

# **A Comparison of Income and Expenditure Inequality Estimates: The Australian Evidence, 1975/76 to 1993/94\***

by

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## **ABSTRACT**

This paper compares, using Australian unit record data, income and expenditure inequalities over the period 1975/76 to 1993/94. The study finds inconsistencies between the two inequality movements over much of this period. We, also, observe differences in the nature of income and consumption disparities. Both inequalities agree, however, that the 'within group' inequality dominates the 'between group' component. The inequality estimates are quite sensitive to the equivalence scale used as the household size deflator but not to the cost of living index used as the price deflator.

### ***JEL Classification:***

D1, D6, I3

### ***Keywords:***

Inequality, Generalised Entropy, True Cost of Living Index,  
Equivalence Scales, Rank Three Demand

## 1. INTRODUCTION

The literature on income inequality runs parallel to that on expenditure inequality. As the empirical evidence on each mounts, the issue of comparison between the two sets of estimates, especially, the sensitivity of inequality magnitudes and their trends to the use of income or consumption expenditure takes on a special policy significance. Such an exercise on Australian unit record data is the principal motivation for this study.

The income inequality literature predates that on consumption expenditure inequality, and is more extensive in its coverage and content. However, with the increasing availability of information from large scale budget surveys in recent years, often in their original unit record form, the literature on expenditure inequality is fast expanding. The overwhelming weight of argument seems to favour the use of expenditure over income in welfare based distributional comparisons. McGregor and Barooah (1992), Kakwani (1993), Slesnick (1994), Johnson and Shipp (1998), among others, argue that consumption expenditure is a more appropriate indicator of well being, since utility is derived from the consumption of goods and services. In many societies, especially in developing countries, non monetary factors, eg. the lack of markets in rural areas, may constrain the ability of the poor to convert a dollar's worth of income to a dollar's worth of goods and services. Such constraints tend to disappear with urbanisation and increasing affluence causing the rich to have more marketing opportunities and greater access to goods and services than the poor. Such a possibility will cause income inequality to understate the true extent of welfare disparity. An argument often expressed in favour of use of expenditure in inequality comparisons is based on the fact that expenditure is less subject, than income, to short term fluctuations since households can smooth away the former by adjusting savings. For example, Blundell and Preston (1998) point out that measured income can be considered to be composed of both permanent and transitory income, and thus households that appear income poor in a cross section may do so

only temporarily. Viewed thus, consumption will be a superior measure of welfare since most households have the ability to borrow or save to smooth out fluctuations in their transitory income. Moreover, given the reality of income concealment to escape taxation, income data is notoriously unreliable for use in welfare based distributional comparisons. There are, however, problems with the use of expenditures as well – for example, those arising from differences over time in the method of measurement of expenditure, or definitions of items.

Following the pioneering work of Kolm (1969) and Atkinson (1970), the measurement of inequality has been based on explicit social welfare functions. In the Kolm-Atkinson framework, the social welfare function is defined on the distribution of ‘income’ rather than the distribution of individual utility or welfare. Muellbauer (1974) extends the approach and defines social welfare function on the distribution of money metric individual welfare. Muellbauer (1974, p.498) has, further, shown that measures of social welfare based on ‘income’ coincide with measures based on individual welfare if and only if preferences are homothetic for all consuming units. Roberts (1990) extends the Muellbauer analysis to derive restrictions on preferences under which measures of social welfare based on the distribution of money metric individual welfare coincide with measures based on the distribution of individual welfare itself. The restrictions on consumer preferences, implied by the Muellbauer/Roberts analysis, are strong and unrealistic, as confirmed by their numerous rejections on expenditure data. This gives us an additional reason to distinguish between income and consumption expenditure inequality.

The Australian literature on inequality has, mostly, been based on income rather than consumption expenditure. Most Australian studies have found that income inequality in Australia rose through the mid seventies to the early nineties – see, for example, Meagher and Dixon (1986), Saunders (1993), Borland and Wilkins (1996), Harding (1997). The timing and severity of the inequality increases differed slightly according to the data, unit of analysis and

the equivalence scale used to take note of differences in household size and composition. Relatively little attention has been paid to consumption inequality in Australia, except for the recent work by Barrett, Crossley and Worswick (1999) which found that consumption inequality was rising but at a slower rate than income inequality.

This paper seeks to provide Australian evidence on the following questions:

- (i) Over the period, 1975/76 to 1993/94, how similar or otherwise have been the movements in income and consumption expenditure inequality? In attempting to answer this question, we extend the exercise of Barrett, Crossley and Worswick (1999) to include multiple family households consisting of unrelated young adults and others. Also, we include durables expenditure in our analysis.
- (ii) Over this period, what is the impact of changing equivalence scale specifications on inequality magnitudes and on their movements over time? Given differences in needs between individuals, especially between adults and children, and the existence of economies of household size, equivalence scales have traditionally been used to correct for differences between households in terms of their size and composition. As the Australian evidence of Lancaster and Ray (1998) confirm, there is a wide array of equivalence scales to choose from. This makes the issue of sensitivity of inequality calculations to the equivalence scale used one with policy significance.
- (iii) Is the picture on income versus expenditure inequality movements robust to the price deflator used in the inequality calculations? In intertemporal comparisons of inequality, the issue of what price deflator is used to convert the money figures on income and expenditure into real ones, ie. at constant prices, assumes considerable significance. This paper provides Australian evidence on the sensitivity of inequality magnitudes and their movements to the use of fixed weight price index, such as the CPI, or the true cost of living index (TCLI) that takes account of consumer preferences and substitution between items due to relative price changes.

