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National Centre for Social and Economic Modelling
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AN INTRODUCTION TO POVERTY MEASUREMENT ISSUES

Harry Greenwell, Rachel Lloyd and Ann Harding

Discussion Paper no. 55
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Director: Ann Harding

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Abstract

It is difficult to estimate poverty accurately because the concept of 'poverty' is not easy to define and even once it is defined it is not easy to measure in a way that is true to the definition. This paper surveys the methodological steps required to produce poverty estimates and highlights the limitations or assumptions associated with each step. It also discusses characteristics of the primary source of data for poverty analysis in Australia — the income surveys conducted by the Australian Bureau of Statistics. The aim of this discussion is to aid the careful interpretation of poverty estimates and to emphasise the need for researchers to account for the difficulties of poverty measurement in their work.

Author note

Harry Greenwell is a Research Officer and Rachel Lloyd is a Senior Research Fellow at NATSEM. Ann Harding is Professor of Applied Economics and Social Policy and inaugural Director of NATSEM at the University of Canberra.

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General caveat

NATSEM research findings are generally based on estimated characteristics of the population. Such estimates are usually derived from the application of microsimulation modelling techniques to microdata based on sample surveys.

These estimates may be different from the actual characteristics of the population because of sampling and nonsampling errors in the microdata and because of the assumptions underlying the modelling techniques.

The microdata do not contain any information that enables identification of the individuals or families to which they refer.

Contents

1 Introduction

In 2000 the Smith Family commissioned NATSEM to produce a series of annual reports on poverty in Australia. The first report (Harding and Szukalska 2000a) produced estimates of poverty in Australia in 1999 and was published in November 2000. The second report, which examines trends in poverty in the 1990s, was published in November 2001. The goal of these reports is to provide current, accessible data on poverty in Australia. This paper is intended to supplement these reports by presenting an overview of the general issues associated with poverty measurement.

The paper is intended as a resource for researchers wanting a general introduction to poverty measurement. It also aims to provide greater background for people interested in the results in the poverty reports produced for the Smith Family. In addition it provides workers at the Smith Family and elsewhere with the knowledge to use NATSEM poverty lines to assess people for eligibility to their programs.

Poverty research is inevitably constrained by the available data. Section 2 of this paper provides a detailed examination of the main data source used in Australian poverty analysis — the income surveys undertaken by the Australian Bureau of Statistics (ABS). Section 3 explains the steps involved in measuring poverty. Section 4 concludes the paper. The appendix on equivalence scales explains how various equivalence scales are calculated and how to find the poverty line for any family type from the poverty lines used in the most recent Smith Family poverty report.

2 Data: the ABS income surveys

Most poverty analysis in Australia is based on surveys of household income conducted by the Australian Bureau of Statistics (ABS).[1] The ABS

[1] The ABS also conducts 'expenditure surveys' that allow for the comparison of income and expenditure poverty. The merits of using income or expenditure for poverty measurement are discussed in subsection 3.1. However, the characteristics of the expenditure surveys are not discussed in this paper. For more detail, see ABS (2000); for discussion of some data issues, see Harding and Greenwell (2001, pp. 23–4, 31–2).

has conducted periodic income surveys since 1969. It first released a confidentialised unit record file (CURF) for the 1982 Income and Housing Survey, allowing other organisations to conduct detailed analyses of income distribution and poverty, among other things. Since then, CURFs have been released for the 1986 Income Distribution Survey, the 1990 Survey of Income and Housing Costs and Amenities and the Surveys of Income and Housing Costs conducted in 1994-95, 1995-96, 1996-97, 1997-98 and 1999-2000. Hereafter, these surveys are all referred to as the 'income surveys'.

Inevitably, limitations in the scope and methodology of the income surveys affect the accuracy of poverty measurement. After each survey the ABS published detailed accounts of the survey methodologies in *Income Distribution, Australia* (Cat. No. 6523.0) (see also ABS 1997 and Lambert 1996). Although the methodology used for each survey has remained substantially the same over the years, the surveys have varied not only in frequency but also in scope, sample size and variable definitions. In particular, there was a significant change in approach after 1990. The frequency of surveys was increased (they were conducted annually for four years and are currently conducted biannually) and the sample size was roughly halved. The definition of 'dependent children' changed. Finally, the surveys were added to the Monthly Population Survey rather than being conducted as stand-alone surveys. Consequently, they were conducted throughout the financial year rather than during just one quarter. These differences, in so far as they are relevant to poverty measurement, are discussed below. (The following sections draw heavily on ABS Cat. No. 6523.0 and Cat. No. 6553.0.)

2.1 Survey collection, scope and weighting

The data obtained during the income surveys were collected through personal interviews. In 1982, 1986 and 1990, interviews were conducted during September–November, September–December and October–December, respectively. Since then the surveys have been attached to the Monthly Population Survey, which is conducted throughout each year.

The scope of the income surveys has been determined by the type of dwellings, the geographic areas and persons included in each survey. The scope of the 1982, 1986 and 1990 surveys included private dwellings (for example, houses, flats, units and garages) and special dwellings (for

example, hotels, boarding houses, construction camps and caravan parks). Since then caravan parks have been the only special dwellings included in the scope of the income surveys. The scope of each of the surveys has been further restricted to exclude persons who are members of Australian or non-Australian defence forces, overseas visitors and diplomatic personnel. Since 1990 the surveys have excluded 'persons living in remote and sparsely settled parts of Australia'. It should also be noted that one group who are almost certainly poor — the homeless — were omitted from each of these surveys as the ABS surveys only people with a fixed address.

Each ABS dataset comes with a set of weights that indicates the number of people in the whole population represented by each observation in the sample. The process used to produce these weights is complex and is not discussed in this paper (for details, see ABS 1997, pp. 18–19).

2.2 Sampling error

Because the income surveys cover samples of the Australian population the poverty figures derived from the surveys are only estimates of poverty levels in the whole population. These estimates are subject to sampling error, which will vary with the size of the sample (that is, larger samples produce lower sampling variability). The sample sizes for the income surveys have varied significantly over time (table 1).

Table 1 **Sample sizes of the income surveys, 1982 to 1997-98**

	People aged 15 years or more		Income units	
	Sample	Weighted population	Sample	Weighted population
	no.	no.	no.	no.
1982	31 723	11 244 639	20 117	7 198 408
1986	17 714	12 187 910	10 815	7 634 114
1990	30 444	13 155 265	18 952	8 169 117
1994-95	13 827	13 787 612	8 675	8 716 201
1995-96	14 017	13 972 927	8 871	8 888 317
1994–96[a]	27 844	13 762 624	17 546	8 750 833
1996-97	14 595	14 209 812	9 276	9 083 289
1997-98	13 931	14 428 177	8 778	9 129 424

[a] The ABS released a CURF that contained updated data from the 1994-95 survey combined with the 1995-96 data. See ABS (1998a, pp. 5–6) for details of the updating process.

