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Even though poverty indices with axiomatically sound properties have been advocated for several decades, most empirical studies of poverty in Australia and elsewhere continue to use the crude, but easily understood, head-count ratio. The difficulty of interpreting the axiomatically more desirable indices is a major reason why their use has been resisted in applied poverty measurement. This paper demonstrates how the more sophisticated poverty indices can be converted into a form that is readily interpreted as a measure of poverty intensity of a group, relative to the population to which the group belongs. The resulting poverty-intensity index is easy to understand and it retains the axiomatic properties of the poverty index on which it is based. We apply the method to Australian data. Poverty measures reported previously in the literature are converted into measures of poverty intensity and interpreted accordingly. We also calculate and interpret some new measures of poverty and poverty intensity using the Income and Housing Costs Survey, 1996-97. It is hoped our procedure will lead to wider use of poverty indices that are theoretically superior to the head-count ratio.

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Poverty Intensity in Australia

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Summary

This paper proposes a poverty-intensity index that has desirable axiomatic properties and is easy to understand. The index is applied to recent Australian data.

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Abstract

Even though poverty indices with axiomatically sound properties have been advocated for several decades, most empirical studies of poverty in Australia and elsewhere continue to use the crude, but easily understood, head-count ratio. The difficulty of interpreting the axiomatically more desirable indices is a major reason why their use has been resisted in applied poverty measurement. This paper demonstrates how the more sophisticated poverty indices can be converted into a form that is readily interpreted as a measure of poverty intensity of a group, relative to the population to which the group belongs. The resulting poverty-intensity index is easy to understand and it retains the axiomatic properties of the poverty index on which it is based. We apply the method to Australian data. Poverty measures reported previously in the literature are converted into measures of poverty intensity and interpreted accordingly. We also calculate and interpret some new measures of poverty and poverty intensity using the Income and Housing Costs Survey, 1996-97. It is hoped our procedure will lead to wider use of poverty indices that are theoretically superior to the head-count ratio.

1. Introduction

The measurement of poverty involves two distinct sets of problems. The first problem is to identify individual income units (people who share income) that are poor.[1] The second problem is to aggregate the poverty of individual income units into an index of aggregate poverty for a group of income units. This paper focuses on the latter: on the measurement of aggregate poverty.

Poverty in Australia has typically been measured using the head-count ratio, which is the proportion of the population that lives in income units with incomes below some arbitrary poverty threshold. Exceptions are studies by Kakwani (1986), Johnson (1988, 1991 and 1996b) and Johnson and Dixon (1999). These authors and others (for example, Sen, 1976; Takayama, 1979; Kakwani (1980); Foster, Greer and Thorbecke, 1984) have recognised the deficiencies of the head-count ratio and, in response, have developed poverty indices with superior properties.[2] In the empirical literature Kakwani (1986) reported, for example, that the value of his index for all Australians in the year 1975-76 was 4.05 while Johnson (1996b) reported that his deprivation-weighted poverty index for all Australian income units in 1989-90 was 0.0252. Results such as these have little meaning to most readers because the measures are functions, not only of the proportion of the population that is poor, but also of the mean income of the poor and the distribution of income among the poor. In contrast, head-count ratios such as those presented by Kakwani (1986) (7.02 percent of Australians were poor in 1975-76) and Johnson (1996b) (11.54 percent of Australians lived in poor income units in 1989-90) are readily understood even though they constitute crude measures of poverty.[3]

A major reason why the head-count ratio continues to dominate empirical studies is its intuitive appeal relative to that of the theoretically sound poverty indices. Saunders and Whiteford (1989, p.31) state that the head-count ratio: “is simple to derive, easy to understand and open to clear and obvious interpretation”. The objective of this paper is to show how many of the new poverty indices can be converted into a form that is readily understandable yet preserves their desirable properties. In Section 2 we present a “poverty-intensity” index,[4] which measures the poverty of a group of income units relative to the population to which the group belongs. The use of poverty-intensity indices should make the results of empirical studies of poverty accessible to a wider audience. However, economists and other professionals who compute measures of poverty intensity still need to understand the properties of poverty indices in order to choose the poverty index on which the poverty-intensity index is to be based. In Section 3 we draw upon the results of previous research into Australian poverty to demonstrate the application of our poverty-intensity index and in Section 4 we present some new measures of poverty and poverty intensity based on data from the 1996–97 Income and Housing Costs Survey, Australia.

