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IN AN INTERNATIONAL COMPARATIVE
PERSPECTIVE

Peter Saunders and Garry Hobbes

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**INCOME INEQUALITY IN AUSTRALIA IN
AN INTERNATIONAL COMPARATIVE PERSPECTIVE**

Peter Saunders and Garry Hobbes

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ABSTRACT

Earlier comparative work on income distribution has tended to suggest that Australia is characterised by less income inequality than other industrialised economies. Concerns about the quality of the Australian data used in such comparisons have led to the need for more detailed assessment of the situation. The Luxembourg Income Study has been a focus for this work by bringing together microdata sets for a range of countries and reorganising them to conform to standardised concepts and definitions. This paper builds on earlier work undertaken as part of the Luxembourg Income Study by including Australia in an international comparative analysis of income distribution and redistribution. The Australian data are those from the **1981-1982 Income and Housing Survey**, with income tax imputed onto the data file. Results are presented for the gross and net income distributions between both families and individuals in seven countries. A common set of equivalence scales is also used to adjust for differing family needs. The results indicate that, using several summary measures of inequality, the distribution of income in Australia is less equal than in four of the other six countries studied. Earlier research which placed Australia high on the international league table of income equality is thus not confirmed by the results.

1. INTRODUCTION

Australia has traditionally been regarded, among western industrialised nations at least, as relatively egalitarian. Although there are clearly many dimensions of egalitarianism, one that is fundamental relates to equality in the distribution of income. The significance of this was acknowledged in the recent report **Towards a Fairer Australia. Social Justice Under Labor** which noted that one of the key elements of a just society is... 'equity in the distribution of economic resources' (Commonwealth of Australia, 1988, Overview, p.i) - although it is interesting to note that that report contains no discussion of the extent of, or trends in, the distribution of income. This paper provides a preliminary analysis of income distribution in Australia in an international comparative context. It builds on earlier research which has made great efforts to ensure that the income distribution data used in the analysis are as truly comparable across countries as the data themselves permit. This exercise involves using microdata unit records, adjusted to conform wherever possible to standard definitions of basic concepts such as income and the income unit. By adopting this approach, the severe difficulties encountered by earlier comparative studies of income distribution that relied on published data which often differed in scope, presentation and definition can in principle be overcome, or at least minimised.

The problems involved in attempting to compare the distribution of income across countries on the basis of published data specific to each country were illustrated in the celebrated study undertaken by Sawyer and published by the OECD in the mid-seventies (Sawyer, 1976). Because of the limitations of the data with which he was working, Sawyer had to derive pre-tax data from published post-tax data in some countries by adding average tax payments within income classes, while in other countries average tax payments were deducted from published pre-tax data in order to derive post-tax distributions. The problems arising from such procedures - acknowledged by Sawyer himself - include the fact that it is not possible to re-rank the distribution by the derived income concept, nor take account of income variation within the income classes.

Despite these problems, Sawyer's study was a valuable contribution to research on income distribution and his results have been very widely quoted. Sawyer's results showed the income distribution in Australia to be more equal than in most of the other OECD countries included in his analysis. Several subsequent studies have, however, made reservations about the quality of the Australian data used by Sawyer. His analysis used data from the Survey of Consumer Expenditure and Finances conducted by Macquarie University in the mid-sixties. The more detailed income information was collected in the finance section of the survey, although major concerns about the quality of the Macquarie data have been voiced by several Australian researchers (Bentley,

Collins and Drane, 1974; Ingles, 1981; Podder, 1972). Sawyer, in particular, noted that one person households were under-represented in the Macquarie sample and, given that the income of these households tends to be much lower than larger households, this will cause a bias towards equality if no adjustment is made for differences in household needs. In fact, when Sawyer adjusted the data to a standard household size, the Australian income distribution became more unequal and its ranking worsened when compared with similarly adjusted distributions for other countries. (See Sawyer, *op. cit.*, Tables 4 and 10; Ingles, *op. cit.*, pp. 41-42).

Drawing general attention to these data concerns, a Background Paper prepared for the Royal Commission on the Distribution of Income and Wealth in the United Kingdom commented in relation to the data,

These points would suggest that this source scores very low in terms of reliability. This is an important conclusion since it has been widely quoted as indicating that Australia has the most egalitarian distribution of income amongst the major Western nations. (Stark, 1977, para. 27, p.6)

Since that time, the quality of Australian income distribution data has been greatly improved as a result of the income distribution surveys undertaken by the Australian Bureau of Statistics (ABS). The data released by ABS on the unit record tape from the **1981-82 Income and Housing Survey** form the basis of the analysis in the remainder of this paper. In the following section, the research project that has produced the results with which the Australian data are compared is briefly described. Section 3 canvasses some of the methodological issues that have been addressed in this research. Section 4 presents the empirical results on income distribution and compares the estimates. Finally, Section 5 summarises the main features of the results and indicates the major conclusions of the analysis.

2. THE LUXEMBOURG INCOME STUDY

Following concerns over the lack of comparable income survey data, combined with the dramatic increase in interest in questions of income distribution by researchers and policy analysts, the Luxembourg Income Study (LIS) began under the sponsorship of the government of Luxembourg in 1983. The purpose of the LIS project was to gather in one central location, the Centre for Population, Poverty and Policy Studies (CEPS) in Walferdange, Luxembourg, sophisticated microdata sets which contain comprehensive measures of income and economic well-being for a set of modern industrialised welfare states. Over the following two years, microdata sets were gathered in Luxembourg for seven countries participating in the project - Canada, Germany, Israel, Norway, Sweden,

the United Kingdom and the United States. On the basis of these data sets, 1979 was set as the initial modal year for the LIS project, with all countries providing data as close as possible to that year. Plans are currently in train to assemble similar LIS data for more recent years, most probably 1985 or 1986.