Standard errors are one measure of the effect of the sample size on the accuracy of the estimate. There are roughly two chances in three that the true value for the whole population will lie within one standard error of the estimate and there are roughly 19 chances in 20 that the true value lies within two standard errors of the estimate. The latter is referred to as the 95 per cent confidence interval and means that, if repeated samples were conducted (at the same point in time), for 19 out of 20 samples the true population value will fall within a range of two standard errors from the estimate.

Relatively few poverty studies report the standard errors associated with their estimates. We have calculated standard errors for NATSEM's most recent estimates of poverty using the Henderson half average income poverty line[2] to give an indication of the degree of sampling variability associated with poverty measurement (table 2). These standard errors have been estimated according to the method suggested by the ABS in its publications (see Cat. No. 6523.0).

The results in table 2 confirm two unsurprising conclusions: the standard errors are lower in 1990 than in later years (because the sample size was larger) and the standard errors are larger for adult poverty rates than for all people, and larger again for child poverty rates (because these estimates are based on smaller samples). They also confirm the major conclusion of the 2001 report — that poverty increased during the 1990s. Even taking the opposite extremities of the confidence intervals for 1990 and 1999-2000, the poverty rate increased from 11.5 per cent to 12.6 per cent. This is equivalent to a net increase of *at least* 551 000 people in poverty during the 1990s.

The adult poverty rates produce similar conclusions but analysis of child poverty rates must remain more speculative because the confidence interval is significantly broader. It is possible that year-to-year changes in the child poverty rates are entirely a product of sampling error. Most other disaggregated poverty estimates rely on sample sizes significantly smaller than that for children. Thus, the large sampling errors for children suggest that sampling errors may be important to the interpretation of many poverty estimates.

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2 This poverty line and others are explained in section 3.

Table 2 **Standard errors and 95 per cent confidence intervals for estimates of numbers in poverty and poverty rates, 1990 to 1999-2000**

	1990	1994-95	1995-96	1997-98	1999-2000
People in poverty ('000)					
Standard error	19	34	34	35	35
Minimum	1 734	1 992	2 069	2 247	2 361
Estimate	1 772	2 060	2 137	2 317	2 432
Maximum	1 810	2 128	2 206	2 387	2 503
Poverty rate (%)					
Standard error	0.12	0.19	0.19	0.18	0.18
Minimum	11.1	11.3	11.6	12.3	12.6
Estimate	11.3	11.7	12.0	12.6	13.0
Maximum	11.5	12.0	12.3	13.0	13.3
Adults in poverty ('000)					
Standard error	17	30	30	31	31
Minimum	1 227	1 368	1 450	1 571	1 625
Estimate	1 261	1 427	1 510	1 633	1 688
Maximum	1 294	1 486	1 571	1 695	1 751
Adult poverty rate (%)					
Standard error	0.14	0.22	0.23	0.23	0.22
Minimum	10.2	10.6	11.1	11.7	11.8
Estimate	10.4	11.0	11.5	12.2	12.3
Maximum	10.7	11.5	12.0	12.6	12.7
Children in poverty ('000)					
Standard error	12	22	22	23	23
Minimum	487	589	583	639	697
Estimate	511	633	627	684	743
Maximum	535	677	671	729	790
Child poverty rate (%)					
Standard error	0.33	0.46	0.46	0.45	0.46
Minimum	13.6	12.4	12.2	12.9	13.9
Estimate	14.3	13.3	13.1	13.8	14.9
Maximum	15.0	14.2	14.1	14.7	15.8

Note: Estimates use the Henderson half average income poverty line. 'Minimum' and 'maximum' refer to the bounds of the 95 per cent confidence interval.

Source: NATSEM calculations based on various ABS CURF Technical Papers, Cat. No. 6541.0.15.001.

2.3 Survey concepts and definitions

The income surveys collect data on three core components: demographic characteristics, income and housing. The definitions of income, the 'income unit' and 'dependent children', and the imputation of income tax are particularly important to poverty research.

The income surveys measure gross cash income, which includes income from wages and salaries, self-employment, government cash benefits, investments and other categories such as workers compensation, superannuation and royalties.

There are numerous subtleties that arise from this definition of income (ABS 1997, p. 7).

- Household income can include both cash and in-kind receipts from government, private businesses and other households. The ABS collects data on only cash receipts.
- Income can be derived from services provided from *within* the household. For example, ownership of a dwelling can be treated as a payment of rent from the household owners to themselves. This has the advantage of accounting for the opportunity cost of living in one's house rather than renting it out. However, the ABS does not calculate the value of such services for the income surveys (although it does for the National Accounts).
- Income can be regular and recurrent or it can come in the form of one-off payments. The ABS excludes most one-off payments (for example, inheritances, legacies, loans and capital gains and losses) but it includes regular annuities, private pensions and superannuation.
- Intra-household transfers of income are excluded.
- Income can be measured over different periods. The income surveys include both 'current weekly income' (that is, income in the week immediately preceding the survey) and annual income from the previous financial year.
- Some households report negative incomes (that is, losses) from businesses or investments. The treatment of negative incomes has varied. In 1982, 1986 and 1990 they were reset to zero; thereafter the original negative values were retained.

The issues just described relate to the definition of gross cash income for the purposes of data collection. A separate issue that arises for poverty measurement is the concept of income used — for example, whether to use gross income or disposable income (that is, gross income minus income tax). Income is used as a proxy measure for each person's standard of living. (The debate about the most appropriate measure of standard of living is explored in subsection 3.1.) Of course, disposable income can be used only if data on income tax are available. The ABS no longer attempts to collect tax information directly but has instead imputed tax values using taxation criteria and the demographic and income data available from the surveys.

The final issue that is of significance to poverty measurement is the definition of 'income unit' and the associated definition of 'dependent children' used. As is explained in more detail in subsection 3.2, research into income distribution and poverty usually assumes that income is shared among some family and household members. Consequently, this 'sharing group' or income unit ought to be the basis for comparing incomes. The ABS has an officially defined 'ABS income unit', which can be:

- a couple (married or de facto) with dependent children;
- a couple without dependent children;
- a sole parent; or
- a single person.

The definition of dependent children has changed between surveys. In 1982, dependent children were 'all unmarried persons living with their parent(s) and either under 15 years of age, or full-time students aged 15–20 years' (ABS 1984, p. 2). In 1986 and 1990 the definition became a 'person aged under 15 years, or aged 15 to 20 years and a full-time student, who has a parent/guardian in the income unit and is neither a spouse *nor a parent* [emphasis added] of anyone in the income unit' (ABS 1993, p. 37). From 1994-95 onwards, the definition was expanded to include 21–24 year old full-time students. Thus, dependent children are:

> All persons aged under 15 years, and persons aged 15–24 years who are full-time students, live with a parent, guardian or other relative and do not have a spouse or offspring of their own living with them. (ABS 1999, p. 68)

As is explained in subsection 3.2, poverty estimates are usually based on a comparison of the incomes of each ABS income unit and so changes in the definition of dependent children matter. To overcome this problem, NATSEM has modified datasets from earlier years to achieve a consistent application of the current definition of dependent children to all surveys. For earlier survey years, this required identifying 21–24 year old full-time students who were neither married nor in a de facto relationship[3], did not have children and were living at home. Their characteristics were added to those of their extended family through a process that involved a small degree of approximation.