2. Poverty Intensity

Rodgers and Rodgers (1991, p.345) define a poverty-intensity (PI) index for a group, g, of income units in a population as:

PI_g = the proportion of population poverty contributed by group g / the proportion of population size contributed by group g [1]

The numerator of [1] is equal to POV_g^+ / POV, where POV_g^+ is the contribution by group g to the poverty index value, POV, that applies to the entire population. The denominator of [1] is equal to n_g / n, where n_g is the number of people in group g and n is number of people in the whole population. If POV is additively decomposable then it can be written as a weighted average of the poverty indices for G mutually exclusive and collectively exhaustive groups that comprise the population:

$$POV = \sum_{g=1}^{G} \frac{n_g}{n} POV_g \qquad [2]$$

where POV_g is the level of poverty in group g, as measured by POV. In this case $POV_g^+ = \frac{n_g}{n} POV_g$ and the PI_g index is simply the ratio of the poverty index for group g to that of the entire population:

$$PI_g = \frac{POV_g}{POV} \qquad [3]$$

Using Equations [2] and [3] it can be shown that $\Delta PI_g / \Delta POV_g > 0$ (Rodgers and Rodgers, 1991, p.347), that is, the poverty-intensity index is a strictly increasing function of the poverty index on which it is based, provided that index is additively decomposable. Therefore, PI_g satisfies the same properties as POV_g.

The PI_g index has intuitive meaning and so makes theoretically sound measures of poverty accessible to a wide audience. If, for example, $PI_g = 3$ then the intensity of poverty in group g is three times that of the population as a whole; $PI_g = 0.3$ indicates that the intensity of poverty in group g is 30 percent that of the

population as a whole. More generally, if PI_g is less than, equal to, or greater than unity then intensity of poverty in group g is respectively less than, equal to, or greater than that of the whole population.

The PI_g index addresses the question: "where is poverty most intense?" rather than "how much poverty exists?" It is well suited to developed countries where even the poorest people receive enough income for survival yet where analysts wish to design, implement and evaluate alternative policies aimed at alleviating hardship. Once the groups with the highest poverty intensity are identified scarce public funds can be allocated efficiently to specifically designed and targeted programs. For example, vocational-training programs may be appropriate for reducing youth poverty whereas subsidized access to nursing homes may be effective in reducing poverty among the elderly. The PI_g index can be used to set priorities in designing programs to ameliorate poverty and it can be used to track structural changes in poverty over time.

To demonstrate the features of a PI index we consider two poverty indices with attractive properties: the deprivation-weighted index of Johnson(1996a and 1996b) and Johnson and Dixon (1999) and the poverty index of Foster, Greer and Thorbecke (1984).

The Johnson-Dixon (JD) index for an entire population comprised of G mutually exclusive and collectively exhaustive groups is equal to

$$P^{JD} = \frac{1}{n} \sum_{g=1}^{G} \sum_{i \in M_g} h_i \left[1 - \left(y_i / z_i \right)^{\beta} \right] \qquad 0 < \beta \leq 1 \qquad [4]$$

where:

n is the number of people in the population;

M_g is the set of poor income units in group g (g=1,2,…G);

h_i is the number of people in income unit i;

z_i is the poverty line for income unit i;

y_i is disposable income of income unit i, $y_i < z_i$; and

$0 < \beta \leq 1$, where β is a poverty aversion parameter, which determines the rate at which poverty increases as the disposable income of the i^{th} income unit decreases, *ceteris paribus*.[5]

The JD index for a single group, g, is:

$$P_g^{JD} = \frac{1}{n_g} \sum_{i \in M_g} h_i \left[1 - \left(y_i / z_i\right)^{\beta}\right] \qquad [5]$$

where:

n_g is the number of people in group g and $\sum_{g=1}^{G} n_g = n$.

