243 per year.

B.1.11 Low Income Earner Rebate

The low-income earner rebate, LI , for an individual with an annual taxable income of x_i is given by:

$$\begin{aligned}
 LI &= d_1 - \text{Max}(0, 0.04(x_i - d_2)) && \text{if } x_i \leq 24,450 \\
 &= 0 && \text{if } x_i > 24,450
 \end{aligned} \tag{20}$$

where $d_1 = \$150$ and $d_2 = \$20,700$.

B.2 The UK Tax and Benefits System

B.2.1 Income Taxation

Income taxation in the UK takes a similar specification to the system in Australia, with three marginal rates: t_1, t_2, t_3 . If x_i (annual income) falls into the k th tax bracket, so that $b_k \leq x_i \leq b_{k+1}$, the tax paid, $T(x_i)$, can be written for $k \geq 1$ as:

$$T(x_i) = t_k(x_i - b_k) + \sum_{j=1}^{k-1} t_j(b_{j+1} - b_j) \tag{21}$$

The income tax schedule for the 1997–1998 tax year is shown in Table 10.

Table 10: UK Income Tax Schedule: 1997–1998

| k | Threshold Income, b_k | Marginal Tax Rate, t_k |
|-----|----------------------------|-----------------------------|
| 1 | 0 | 0.20 |
| 2 | 4,100 | 0.23 |
| 3 | 26,100 | 0.40 |

Income taxation is subject to a number of allowances, which are deducted from an individual's annual income when determining their income tax burden. The allowances applicable for 1997–1998 are displayed in Table 11.

Table 11: UK Income Tax Allowances: 1997–1998

| | |
|--|-------|
| Personal Allowance (aged under 65) | |
| Aged under 65 | 4045 |
| Aged 65–74 | 5220 |
| Aged 75 or over | 5400 |
| Married Couples Allowance | |
| Both aged under 65 | 1830 |
| Either partner between 65–74, neither 75 or over | 3185 |
| Either partner over 75 | 3225 |
| Income Limit | 15600 |
| Additional Personal Allowance | 1830 |

The Married Couples Allowance is provided in addition to the Personal Allowance, and can be allocated entirely to one, or the other spouse, or divided equally between them. In 1997-1998, the reduction in income tax liability for Married Couples Allowance was restricted to 20 per cent.

Individuals 65 years of age and over are eligible for personal and married couples allowances that are greater than the respective under 65 allowances. The additional benefit is, however, reduced by 50p for every pound of income earned in excess of the Income Limit, until the base allowance (applicable for individuals under 65) is reached.

The Additional personal allowance can be claimed by a single parent (or by a married individual if their spouse is totally incapacitated) who maintains a resident child at his or her own expense.

B.2.2 National Insurance Contributions

National Insurance Contributions (*NICs*) are used to determine an individual’s eligibility for contribution-based Jobseekers Allowance, and Maternity Allowance, which are considered below.⁵³ There are six classes of contributions, which depend on the employment status and type of income earned by an individual:

- Class 1 contributions are paid by people aged between 16 years and the state pensionable age (65 for men, and 60 for women) who work in Great Britain (or Northern Ireland) as employees (and their employers)
- Class 1A contributions are paid only by employers who provide employees with certain benefits in kind for private use, for example cars and fuel
- Class 1B contributions are paid only by employers who enter into a Pay As You Earn Settlement Agreement with the Inland Revenue for tax purposes
- Class 2 contributions are paid by people who are self-employed

⁵³NICs also determine eligibility for the Incapacity Benefit, Basic Retirement Pension, Widowed Mother’s Allowance, Widow’s Pension, Widow’s Payment, and the State Earnings Related Pension Scheme.

- Class 3 contributions are voluntary contributions paid by people who wish to protect their entitlement to the State pension and who do not pay enough National Insurance Contributions in another class
- Class 4 contributions are paid by those whose profits and gains are chargeable to income tax under Cases I and II of Schedule D of the Income and Corporation Taxes Act 1988. These are normally paid by self-employed people in addition to Class 2 contributions. Class 4 contributions do not count towards benefits.

Focusing on Class 1 *NICs*, an employee earning a wage less than £62.00 per week (between 1997–1998), referred to as the Lower Earnings Limit (LEL), pays no *NICs*.⁵⁴ However, if an employee’s earnings reach or exceed the LEL, they must pay *NICs* at a rate of 2 per cent for all income up to and including the LEL, and 10.0 per cent for income greater than the LEL, but less than or equal to the Upper Earnings Limit (UEL) of £465.00 per week.⁵⁵ Class 1 *NICs* are defined formally with regard to weekly income, x_i , by:

$$NIC = \begin{cases} 0 & x_i < LEL \\ 0.02LEL + \min[0.1(UEL - LEL), 0.1(x_i - LEL)] & x_i \geq LEL \end{cases} \quad (22)$$

Employees who pay Class 1 *NICs* are eligible for a Contracted-out rebate if they have made contributions to an Appropriate Personal Pension in place of the State Earnings Related Pension Scheme. In 1997–1998, this rebate was based on the age of the individual, and their wage.⁵⁶

B.2.3 Jobseeker’s Allowance, and Income Support

Jobseeker’s Allowance (*JSA*) replaced the Unemployment Benefit and Income Support for the unemployed on 7 October 1996. It is contributory, or means tested, depending upon the National Insurance Contributions made, and the allowance is taxable.

JSA is payable to unemployed individuals under pensionable age who are available for, capable of, and actively seeking employment of at least 40 hours per week.⁵⁷ A claimant must enter into a Jobseeker’s Agreement with the Employment Service, which describes the procedure that the claimant agrees to follow while searching for work, and any restrictions that they may nominate on working conditions. The claimant must also be in Great Britain, not be in relevant education, and not be working in excess of 16 hours per week on average.

⁵⁴Class 1 *NICs* are the only type that is relevant for the simulation analyses.

⁵⁵For employees with incomes in excess of the LEL, *NICs* must be paid by the employer on all income, at a rate of 3 per cent at and below the LEL, and 3–10 per cent above the LEL. From the 2000/2001 tax year, employee’s earning between the LEL and the Employee’s Earning Threshold are credited with *NICs* that they do not pay.

⁵⁶See *Employee’s guide to minimum contributions*, National Insurance Contributions Series CA 17. It is assumed that no individual contributes to an Appropriate Personal Pension for the simulation analysis.

⁵⁷Carers, and individuals with a physical or mental condition may be eligible when looking for work of less than 40 hours per week.