2.4 Data issues in measurement of poverty trends

The income surveys can be used to determine just who was in poverty at each survey date. But they also lend themselves to comparisons of how poverty has changed over time. However, there are two problems with such trend measurement. The first and most significant is that successive income surveys do not provide data for how incomes have changed *for the same sample of people*. That is, successive income surveys comprise a series of cross-sectional surveys rather than a longitudinal survey, which would ask the same people questions at regular intervals (usually annually). As a consequence, it is not possible to capture the dynamics of poverty — for example, by determining whether a large number of people are moving into and out of poverty or whether most of the poor remain stuck in poverty for extended periods. The lack of longitudinal data also inhibit studies that might attempt to capture a person's lifetime wellbeing, rather than just their wellbeing at a point in time. Life cycle wellbeing is particularly important if, for example, more young people are choosing to stay in education for longer (and are thereby *choosing* lower current incomes in the expectation of higher future incomes).[4] Fortunately, a new longitudinal survey — the Household, Income and Labour Dynamics in Australia (HILDA) Survey — has just commenced.[5] The data it yields should provide the opportunity for poverty studies for the 2000s that probe life cycle issues and poverty dynamics.

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3 In 1982 it was not possible to identify people in de facto relationships.

4 The authors are grateful to Bruce Chapman for this observation.

5 For more information on the HILDA survey, see http://www.melbourneinstitute.com/hilda/

The second problem with measuring poverty trends using the income surveys is that over time the survey methodology has changed. It is not possible to eliminate all of the resulting differences but it is possible to minimise their impact in many cases. The remainder of this section relates to NATSEM reports produced for the Smith Family and summarises the changes made to the data to improve the comparability of results from one survey to the next. In summary, NATSEM made the following alterations regarding the data.

- Current weekly income was preferred to annual income because shortened ABS questionnaires during the 1990s provided less detail on annual income. Consequently, the 1986 survey, which has only imputed tax for annual income, not weekly income, was not used.
- Datasets were altered to make the definition of 'dependent children' consistent with the current definition.
- NATSEM reweighted the 1990 income survey to address concerns about the accuracy of the weights (Landt, Harding, Percival and Sadkowsky 1994).
- Income tax in 1982 was imputed by NATSEM.
- After completing the steps above and generating results for each year, results from 1982 and 1996-97 were excluded from the 2001 report due to unresolved concerns about data quality.
- The survey population has been restricted to people living in private dwellings.
- NATSEM reset negative incomes to zero in the later surveys and, where gross incomes had been reduced by negative incomes, the gross incomes were increased accordingly.
- The ABS CURFs for 1982 and 1990 contain a flag identifying records that should be excluded from any current income analysis. Accordingly, these records were removed.

3 Measuring poverty

The concept of poverty is vague and consequently the best definition of poverty is a matter of considerable academic dispute. Perhaps the only point of general agreement is that people who live in poverty must live in a state of deprivation, a state in which their standard of living falls below some minimum acceptable standard.

Definitions of poverty vary, firstly, over the question of how to measure different *standards of living*. Within poverty research, disposable income is the most commonly used measure of a person's standard of living but this is not without limitations. Secondly, studies of poverty can differ according to the choice of *income unit*. For example, it seems true that most nuclear families share their income so perhaps it is more appropriate to compare *family* incomes than *individual* incomes. In the 2001 Smith Family report, as in many other poverty studies, the ABS income unit was chosen as the income unit. This provokes a further source of difference: how best to compare the incomes of income units that have a different size or composition using *equivalence scales*.

The preceding three issues in poverty measurement all relate to how people's different circumstances are to be compared. Once these issues have been addressed, people are defined to be in poverty if the 'equivalent' income of their nuclear family falls below a certain threshold. This threshold is the *poverty line* and divergent approaches to drawing the poverty line provoke the fourth issue in poverty measurement. Finally, once the poverty line has been developed and people can be identified as poor or not poor, there remains considerable debate about how best to represent the *extent* of poverty. For example, poverty rates are simple to understand but fail to capture the depth of poverty. The measurement of 'poverty gaps', while also problematic, can help to provide a better picture of the extent of poverty.[6]

In summary, the way poverty has been defined and measured provokes a multitude of questions.

- What is the best way to measure a person's standard of living?

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6 This analysis of the steps involved in measuring poverty owes much to the discussions in Trigger (2000, pp. 3–39) and Johnson (1996).

- What is the best group among whom to assume income is shared — the nuclear family, the extended family or the household?
- What scale can be used to compare households or families of differing size and composition?
- Where should the poverty line be drawn and how should it be indexed over time?
- What is the best way to determine the extent of poverty?

These questions are now addressed.

3.1 Standard of living and the indicator of resources

Each person's standard of living depends on many intangible factors, such as the presence of friends and relatives, the degree of satisfaction derived from personal possessions, work and other activities and his or her goals. Such factors are difficult, if not impossible, to measure directly and so poverty measurement relies on finding some proxy or 'indicator of resources' that can give a reasonable approximation of each person's standard of living. Common indicators of resources are disposable income, expenditure and 'discretionary income' (that is, the income that remains after spending that is largely non-discretionary — such as spending on housing — has been deducted).

In addition to the factors just mentioned, a person's standard of living also depends on her or his costs of living. While it seems plausible that the cost of living can be accurately estimated by changes in price levels, this will be only an estimate because economic costs need not be financial costs. For example, the cost of playing cricket includes not only the expense of equipment, registration fees, etc. but also the time devoted to the game. Poverty estimates that do not attempt to account for costs of living effectively assume that these costs are the same throughout the community being studied. Clearly this is not the case. However, accounting for costs of living is a difficult task in its own right[7] and consequently most Australian poverty studies have implicitly or explicitly adopted the assumption of homogeneous costs of living.

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7 It is not possible to account for costs of living using the consumer price index because this index measures *changes* in price levels, not *differences* in price levels.

The only exceptions are poverty studies based on discretionary income because, as is discussed below, spending that is largely non-discretionary will still vary with costs of living.

Disposable income

There are several income concepts that can be used to indicate a person's standard of living, including private income (income from market-related activities, such as wages and salaries, self-employment, interest, rent and dividends), gross income (private income plus government cash benefits), disposable income (gross income minus income tax) and final or social income (disposable income plus government non-cash benefits such as health or education services). Final income ought to supply the most comprehensive indication of a person's wellbeing. But it is difficult to define and measure (see, for example, the discussion in Saunders 1994, ch. 6). Disposable income is easier to measure and, like social income, has the advantage that it captures income after government interventions, thus giving a better indication of the income people have available to spend as they choose. Consequently, disposable income is the predominant indicator of resources used in poverty studies.