P^{JD} is additively decomposable and therefore can be written as a weighted sum of JD poverty indices for the G groups:

$$P^{JD} = \sum_{g=1}^{G} \frac{n_g}{n} P_g^{JD} \qquad [6]$$

Substituting Equation [6] into Equation [1] we obtain the PI index for group g based upon the JD poverty index:

$$PI_g^{JD} = \frac{\left(n_g / n\right)\left(P_g^{JD} / P^{JD}\right)}{\left(n_g / n\right)} = \frac{P_g^{JD}}{P^{JD}} \qquad [7]$$

The numerator of PI_g^{JD} is given by Equation [5] and the denominator is given by Equation [4]. PI_g^{JD} has the same properties as the JD poverty index, namely,

additive decomposability, symmetry, focus, monotonicity, distribution, transfer sensitivity and substitution sensitivity (Johnson and Dixon, 1999, p.104-107).

The Foster, Greer and Thorbecke (FGT) index for a population comprised of G mutually exclusive and collectively exhaustive groups is:

$$P^{FGT} = \frac{1}{n} \sum_{g=1}^{G} \sum_{i \in M_g} h_i \left(1 - \frac{y_i}{z_i}\right)^{\alpha} \qquad \alpha \geq 2 \qquad [8]$$

where:

α is a poverty aversion parameter, which determines the rate at which poverty increases as the disposable income of the i^{th} income unit decreases, *ceteris paribus*.[6]

The FGT index for a single group, g, is:

$$P_g^{FGT} = \frac{1}{n_g} \sum_{i \in M_g} h_i \left(1 - \frac{y_i}{z_i}\right)^{\alpha} \qquad [9]$$

The PI index for group g based upon the FGT poverty index is:

$$PI_g^{FGT} = \frac{P_g^{FGT}}{P^{FGT}} \qquad [10]$$

PI_g^{FGT} has the same properties as the FGT poverty index, namely, additive decomposability, symmetry, focus, monotonicity, transfer and monotonicity sensitivity (see Rodgers and Rodgers, 1991, p.345).

A PI index based on the head-count ratio is calculated for comparison purposes in Sections 3 and 4 below. The head-count ratio (H) for a population comprised of G mutually exclusive and collectively exhaustive groups is:

$$P^{H} = \frac{1}{n} \sum_{g=1}^{G} \sum_{i \in M_g} h_i \qquad [11]$$

The head-count ratio for a single group, g, is:

$$P_g^H = \frac{1}{n_g} \sum_{i \in M_g} h_i \qquad [12]$$

and the PI index for group g based upon H is:

$$PI_g^H = \frac{P_g^H}{P^H} \qquad [13]$$

PI_g^H has the same deficiencies as the H poverty index (see Rodgers and Rodgers, 1991, p.345).

3. Poverty Intensity in Australia, 1981 through 1990

Table 1 presents the JD index of poverty in Australia in 1981-82, 1985-86 and 1989-90 and the corresponding PI indices calculated using Equations [4], [5] and [7] with β = 0.5. The PI_g^{JD} values are easy to interpret. In all three years, poverty among couples was less intensive, and poverty among singles was more intensive, than poverty in the population as a whole. Singles with dependents were the most intensely poor group during in 1980s. The latter were 2.8491 times as poor as the population as a whole in 1981-82; 2.6083 times as poor as the population as a whole in 1985-86; and 3.2421 times as poor as the population as a whole in 1989-90.[7] Couples (with no dependents) were the least intensely poor group during in 1980s. The latter were 0.6293 times as poor as the population as a whole in 1981-82; 0.7866 times as poor as the population as a whole in 1985-86; and 0.5635 times as poor as the population as a whole in 1989-90.