The Contribution-based *JSA* is payable for a period of up to 182 days to claimants who have qualifying earnings relating to Class 1 contributions equal to at least 50 times the weekly LEL during each of the two tax years on which their claim is based, and qualifying earnings relating to Class 1 contributions equal to at least 25 times the weekly LEL during at least one of the two years preceding the years upon which their claim is based.⁵⁸ The benefit is unaffected by capital held, or the labour status of the claimant’s partner if one exists. The claimant’s income independent of their partner is deducted from the benefit received. Income is calculated by adding:

- All earnings net of taxation and *NICs*;
- All allowances other than Social Fund Payments;
- All Maintenance Payments;
- Less £5 per week earnings disregard.

The Income-based *JSA* is payable to unemployed people who have made insufficient *NICs*. The Income-based *JSA* is reduced by £1 for every £250, or part there of, of capital owned above £3,000, and cuts out if capital owned is in excess of £8,000.⁵⁹ The benefit also depends upon the income of the claimant’s partner, who must work less than 24 hours per week. Income earned by the partner of a claimant is added to the claimant’s income, and subjected to the same scaling as described for the contribution-based *JSA*.

The *JSA* payment is defined by:

$$JSA = \begin{cases} JSA_{BR} - x_i & \text{Contributions-based} \\ JSA_{BR} - x_i - x_s & \text{Income-based} \end{cases} \quad (23)$$

where JSA_{BR} is the relevant basic rate plus any additional premia (defined below), x_i is the claimant’s income, and x_s is spouse income as defined above.

*Basic Rates of Benefit (per week):*⁶⁰

Applied for both Income-based and Contributions-based JSA

| | |
|--------------------|--------|
| Single, aged 16–17 | £29.60 |
| Single, aged 18–24 | £38.90 |
| Single, aged 25+ | £49.15 |

Applied only for Income-based JSA

| | |
|-------------------------------|--------|
| Couple, both under 18 | £58.70 |
| Couple, at least one aged 18+ | £77.15 |
| Lone Parent, aged 18+ | £49.15 |
| Each Dependant Child under 11 | £16.90 |
| Each Dependant Child 11–15 | £24.75 |
| Each Dependant Child 16–18 | £29.60 |

⁵⁸For the two years upon which their claim is based, the *NICs* may be either paid or credited. However, for the two years prior to the years upon which a claim is made the *NICs* must have been paid, not credited.

⁵⁹Capital independent of the home, where the claimant is an owner/occupier.

⁶⁰Unmarried couples, who live together as husband and wife are treated as married. Children aged between 16 and 18 can be included in their parents’ income assessment so long as they are in full-time education.

Families with children are also eligible for additional premia, which amount to £10.80 (per week) for couples and £15.75 for single parents.

Income Support (*IS*) is a taxable, non-contributory, means-tested benefit payable to people living in Great Britain aged 16 or over. Following the commencement of *JSA*, *IS* is only payable to individuals who are not required to be available for work, such as pensioners, lone parents (with a child under 16 years of age), pregnant women (within 11 weeks of their date of confinement), the sick, or the disabled. The *IS* benefit pays the same rates and is subject to the same restrictions on capital and labour as the income-based *JSA*.

B.2.4 Housing Benefit and Council Tax Benefit

The Housing Benefit (*HB*) is a non-taxable, non-contributory, means-tested benefit payable to claimants to aid with the rental costs of housing; it is not payable to owner-occupiers. Claimants on *IS*, or Income-based *JSA* are entitled to the full *HB*. Similar restrictions on capital and income apply for *HB* as those described for income-based *JSA*. However, the *HB* is only reduced when a claimant's income (added to that of their spouse) exceeds their basic income-based *JSA* rate (referred to as their applicable amount), after which the *HB* is reduced by 65p in the £1.

The maximum *HB* is the Eligible Rent (*ER*), which is determined by the local authority that is responsible for the benefit's administration. The average *HB* paid to all recipients in May of 1998 was £44.13 per week, and £49.13 for individuals in receipt of *IS* / *JSA*. The *HB* is consequently equal to:

$$HB = ER - \max[0, 0.65(x_i + x_s - JSA_{BR})] \quad (24)$$

Council Tax Benefit (*CTB*) is a non-taxable, non-contributory, means-tested benefit designed to help low income households meet the costs of the council tax. The *CTB* is subject to the same restrictions regarding capital and income as described for the *HB*, with the exception that the taper on income earned over the relative applicable amount is 20, rather than 65 per cent. The average *CTB* paid to all recipients in May of 1998 was £8.14 per week.⁶¹

B.2.5 Social Fund Payments – The Maternity Payment

Social Fund Payments are designed to aid needy individuals with the costs arising due to special circumstances, including the birth of a child, a funeral, or cold weather and winter fuel payments, all of which are governed by regulations. There is also a discretionary part of the Social Fund, which provides aid through non-repayable grants and interest free loans.

⁶¹All individuals with low incomes are assumed to be eligible for *HB*, with an *ER* of £49.13 per week for the simulation analyses.

The Maternity Payment (*MP*) is paid by the Benefits Agency to pregnant women who have paid sufficient *NICs*, but are ineligible for Statutory Maternity Pay (see below). The claimant must have paid Class 1 *NICs* for at least 26 weeks during the 66 weeks up to and including the week that their baby is due. Two rates of the *MP* are payable depending on the employment status of the claimant during the 15th week prior to the expected week of confinement. If the claimant was employed then a flat rate of £55.70 per week is paid, otherwise a lower rate of £51.70 per week is applied. The *MP* is not taxable and is paid for a total of up to 18 weeks. There is a restriction on capital, such that the benefit is reduced by 100 per cent of the capital owned over £500.

B.2.6 Child Benefit

The Child Benefit (*CB*) is non-taxable, non-contributory, and not means-tested, and provides support for claimants with dependant children. As defined previously, a child is an individual under the age of 17, or under the age of 20 if in full-time education. The *CB* pays £11.05 per week for the first child of a couple and £17.10 per week for the first child of a lone parent. Each additional child increases the benefit paid by £9.00 per week.

B.2.7 Statutory Maternity Pay and Maternity Allowance

Statutory Maternity Pay (*SMP*) is a scheme structured for women who have a history of continuous employment with a single employer, and who were working immediately prior to taking maternity leave. *SMP* is paid by the claimant's employer, who substantially recoups the cost from the government. Two rules govern a claimant's eligibility for *SMP*: *Continuous Employment Rule*, which requires the claimant to be employed by the same employer for 26 weeks immediately preceding and including the qualifying week (commencing on the 15th week prior to the week in which their baby is due); and *Earnings Rule*, which requires the average earnings of the claimant for the eight weeks prior to taking maternity leave to be greater than or equal to the LEL of *NICs*.