Although income is the most common measure of a person's standard of living, it is not the only possibility and it is clearly less than perfect. As mentioned above, poverty measurement generally is limited by its focus on people's circumstances at one point in time rather than over the course of their life. Income poverty measures are particularly susceptible to these problems, more so than other indicators of resources that are based fully or partly on a person's expenditure. For example, income poverty measures do not distinguish between people who *choose* to forgo income to pursue further education in the hope of gaining greater future income and people (for example, retirees) whose future income is likely to be very similar to their present income. Similarly, people who had high incomes and hence had the opportunity to accumulate wealth may *choose* to live on a low income and run down their savings. Such people would clearly not experience poverty because, as Saunders (1997) notes, the concept of poverty is strongly associated with a lack of choice about how to live.

Discretionary income

Gross (before-tax) income is not a good measure of an income unit's standard of living because part of that income must be devoted to an entirely non-discretionary item — tax. Analogously, it can be argued that expenditure on items that are essential or close to essential should also be subtracted from income to give a better indication of 'discretionary income'. Costs that might be regarded as essential or close to essential include housing costs, health costs, childcare costs, work-related costs and child support payments (Citro and Michael 1995, pp. 9–11, ch. 4). Where Australian studies have attempted to measure discretionary income, they have generally adjusted income for only housing costs. This is primarily because the income surveys include these costs but no others and because the Commission of Inquiry into Poverty (1975) set an important precedent by calculating poverty both before and after housing costs had been accounted for.

The income that remains after all housing costs have been met is referred to as 'after-housing income' and sometimes disposable income is referred to as 'before-housing income' to indicate that housing costs have not been deducted. As mentioned above, the case for using after-housing income relies on the fact that housing is such a large and essential expenditure item for most families. Families who are purchasing their home or renting from private landlords will have much of their income 'locked up' in housing costs, reducing their other general consumption and associated standard of living. That is, their 'after-housing income' is significantly lower than their disposable income and so they are more likely to be in 'after-housing poverty'. By contrast, those families who own their home outright or are in government housing typically have much lower housing costs. This means that more of their income is available for general consumption than would otherwise be the case and so they are less likely to be in after-housing poverty. Another advantage of using after-housing income is that it will vary with the different costs of housing in different regions, thereby reflecting one of the sources of regional variations in the cost of living.

An argument against the after-housing approach is that, although having *some form of housing* is essential and not discretionary, there remains discretion in the *quality* of housing (and the corresponding housing costs). In other words, although a family's standard of housing depends in part on its income, it also depends in part on its priorities. A

family that places a high priority on housing relative to other goods and services will spend more on housing and will thus have a lower after-housing income. In effect, the after-housing measure distorts poverty measurement so that the families that place a relatively high value on the quality of housing are more likely to be in poverty.

Expenditure

An expenditure poverty measure would rank people according to their expenditure, such that people with particularly low spending would fall into expenditure poverty. Evidence from ABS expenditure surveys indicates that expenditure is consistently more evenly distributed than income (see, for example, Harding and Greenwell 2001, pp. 18–21). It seems plausible that this is because people on high incomes devote some of their incomes to savings while people on low incomes (especially temporarily on low incomes) may borrow to maintain their standard of living.[8] Consequently, the use of expenditure as the indicator of resources can help capture some of the life cycle effects noted above.

Expenditure is only a very imperfect method for examining a person's wellbeing over their lifetime and it is also subject to other criticisms. Saunders (1998a, p. 9) draws the distinction between the *capacity to consume* (income) and *actual consumption* (expenditure). A person may choose to consume little even though their capacity to consume is considerable. The income measure, which places such a person out of poverty, seems the more appropriate for, as Saunders has said, 'the wealthy miser may consume little, but this does not make him (or her) poor' (Saunders 1997, p. 12). Furthermore, it might be argued in defence of the income measure that people who have fallen on hard times and are forced to eat into savings, or to borrow, are people who should be included among the poor. Of course, this argument is valid only to the extent that it is 'hard times' rather than, say, the prospect of better future earnings that has induced people to borrow or run down their savings.

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8 Although these conclusions seem plausible, they should be treated with some caution because the ABS notes that differences in the approaches to measuring income and expenditure in their Household Expenditure Surveys mean that the 'difference between income and expenditure cannot be considered to be a measure of saving' (ABS 2000, pp. 12–13).

Conclusions

Any indicator of resources will be an imperfect measure of a person's standard of living, partly because it will not capture intangible factors such as family ties and friendships and partly because even the tangible, material factors are hard to quantify precisely. Ideally, studies of poverty and deprivation should attempt to examine poverty using several indicators, try to incorporate qualitative studies of the non-monetary factors that affect poverty and incorporate life cycle and wealth studies that estimate the wellbeing of people over the course of their lifetime. In practice, such comprehensive studies are rarely, if ever, conducted and poverty researchers content themselves with reporting on one facet of the complex mix of elements that influence the standard of living of members of society. In NATSEM's recent research for the Smith Family, the focus was both before-housing and after-housing income. Other studies (for example, Saunders 1997 and Trigger 2000) compare income and expenditure poverty. A full understanding of poverty can come only from taking account of these varying approaches and attempting to blend them to give an overall picture of deprivation in our society.

3.2 The income unit

Poverty calculations begin by ranking people according to income (or an alternative indicator of resources) and then identifying those who fall below a predetermined poverty line. Section 3.4 addresses the definition of the poverty line itself. This section addresses the question: if people are to be ranked by income, whose income should they be ranked by?

Ranking people by their personal income does not make much sense in a world where families often share their incomes. For example, a ranking of personal incomes would place all non-working partners of high-income earners in poverty. The assumption that in most families the income earned by each member of the family is shared between the parents and their children is widely accepted in academic research (for example, see Saunders 2001, p. 281). The implication of this assumption is that, although poverty measurement involves a ranking *of* people, those people are ranked *by* their families' incomes.[9] In effect, what is

[9] The distinction between the ranking of x (for example, persons) and the ranking by y (for example, family incomes) is also important to some definitions of the poverty line. See the technical note on the half-average and half-median poverty lines in subsection 3.4.

assumed is that because all family members share their income they all have the same standard of living. Evidently this is only a rough approximation of what is actually the case.

The term 'family' is vague. In poverty and inequality research, this group that is assumed to share their income is sometimes referred to as the 'income unit'. Two issues arise from the use of income units in poverty research. One issue is to determine the appropriate definition of the income unit; the other issue is to determine how to compare the incomes of income units of different size or composition. The latter issue is addressed in subsection 3.3.

The most common income unit in Australian poverty research is the 'ABS income unit'[10], which is defined as:

> One person or a group of related persons within a household, whose command over income is assumed to be shared. Income sharing is assumed to take place within married (registered or *de facto*) couples, and between parents and dependent children.[11] (ABS 1999, p. 69)

The ABS income unit is not the only possibility. For example, poverty could be based on the income of the extended family or the household (for example, see the poverty studies by Hunter 1999 and Harding, Lloyd, Hellwig and Bailey 2000, both of which use the ABS definition of the household). No income unit can capture the 'income-sharing group' perfectly. One problem common to the ABS income unit, the extended family and the household is the appropriate treatment of dependent children. As they get older, children gradually gain greater independence but the exact point at which they are predominantly self-sufficient will vary greatly between families. This suggests that each of these potential income units may be too broad because they include people where little income sharing remains.