Each country participating in the LIS project, acting through a country coordinator, was required to establish that their data set was sufficiently broad in coverage and detailed in scope to fit within the standardised LIS framework. Of particular relevance was the degree of detail in relation to income, particularly public transfer income, as well as availability close to the initial modal year. Once the data sets were assembled in Luxembourg, they were reorganised with the advice of country coordinators so as to conform wherever possible to the standardised LIS definitions, concepts and structures. This does not mean that every item on every data set is rendered comparable. What it does mean, however, is that if a particular LIS variable is available for country A it should be comparable to the same variable on any other country file. While it has not proved possible to create a complete set of common variables, each represented on every file, it has been possible to ensure that such basic variables as factor income, market income, gross income, net income and equivalent income are defined to common standards.

Analysis of the original seven countries in the LIS project has to date included comparative aspects of poverty, income distribution and redistribution, and the economic status of the elderly, children and one parent families (Smeeding et al., 1985; O'Higgins, Schmaus and Stephenson 1985; Hedstrom and Ringen, 1987; Hauser and Fischer, 1985; Smeeding, Torrey and Rein, 1987). Work is currently in progress estimating the distributional impact of non-cash income provisions, using a methodological framework similar to that used recently by the ABS in its study of the impact of government benefits and taxes on household income (ABS, 1987). An important aspect of this particular project is to provide the unit record tapes, expanded to include the LIS non-cash income imputations, to the research community so that other researchers can explore and analyse the data for themselves.

Within the last two years, the scope of the LIS project has begun to expand rapidly. Under the sponsorship of ABS and the Social Welfare Research Centre, Australia formally joined the project in 1987. Other countries now involved include Denmark, Finland, France, Luxembourg, the Netherlands and Switzerland, while further expansion to include Hungary, Italy, Japan and Poland is in the planning stages. Table 1 summarises the existing LIS data for Australia and the other six countries that will be discussed in this paper. (The original LIS research on income distribution also included Israel although they have not been included in this analysis.) The somewhat lengthy

Table 1:
An Overview of LIS Datasets

Country	Dataset Name, Income Year (and Size)(a)	Population Coverage(b)	Basis of Household Sampling Frame(c)
Australia	Income and Housing Survey 1981-82 (45,000)	97.5(e)	Dicennial Census
Canada	Survey of Consumer Finances, 1981 (37,900)	97.5(e)	Dicennial Census
Germany	Transfer Survey, 1979(d) (2,800)	91.5(g)	Electoral Register and Census
Norway	Norwegian Tax Files, 1979 (10,400)	98.5(e)	Tax Records
Sweden	Swedish Income Distribution Survey, 1981 (9,600)	98.0(e)	Population Register
United Kingdom	Family Expenditure Survey,(d) 1979 (6,800)	96.5(f)	Electoral Register
United States	Current Population Survey, 1979, (65,000)	97.5(e)	Dicennial Census

- Notes:**
- (a) Dataset size is the number of actual units surveyed.
 - (b) As a percent of total national population.
 - (c) Sampling frame indicates the overall base from which the relevant household population sample was drawn. The actual sample may be drawn on a stratified probability basis, e.g., by area or age.
 - (d) The United Kingdom and German surveys collect subannual income data which is normalised to annual income levels.
 - (e) Excludes institutionalised and homeless populations. Also some far northern rural residents (Intuits, Eskimos, Lapps, etc.) may be undersampled.
 - (f) Excludes those not on the electoral register, the homeless, and the institutionalised.
 - (g) Excludes foreign-born heads of households, the institutionalised, and the homeless.

period between the original data years and the analysis of the data reflects not only the time taken to release the microdata tapes, but also the time taken to convert to the standardised LIS definitions.

The four basic LIS cash income concepts are factor income, market income, gross income and net (or disposable) income. Attempts to broaden these income concepts to include, for example, imputed rent from owner-occupied housing, were thwarted initially by the differences in the country data sets, although attempts are in train to address this issue. Factor income is defined as the sum of wages and salaries, self employment income, and cash property income. Market income is derived by adding employment-related (occupational) pensions to factor income. Gross income is equal to the sum of market income, public cash benefits, private transfers (e.g. alimony and child support) and other cash income. Finally, net or disposable cash income is derived by deducting personal income tax and mandatory employee (and self employed) social insurance contributions for gross income.

The three basic income unit definitions conventionally used in income distribution analysis are the household, the family and the individual. In seeking to achieve exact comparability, constraints have been imposed by the way in which some of the data sets have been structured. The German data set, for example, is based on a household concept and cannot be disaggregated into family subcomponents or sub-units. Furthermore, those data sets based on the family unit do not always employ the same definition of the family. These differences are not, however, of great significance, and even the German household definition produces relatively few multiple family households. The basic income unit used is thus the family, defined to include individual adults or couples, with or without children. As will become apparent, while the family unit is employed in the analysis to correspond to the unit where income is pooled, the individual is also used as the unit when measuring and describing the income distribution.