The claimant's employer pays the benefit in the same way as income earned prior to taking maternity leave for a period of 18 weeks. For the first six weeks of leave, *SMP* is equal to 90 per cent of the claimant's average wage (over the eight weeks prior to taking maternity leave), or the standard weekly rate of £55.70, whichever is higher. The standard rate is paid for the remaining weeks of the benefit. The benefit is taxable and there is no requirement for the woman to return to work after the baby is born.

$$SMP = \begin{cases} \max[0.9x_i, 55.70] & \text{first six weeks of } SMP \\ 55.70 & \text{remaining weeks of } SMP \end{cases} \quad (25)$$

Women not eligible for *SMP*, but who had earnings in excess of the LEL for at least 26 weeks in the 66 week period prior to the week in which the baby is due are eligible for Maternity Allowance

(*MA*). This benefit is non-taxable, non-contributory, and not means-tested. It pays 90 per cent of the claimant's average weekly earnings up to a maximum of £55.70 per week for up to 18 weeks.

B.2.8 Family Credit

The Family Credit (*FC*) is a non-taxable, non-contributory, means tested benefit designed to support working families with children.⁶² Families are eligible if they possess at least one adult working 16 hours per week or more (and hence is only payable if an individual is ineligible for *JSA*).⁶³ The *FC* is calculated using the following rates (per week):

| | |
|--------------------------|--------|
| Adult Credit | £47.65 |
| 30-hour Credit | £10.55 |
| Child Credit, under 11 | £12.05 |
| Child Credit, aged 11–15 | £19.95 |
| Child Credit, aged 16–17 | £24.80 |
| Child Credit, aged 18 | £34.70 |

The maximum benefit paid under *FC* is equal to the sum of the rates that define a family's demographic structure. Aggregate income of all adults in the household in excess of the applicable amount of £77.15, reduces the *FC* payable by 70p per £1.⁶⁴ Hence:

$$FC = FC_{BR} - \max[0, 0.7(x_h - 77.15)] \quad (26)$$

where FC_{BR} is the relevant basic rate, and x_h is the aggregate income of all household adult members in excess of the JSA_{BR} .

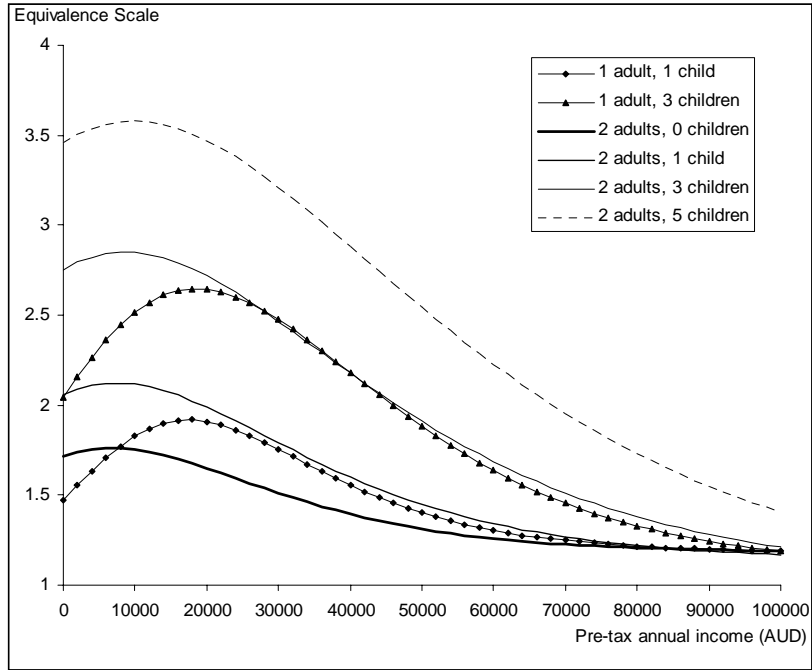
C Paramaterisations of the Relativities Implicit in Transfer Policy

D Confidence Intervals for Reported Statistics

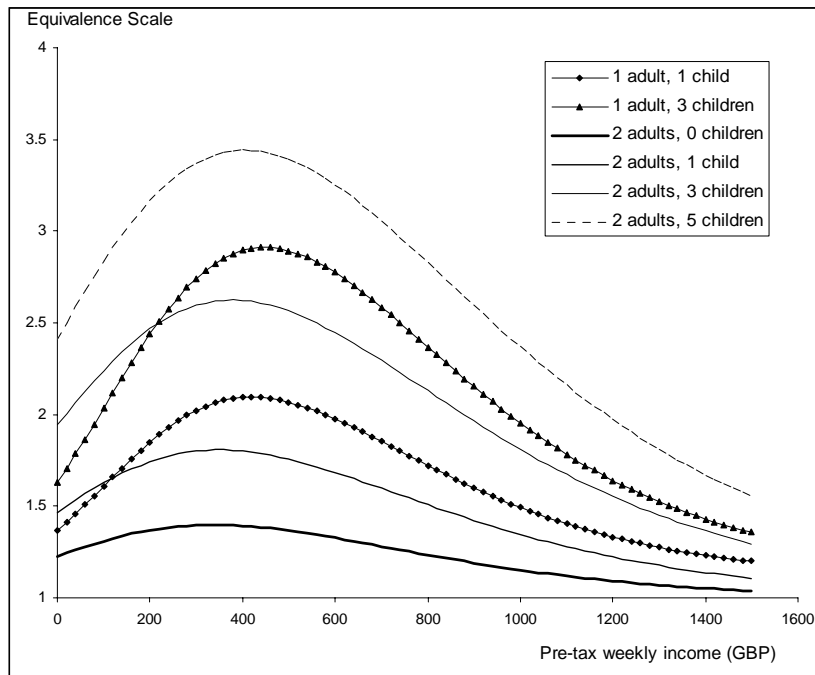
⁶²Replaced by the Working Families Tax Credit from 5 October, 1999. See Dilnot & McCrea (1999).

⁶³An individual is identified as working at least 16 hours per week if their weekly income exceeds £57.60, and in excess of 30 hours per week if their income exceeds £108.00 per week (based on the minimum wage rate of £3.60 per hour).

⁶⁴There are also restrictions upon capital. The first £3,000 of a person's savings or capital are ignored. If the claimant or their partner has between £3,000 and £8,000 in capital, £1 per week is taken off their benefit for each £250, or part there of, over £3,000. People with more than £8,000 of capital are ineligible for *FC*.