It can also be argued that common definitions of the income unit are too narrow. For example, young people living away from home (and therefore treated as separate income units) may well still receive substantial support from their parents and thus not really be an independent unit. Similarly, it has been argued that different cultural attitudes towards income-sharing, particularly among indigenous

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10 For simplicity, NATSEM often refers to the ABS income unit as the 'family'.

11 The definition of 'dependent children' is given in subsection 2.3.

communities, often mean that income is shared much more widely than the ABS income unit or even the household (Hunter 1999, p. 7; Hunter, Kennedy and Smith 2001, p. 3).

There is little work that the authors are aware of that examines the most appropriate definition of the income unit for poverty analysis. Such work would require an analysis of intrahousehold allocation of resources in Australia and there is little data that allow such analysis. In its recent work, NATSEM has followed convention in choosing the ABS income unit but this should not be interpreted as a statement that this is the best income unit definition. NATSEM has not performed any analysis that could justify such a claim. Given the lack of research into intra-household income payments, tests for sensitivity to the choice of the income unit might seem appropriate. However, recalculating poverty rates for different income units can be laborious or, depending on the data, impossible. An alternative approach might be to exclude certain groups from the analysis. In particular, 15–24 year olds are a group for which sharing arrangements are least clear and so one test for sensitivity might examine how much poverty estimates change if this group were removed.

3.3 Equivalence scales

As mentioned earlier, ranking people by their income unit's income creates a new complication: how to account for the differences in size and composition of different income units. Size is important because a larger income unit will need a greater income than a small unit to attain the same standard of living. It can also be argued that income unit composition should be accounted for because it seems likely that some income unit members create greater 'costs' than others do. For example, it is likely that an income unit needs a greater income to support older children than younger ones. Similarly, it seems likely that a couple will not require double the income of a single person to achieve the same standard of living because they can share some of their costs.

The purpose of an 'equivalence scale' is to allow for a meaningful comparison of income unit incomes. Equivalence scales can take account of various income unit characteristics, including the size of the income unit and the age, gender and labour force status of the members of the income unit. An equivalence scale is applied to an income unit's income,

deflating or inflating it to produce the unit's 'equivalent' income. Numerous equivalence scales have been developed but no one scale has been overwhelmingly endorsed by the research community. Therefore, in NATSEM's research for the Smith Family it has reported poverty levels for three equivalence scales: the 'simplified Henderson scale' (slightly modified by NATSEM), the 'new OECD scale' and the 'international scale'. The operation of equivalence scales generally, and these scales in particular, is explained in more detail in the appendix.

3.4 Drawing the poverty line

A person is in poverty if her or his standard of living falls below some minimum level — the poverty line. More specifically, in recent Smith Family poverty reports a person is in poverty if the equivalent disposable income of his or her income unit falls below the poverty line. The question of where to draw the poverty line is another issue about which there is little consensus among researchers.

Poverty lines are commonly distinguished according to whether they are 'absolute' or 'relative'. Absolute poverty commonly refers to people who live in families that do not have sufficient income to pay for such basic necessities as food and housing. It is usually assumed that these basic necessities do not change, although their prices might. Few Australian studies have analysed absolute poverty (ABS 1998b, p. 125), perhaps in part because such approaches lack relevance to Australian society. As Saunders (1998b, p. 7) has argued, poverty lines:

> … must also to some extent reflect the actual behavioural patterns of the population if their relevance is not to be severely circumscribed. In the area of food, for example, a diet consisting mainly of lentils and brown rice may meet … dietary guidelines, but be of little relevance to the actual eating habit of the vast majority of Australians.

Thus, in Australia, most studies have focused on circumstances where a family's income is low *relative to the incomes of other families*. The rationale for adopting this approach is that a person is deemed to be in poverty in an industrialised nation if that person is not afforded the opportunity to 'participate in the ordinary life of society' (Nolan 2001, p. 26; see also the discussion in Saunders 1994, pp. 223–30, and Osberg 2000, pp. 4–5).

There is a lack of clarity in the distinction between absolute and relative poverty, which has caused different writers to classify the similar lines differently (for example, compare Johnson 1996 and Osberg 2000). The confusion can be eliminated by following Johnson's suggestion to characterise poverty lines according to how the line is drawn at a point in time (the 'benchmark poverty line') and how the line is updated (Johnson 1996, p. 111).

The remainder of this subsection considers the different benchmarks and updating methods that are available, comments briefly on some of their strengths and deficiencies and in the process attempts to clarify potential confusion in the absolute–relative distinction.

Benchmarks for a point in time

One way to set the benchmark poverty line for a point in time is to prescribe a basket of goods and services that fulfils the 'necessities' of a standard family and then determine the average or minimum price of that basket. The basket might be defined in terms of the food, water, clothing and shelter needed for survival but could also be determined in relative terms, guided by what is needed to be able to 'participate in the ordinary life of society'. Although 'price of a basket' definitions are usually regarded as 'absolute' in nature, the possibility of defining the basket in terms of the ordinary life of society is suggestive of a more 'relative' notion of poverty and this is the principal source of ambiguity in the absolute–relative distinction.

An alternative to price-of-a-basket benchmarks is to define the poverty line for a point in time as some proportion (usually one-half) of the average or median income. As Osberg (2000, p. 4) has noted this approach is emphatically relative because the poverty line is explicitly and transparently tied to the income distribution.[12]

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12 The price-of-a-basket or proportion-of-income benchmarks are not the only alternatives. For example, Saunders (1994, pp. 236–41) examined the possibility of defining a 'consensual poverty line' that is based on community surveys. However, the appropriate surveys are rarely available and, even when they are, the diversity of opinion makes a 'consensual' line difficult to identify. Consequently, few studies have produced results using such lines.

Methods for updating poverty lines over time

Poverty lines can be updated according to movements in prices or movements in incomes. Roughly speaking, the moving-prices approach adjusts the poverty line for changes in the cost of living whereas the moving-incomes approach adjusts for changes in the standard of living. The moving-prices approach is typically implemented using the consumer price index (CPI). It sits naturally with 'absolute' poverty concepts, which assume that the requirements for escaping poverty remain fixed and only their costs change.

There are numerous ways to implement the moving-incomes approach. At various times in Australia, average weekly earnings, household disposable income per capita (HDIPC) and movements in average or median equivalent disposable incomes have all been used in different studies. While there is debate about which of these methods is most appropriate (see, for example, discussion in Trigger 2000, pp. 38–9, 128–9, and Harding and Szukalska 1999, p. 7), the moving-incomes approach has generally been preferred to the moving-prices approach in Australia. This accords with the preference for relative poverty lines because the requirements for someone to 'participate in the ordinary life of society' depend on the social expectations of the time. Also it is generally assumed (although less often justified) that movements in incomes serve as a good indication of movements in social expectations.