A poverty-intensity index' movements through time do not necessarily mimic those of the poverty index on which it is based because poverty in the entire population may be changing. Between 1981-82 and 1985-86, for example, poverty for singles with dependents rose by 21 percent (from 0.0661 to 0.0819) but poverty among all income units rose even faster, by 30 percent (from 0.0232 to 0.0314), so the PI_g^{JD} index for singles with dependents *fell* by 9 percent from 2.8491 to 2.6083. Similarly, between 1985-86 and 1989-90, poverty for singles with dependents fell (from 0.0819 to 0.0817) but poverty among all income units fell even faster (from 0.0314 to 0.0252), so the PI_g^{JD} index for singles with dependents *rose* by 24 percent from 2.6083 to 3.2421.

Table 2 gives head-count ratios reported by Johnson (1996b) for 1981-82, 1985-86 and 1989-90. The corresponding PI_g^H indices calculated using Equations [11], [12] and [13] are also presented. Like PI_g^{JD}, PI_g^H indicates that singles with dependents are the most intensely poor group and couples with no dependents are the least intensely poor group in the 1980s. A closer comparison of the PI_g indices in Tables 1 and 2, however, demonstrates that Johnson's index can paint a different picture of poverty intensity than the head-count ratio. For example, in 1981-82 poverty among singles with dependents was 2.8491 times as intense as poverty in the population as a whole according to PI_g^{JD} (see Table 1) and 4.6597 times as intense as poverty in the population as a whole according to PI_g^H (see Table 2). Similarly, in 1985-86 and 1989-90, PI_g^H indicates greater poverty intensity among singles with dependents than does PI_g^{JD}. Both sets of statistics are intuitively understandable by a wide

audience but PI_g^{JD} is the better measure of poverty intensity. Like the head-count ratio on which it is based, PI_g^H lacks axiomatically desirable properties.

Finally, PI indices, being ratios of poverty indices, have the practical advantage of being less sensitive to errors and inaccuracies in measuring income and less sensitive to arbitrary choices of poverty lines and equivalence scales than the poverty indices on which they are based.[8] This point is demonstrated in Table 3, which presents more JD indices of Australian poverty for 1981-82 and 1989-90. Three sets of poverty lines, z, (100 percent, 80 percent and 120 percent of the Henderson poverty lines)
and three values of the poverty aversion parameter, β, (0.25, 0.50 and 0.75) were used. Beneath the poverty indices are listed the poverty-intensity values, which were computed from JD poverty indices. The final column of the table lists the coefficient of variation of poverty or poverty intensity for each income unit, computed across the five combinations of z and β that appear in the table. In each case, the coefficient of variation in poverty is more than three times as large as the coefficient of variation in poverty intensity. This demonstrates that the JD poverty-intensity index is less sensitive to the choice of poverty lines and equivalence scales than the JD poverty indices on which it is based.

4. Poverty Intensity in Australia, 1995-96

Table 4 presents values of the JD, FGT and H indices, and the PI indices based upon them, for the year ending June 1996. The data used in the calculations are income-unit-level data from the ABS' Income and Housing Survey, Australia, 1996-97. The data are a sample of persons aged 15 years

and older living in private dwellings (houses, flats, home units, caravans, tents and other structures used as places of residence). An income-unit is classified as poor if its income net of tax, y, is less than the real 1995-96 value of the Henderson poverty line for an income-unit of its size and composition, z. (The poverty lines used in our calculations are given in the Appendix to this paper.) The value of h is set equal to the number of people in the income unit multiplied by the weight attached to the income unit by ABS. For income units with negative or zero disposable income, we follow Johnson's (1996b, p 166) convention of replacing disposable income by an arbitrarily low value. We inflated Johnson's value of $100 in 1981-82 by the CPI to obtain $212 per annum in 1995-96.