3. METHODOLOGICAL ISSUES

The current paper relies heavily on the LIS analysis of income distribution and redistribution already undertaken by O'Higgins, Schmaus and Stephenson (1985). At the time that that work was undertaken, the LIS project did not include Australia. The current paper has adopted the framework of O'Higgins, Schmaus and Stephenson and re-organised the Australian data from the **1981-82 Income and Housing Survey** unit record file to conform with the LIS definitions described briefly in the previous section. As a consequence, the results produced for Australia can be directly compared with those presented by O'Higgins et al. for Canada, Germany, Norway, Sweden, the United

Kingdom and the United States. Although this procedure has the great advantage that the framework and conceptualisation is already in place, it does mean that the comparative analysis is limited to only those aspects included in the initial study, at least at this stage.

One difficulty that had to be overcome at the outset was the need to estimate personal income tax liabilities in 1981-82 in order to calculate net income. This proved to be an extremely complex exercise since it required analysis to be undertaken simultaneously on both the individual and the income unit files on the unit record tape. It also required the identification and separation of taxable and non-taxable income components. Once this was done, the 1981-82 tax scales were used to estimate total tax liabilities. Income tax deductions and rebates were allocated to eligible families on a random basis, after allowing for the overall patterns indicated in the published Taxation Statistics for 1981-82. Finally, the resulting tax imputations were used to derive tax payments and net income, and comparisons were made with published tax statistics. These comparisons indicated that the tax imputation algorithm produced results which compared reasonably closely to those reported by the Taxation Commissioner for 1981-82. These comparisons are presented, and the tax imputation methodology explained in more detail, in the Appendix.

The basic income definitions used in the analysis have already been explained. Since each of these income concepts relates to the family or income unit as a whole, the question arises of what adjustments are required to derive a measure of equivalent income that takes account of differences in family size. The use of country-specific equivalence scales was rejected on the grounds that they would obscure the extent to which differences in the distributions of equivalent income were simply a reflection of the equivalence scales used. Thus, a common set of equivalence scales was used which allocated a value of 0.5 to the first individual in any unit, a value of 0.25 for each individual from the second to the ninth (so that a nine-person unit has an equivalence factor of 2.5), and a value of 3.0 to all units with ten or more members.

The use of equivalence scales reflects the fact that income units are of different size. There remains the question of how different sized income units should be weighted when measuring income inequality, a point initially addressed by Danziger and Taussig (1979). Atkinson (1983) has noted that there are three possible weightings for an income unit comprised of N members. They can be weighted as one unit, or as N units, or as N^* equivalent adults (where N^* relates to the equivalence scale discussed earlier). Furthermore, if the total income of this income unit is Y , the income accruing to each individual member may be considered to be either Y/N or Y/N^* . This leaves nine ways in which the income distribution can be described, depending on which combination of

the three different choices of unit income and the three alternative unit weighting procedures is selected. In Australia, the most common choices made in income distribution analysis have been to treat the unit as a single unit with total income Y , or to treat the unit as N individuals each with their own contribution to total unit income. In contrast, poverty research has tended to treat the unit as a single unit with equivalent income Y/N^* , an approach adopted in the income distribution context by Cox (1982).

Of the nine possibilities canvassed by Atkinson, O'Higgins et al. reject those that treat the family as N^* equivalent units, on the grounds that equivalent individuals do not exist, even though families or individuals have an equivalent income. They prefer three of the remaining six possibilities - the distribution of family income among families, the distribution of per capita income among individuals, and the distribution of equivalent income among individuals. Of these, the second can probably be rejected in favour of the third, since the equivalences implied by the per capita income approach are well out of line with the equivalence scales normally used in this line of research.

There remains, finally, the issue of the basis on which units are ranked in order to derive measures of inequality. The normal procedure here, if the family is taken as the unit, is to rank families by total family income, Y . This has the disadvantage that, for example, the bottom quintile of the distribution relates to the bottom fifth of **families**; it may contain more (or less) than the bottom fifth of the **population** of individuals. This problem can be avoided by ranking on the basis of family income, but defining the quintile boundaries on the basis of individuals. Thus the bottom quintile would be those twenty per cent of individuals living in income units with the lowest family incomes. This latter procedure has been used when describing the distribution of equivalent income, i.e. families are ranked on the basis of family equivalent income, but each individual is weighted equally so that the quintiles each contain one fifth of individuals ranked according to the equivalent incomes of the families to which they belong.

4. EMPIRICAL RESULTS

4.1 Income Sources

Table 2 shows, for each country, the relative importance of each income source and direct taxes by measuring each as a percentage of average gross income. This table reflects the overall income and fiscal structure of each country and indicates the importance of the market and fiscal sectors in determining the overall structure of income inequality. In the three non-European countries - Australia, Canada and the United States - factor income (and as a consequence market income, given the low levels of occupational pensions) accounts for 88 per cent of gross income, compared with closer to 80 per cent for Germany and the United Kingdom, 84 per cent for Norway and

Table 2**The Relative Importance of Income Sources and Taxes as a Percentage of Average Gross Income**

Income Component	Australia	Canada	Germany	Norway	Sweden	United Kingdom	United States
Wages and Salaries	69.9	75.7	63.1	69.9	64.5	72.0	75.8
Self-employment Income	13.5	5.4	16.7	11.1	3.7	4.5	6.7
Property Income	5.3	7.2	1.1	2.7	2.7	2.7	5.8
Factor Income	88.7	88.3	80.9	83.7	70.8	79.3	88.3
Occupational Pensions	1.1	1.8	2.3	1.2	0.0	2.5	2.6
Market Income	89.8	90.1	83.3	84.9	70.8	81.7	90.8
Government Cash Benefits	9.4	9.1	16.5	14.1	29.2	17.2	8.0
Private Transfers/Other	0.8	0.8	0.2	0.9	0.0	1.1	1.2
Gross Income	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Income Tax	18.6	15.2	14.8	19.1	28.5	13.6	16.5
Employees Social Security Contributions	0.0	0.0	7.7	6.2	1.2	3.3	4.5
Net Income	81.4	84.8	77.5	74.7	70.2	83.1	79.0

Sources: (i) O'Higgins, Schmaus and Stephenson (1985), Table 1, p.14.
(ii) **1981-82 Income and Housing Survey**, unit record file.