Panel A: Australian Estimates



Panel B: UK Estimates

Figure 2: Parameterised Tax-implicit Equivalence Scale Estimates

Table 12: Redistributive Effect of Taxes and Benefits – 95 per cent Confidence Intervals

| Lower 95 per cent Confidence Interval | | | | | | | |
|---------------------------------------|---------|--------------|-------------------------|-----------|------------|---------|---------|
| Income Distribution | measure | Gross Income | Government Benefits (a) | Taxes (b) | Net Income | R | V(adj) |
| Australia - Simulated | | | | | | | |
| Hh(y) | Gini | 0.43885 | 0.80954 | 0.55233 | 0.35133 | 0.00796 | 0.09366 |
| | Average | 38153.70 | 2017.68 | 9925.21 | 30393.40 | | |
| Tax E(y) | Gini | 0.46826 | 0.71793 | 0.57657 | 0.37611 | 0.00228 | 0.09337 |
| | Average | 33397.30 | 1475.64 | 9143.75 | 25825.60 | | |
| OECD E(y) | Gini | 0.41029 | 0.75410 | 0.52544 | 0.30773 | 0.00510 | 0.10605 |
| | Average | 21867.00 | 1282.91 | 5712.51 | 17520.00 | | |
| Australia - Survey | | | | | | | |
| Hh(y) | Gini | 0.43928 | 0.80869 | 0.55372 | 0.35636 | 0.00692 | 0.08792 |
| | Average | 38185.60 | 1971.08 | 8938.98 | 31341.20 | | |
| Tax E(y) | Gini | 0.46864 | 0.72355 | 0.57807 | 0.38374 | 0.00212 | 0.08586 |
| | Average | 33446.50 | 1466.59 | 8227.46 | 26769.20 | | |
| OECD E(y) | Gini | 0.41115 | 0.75245 | 0.52783 | 0.31325 | 0.00372 | 0.10017 |
| | Average | 21855.60 | 1244.67 | 5136.55 | 18051.50 | | |
| UK - Simulated | | | | | | | |
| Hh(y) | Gini | 0.42426 | 0.77299 | 0.56808 | 0.34316 | 0.00968 | 0.08938 |
| | Average | 21133.68 | 697.15 | 6271.25 | 15591.58 | | |
| Tax E(y) | Gini | 0.44668 | 0.67592 | 0.59139 | 0.35239 | 0.00684 | 0.09997 |
| | Average | 16508.02 | 566.55 | 5185.33 | 11905.76 | | |
| OECD E(y) | Gini | 0.38421 | 0.68331 | 0.53217 | 0.29691 | 0.00879 | 0.09566 |
| | Average | 12181.21 | 444.92 | 3646.23 | 9006.56 | | |
| UK - Survey | | | | | | | |
| Hh(y) | Gini | 0.42394 | 0.76319 | 0.52258 | 0.37962 | 0.00479 | 0.04781 |
| | Average | 21161.86 | 651.03 | 4817.24 | 17030.34 | | |
| Tax E(y) | Gini | 0.44642 | 0.65530 | 0.54476 | 0.39050 | 0.00285 | 0.05694 |
| | Average | 16520.05 | 549.25 | 3883.94 | 13226.99 | | |
| OECD E(y) | Gini | 0.38404 | 0.65586 | 0.48627 | 0.32912 | 0.00328 | 0.05696 |
| | Average | 12187.35 | 418.55 | 2781.36 | 9855.74 | | |
| Upper 95 per cent Confidence Interval | | | | | | | |
| Income Distribution | measure | Gross Income | Government Benefits (a) | Taxes (b) | Net Income | R | V(adj) |
| Australia - Simulated | | | | | | | |
| Hh(y) | Gini | 0.45817 | 0.82465 | 0.57570 | 0.36696 | 0.00958 | 0.10251 |
| | Average | 40119.90 | 2275.08 | 10692.80 | 31552.90 | | |
| Tax E(y) | Gini | 0.49521 | 0.73913 | 0.60980 | 0.39729 | 0.00290 | 0.10226 |
| | Average | 35888.90 | 1654.28 | 10203.40 | 27265.60 | | |
| OECD E(y) | Gini | 0.43106 | 0.77209 | 0.55016 | 0.32264 | 0.00626 | 0.11622 |
| | Average | 22992.10 | 1445.00 | 6158.02 | 18162.20 | | |
| Australia - Survey | | | | | | | |
| Hh(y) | Gini | 0.45891 | 0.82366 | 0.57724 | 0.37281 | 0.00819 | 0.09628 |
| | Average | 40143.10 | 2196.53 | 9618.71 | 32575.00 | | |
| Tax E(y) | Gini | 0.49675 | 0.74298 | 0.61232 | 0.40615 | 0.00255 | 0.09422 |
| | Average | 35891.60 | 1618.78 | 9169.69 | 28264.90 | | |
| OECD E(y) | Gini | 0.43187 | 0.77057 | 0.55361 | 0.32829 | 0.00432 | 0.10954 |
| | Average | 22966.40 | 1380.63 | 5537.58 | 18725.50 | | |
| UK - Simulated | | | | | | | |
| Hh(y) | Gini | 0.44602 | 0.79433 | 0.59088 | 0.36061 | 0.01159 | 0.09582 |
| | Average | 22257.04 | 756.25 | 6787.98 | 16251.30 | | |
| Tax E(y) | Gini | 0.47924 | 0.70652 | 0.62214 | 0.38082 | 0.00838 | 0.10776 |
| | Average | 17824.87 | 631.10 | 5797.17 | 12663.46 | | |
| OECD E(y) | Gini | 0.40754 | 0.70946 | 0.55627 | 0.31485 | 0.01058 | 0.10400 |
| | Average | 12837.34 | 485.23 | 3951.33 | 9368.84 | | |
| UK - Survey | | | | | | | |
| Hh(y) | Gini | 0.44460 | 0.78263 | 0.54960 | 0.39776 | 0.00756 | 0.05506 |
| | Average | 22306.06 | 735.44 | 5194.10 | 17830.87 | | |
| Tax E(y) | Gini | 0.47822 | 0.67982 | 0.58754 | 0.41786 | 0.00528 | 0.06648 |
| | Average | 17882.71 | 619.65 | 4353.95 | 14125.76 | | |
| OECD E(y) | Gini | 0.40736 | 0.67808 | 0.51694 | 0.34756 | 0.00598 | 0.06495 |
| | Average | 12837.59 | 468.04 | 2999.93 | 10291.95 | | |