In 1995-96, according to the PI_g^{JD} index, singles with no dependents were the most intensely poor group. They were 2.1360 times as poor as the population as a whole. Singles with dependents were 1.7082 times as poor as the population as a whole. Couples with no dependents were 0.7449 times as poor as the population as a whole. The least poor group was couples with dependents, who were 0.4101 times as poor as the population as a whole. Similar poverty-intensity values and the same ranking of the four groups are produced using the PI_g^{FGT} index. The 1995-96 ranking of the four income-unit types by JD and FGT and their poverty-intensity indices is quite different to that of the previous decade (see Tables 1 and 2). In the 1980s singles with dependents were more intensely poor than singles with no dependents and couples with dependents were more intensely poor than couples with no dependents. These changes in the relative poverty status of income units with and without dependents deserve further investigation. It would be interesting if it

were caused by structural change in the income distribution or by changes over time in the contribution of government cash transfers to income units with, and without, dependents. Stanton and Fuery (1995) describe the changes in payments to families with children that occurred between 1983 and 1996.[9]

The head-count ratio and its poverty-intensity index indicate that the ranking of the four income-unit types in 1995-96 is unchanged from the 1980s. Thus we see how the choice of poverty index matters. According to PI_g^H, singles with dependents were the most intensely poor (2.2179 times as poor as the population as a whole), followed by singles with no dependents, couples with dependents, and couples with no dependents (0.5566 times as poor as the population as a whole). Unlike PI_g^{JD} and PI_g^{FGT}, PI_g^H fails to take account of the magnitude of the poverty gap for each of the four groups. The mean, normalized poverty gap[10], for each of the four types of income units is given in Table 4. Poor single adults with no dependents, on average, have disposable incomes that are 50.38 percent below the poverty line; poor singles with dependents have disposable incomes that are 36.47 percent below the poverty line. Poor couples with no dependents, on average, have disposable incomes that are 55.22 percent below the poverty line; poor couples with dependents have disposable incomes that are 30.18 percent below the poverty line.

The conflicting results produced by PI_g^H compared with PI_g^{JD} and PI_g^{FGT} are consistent with earlier findings that PI_g indices based on axiomatically sound poverty indices tend to be highly correlated with one another and less highly correlated with the axiomatically inferior PI_g^H (Rodgers and Rodgers, 1991, Table 4).

5. Conclusion

Programs to reduce poverty require the measurement of poverty in various groups in society. This task is most commonly accomplished using the head-count ratio even though it is known to be potentially misleading. More sophisticated poverty indices are available but are seldom used primarily because their values are difficult to interpret and complex to compute. This paper advocates the use of poverty-intensity (PI) indices, which are simple to interpret and have the same properties as the poverty indices upon which they are based. In the area of policy design and evaluation, we believe that poverty-intensity indices are a useful adjunct that gives intuitive meaning to the results of empirical studies of poverty.

To demonstrate the use of PI indices we have transformed measures of poverty in Australia in the 1980s into PI measures and interpreted the results. For example, single adults with dependents were the poorest group, being more than three times as poor as the population as a whole in 1989-90. The next poorest group was singles with no dependents, followed by couples with the dependents. Couples with no dependents were the least poorest group, being about half as poor as the population as a whole. We also performed some new computations of poverty and poverty intensity using Australian unit-record data for 1995-96.

An interesting reversal of poverty-intensity rankings between 1989-90 and 1995-96 was revealed by PI indices based on the axiomatically sound poverty indices of Johnson and Dixon (1999) and Foster, Greer and Thorbecke (1991).

By 1995-96 single adults with no dependents were the most intensely poor group. They were more than twice as poor as the population as a whole. Single adults with dependents were found to be approximately 1.7 times as poor as the population as a whole and couples with no dependents were approximately 0.75 times as poor as the population as a whole. Couples with dependents were the least intensely poor group. They were less than 40 percent as poor as the population as a whole. The observed change in ranking of the four groups between 1989-90 and 1995-96 is not revealed by the head-count ratio and its poverty-intensity index. Thus, the choice of poverty index matters. The availability of poverty-intensity indices that can be based upon sophisticated measures of poverty, yet have intuitive meaning, should contribute to effective poverty measurement and policy based upon it.