70 per cent for Sweden. Within factor income, Australia has the highest percentage of non-wage and salary income, well above all other countries except Germany. Market income thus plays a major role in shaping the overall income distribution in Australia, Canada and the United States, with transfers accounting for less than 10 per cent of gross income. At the other extreme lies Sweden, where market incomes play a much smaller role and transfers amount to 30 per cent of gross income. In between is a mixed group of countries, comprising Germany, Norway and the United Kingdom where transfers amount to between 15 and 20 per cent of gross income.

The importance of government transfers is a guide to the significance of income tax and employee social security contributions in the income structure, although this is also dependent on the overall tax structure in each country. Together, these direct taxes account for about 15 per cent of gross income in Canada and the United Kingdom, around 20 per cent in Australia, Germany and the United States, and close to 30 per cent in Sweden. Australia's income tax share is exceeded in only Norway and Sweden. Taken together, government cash benefits and direct taxes as a percentage of gross income indicate the potential impact that government income maintenance and direct tax policies may have on the distribution of income. In addition, the significance of wages and salaries as a source of income indicates the potential impact of wages policy in shaping the overall income distribution. The following three sub-sections investigate the result of these (and other) factors on income inequality.

4.2 The Distribution of Family Income Among Families

Table 3 presents the distribution of gross and net family income among quintiles of families, with Gini coefficients provided for each distribution. Despite the limitations of the Gini coefficient as an inequality measure in providing an unambiguous ranking of the distribution (Atkinson, 1970), it will be used along with the income shares of the lowest and highest quintiles in the following discussion as indicators of relative inequality for comparative purposes. All three indicators suggest a very similar ranking of countries in terms of the inequality of gross income among families. Sweden stands alone as clearly having the most equal distribution. At the other extreme lie Germany and the United States which have the highest degree of inequality. In between, in increasing order of inequality, are Norway, the United Kingdom, Canada and Australia. With the exception of the income share of the lowest quintile, Australia's degree of inequality is closer to that of Germany and the United States than it is to that of the group of countries in the middle of the range. It is interesting to note that the inequality ranking of countries does not correspond to the importance of government cash benefits in gross income (Table 1). For example, in Germany government cash benefits are almost twice as high relative to gross income as in the United States, yet they appear together at the bottom of the

Table 3

The Distribution of Family Income Among Families

	Australia	Canada	Germany	Norway	Sweden	United Kingdom	United States
<i>Distribution of Gross Family Income among Quintiles of Families</i>							
Lowest quintile	4.6	4.6	4.4	4.9	6.6	4.9	3.8
Second quintile	10.0	11.0	10.2	11.4	12.3	10.9	9.8
Third quintile	16.5	17.7	15.9	18.4	17.2	18.2	16.6
Fourth quintile	25.2	25.3	22.6	25.5	25.0	25.3	25.3
Top quintile	43.7	41.4	46.9	39.8	38.9	40.8	44.5
Gini coefficient	0.399	0.374	0.414(a)	0.356	0.329	0.365	0.412
<i>Distribution of Net Family Income among Quintiles of Families</i>							
Lowest quintile	5.6	5.3	5.0	6.3	8.0	5.8	4.5
Second quintile	11.4	11.8	11.5	12.8	13.2	11.5	11.2
Third quintile	17.1	18.1	15.9	18.9	17.4	18.2	17.7
Fourth quintile	25.2	24.6	21.8	25.3	24.5	25.0	25.6
Fifth quintile	40.7	39.7	45.8	36.7	36.9	39.5	41.0
Gini coefficient	0.357	0.348	0.389(a)	0.311	0.292	0.343	0.370
Redistributive Factor (%) ^(b)	10.5	7.0	6.0	12.6	11.2	6.0	10.2

- Note:**
- (a) The German data contain a relatively large proportion (2.7 per cent) of income units with zero or negative reported income. These have been excluded when calculating the Gini coefficient.
 - (b) The redistributive factor is defined as the absolute difference between the Gini coefficients for gross and net income, expressed as a percentage of the gross income Gini coefficient.

Source:

- (i) O'Higgins, Schmaus and Stephenson, 1985, Table 2, p. 17.
- (ii) 1981-82 Income and Housing Survey, unit record file.

income inequality ranking. In contrast, government cash benefits are almost twice as high relative to gross income in the United Kingdom compared with Canada, yet they have similar patterns of income inequality.

The lower half of Table 3 shows the distribution of net income among families. Using the same inequality indicators as before, the general ranking of countries is broadly similar to the gross income picture, although the detailed rankings are more dependent on which measure is used. Norway now moves closer to Sweden in terms of having the lowest degree of inequality. On the basis of all three indicators, the United Kingdom ranks next. Canada ranks fourth and Australia fifth on the basis of the Gini coefficient and the share of the top quintile, although their ranking is reversed when the income shares of the lowest quintile are compared. As before, Germany and the United States emerge as the two countries with most inequality, although their ranking is dependent upon which of the three indicators is used.