(a) Australian Government Benefits include FTI, in addition to calibrated benefits

(b) Australian Taxes include ML and all rebates described in Section 8.2, UK taxes include NICs

Hh(y) = aggregate household income distribution

Tax E(y) = tax based equivalent income distribution

Demand E(y) = demand based equivalent income distribution

V(adj) = Observed progressivity + R

R = Atkinson-Plotnick Reranking measure

Table 13: Aggregate Income Distributions – 95 per cent Confidence Intervals

| Lower 95 per cent Confidence Interval | | | | | | | |
|--|---------------|----------------|-------------------------|-----------|-----------------|---------|---------|
| Income Distribution | measure | Pre-tax Income | Government Benefits (a) | Taxes (b) | Post-tax Income | R | V(adj) |
| Australian system on Australian Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.43885 | 0.80954 | 0.55233 | 0.35133 | 0.00796 | 0.09366 |
| | Average | 38153.70 | 2017.68 | 9925.21 | 30393.40 | | |
| Tax E(y) | Gini | 0.46826 | 0.71793 | 0.57657 | 0.37611 | 0.00228 | 0.09337 |
| | Average | 33397.30 | 1475.64 | 9143.75 | 25825.60 | | |
| OECD E(y) | Gini | 0.41029 | 0.75410 | 0.52544 | 0.30773 | 0.00510 | 0.10605 |
| | Average | 21867.00 | 1282.91 | 5712.51 | 17520.00 | | |
| Australian system on UK Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.42506 | 0.82240 | 0.55725 | 0.34270 | 0.00656 | 0.08565 |
| | Average | 39984.72 | 1624.52 | 10298.93 | 31456.89 | | |
| Tax E(y) | Gini | 0.43620 | 0.72968 | 0.56272 | 0.35237 | 0.00175 | 0.08616 |
| | Average | 34671.82 | 1187.56 | 9430.02 | 26754.70 | | |
| OECD E(y) | Gini | 0.38066 | 0.76991 | 0.51050 | 0.29019 | 0.00448 | 0.09512 |
| | Average | 23592.43 | 1028.57 | 6057.70 | 18459.97 | | |
| UK system on Australian Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.43864 | 0.75359 | 0.56455 | 0.35713 | 0.01031 | 0.09025 |
| | Average (UK) | 20190.72 | 823.89 | 6030.23 | 15023.58 | | |
| | Average (Aus) | 38165.25 | 1557.35 | 11398.57 | 28398.13 | | |
| Tax E(y) | Gini | 0.47515 | 0.66053 | 0.60194 | 0.37837 | 0.00713 | 0.10217 |
| | Average (UK) | 16073.62 | 663.59 | 5095.33 | 11668.70 | | |
| | Average (Aus) | 30382.95 | 1254.34 | 9631.38 | 22056.61 | | |
| OECD E(y) | Gini | 0.40909 | 0.66900 | 0.53601 | 0.31939 | 0.00885 | 0.09740 |
| | Average (UK) | 11438.49 | 511.86 | 3444.27 | 8536.22 | | |
| | Average (Aus) | 21621.47 | 967.54 | 6510.48 | 16135.48 | | |
| UK system on UK Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.42426 | 0.77299 | 0.56808 | 0.34316 | 0.00968 | 0.08938 |
| | Average | 21133.68 | 697.15 | 6271.25 | 15591.58 | | |
| | Average (Aus) | 39947.68 | 1317.79 | 11854.16 | 29471.78 | | |
| Tax E(y) | Gini | 0.44668 | 0.67592 | 0.59139 | 0.35239 | 0.00684 | 0.09997 |
| | Average | 16508.02 | 566.55 | 5185.33 | 11905.76 | | |
| | Average (Aus) | 31204.09 | 1070.91 | 9801.50 | 22504.72 | | |
| OECD E(y) | Gini | 0.38421 | 0.68331 | 0.53217 | 0.29691 | 0.00879 | 0.09566 |
| | Average | 12181.21 | 444.92 | 3646.23 | 9006.56 | | |
| | Average (Aus) | 23025.38 | 841.00 | 6892.24 | 17024.53 | | |
| Upper 95 per cent Confidence Interval | | | | | | | |
| Income Distribution | measure | Pre-tax Income | Government Benefits (a) | Taxes (b) | Post-tax Income | R | V(adj) |
| Australian system on Australian Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.45817 | 0.82465 | 0.57570 | 0.36696 | 0.00958 | 0.10251 |
| | Average | 40119.90 | 2275.08 | 10692.80 | 31552.90 | | |
| Tax E(y) | Gini | 0.49521 | 0.73913 | 0.60980 | 0.39729 | 0.00290 | 0.10226 |
| | Average | 35888.90 | 1654.28 | 10203.40 | 27265.60 | | |
| OECD E(y) | Gini | 0.43106 | 0.77209 | 0.55016 | 0.32264 | 0.00626 | 0.11622 |
| | Average | 22992.10 | 1445.00 | 6158.02 | 18162.20 | | |
| Australian system on UK Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.44680 | 0.83458 | 0.57792 | 0.36149 | 0.00822 | 0.09257 |
| | Average | 41879.16 | 1783.17 | 11133.35 | 32738.68 | | |
| Tax E(y) | Gini | 0.46449 | 0.76326 | 0.59109 | 0.37701 | 0.00226 | 0.09297 |
| | Average | 37026.36 | 1327.71 | 10508.19 | 28048.31 | | |
| OECD E(y) | Gini | 0.40394 | 0.79289 | 0.54071 | 0.30788 | 0.00571 | 0.10404 |
| | Average | 24716.77 | 1146.72 | 6630.29 | 19276.44 | | |
| UK system on Australian Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.45858 | 0.77226 | 0.58512 | 0.37352 | 0.01194 | 0.09817 |
| | Average (UK) | 21194.32 | 916.25 | 6477.80 | 15611.23 | | |
| | Average (Aus) | 40062.29 | 1731.93 | 12244.57 | 29508.94 | | |
| Tax E(y) | Gini | 0.50700 | 0.68535 | 0.63301 | 0.40589 | 0.00853 | 0.11119 |
| | Average (UK) | 17470.13 | 743.02 | 5703.62 | 12446.67 | | |
| | Average (Aus) | 33022.69 | 1404.49 | 10781.20 | 23527.16 | | |
| OECD E(y) | Gini | 0.43046 | 0.69039 | 0.55785 | 0.33507 | 0.01031 | 0.10620 |
| | Average (UK) | 12016.99 | 565.33 | 3701.43 | 8865.01 | | |
| | Average (Aus) | 22714.97 | 1068.61 | 6996.59 | 16756.98 | | |
| UK system on UK Cross-sectional Population | | | | | | | |
| Hh(y) | Gini | 0.44602 | 0.79433 | 0.59088 | 0.36061 | 0.01159 | 0.09582 |
| | Average | 22257.04 | 756.25 | 6787.98 | 16251.30 | | |
| | Average (Aus) | 42071.09 | 1429.49 | 12830.89 | 30718.82 | | |
| Tax E(y) | Gini | 0.47924 | 0.70652 | 0.62214 | 0.38082 | 0.00838 | 0.10776 |
| | Average | 17824.87 | 631.10 | 5797.17 | 12663.46 | | |
| | Average (Aus) | 33693.24 | 1192.93 | 10958.02 | 23936.94 | | |
| OECD E(y) | Gini | 0.40754 | 0.70946 | 0.55627 | 0.31485 | 0.01058 | 0.10400 |
| | Average | 12837.34 | 485.23 | 3951.33 | 9368.84 | | |
| | Average (Aus) | 24265.63 | 917.20 | 7468.95 | 17709.33 | | |