The reason for confusion in the absolute–relative distinction is that either poverty benchmark (price of a basket or proportion of income) could, in theory, be updated using either updating method (moving prices or moving incomes). In particular, a price-of-a-basket benchmark could be updated for the changing costs of the basket (this would be especially appropriate if the basket had been defined in terms of basic necessities). Alternatively, updating such a benchmark in accordance with changes in average incomes would, in effect, be a means of approximating a new basket of goods and services that reflected changed social expectations associated with new levels of income. Thus, a price-of-a-basket benchmark can be given a more 'absolute' or 'relative' flavour depending on how it is updated.

The most significant problem for updating a poverty line according to moving incomes is that incomes may fall during periods of recession and yet it is not clear that people's expectations fall with a fall in income in

the same way that they are assumed to rise with a rise in income. In other words, it seems unlikely that people's expectations about what constitutes a minimally adequate standard of living are cyclical. Another implication of the moving-incomes updating method is that it is statistically unlikely that there would ever be a time when there was no one who was living in poverty according to poverty lines updated in this fashion. This is because the 'moving incomes' are derived from the income distribution and income would have to be distributed much more equally than at present for there to be no one with an income below half of the average. This is not such a serious problem. But it is worth emphasising that the point of these poverty results is not to determine whether poverty exists but to determine how great it is (the poverty rate), how it has changed over time (poverty trends) and what types of people have the greatest risk of being in poverty (poverty composition).

The consumer price index has been shunned as a basis for updating poverty lines in Australian poverty research because of its 'absolute' connotations. However, it seems plausible that for some purposes, particularly the contribution of poverty research to policy debate, it might be more valuable to determine whether a group of people have experienced an improvement in their standard of living, regardless of whether the 'top end of town' experienced more rapid improvements. That is, it might be valuable to know that a person's *real* standard of living has improved even if her or his *relative* standard of living has not. This suggests that the consumer price index might be an appropriate updating index for some purposes.

As noted above, there is a continuing debate about the best way to track movement in incomes: household disposable income per capita or moving averages or medians. The alternatives in this debate, and the debate on the appropriateness of moving incomes and moving prices more generally, can have a significant effect on poverty measurement. This is demonstrated by tables 3 and 4, which show the levels and changes in median and average equivalent incomes, household disposable income per capita and consumer price index. They indicate that, although the median and average equivalent incomes move closely together, they move quite differently from either of the other two. This suggests that the choice of updating index could have a significant impact on poverty trends.

Table 3 **Median, average and household disposable incomes and consumer price index**

	Dec. 1990	1994-95	1995-96	1997-98	1999-00
Median equivalent income[a]	$583.25	$611.00	$618.61	$668.50	$723.40
Average equivalent income[a]	$651.39	$692.75	$710.99	$769.89	$831.52
Household disposable income per capita[b]	$284.32	$319.01	$333.26	$353.02	$386.62
Consumer price index[c]	106.0	113.9	118.7	120.3	124.7

Note: HDIPC and CPI figures are annual averages for the financial years. However, the December quarter figure is used for 1990 to match the interview period of the 1990 income survey.

Sources: [a] NATSEM calculations. [b] Derham and Johnson (2001). [c] ABS AusStats Service, *Consumer Price Index*, Cat. No. 6401.0, tables 1A and 1B.

Table 4 **Changes in median, average and household disposable income and consumer price index**

	Dec. 1990 to 1994-95	1994-95 to 1995-96	1995-96 to 1997-98	1997-98 to 1999-00	Dec. 1990 to 1999-00
	%	%	%	%	%
Median equivalent income	4.8	1.2	8.1	8.2	24.0
Average equivalent income	6.3	2.6	8.3	8.0	27.7
Household disposable income per capita	12.2	4.5	5.9	9.5	36.0
Consumer price index	7.5	4.2	1.3	3.7	17.6

Source: NATSEM calculations.

In recognition of the continuing debate about the most appropriate poverty line, NATSEM's recent work for the Smith Family presents results for three moving-income poverty lines: one using a price-of-a-basket benchmark (the Henderson poverty line developed by the Commission of Inquiry into Poverty) and two using proportion-of-income benchmarks (the half-average and the half-median poverty lines). These lines have been updated according to changes in household disposable income per capita, average equivalent disposable income and median equivalent disposable income, respectively.

Technical note on the half-average and half-median poverty lines

It is worth emphasising one technical point about the income unit used for calculating average and median incomes (and hence the half-average and half-median poverty lines). Although the average or median is based on a ranking *by equivalent family incomes*, it is nonetheless a ranking *of individuals*. An illustration might help clarify the distinction. Just as a

ranking *of* giraffes or elephants can be *by* height or weight, a ranking *of* individuals or families can be *by* individual income or family income. Danziger and Taussig (1979) have argued that the most meaningful poverty estimates are derived from a ranking of individuals, rather than families, by family income. The problem with a ranking of families is that the results will be distorted because, in general, higher income families contain fewer people than lower income families. The trend results could be further distorted if, as has been the case recently, family sizes have been changing over time.

Technical note on the Henderson poverty line

It is difficult to replicate the methodology used when the Henderson poverty line was developed in the 1960s and 1970s. For his 1975 report, Henderson excluded farmers, the self-employed and 'juveniles' (that is, 15–20 year olds who were independent but living at home) from the scope of his poverty figures (Commission of Inquiry into Poverty 1975, p. 14, n. 5). Furthermore, the current ABS definition of dependent children differs from Henderson's definition and the Commission of Inquiry used annual income rather than weekly income.

Only some of these differences can be easily accommodated by the data available today. For the purposes of comparability, NATSEM's recent work for the Smith Family reports two sets of results based on the Henderson poverty line. The first set of results is based on a subset of the population that is roughly consistent with Henderson's original methodology (the 'traditional' results). The second set of results is based on the same data used for the other poverty measures (the 'comparative' results). In summary, the 'traditional' results were derived from a dataset with the following characteristics.

- Families in which either the reference person or the spouse was self-employed were excluded.
- 'Juveniles' were excluded, although they were defined somewhat differently in NATSEM's research from the Henderson definition.
- The definition of dependent children was not changed from the ABS definition to the Henderson definition.
- Farmers could not be separately identified in the surveys and so were retained.

- Weekly income was used rather than annual income because, as mentioned above, there is less detailed annual income data in the surveys since 1990 and some concern about the comparability over time of the annual income measures.

3.5 Measuring the extent of poverty

There is a considerable literature on the most appropriate indexes of poverty measurement (for an overview, see Trigger 2000, pp. 22–32). One of the most frequently used measures is the *head count index*, which simply shows the number and proportion of individuals falling below a given poverty line. This index is easy to understand, but is extremely sensitive to exactly where the poverty line is drawn. Because poverty lines are typically set in income ranges where large proportions of social security recipients are clustered, small movements in the poverty line can result in large apparent increases or decreases in poverty. A related drawback of the head count index is that it takes no account of the severity of poverty — that is, the fact that some of the poor will be much worse off than others. As a result of this deficiency, government policies that raise the income of the very poorest will have no discernible impact on the head count poverty rate if they do not raise the incomes of the poor above the poverty line.