The last line of Table 3 provides an indication of the redistributive impact of direct taxes, calculated as the percentage reduction in the Gini coefficients for gross and net income. This measure indicates that direct taxes in fact have the greatest equalising effect in the two countries - Sweden and Norway - where the distribution of gross income is already most egalitarian. There is also a considerable equalising effect of taxes in both Australia and the United States, primarily due to the reduced income share of the top quintile. (In both countries, the income share of the fourth quintile is greater after accounting for direct taxes than it is before.) In the remaining three countries - Canada, Germany and the United Kingdom - the redistributive impact of direct taxes is much lower.

4.3 The Distribution of Equivalent Income Among Individuals

The income distributions presented in Table 3 take no account of family size. In welfare terms, it makes a great difference whether those families in the lowest income quintile are single adults or larger families with children. In order to derive income distributions which have a closer correspondence to the distribution of economic welfare, it is necessary to consider the distribution of equivalent rather than unadjusted income. This has been done using the equivalence scales discussed earlier. Also as noted earlier, the distribution of equivalent income has now been expressed in terms of quintiles of individuals, although the ranking of the distribution has been undertaken on the basis of equivalent family income. The lowest quintile, for example, thus contains the 20 per cent of **individuals** who are in **families** with the lowest equivalent incomes. The results are presented for gross and net equivalent income in Table 4.

Table 4
The Distribution of Equivalent Family Income Among Individuals

	Australia	Canada	Germany	Norway	Sweden	United Kingdom	United States
<i>Distribution of Equivalent Family Gross Income among Quintiles of Individuals</i>							
Lowest quintile	6.2	6.7	7.2	8.1	9.4	7.9	5.1
Second quintile	11.0	12.6	12.1	13.6	14.6	13.0	11.4
Third quintile	16.9	17.5	16.0	17.9	18.5	17.9	17.1
Fourth quintile	24.9	24.0	21.3	23.4	23.3	23.7	24.2
Top quintile	41.3	39.2	43.4	37.0	34.2	37.5	42.1
Gini coefficient	0.351	0.327	0.352(a)	0.289	0.249	0.297	0.371
<i>Distribution of Equivalent Family Net Income among Quintiles of Individuals</i>							
Lowest quintile	8.1	7.6	7.5	9.9	10.6	9.0	6.1
Second quintile	11.4	13.3	12.7	14.8	16.1	13.5	12.8
Third quintile	14.4	17.9	16.1	18.4	19.1	18.0	18.1
Fourth quintile	23.0	23.8	20.7	22.9	23.1	23.4	24.4
Fifth quintile	43.1	37.4	43.0	34.1	31.1	36.1	38.6
Gini coefficient	0.305	0.299	0.340(a)	0.243	0.205	0.273	0.326
Redistributive Factor (%) ^(b)	13.1	8.6	3.4	15.9	17.7	8.1	12.1

Notes and Sources: See Table 3.

The effect of adjusting income by equivalence scales is to reduce inequality in all countries, although the extent of the reduction varies across countries. The share of equivalent income of the bottom quintile is greater in all countries than the bottom quintile's share of unadjusted income, particularly in Germany, Norway, Sweden and the United Kingdom. The share of the top quintile also declines in all countries when equivalent gross income is compared with unadjusted gross scheme, most notably in Germany and Sweden. When the corresponding net income distributions are compared, the share of the top quintile declines by almost 6 percentage points in Sweden, by about 3.5 percentage points in Canada, Germany, Norway and the United Kingdom. By contrast, in Australia the share of the top quintile in equivalent income exceeds the top quintile share of unadjusted income by almost 2.5 percentage points. Indeed, inequality at the upper end of the distribution of equivalent net income in Australia is greater than in all other countries.

The inequality ranking among countries of the distribution of equivalent income is similar to the pattern already described for unadjusted income. Whichever indicator is used, Sweden ranks as the most equal country (on the basis of both gross and net equivalent incomes), followed always by Norway and then the United Kingdom. The ranking of the remaining four countries varies according to which inequality indicator is used, as well as whether gross or net equivalent income is considered. Canada always ranks first or second amongst these four countries, while the United States generally ranks third or fourth. The relative positions of Australia and Germany vary according to which specific indicator is used. By and large, therefore, the inequality rankings of countries established earlier for unadjusted income are not materially affected by the analysis of the distributions of equivalent income. Sweden clearly remains most egalitarian, followed by Norway, the United Kingdom and Canada. The ranking of the remaining three countries - Australia, Germany and the United States - depends on the indicator selected, but it is clear that all three countries are characterised by greater income inequality than the other four countries studied.

Since the distributions of equivalent net income represent the best approximation of the distribution of monetary economic welfare, they deserve particular attention. What is most striking about these results is the low degree of inequality in Sweden, as evidenced by the Gini coefficient of 0.205 and the closeness of the income shares of the bottom and top quintiles. Across countries, the equivalent net income share of the bottom quintile ranges from 6.1 per cent in the United States to 10.6 per cent in Sweden. Australia falls in the middle with the share of the bottom quintile equal to 8.1 per cent. The share of the top quintile in equivalent net income ranges from 31.1 per cent in Sweden to 43.1 per cent in Australia. The share of equivalent net income going to the middle sixty per cent of families is close to 55 per cent in Canada, United Kingdom and the United States. It

is just over 56 per cent in Norway and over 58 per cent in Sweden. In Germany it is 49.5 per cent, and in Australia 48.8 per cent. Thus in Australia the medium-ranking share of the lowest quintile, combined with the high share of the top quintile has left the income share of families in the middle of the income distribution well below that in most of the other countries. Further investigation is required to establish why the inequality of equivalent income is so great at the upper end of the distribution in Australia. One possibility is that it may reflect the fact that many of these individuals are in small (childless) two income families, combined with the use of an individual unit for income tax purposes which serves to reduce tax liability below what it would be if family income was aggregated for tax purposes.