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Table 1: Poverty and Poverty-Intensity Indices,
Based on Johnson's Deprivation Weighted Poverty Index,
Australia, 1981-82, 1985-86, 1989-90

Period		Income Unit Type				
		Couples	Couples + dependents	Singles	Singles + dependents	All income units
1981-82	POV_g	0.0146	0.0187	0.0362	0.0661	0.0232
	PI_g	0.6293	0.8060	1.5603	2.8491	1.0000
	n_g/n	0.2380	0.5260	0.1910	0.0450	1.0000
1985-86	POV_g	0.0247	0.0278	0.0362	0.0819	0.0314
	PI_g	0.7866	0.8854	1.1529	2.6083	1.0000
	n_g/n	n.a.	n.a.	n.a.	n.a.	1.0000
1989-90	POV_g	0.0142	0.0176	0.0425	0.0817	0.0252
	PI_g	0.5635	0.6984	1.6865	3.2421	1.0000
	n_g/n	0.2610	0.4880	0.1940	0.0580	1.0000

Source: Johnson (1996b, Table 6.1, p.67). JD poverty indices for 1981-82 and 1989-90 also appear in Johnson and Dixon (1999, Table 1).

Table 2: Poverty and Poverty-Intensity Indices,
Based on the Head-Count Ratio,
Australia, 1981-82, 1985-86, 1989-90

Period		Income Unit Type				
		Couples	Couples + dependents	Singles	Singles + dependents	All income units
1981-82	POV_g	0.0504	0.0824	0.1470	0.4930	0.1058
	PI_g	0.4764	0.7788	1.3894	4.6597	1.0000
	n_g/n	0.2380	0.5260	0.1910	0.0450	1.0000
1985-86	POV_g	0.0617	0.1064	0.1821	0.5000	0.1292
	PI_g	0.4776	0.8235	1.4094	3.8700	1.0000
	n_g/n	n.a	n.a.	n.a.	n.a.	1.0000
1989-90	POV_g	0.0476	0.0736	0.2009	0.4875	0.1154
	PI_g	0.4125	0.6378	1.7409	4.2244	1.0000
	n_g/n	0.2610	0.4880	0.1940	0.0580	1.0000

Source: Johnson (1996b, Table 6.1, p.67).

Table 3: Poverty and Poverty-Intensity Indices,

Based on Johnson and Dixon's Index,

Australia, 1982 and 1990

Sensitivity to Poverty Line and Distribution Sensitivity Parameter

Poverty Line	z	0.8z	1.2z	z	z	Coeff of Var
Distribution Sensitivity Parameter	0.5	0.5	0.5	0.25	0.75	
Poverty Index, 1981-82						
Couples	0.0145	0.0111	0.0189	0.0090	0.0183	0.2706
Couples + dependents	0.0187	0.0142	0.0266	0.0113	0.0238	0.3020
Singles	0.0363	0.0273	0.0568	0.0227	0.0454	0.3269
Singles + dependents	0.0663	0.0363	0.1134	0.0372	0.0898	0.4369
All income units	0.0231	0.0169	0.0344	0.0141	0.0296	0.3213
Poverty Index, 1989-90						
Couples	0.0141	0.0109	0.0185	0.0091	0.0175	0.2594
Couples + dependents	0.0176	0.0129	0.0247	0.0105	0.0228	0.3093
Singles	0.0425	0.0318	0.0640	0.0270	0.0529	0.3106
Singles + dependents	0.0817	0.0490	0.1244	0.0464	0.1101	0.3820
All income units	0.0252	0.0181	0.0364	0.0154	0.0323	0.3149
Poverty-Intensity Index, 1981-82						
Couples	0.6277	0.6568	0.5494	0.6383	0.6182	0.0593
Couples + dependents	0.8095	0.8402	0.7733	0.8014	0.8041	0.0265
Singles	1.5714	1.6154	1.6512	1.6099	1.5338	0.0252
Singles + dependents	2.8701	2.1479	3.2965	2.6383	3.0338	0.1391
All income units	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
Poverty-Intensity Index, 1989-90						
Couples	0.5595	0.6022	0.5082	0.5909	0.5418	0.0605
Couples + dependents	0.6984	0.7127	0.6786	0.6818	0.7059	0.0191
Singles	1.6865	1.7569	1.7582	1.7532	1.6378	0.0283
Singles + dependents	3.2421	2.7072	3.4176	3.0130	3.4087	0.0852
All income units	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000

Source: Johnson and Dixon (1999, Table 2).