A poverty measure that takes account of the depth of poverty is the *poverty gap*, which estimates the gap between actual incomes and the poverty line for all those who are in poverty. The poverty gap can also be used to measure the total cost of raising all of the poor to the poverty line but no further. However, the poverty gap has also faced criticisms (see, for example, Saunders 1996, p. 29, or Osberg 2000, p. 7).

There is continuing debate about more complex indexes of poverty that often incorporate both the head count poverty rate and the poverty gap (for example, see Osberg 2000, pp. 3–10). Due to the lack of consensus on a preferred index, in its recent work NATSEM has preferred the measures that are easiest to interpret: the head count index and the poverty gap.[13]

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13 Recent work by Rodgers and Rodgers (2000) on the development of a 'poverty intensity index' might make some of the more complex indexes easier to interpret. NATSEM has not yet had the opportunity to pursue this possibility.

4 Summary and conclusions

Poverty is very difficult to measure. The concept of poverty, the available data and the methodology all cause poverty estimates to be at best rough approximations of deprivation within a community.

Poverty relates to individual standards of living, which are influenced by intangible (and therefore inherently unquantifiable) elements such as the strength of a person's ties to friends and family. The use of disposable income as a proxy for a person's standard of living is further weakened by its exclusion of the 'social wage' — that is, non-cash government benefits. Poverty studies are confined to examining each person's wellbeing at a point in time; estimates of welfare over a lifetime may be quite different (Harding 1993). The varied circumstances of different families must be approximated through the choice of the income unit and the equivalence scale. There is no one accepted method for determining where to draw the poverty line: both the benchmark and the updating method can vary considerably. Even when the poverty line has been drawn and people in poverty have been identified, academic debate continues over the index that best represents the extent of poverty according to that poverty line. And, finally, the available data always contain some level of sample error.

These conceptual problems, data limitations and methodological choices and approximations do not imply that poverty estimation is pointless. Poverty figures will continue to be important to policy debate, to welfare agencies and to anyone who seeks to understand why people are deprived and who hope to contribute to alleviating the problem. Poverty researchers are increasingly aware of the need to test the sensitivity of their results for variations in their preferred methodology. Sampling errors can also be quantified. Consequently some of the concerns listed above can be addressed by careful, thorough research. However, the above points also underline the importance of interpreting poverty results with considerable care.

'Poverty' is a powerful and emotive term that should be treated cautiously at the best of times. Given the many obstacles in the path to poverty measurement, this caution should be multiplied many times over.

Technical appendix: equivalence scales

Introduction to equivalence scales

Income units of different size and composition will incur different costs and these must be taken into account when comparing income unit incomes. The purpose of an 'equivalence scale' is to allow for a more meaningful comparison of income units' incomes. Equivalence scales can take account of various family characteristics, including the family size and the age, gender and labour force status of the family members. An equivalence scale (S) is applied to an income unit's total disposable income (I), deflating or inflating it to produce the unit's 'equivalent' income (I_e) as follows:

(1) $I_e = I / S.$

The scale itself is constructed by assigning points to the income unit according to its characteristics. One common element of all equivalence scales is that, if all other things are equal, larger income units are assigned more points. Thus the larger the unit, the greater the deflation (or the less the inflation) of the unit's disposable income. For example, suppose the equivalence scale used assigns one point for each family member and hence the scale S just equals the number of people in the family. As Hunter, Kennedy and Smith (2001, p. 4) note, in this case I_e just represents the income per person of the income unit. Another simple scale — the 'international scale' — can be constructed by taking the square root of the number of people in the family. On this scale, a single person would be assigned one point, a couple without children would be assigned $\sqrt{2} = 1.41$ points and a couple with two children would be assigned $\sqrt{4} = 2$ points. Thus, this scale implies that the costs for a two-person family are roughly 41 per cent greater than those of a single person and that the costs for a four-person family are roughly double those of a single person.

Instead of using the costs for a single-person income unit as the benchmark for comparison, equivalence scales are often 'normalised' so that, for example, a couple with two children is the benchmark. This implies that the scale (S) for smaller income units satisfies $S < 1$ (that is, their incomes are inflated) while for larger income units it satisfies $S > 1$

(that is, their incomes are deflated) and for the 'standard income unit' S = 1 (that is, its income does not need to be adjusted). This normalisation of the scale for an income unit is given by:

(2) $S = P / P_S$

where P refers to the total points allocated to that income unit and P_S is the number of points allocated to the 'standard' income unit (the normalisation factor). For example, the normalised square-root scale is found from S = P/2 because $P_S = \sqrt{4} = 2$. The result of this 'normalisation' process is that an income unit's equivalent income I_e represents the income required for that unit to maintain the same standard of living if it had the size and composition of the standard income unit.

There are many different equivalence scales, some of which vary quite considerably. These differences can produce important biases towards some income unit types in income distribution and poverty analysis. This is illustrated in the later discussion of the OECD scale. In order to determine the sensitivity of poverty results to the choice of scale, in its recent work NATSEM has produced results for three scales: the simplified Henderson scale (slightly modified by NATSEM), the 'new OECD scale' and the international scale.

The simplified Henderson equivalence scale

The Henderson scale was developed when Professor Ronald Henderson was chairman of the Commission of Inquiry into Poverty (1975). The results of the inquiry use the 'detailed Henderson scale', which creates different scales depending on the age, gender, labour force status and family position of each person. The detailed scale also allows for differences in 'housing and other costs' that are likely to vary with *household* size, as opposed to *income unit* size. The simplified scale — which was used in the inquiry's interim report — retains the same structure except that it does not vary with age or gender. The simplified scale has been preferred in the 2001 Smith Family report primarily because it is much easier to use. However, it was felt that the variation of costs for children of different ages was sufficiently important (see Percival and Harding 2000) that this element of the detailed scale should be retained. Consequently, the (modified) simplified Henderson scale assigns points to each individual and (in the case of 'housing and other costs') to each income unit in accordance with tables 5 and 6.

Table 5 **'Individual points' for the simplified Henderson equivalence scale (as modified by NATSEM)**

Head, working	20.00
Head, not in the labour force	13.00
Partner, working	18.50
Partner, not in the labour force	9.50
Dependent child, 0-5 years	5.080
Dependent child, 6-14 years	8.355
Dependent child 15-24 years	12.025

Note: Points for children in the detailed Henderson scale originally varied by gender. ABS data do not record the gender of children so the points for boys and girls in each age group were averaged.

Source: Commission of Inquiry into Poverty (1975, pp. 354–6).

Table 6 **'Household points' for the simplified Henderson equivalence scale**

Household size	Housing	Fuel/power	Total
1	12.1	4.9	17.0
2	13.3	6.7	20.0
3	14.5	8.0	22.5
4	15.7	9.3	25.0
5	16.9	10.6	27.5
6	18.2	11.8	30.0
7	19.4	12.6	32.0
8	20.0	14.0	34.0
9	21.2	14.8	36.0
10	21.8	16.2	38.0
11	22.4	17.6	40.0
12+	24.2	19.8	44.0

Source: Commission of Inquiry into Poverty (1975, p. 354).