(a) The Australian benefits include the Family Tax Initiative in addition to the calibrated benefits

(b) Australian taxes include ML and all rebates described in Section 8.2, UK taxes include NICs

Hh(y) = aggregate household income distribution

Tax E(y) = tax based equivalent income distribution

Demand E(y) = demand based equivalent income distribution

Average (UK) = average of distribution measured in GBP

Average (Aus) = average of distribution measured in AUD = Average (UK)*43139/438.88

V(adj) = Observed progressivity + R

R = Atkinson-Plotnick Reranking measure

Table 14: Distributional Statistics for Working Lifetime of Cohort – Observed Demographic Trends

| equiv scale | income | Annualised lifetime | | | Household Specific | | Mobility | Annual | |
|--|----------|---------------------|---------|---------|--------------------|---------|----------|---------|---------|
| | | mean | G(2) | G(4) | G(2) | mean | G(2) | G(2) | G(4) |
| Australian Tax and Benefits - lower 95 per cent confidence limit | | | | | | | | | |
| unadjusted | Pre-tax | 36941.31 | 0.26726 | 0.44014 | 1.054E-04 | 0.28193 | 0.12700 | 0.39258 | 0.65296 |
| | Post-tax | 32542.28 | 0.18199 | 0.31539 | 8.668E-05 | 0.22287 | 0.11845 | 0.29776 | 0.52031 |
| | Net | 4387.45 | 0.08480 | 0.12365 | 1.841E-05 | 0.05767 | 0.00881 | 0.09339 | 0.12909 |
| Henderson | Pre-tax | 26301.89 | 0.27294 | 0.44631 | 1.065E-04 | 0.28611 | 0.12738 | 0.39955 | 0.65755 |
| | Post-tax | 22488.03 | 0.17510 | 0.28764 | 7.850E-05 | 0.19869 | 0.10314 | 0.27651 | 0.47331 |
| | Net | 3809.89 | 0.09757 | 0.15816 | 2.728E-05 | 0.08619 | 0.02411 | 0.12133 | 0.17996 |
| OECD | Pre-tax | 21347.28 | 0.28236 | 0.45893 | 1.089E-04 | 0.29517 | 0.13162 | 0.41322 | 0.67320 |
| | Post-tax | 18064.89 | 0.18513 | 0.29876 | 7.947E-05 | 0.19953 | 0.10359 | 0.28750 | 0.47824 |
| | Net | 3280.55 | 0.09701 | 0.15960 | 2.889E-05 | 0.09443 | 0.02749 | 0.12411 | 0.19080 |
| Aus tax | Pre-tax | 27688.64 | 0.31334 | 0.50369 | 1.156E-04 | 0.31110 | 0.13152 | 0.44407 | 0.70583 |
| | Post-tax | 23077.13 | 0.22356 | 0.36093 | 9.015E-05 | 0.22562 | 0.10992 | 0.33203 | 0.54111 |
| | Net | 4611.47 | 0.08962 | 0.14220 | 2.490E-05 | 0.08424 | 0.02144 | 0.11069 | 0.16111 |
| Australian Tax and Benefits - upper 95 per cent confidence limit | | | | | | | | | |
| unadjusted | Pre-tax | 37230.81 | 0.26970 | 0.44339 | 1.090E-04 | 0.28996 | 0.12851 | 0.40016 | 0.66362 |
| | Post-tax | 32705.78 | 0.18395 | 0.31826 | 8.973E-05 | 0.22783 | 0.11873 | 0.30589 | 0.53347 |
| | Net | 4530.28 | 0.08621 | 0.12614 | 1.947E-05 | 0.06315 | 0.00934 | 0.09581 | 0.13378 |
| Henderson | Pre-tax | 26511.41 | 0.27560 | 0.44982 | 1.099E-04 | 0.29454 | 0.12936 | 0.40558 | 0.66626 |
| | Post-tax | 22602.87 | 0.17699 | 0.29038 | 8.188E-05 | 0.20375 | 0.10431 | 0.28331 | 0.48519 |
| | Net | 3908.87 | 0.09874 | 0.16006 | 2.873E-05 | 0.09183 | 0.02511 | 0.12432 | 0.18570 |
| OECD | Pre-tax | 21524.71 | 0.28516 | 0.46258 | 1.123E-04 | 0.30368 | 0.13251 | 0.41845 | 0.68040 |