The redistributive factors shown in Table 4 exhibit a similar pattern across countries to those presented in Table 3. Redistribution is again greatest in Norway and Sweden, which have the most equal distributions before tax. Australia and the United States again also have quite large redistributive factors, yet in both countries the Gini coefficient after tax exceeds the before tax Ginis in Norway, Sweden and the United Kingdom. The estimated redistributive impact is lower again in Canada and the United Kingdom, and particularly low in Germany where direct taxes cause the Gini coefficient for equivalent income to decline by only 3.4 per cent.

4.4 Sources of Inequality

It is useful to begin the analysis of the sources of inequality by using data with a single income ranking scheme. Thus, the following results are based on rankings by family gross income, but weight each individual equally. Although in conceptual terms the use of equivalent income data has much to recommend it, this procedure has not been followed because in practice equivalencing transformations of the data obscure the impact of various income sources on overall inequality. Table 5 sets out the quintile shares of individuals in factor, gross and net income once ranking has been undertaken on the basis of family gross income. Inequality in the distribution of factor income is particularly marked in Germany, where inequality at both extremes is greater than elsewhere. The range of factor income inequality shows great variation across countries: For example, the ratio of the top quintile share to the lowest quintile share of factor income varies from 5.1 in Sweden to 19.4 in Germany. Australia has the second highest value of this ratio (10.8) behind Germany, and also ranks second lowest behind Germany in terms of the factor income share of the lowest quintile. There thus appears little comfort in these results for those who argue that the income distribution generated by the market in Australia is more equal than in other similar countries. Indeed, the reverse appears a better description of reality.

Table 5**The Distribution of Income Among Individuals**

(Income shares of quintiles of individuals ranked by family gross income)

	Australia	Canada	Germany	Norway	Sweden	United Kingdom	United States
<i>Distribution of Factor Income among Quintiles of Individuals</i>							
Lowest Quintile	3.5	5.4	2.3	4.4	6.5	4.0	4.2
Second Quintile	14.9	14.9	13.8	17.0	18.5	15.0	12.8
Third Quintile	20.2	19.2	17.1	19.6	18.8	19.9	19.2
Fourth Quintile	23.6	24.5	22.0	24.2	23.0	24.9	25.1
Top Quintile	37.7	36.0	44.7	34.9	33.2	36.3	38.8
<i>Distribution of Gross Income among Quintiles of Individuals</i>							
Lowest Quintile	9.1	9.5	10.7	12.0	13.7	10.9	7.5
Second Quintile	16.0	15.6	14.7	17.8	20.5	15.6	14.3
Third Quintile	18.9	18.7	16.2	18.4	18.6	18.7	18.8
Fourth Quintile	21.6	23.0	20.1	21.6	20.1	22.9	23.6
Top Quintile	34.3	33.2	38.2	30.3	27.1	31.9	35.9
<i>Distribution of Net Income among Quintiles of Individuals</i>							
Lowest Quintile	10.9	10.8	13.1	14.7	16.4	12.4	9.0
Second Quintile	17.2	16.4	15.3	18.6	21.2	15.9	15.9
Third Quintile	19.3	18.8	16.0	18.6	18.3	18.6	19.5
Fourth Quintile	21.5	22.6	19.3	21.0	19.9	22.4	23.6
Top Quintile	31.1	31.4	36.2	27.2	24.2	30.6	32.0

- Notes:**
- (i) In each part of the table, individuals are weighted equally but ranked by family gross income.
 - (ii) The Gini coefficients are not presented since the income unit (the family) is not congruent with the unit weight (the individual).

- Sources:**
- (i) O'Higgins, Schmaus and Stephenson (1985), Table 3, p.23.
 - (ii) 1981-82 Income and Housing Survey, unit record file.

The distribution of gross income among individuals shows a similar pattern across countries to the results already discussed, although with a lower degree of inequality overall. Focusing on the income shares of the lowest and highest quintiles, Sweden exhibits greatest equality, followed by Norway and the United Kingdom. The ranking of the remaining four countries depends on which summary indicator is selected. Australia and Canada have relatively low shares for both the lowest and top quintiles, Germany is characterised by considerable inequality in the top quintile, while the United States has the lowest share of the bottom quintile. The significant equalising effect of government cash transfers is apparent from comparisons of the inequalities in gross and factor income. Inequality in gross income is much less than that of factor income in all countries, and the variation across countries in the distribution of gross income is also less than for factor income.

The ratio of the gross income share of the highest to lowest quintiles ranges from 2.0 in Sweden to 4.8 in the United States. Australia again ranks second last on this measure, with a ratio of 3.8, although this is only slightly higher than the corresponding ratios for Germany (3.6) and Canada (3.5). The lowest quintile of individuals receives more than 10 per cent of gross income in all countries except Australia, Canada and the United States, while the highest quintile of individuals receives less than 35 per cent of gross income in all countries except Germany and the United States. Finally, it is interesting to note, with the exception of Germany, the extreme similarity in all countries of the gross income share of the third quintile. For the remaining six countries, the third quintile's gross income share varies from 18.4 per cent in Norway to 18.9 per cent in Australia. In fact, with the exception of both Germany and Sweden, the gross income share of the middle three quintiles shows remarkable stability across countries, varying from 56.5 per cent in Australia to 57.8 per cent in Norway. The low gross income share of the middle three quintiles in Germany (51.0 per cent) reflects the inequality already noted in the top quintile, while the high gross income share of the middle quintiles in Sweden (59.2 per cent) reflects Sweden's relative equality across the whole income distribution.