Table 4: Poverty and Poverty-Intensity Indices, Australia, 1995-96

Period		Income Unit Type: Couples	Couples + dependents	Singles	Singles + dependents	All income units
Based on JD Index with β=0.5.						
1995-96	POV_g	0.0266	0.0147	0.0763	0.0610	0.0357
	PI_g	0.7449	0.4101	2.1360	1.7082	1.0000
Based on FGT with α = 2.						
1995-96	POV_g	0.0271	0.0132	0.0774	0.0560	0.0351
	PI_g	0.7725	0.3757	2.2049	1.5957	1.0000
Based on head-count ratio.						
1995-96	POV_g	0.0647	0.0720	0.2078	0.2577	0.1162
	PI_g	0.5566	0.6199	1.7880	2.2179	1.0000
Mean Normalized Poverty Gap						
1995-96	GAP_g	0.5522	0.3018	0.5038	0.3647	0.4326
Proportion in the Population						
1995-96	n_g/n	0.2422	0.4454	0.2414	0.0710	1.0000

Source: Computed by the authors using data from the Income and Housing Cost Survey, Australia, 1996-97 (IDS96).

Appendix

Type of Income Unit	Equivalence Scale (All Costs)		1995-96 Poverty Line ($ per annum)	
	Head in Workforce	Head not in Workforce	Head in Workforce	Head not in Workforce
(1)	(2)	(3)	(4)	(5)
Couple	0.7122	0.6115	12,622.52	10,837.79
Couple plus 1	0.8561	0.7554	15,172.90	13,388.17
Couple plus 2	1.0000	0.8993	17,723.28	15,938.55
Couple plus 3	1.1439	1.0432	20,273.66	18,488.93
Couple plus 4	1.2878	1.1871	22,824.04	21,039.31
Couple plus 5	1.4245	1.3237	25,246.81	23,460.31
Couple plus 6	1.5612	1.4604	27,669.59	25,883.08
Couple plus 7	1.6978	1.5971	30,090.59	28,305.85
Couple plus 8	1.8345	1.7338	32,513.36	30,728.63
Couple plus 9	1.9712	1.8705	34,936.13	33,151.40
Couple plus 10+	2.1367	2.0360	37,869.34	36,084.60
Single person	0.5324	0.4317	9,435.88	7,651.14
Single Parent plus 1	0.6835	0.5827	12,113.86	10,327.36
Single Parent plus 2	0.8273	0.7266	14,662.47	12,877.74
Single Parent plus 3	0.9712	0.8705	17,212.85	15,428.12
Single Parent plus 4	1.1151	1.0144	19,763.23	17,978.50
Single Parent plus 5	1.2590	1.1583	22,313.61	20,528.88
Single Parent plus 6	1.3957	1.2950	24,736.38	22,951.65
Single Parent plus 7	1.5324	1.4317	27,159.16	25,374.42
Single Parent plus 8	1.6691	1.5683	29,581.93	27,795.42
Single Parent plus 9	1.8058	1.7050	32,004.70	30,218.20
Single Parent plus 10+	1.9424	1.8417	34,425.70	32,640.97

Note:

Poverty lines were calculated using a benchmark income of $62.70 per week for a couple plus two dependents that applies to the September quarter, 1973.

The benchmark income was inflated using the consumer price index to obtain its equivalent real weekly income of $336.69 in September, 1995; $339.27 in December, 1995; $340.70 in March, 1996; $342.99 in June, 1996.

These weekly incomes aggregate to an annual total of $17,723.28 for 1995-96. Poverty lines for other family types (see Columns 4 and 5) are derived by multiplying $17,723.28 by the value assigned to that family type in the equivalence scales of Johnson (1987, Table 1), which are reproduced in Columns 2 and 3.