| | Post-tax | 18163.29 | 0.18717 | 0.30179 | 8.263E-05 | 0.20479 | 0.10437 | 0.29295 | 0.48839 |
| | Net | 3361.91 | 0.09813 | 0.16131 | 3.032E-05 | 0.10029 | 0.02857 | 0.12727 | 0.19656 |
| Aus tax | Pre-tax | 27953.87 | 0.31630 | 0.50726 | 1.193E-04 | 0.31939 | 0.13274 | 0.44979 | 0.71296 |
| | Post-tax | 23231.35 | 0.22578 | 0.36406 | 9.338E-05 | 0.23081 | 0.11030 | 0.33796 | 0.55081 |
| | Net | 4723.38 | 0.09068 | 0.14379 | 2.625E-05 | 0.08993 | 0.02221 | 0.11346 | 0.16596 |
| UK Tax and Benefits - lower 95 per cent confidence limit | | | | | | | | | |
| unadjusted | Pre-tax | 36673.34 | 0.26726 | 0.44014 | 1.054E-04 | 0.28193 | 0.12719 | 0.39258 | 0.65296 |
| | Post-tax | 28357.93 | 0.18806 | 0.32644 | 8.799E-05 | 0.22502 | 0.11720 | 0.30294 | 0.52252 |
| | Net | 8300.68 | 0.07895 | 0.11326 | 1.712E-05 | 0.05572 | 0.00991 | 0.08878 | 0.12819 |
| Henderson | Pre-tax | 26139.77 | 0.27294 | 0.44631 | 1.065E-04 | 0.28611 | 0.12783 | 0.39955 | 0.65755 |
| | Post-tax | 20026.91 | 0.19176 | 0.32447 | 8.645E-05 | 0.21841 | 0.11344 | 0.30403 | 0.51083 |
| | Net | 6107.26 | 0.08098 | 0.12158 | 1.983E-05 | 0.06642 | 0.01409 | 0.09505 | 0.14523 |
| OECD | Pre-tax | 21227.85 | 0.28236 | 0.45893 | 1.090E-04 | 0.29517 | 0.13133 | 0.41322 | 0.67320 |
| | Post-tax | 16218.93 | 0.20338 | 0.34059 | 8.848E-05 | 0.22481 | 0.11518 | 0.31816 | 0.52650 |
| | Net | 5003.18 | 0.07884 | 0.11810 | 2.026E-05 | 0.06905 | 0.01603 | 0.09482 | 0.14560 |
| UK tax | Pre-tax | 26941.69 | 0.31357 | 0.49281 | 1.171E-04 | 0.30774 | 0.13104 | 0.44412 | 0.69385 |
| | Post-tax | 20342.67 | 0.22850 | 0.36961 | 9.594E-05 | 0.23652 | 0.11694 | 0.34503 | 0.54709 |
| | Net | 6589.95 | 0.08498 | 0.12292 | 2.083E-05 | 0.06961 | 0.01373 | 0.09864 | 0.14522 |
| UK Tax and Benefits - upper 95 per cent confidence limit | | | | | | | | | |
| unadjusted | Pre-tax | 37474.10 | 0.26970 | 0.44339 | 1.088E-04 | 0.28996 | 0.12840 | 0.40016 | 0.66362 |
| | Post-tax | 28881.33 | 0.18970 | 0.32887 | 9.120E-05 | 0.23032 | 0.11797 | 0.31022 | 0.53426 |
| | Net | 8613.98 | 0.08023 | 0.11508 | 1.816E-05 | 0.06065 | 0.01049 | 0.09076 | 0.13153 |
| Henderson | Pre-tax | 26672.25 | 0.27560 | 0.44982 | 1.100E-04 | 0.29454 | 0.12858 | 0.40558 | 0.66626 |
| | Post-tax | 20342.64 | 0.19341 | 0.32693 | 8.919E-05 | 0.22375 | 0.11431 | 0.30908 | 0.51940 |
| | Net | 6332.75 | 0.08226 | 0.12319 | 2.093E-05 | 0.07182 | 0.01485 | 0.09713 | 0.14856 |
| OECD | Pre-tax | 21636.74 | 0.28516 | 0.46258 | 1.121E-04 | 0.30368 | 0.13288 | 0.41845 | 0.68040 |
| | Post-tax | 16462.06 | 0.20515 | 0.34322 | 9.134E-05 | 0.23039 | 0.11622 | 0.32182 | 0.53277 |
| | Net | 5184.21 | 0.08011 | 0.11962 | 2.134E-05 | 0.07453 | 0.01687 | 0.09702 | 0.14896 |
| UK tax | Pre-tax | 27551.29 | 0.31691 | 0.49671 | 1.212E-04 | 0.31585 | 0.13246 | 0.44969 | 0.70100 |
| | Post-tax | 20701.54 | 0.23077 | 0.37261 | 9.941E-05 | 0.24233 | 0.11829 | 0.34957 | 0.55415 |
| | Net | 6855.20 | 0.08626 | 0.12442 | 2.198E-05 | 0.07509 | 0.01443 | 0.10079 | 0.14856 |