Finally, the distribution of net income among individuals ranked by family gross income shows a similar pattern of inequality across countries as in earlier results. Sweden, Norway and the United Kingdom, in that order, exhibit greatest equality and the United States most inequality. Australia and Canada are very similar at both extremes, but their ranking relative to Germany is indeterminate, since Germany has a greater share of net income going to both the lowest and highest quintiles. The inequality of net income in Australia at the top end of the income distribution is now less marked than was indicated in Table 4. It is important to stress however, that Table 5 differs from Table 4 not only because equivalencing transformations are not used in Table 5, but also because families

are ranked by different income concepts in each table. Further work would need to be done before any definitive conclusions could be reached as to whether the observed differences primarily reflect the effects of equivalencing incomes or the income measure used to rank families.

Table 6 provides information on the composition of the lowest and highest gross income quintile shares of individuals when ranked according to the gross income of the families to which they belong. Each entry in the table indicates the percentage of gross income which goes to each quintile in a particular form of income indicated. Examination of the lowest quintile shows the significance of government cash benefits in the determination of overall inequality. The main exception to this is Germany, where cash benefits are a significant income source in the lowest quintile but overall inequality is also considerable. This highlights the fact that income inequality in Germany is at the top rather than the bottom of the income distribution. There are considerable country differences in the lowest quintile in the importance of wages and salaries as a source of gross income. Australia ranks second last in this regard, exceeding only Germany. Clearly, whatever the wages system is able to do to service greater income equality higher up the income distribution, its impact in the lowest quintile is quite limited, particularly in Australia. It needs to be remembered, however, that the results in Table 6 in part reflect the demographic composition of the quintiles and further work needs to be done on this issue. In all countries except Canada, less than 5 per cent of gross income goes to the bottom quintile in the form of market income. Again, Australia is second lowest to Germany in the absolute importance of market income as a source of gross income at the bottom of the income distribution. In conjunction with the earlier comments, it is apparent that income maintenance policies are easily the most important vehicle for reducing inequality at the lower end of the income distribution.

Turning to the composition of gross income in the highest quintile, while wages and salaries are now a considerable source of income, they are not sufficient alone to explain the pattern of inequality. (This is not so for the second, third or fourth quintiles, where wage and salary income plays the dominant role in the pattern of inequality). There are many considerable differences across countries in the contribution to gross income of the other forms of market income, i.e. self-employment income, property income and occupational pensions. Their percentage contribution to gross income is 1.3 per cent in Sweden, 2.8 per cent in the United Kingdom, 5.8 per cent in Canada, 6.8 per cent in the United States, 6.9 per cent in Norway, 9.9 per cent in Australia and 14.7 per cent in Germany. Self-employment income is particularly important as a source of gross income (and, by implication, a factor contributing to inequality) at the upper end of the income distribution in both Australia and Germany. The importance of self-employment

Table 6

The Composition of Gross Income in the Lowest and Top Quintiles of Individuals

Income Source	Australia	Canada	Germany	Norway	Sweden	United Kingdom	United States
<i>Lowest Quintile:</i>							
Wages and Salaries	2.2	3.6	1.5	2.9	3.6	2.4	3.0
Self-employment							
Income	0.4	0.4	0.3	0.3	0.4	0.3	0.2
Property Income	0.5	0.8	0.2	0.5	0.6	0.5	0.5
Occupational							
Pensions	0.1	0.4	0.5	0.4	0.0	0.8	0.3
Total Cash							
Benefits	5.7	4.2	8.3	7.6	9.1	6.7	3.2
Gross Income	9.1	9.5	10.7	12.0	13.7	10.9	7.5
<i>Top Quintile:</i>							
Wages and Salaries	23.9	26.3	21.9	22.4	22.1	26.3	28.0
Self-employment							
Income	7.2	2.5	13.8	5.9	0.9	1.5	3.5
Property Income	2.3	2.9	0.5	0.9	0.4	0.9	2.7
Occupational							
Pensions	0.4	0.4	0.4	0.1	0.0	0.4	0.6
Total Cash							
Benefits	0.4	0.8	1.6	0.8	3.6	2.6	0.8
Gross Income	34.3	33.2	38.2	30.3	27.1	31.9	35.9

Note: The quintiles are derived by ranking individuals according to the gross income of their family. The income and benefit shares are based on the family totals in each quintile. The gross income figures include private transfers and other cash income which are not shown in the details.

Source: (i) O'Higgins, Schmaus and Stephenson, 1985, Table 4, p. 26.

(ii) 1981-82 Income and Housing Survey, unit record file.

income in the top quintile in Norway also helps explain why the Norwegian income distribution is less equal than in Sweden.

5. SUMMARY AND CONCLUSIONS

This paper presents some results on income inequality for Australia which have been derived so that they are comparable with results for a range of other countries. It needs to be emphasised that the data used in this exercise are in some cases almost a decade old, a reflection of the unavoidable delays in the release of survey unit record tapes in each country and their reorganisation on a standardised basis. The paper has been primarily concerned with presentation of a number of indicators of income inequality with relatively little attempt to explain the similarities and differences that emerge. The content of the analysis has been constrained by the framework of the earlier research on which this paper has relied very heavily. It needs to be emphasised, however, that now that Australia is participating fully in the Luxembourg Income Study, it will be possible to use the standardised unit record tapes to explore further the issues raised in this paper and to begin to test alternative hypotheses on the causes of inequality and the impact of redistributive policies. It was with such possibilities in mind that the Luxembourg Income Study was conceived and developed.