Endnotes

1. See Johnson (1996a) for a discussion of some of the issues involved, particularly in the Australian context.

2. See Rodgers and Rodgers (1991), Creedy (1998) and Johnson and Dixon (1999) for discussions of the desirable properties of a poverty index and for comparisons of the properties of several of the better known poverty indices.

3. Obviously a population, ten percent of whom have zero incomes, is poorer than a population, ten percent of whom have incomes one dollar below the poverty line, *ceteris paribus*. The head-count ratio, however, makes no distinction between the poverty of two such populations.

4. The term "poverty intensity" has been used (for example, Creedy, 1998) to refer to the extent to which the income of a given income unit falls below the poverty line. We use the term poverty intensity in a different way. We are concerned with the poverty of a group of income units rather than with the poverty of an individual income unit.

5 . The role of β is revealed by an examination of the poverty of the ith income unit, $P_i^{JD} = 1 - \left(\frac{y_i}{z_i}\right)^{b}$,

in which z_i is constant. First, $y_i = 0$ implies P_i^{JD} equals one, and $y_i = z_i$ implies P_i^{JD} equals zero, for all $0 < \beta \leq 1$. For a given y_i in the range $0 < y_i < z_i$, the closer is β to one, the larger is the poverty of the ith income unit.
Second, $0 < \beta \leq 1$ implies P_i^{JD} increases as y_i decreases. When $\beta = 1$ the rate of change of P_i^{JD} with respect to income is constant. When $0 < \beta < 1$, P_i^{JD} increases at an increasing rate as y_i decreases. The closer is β to zero, the more convex is the poverty-income profile of the ith income unit. That is, at small income levels, the smaller is β, the larger is the increase in P_i^{JD} resulting from a one-unit reduction in income. Conversely, at income levels close to the poverty line, the smaller is β, the smaller is the increase in P_i^{JD} resulting from a one-unit reduction in income. See Johnson (1996b, p.44) for further discussion of the poverty-aversion parameter, β.

6 . The role of α is revealed by an examination of the poverty of the ith income unit, $P_i^{FGT} = \left(1 - \frac{y_i}{z_i}\right)^{a}$,

in which z_i is constant. First, $y_i = 0$ implies P_i^{FGT} equals one, and $y_i = z_i$ implies P_i^{FGT} equals zero, for all $\alpha \geq 2$. For a given y_i in the range $0 < y_i < z_i$, the larger is α, the smaller is the poverty of the ith income unit.
Second, $\alpha \geq 2$ implies P_i^{FGT} increases as y_i decreases and P_i^{FGT} increases at an increasing rate as y_i decreases. The larger is α, the more convex is the poverty-income profile of the ith income unit. That is, at small income levels, the larger is α, the larger is the increase in P_i^{FGT} resulting from a one-unit reduction in income. Conversely, at income levels close to the poverty line, the larger is α, the smaller is the increase in P_i^{FGT} resulting from a one-unit reduction in income.

7. To put these numbers in context, poverty-intensity measures as high as three are seldom found in the United States. In 1979, for example, Blacks were 2.5735 times as poor, and Blacks in rural farm areas were 3.2566 times as poor, as the U.S. population as a whole (Rodgers and Rodgers, 1991, Table 5).

8. Saunders and Whiteford (1989, p. 33) contend that the head-count ratio is preferred to the theoretically superior poverty indices because the latter are "much more sensitive to errors and inaccuracies in the income data themselves".

9. While we were surprised by the reversal we were astonished by its magnitude. We note in passing that 46 percent of poor couples have a reference person 65 years or older and 55 percent of poor singles are 24 years or younger. Finally, could the reversal be caused by an arbitrary change, which we have been unable to identify, in the way the data were collected?

10. The mean, normalized poverty gap for group g is $\mu_g = \frac{1}{m_g} \sum_{i \in M_g} h_i \left(1 - \frac{y_i}{z_i}\right)$ where m_g is the number of poor people in group g.