Table 15: Distributional Statistics for Working Lifetime of Cohort – Transition Probabilities for 1986

| equiv scale | income | mean | Annualised lifetime | | Intra-household | | Mobility | Annual | | |
|--|----------|----------|---------------------|---------|-----------------|---------|----------|---------|---------|--|
| | | | G(2) | G(4) | G(2) | mean | G(2) | G(2) | G(4) | |
| Australian Tax and Benefits - lower 95 per cent confidence limit | | | | | | | | | | |
| unadjusted | Pre-tax | 34811.69 | 0.26777 | 0.44629 | 1.071E-04 | 0.28651 | 0.13198 | 0.39799 | 0.66391 | |
| | Post-tax | 29817.40 | 0.19864 | 0.34583 | 8.886E-05 | 0.22749 | 0.11855 | 0.31465 | 0.54259 | |
| | Net | 4984.44 | 0.06878 | 0.09986 | 1.787E-05 | 0.05819 | 0.01359 | 0.08228 | 0.11840 | |
| Henderson | Pre-tax | 26359.03 | 0.26562 | 0.44035 | 1.050E-04 | 0.28284 | 0.13018 | 0.39468 | 0.65847 | |
| | Post-tax | 22070.03 | 0.17900 | 0.30007 | 7.964E-05 | 0.20244 | 0.10727 | 0.28450 | 0.49085 | |
| | Net | 4287.42 | 0.08642 | 0.13981 | 2.464E-05 | 0.07929 | 0.02282 | 0.10902 | 0.16427 | |
| OECD | Pre-tax | 22224.78 | 0.27495 | 0.45083 | 1.060E-04 | 0.28762 | 0.13193 | 0.40586 | 0.67080 | |
| | Post-tax | 18460.23 | 0.18695 | 0.30549 | 7.939E-05 | 0.20018 | 0.10630 | 0.29203 | 0.49183 | |
| | Net | 3766.34 | 0.08786 | 0.14504 | 2.603E-05 | 0.08616 | 0.02513 | 0.11269 | 0.17569 | |
| Aus tax | Pre-tax | 27373.60 | 0.29793 | 0.48703 | 1.131E-04 | 0.30400 | 0.13448 | 0.43124 | 0.69751 | |
| | Post-tax | 22501.55 | 0.21782 | 0.35815 | 8.962E-05 | 0.22466 | 0.11326 | 0.32948 | 0.54399 | |
| | Net | 4872.38 | 0.07994 | 0.12843 | 2.292E-05 | 0.07800 | 0.02106 | 0.10074 | 0.15078 | |
| Australian Tax and Benefits - upper 95 per cent confidence limit | | | | | | | | | | |
| unadjusted | Pre-tax | 35025.04 | 0.26997 | 0.44968 | 1.108E-04 | 0.29508 | 0.13348 | 0.40597 | 0.67492 | |
| | Post-tax | 29957.08 | 0.20042 | 0.34875 | 9.210E-05 | 0.23291 | 0.11874 | 0.32232 | 0.55468 | |
| | Net | 5085.04 | 0.06985 | 0.10164 | 1.893E-05 | 0.06340 | 0.01440 | 0.08436 | 0.12246 | |
| Henderson | Pre-tax | 26519.91 | 0.26784 | 0.44365 | 1.085E-04 | 0.29143 | 0.13212 | 0.40131 | 0.66810 | |
| | Post-tax | 22161.25 | 0.18061 | 0.30256 | 8.320E-05 | 0.20778 | 0.10841 | 0.29125 | 0.50249 | |
| | Net | 4360.37 | 0.08739 | 0.14142 | 2.599E-05 | 0.08491 | 0.02375 | 0.11135 | 0.16903 | |
| OECD | Pre-tax | 22365.86 | 0.27736 | 0.45409 | 1.094E-04 | 0.29632 | 0.13273 | 0.41155 | 0.67889 | |
| | Post-tax | 18538.24 | 0.18870 | 0.30794 | 8.267E-05 | 0.20541 | 0.10704 | 0.29746 | 0.50172 | |
| | Net | 3828.71 | 0.08879 | 0.14657 | 2.736E-05 | 0.09209 | 0.02610 | 0.11516 | 0.18043 | |
| Aus tax | Pre-tax | 27562.49 | 0.30036 | 0.49030 | 1.168E-04 | 0.31275 | 0.13565 | 0.43737 | 0.70567 | |
| | Post-tax | 22612.24 | 0.21959 | 0.36069 | 9.296E-05 | 0.23035 | 0.11359 | 0.33545 | 0.55358 | |
| | Net | 4950.44 | 0.08086 | 0.12988 | 2.419E-05 | 0.08369 | 0.02180 | 0.10291 | 0.15492 | |
| UK Tax and Benefits - lower 95 per cent confidence limit | | | | | | | | | | |
| unadjusted | Pre-tax | 34534.03 | 0.26777 | 0.44629 | 1.071E-04 | 0.28651 | 0.13220 | 0.39799 | 0.66391 | |
| | Post-tax | 26518.56 | 0.19890 | 0.34872 | 9.101E-05 | 0.23209 | 0.12117 | 0.31811 | 0.54484 | |
| | Net | 8002.06 | 0.06857 | 0.09713 | 1.573E-05 | 0.05359 | 0.01092 | 0.07935 | 0.11757 | |
| Henderson | Pre-tax | 26174.39 | 0.26562 | 0.44035 | 1.051E-04 | 0.28284 | 0.13065 | 0.39468 | 0.65847 | |
| | Post-tax | 19973.93 | 0.18994 | 0.32815 | 8.667E-05 | 0.21971 | 0.11658 | 0.30516 | 0.52017 | |
| | Net | 6201.93 | 0.07541 | 0.11184 | 1.814E-05 | 0.06207 | 0.01375 | 0.08907 | 0.13717 | |
| OECD | Pre-tax | 22095.25 | 0.27495 | 0.45083 | 1.060E-04 | 0.28762 | 0.13163 | 0.40586 | 0.67080 | |
| | Post-tax | 16825.20 | 0.19981 | 0.33979 | 8.707E-05 | 0.22186 | 0.11554 | 0.31462 | 0.52997 | |
| | Net | 5266.28 | 0.07492 | 0.11081 | 1.871E-05 | 0.06456 | 0.01597 | 0.09081 | 0.13976 | |
| UK tax | Pre-tax | 26811.77 | 0.29647 | 0.47614 | 1.137E-04 | 0.30028 | 0.13392 | 0.42946 | 0.68658 | |
| | Post-tax | 20251.51 | 0.21824 | 0.36269 | 9.443E-05 | 0.23409 | 0.11986 | 0.33744 | 0.54762 | |
| | Net | 6559.89 | 0.07801 | 0.11314 | 1.900E-05 | 0.06461 | 0.01370 | 0.09158 | 0.13751 | |
| UK Tax and Benefits - upper 95 per cent confidence limit | | | | | | | | | | |
| unadjusted | Pre-tax | 35303.80 | 0.26997 | 0.44968 | 1.106E-04 | 0.29508 | 0.13336 | 0.40597 | 0.67492 | |
| | Post-tax | 27031.90 | 0.20066 | 0.35179 | 9.446E-05 | 0.23782 | 0.12190 | 0.32512 | 0.55552 | |
| | Net | 8281.94 | 0.06961 | 0.09848 | 1.671E-05 | 0.05863 | 0.01155 | 0.08124 | 0.12046 | |
| Henderson | Pre-tax | 26686.59 | 0.26784 | 0.44365 | 1.086E-04 | 0.29143 | 0.13133 | 0.40131 | 0.66810 | |
| | Post-tax | 20285.40 | 0.19150 | 0.33071 | 8.954E-05 | 0.22523 | 0.11741 | 0.31064 | 0.52891 | |
| | Net | 6409.84 | 0.07655 | 0.11319 | 1.916E-05 | 0.06737 | 0.01449 | 0.09115 | 0.14027 | |
| OECD | Pre-tax | 22485.95 | 0.27736 | 0.45409 | 1.092E-04 | 0.29632 | 0.13311 | 0.41155 | 0.67889 | |
| | Post-tax | 17051.40 | 0.20140 | 0.34228 | 9.001E-05 | 0.22726 | 0.11652 | 0.31889 | 0.53688 | |
| | Net | 5440.67 | 0.07611 | 0.11218 | 1.974E-05 | 0.07004 | 0.01680 | 0.09306 | 0.14314 | |
| UK tax | Pre-tax | 27379.36 | 0.29903 | 0.47944 | 1.179E-04 | 0.30888 | 0.13529 | 0.43546 | 0.69478 | |
| | Post-tax | 20589.41 | 0.22002 | 0.36531 | 9.799E-05 | 0.24000 | 0.12116 | 0.34237 | 0.55533 | |
| | Net | 6792.87 | 0.07916 | 0.11449 | 2.008E-05 | 0.07011 | 0.01439 | 0.09372 | 0.14071 | |