Whichever way inequality is measured in this paper, an almost totally defined ranking of countries results. On all indicators, Sweden has the most equality, followed by Norway and then the United Kingdom. Most indicators place Canada next, followed by Australia, with Germany and the United States the most unequal. Thus, earlier research which placed Australia high on the international league table of income equality is not confirmed by these results. Although Australia ranks in the middle in terms of inequality at the bottom of the income distribution, it emerges on the basis of some indicators as a country characterised by considerable inequality at higher income levels.

Perhaps the most interesting of the findings that emerges from this study is that the redistributive impact of direct taxes (and, as is clear from the tables, government cash benefits) is greatest in those countries which already exhibit most income equality. This suggests that the two major methods of income redistribution - use of the tax-transfer system, and attempts to improve the structure of income equality generated by the market - may in fact be complementary rather than alternative policy directions. This in turn raises the fundamental question of the appropriate role of government tax and transfer policies in **both** the generation and redistribution of income in mixed economies. It is a line of thinking well-known in Scandinavia and other European countries, but one which is worthy of more careful consideration in Australia.

Appendix: The Tax Imputation Methodology

This Appendix describes the main elements of the tax model used to impute personal income tax onto the unit record file from the **1981-82 Income and Housing Survey**. As a basis for checking the reliability of the tax imputations, the results were compared with data presented in **Taxation Statistics 1981-82** (Commissioner of Taxation, 1984). It is important to emphasise a number of differences in scope and definition between the published Taxation Statistics (TS) and those recorded on the Income and Housing Survey (IHS) file. These differences need to be kept in mind when interpreting the following remarks. Among the more significant of them are the following:

- Some groups (eg. members of Australian defence forces living in military establishments, students in boarding houses, patients in hospitals and inmates of gaols) are excluded from the IHS unit record file, but may still be included in the TS data.
- The IHS unit record file includes only those who provided the relevant income information, while the TS data refer only to those for whom income tax assessments were undertaken during the financial year 1982-83.
- The TS include in the main the returns of taxable individuals for whom 'taxable income exceeded \$4195 and the tax assessed was not extinguished by rebates' (Commissioner of Taxation, 1984, p.2). The IHS unit record file includes all income recorded on the survey responses.
- The IHS unit record file recodes all negative incomes as zero, although these are flagged on the file. Thus for those taxpayers who have a negative income source that serves to reduce their assessable income for tax purposes, their income as recorded on the IHS unit record file will exceed their taxable income by an amount that cannot be identified.

The tax imputation proceeded as follows: First, a 'gross income' total was derived from the IHS unit record file by adding five per cent of lump sum superannuation payments to gross income from all other sources. 'Derived income' was then calculated by deducting non-taxable income from 'gross income'. Non-taxable income was the sum of income from family allowances, widows' pension, war widows' pension, invalid pension, wife's pension for those less than 60 years where the spouse receives war disability or invalidity pension, supplementary assistance for pensioners and sickness beneficiaries, and additional pension or benefit for children.

Deductions: Individuals eligible to claim tax deductions were identified according to their demographic characteristics and income sources. (For example, the deduction for self-employed superannuation contributions was restricted to those with some income from self employment, and so on). The published TS include details of the total deductions and number of claims for selected deductions by seven grades of taxable income. This information was used to allocate a similar pattern of estimated deductions according to 'derived income' grades on the IHS. It was assumed that the probability that a given individual claimed a particular deduction was equal to the ratio of the number who actually claimed to the number identified as eligible to claim that deduction. The average deduction per individual was set equal to the total amount claimed within each taxable income grade divided by the number claiming the deduction in that taxable income grade. Deductions were then allocated randomly to individuals identified as eligible to claim, assuming a normal distribution with mean equal to the average deduction actually claimed and a standard deviation equal to 0.3 times the mean. (If the income above the tax threshold was less than the total imputed deductions, the deductions claimed were correspondingly reduced). Taxable income was then calculated for each individual as the difference between 'derived income' and total estimated deductions. The tax scales were then applied to calculate gross tax liability.

Rebates: The spouse rebate was estimated with reference to the spouse's status and income. Sole parent rebates were estimated for eligible sole parents. All other rebates were estimated using the random allocation method used to estimate deductions. The total rebate claimed was reduced if the tax on income minus deductions was less than the total estimated rebate. Net tax liability was then calculated as the difference between gross tax liability and total estimated rebates.

Table A.1 compares the published information from the **1981-82 Taxation Statistics** with the corresponding information imputed from the tax modelling exercise. Although the two sets of information are broadly comparable, the differences reflect the factors alluded to earlier, and for this reason interpretation of the differences is difficult and requires considerable caution.

Table A 1

**Comparison of the Published Taxation Statistics
with the Imputed Tax Aggregates**

Grade of Taxable Income	Taxable Income: (\$millions)		Tax Payable: (\$million)	
	Taxation Statistics	Tax Imputation	Taxation Statistics	Tax Imputation
Under \$6000	3479	3969	171	203
\$6000 - \$8999	7396	7859	923	984
\$9000 - \$11999	11102	12348	1963	2186
\$12000 - \$15999	20464	21646	4184	4399
\$16000 - \$21999	23475	22890	5494	5336
\$22000 - \$31999	14513	15586	4163	4555
\$32000 and over	7207	8699	2742	3422
Total	87636	92997	19640	21085

Sources: (Columns 1 and 3) **Taxation Statistics 1981-82**, Schedule 1.3(c), p.30
 (Columns 2 and 4) **1981-82 Income and Housing Survey**, unit record file.

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