In table 7 the total Henderson points for various income unit types, and the resulting normalised scale, have been calculated. This table indicates, for example, that the standard family (couple with two children) is allocated 67.94 points. By contrast, a single-person (working) family is allocated 37.00 points. This implies that the single-person family requires about 54 per cent of the income of the standard family to achieve the same standard of living.

Table 7 **Henderson equivalence points and scales, for selected income unit types**

	Equivalence points		Equivalence scale	
	Head & spouse not in labour force	Head in the labour force & spouse not in labour force	Head & spouse not in labour force	Head in the labour force & spouse not in labour force
Couple with no children	42.50	49.50	0.63	0.73
Couple with 1 child	53.36	60.36	0.79	0.89
Couple with 2 children	60.94	67.94	0.90	1.00
Couple with 3 children	71.79	78.79	1.06	1.16
Couple with 4 children	79.37	86.37	1.17	1.27
Sole parent with 1 child	41.36	48.36	0.61	0.71
Sole parent with 2 children	48.94	55.94	0.72	0.82
Sole parent with 3 children	59.79	66.79	0.88	0.98
Sole parent with 4 children	67.37	74.37	0.99	1.09
Single Person	30.00	37.00	0.44	0.54

Note: Households are assumed to be single-income-unit households. The standard income unit is a couple with head working and partner not in labour force, and two dependent children — one aged 6–14 years and one aged 0–5 years. The following assumptions are made about the age of any children: for families with one child, she/he is aged 6–14; for families with 2 children, one is aged 6–14, one is aged 0–5; for families with 3 children, two are aged 6–14, one is aged 0–5; for families with 4 children, two are aged 6–14, two are aged 0–5.

The new OECD scale

The second scale used in the Smith Family poverty reports is the new OECD scale. Although this scale is not nearly as detailed as the Henderson scale, it has the advantage of being used widely in international studies[14] and consequently it allows for more straightforward international comparisons. It is also easier to calculate. The OECD scale assigns the following points:

- family head 1.0 point
- other adults 0.5 points
- dependent children 0.3 points.

Different studies have applied different definitions of 'dependent children'. However Australian studies, including NATSEM's, generally use the current ABS definition of dependent children. The total OECD points for selected family types and the resulting normalised scale are set out in table 8. In contrast to the Henderson scale, a single-person family

14 For example, by Mejer and Linden (2000) and Mejer and Siermann (2000).

is assigned 1 point by the OECD scale, while the standard family is assigned 2.1 points, suggesting that the single-person family requires about 48 per cent of the income of the standard family to achieve the same standard of living. This scale is referred to as the *new* OECD scale because the OECD previously used a scale that gives a greater weighting to 'other adults' and to dependent children. The result is that the new OECD scale will give consistently lower child poverty rates than the original scale.

Table 8 **New OECD and international equivalence points and scales, for selected family types**

	New OECD		International	
	Points	Equivalence scale	Points	Equivalence scale
Couple with no children	1.5	0.71	1.41	0.71
Couple with 1 child	1.8	0.86	1.73	0.87
Couple with 2 children	2.1	1.00	2.00	1.00
Couple with 3 children	2.4	1.14	2.24	1.12
Couple with 4 children	2.7	1.29	2.45	1.22
Sole parent with 1 child	1.3	0.62	1.41	0.71
Sole parent with 2 children	1.6	0.76	1.73	0.87
Sole parent with 3 children	1.9	0.90	2.00	1.00
Sole parent with 4 children	2.2	1.05	2.24	1.12
Single person	1.0	0.48	1.00	0.50

Note: For both scales, the base family is a couple with head working and spouse not in labour force and two dependent children.

The international scale

As mentioned above, the international scale dictates that a family of size N will receive √N points. As its name suggests, this scale is also used for international comparisons, partly because it can be applied to datasets with limited demographic information. This scale is also widely used, for example, by Osberg (2000) and Oxley, Dang, Forster and Pellizzari (2001).

Calculating poverty lines using equivalence scales

In the 2001 Smith Family poverty report, NATSEM reports poverty results for ten differently defined poverty lines. The value of each of these

poverty lines *for a standard income unit* is given in table 9. These figures represent the disposable income per week required for a standard income unit to sit exactly on the poverty line. The following discussion explains how to calculate poverty lines for *any* income unit using the standard lines in table 9 and the equivalence scales discussed above.

Table 9 **Poverty lines for the 'standard family', 1990 to 1999-2000**
In 1999-2000 dollars

	1990	1994-95	1995-96	1997-98	1999-00
	$	$	$	$	$
Before-housing					
Henderson half average	383.16	379.22	373.46	399.03	415.76
Henderson half median	343.07	334.47	324.93	346.48	361.70
OECD half median	352.04	343.59	335.98	358.45	375.63
International half median	347.08	340.49	332.79	354.51	370.17
Henderson	427.78	449.69	452.72	470.55	494.80
After-housing					
Henderson half average	319.34	315.24	310.60	331.87	348.05
Henderson half median	288.89	276.63	273.09	291.02	304.80
OECD half median	288.81	282.92	276.29	293.41	308.35
International half median	285.27	280.55	274.19	291.80	303.61
Henderson	331.15	348.10	350.46	364.26	383.03

Note: The 'standard family' is a couple (reference person working, spouse not) with two children aged 0–5 years and 6–14 years respectively. Poverty lines have been adjusted to 1999-2000 dollars using the consumer price index for the given financial year except for 1990, where the CPI for the December quarter was used. Consequently, the CPI figures accord with the survey period for each survey.

Source: NATSEM calculations.

Using equations (1) and (2) in this appendix and the relevant equivalence scale, a simple formula can be derived for determining the disposable income required to sit on the poverty line for *any type of income unit*. Equation (1) relates an income unit's actual disposable income with its 'equivalent income'. We want to find I, the actual disposable income that places the given family type exactly on the given poverty line (hereafter, I_P). We know the equivalent income required to sit exactly on the poverty line (I_e). It is given in table 9. Using the equivalence scale points set out above, we can also find the number of equivalence scale points assigned to the given income unit (P) and the points assigned to the standard unit (P_s).

We can solve equations (1) and (2) for I_P in terms of our known values — I_e, P and S:

(3) $$I_P = (I_e * P) / P_s.$$

Using this formula it is possible to derive the poverty line for any given income unit from the poverty line for a standard income unit. For example, suppose the family type of interest is a couple (head working, partner not in the labour force) with no children and the preferred poverty line is the 1999-2000 before-housing half-average Henderson poverty line. From table 9, I_e = \$415.76 and, from table 7, P = 49.50 and P_s = 67.94. Thus, the desired poverty line is:

I_P = (415.76 * 49.50) / 67.94

= \$302.92.

By contrast the 1999-2000 after-housing half-median OECD poverty line (I_e = \$308.35) for a couple with one child (P = 1.8, P_s = 2.1) is:

I_P = (308.35 * 1.8) / 2.1

= \$264.30.

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