The rest of this paper is organised as follows. Section 2 introduces the theoretical framework. The data is described in Section 3. The results are presented and analysed in Section 4. We end on the concluding note of Section 5.

## 2. THEORETICAL FRAMEWORK

### 2.1 Inequality Measures

Inequality measures estimate the level of inequality of the population units by measuring the dispersion of a variable associated with welfare. Normally income or consumption is used as a measure of welfare, but estimates of utility based on an assumed utility function can also be used. The choice of the variable used as a measure of welfare is contentious. In this study, real per equivalent adult disposable income,  $\tilde{y}$ , and real per equivalent adult expenditure  $\tilde{x}$ , are used as alternative measures of the welfare variable,  $w$ .

A widely used measure of the dispersion in welfare is the Gini coefficient,  $G$ . Consider a population of  $H$  households with welfare  $w_h$ , enjoyed by household  $h$ , and let  $\bar{w}$  denote mean welfare. Then,

$$G = \frac{1}{2H^2\bar{w}} \sum_i \sum_j |w_i - w_j| \quad (1)$$

where  $w_1 > w_2 > \dots > w_H$  and  $H$  denote the total number of households. The Gini coefficient is not readily decomposable. If the inequality measures are scale invariant (ie. homogenous of degree zero in income or expenditure) and replication invariant (ie. remain unchanged when the population and distribution are replicated), then Shorrocks (1984) shows that the only admissible indices are the ‘‘Generalised Entropy’’ (GE) family of indices. These are given by:

$$I_c = \frac{1}{H} \frac{1}{c(c-1)} \sum_h \left[ \left( \frac{w_h}{\bar{w}} \right)^c - 1 \right], \quad c \neq 0, 1 \quad (2)$$

$$I_0 = \frac{1}{H} \sum_h \log \left( \frac{\bar{w}}{w_h} \right) \quad (3)$$

$$I_1 = \frac{1}{H} \sum_h \frac{w_h}{\bar{w}} \log \left( \frac{w_h}{\bar{w}} \right) \quad (4)$$

The parameter  $c$  reflects different perceptions of inequality, with a lower value representing a higher degree of ‘inequality aversion’. This class of inequality measures includes the mean

logarithmic deviation ( $I_0$ ), the Theil Index ( $I_1$ ), and half the square of the coefficient of variation ( $I_2$ ).  $I_0$ ,  $I_1$  and  $I_2$  are particularly sensitive to changes in the bottom, middle and top, respectively, of the welfare distribution. In the calculations reported below, we divided the population into  $k$  subgroups of households and exploited the property that all members of the GE family are additively decomposable by population subgroups as follows:

$$I_c = I_w + I_B \quad (5)$$

where  $I_w = \sum_k \tilde{p}_k \left( \frac{w_k}{\bar{w}} \right)^c I_k$  refers to the inequality arising within subgroups and

$I_B = \sum_k \tilde{p}_k \left[ \left( \frac{w_k}{\bar{w}} \right)^c - 1 \right]$  refers to the inequality between subgroup mean levels of welfare;  $\tilde{p}_k$

is the population share of the subgroup of type  $k$ ,  $w_k$  is the subgroup mean of the welfare variable,  $w$ , while  $\bar{w}$  is the corresponding mean for the entire population.  $I_k$  is the value of the inequality index for subgroup  $k$ . In addition to the GE inequality indices,  $I_0$ ,  $I_1$  and  $I_2$ , we also used the Gini inequality index. In contrast to  $I_0$  and  $I_2$ , the Gini coefficient is quite insensitive to changes in the tails of the welfare distribution.

## 2.2 Consumer Preferences and Equivalence Scale Specification

The inequality calculations require the use of ‘equivalence scales’ as deflators of income or expenditure to correct for differences in household size or composition. In addition to the traditional scales, namely, the Engel and OECD scales, we also employ utility theory consistent equivalence scales. These scales, to be referred to as ‘price scaled’ equivalence scales, are obtained by applying the price scaling (PS) demographic technique, proposed in Ray (1983), to the rank 3 ‘Generalised Almost Ideal’ (GAI) demand model [see Banks, et al (1997), Lancaster and Ray (1998)]. This demand system collapses to the restrictive rank 2 form of the ‘Almost Ideal’ (AI) demand model as a special case. In the empirical applications

reported below, we refer to the equivalence scales corresponding to the GAI, AI demand models as PS-GAI, PS-AI respectively [see Blacklow and Ray (1998) for more details].

We choose the following functional form for the equivalence scale, EP, namely,

$$EP = (n_a + \delta_1 n_1 + \delta_2 n_2 + \delta_3 n_3)^\theta \quad (5)$$

where  $n_a$ ,  $n_1$ ,  $n_2$ ,  $n_3$  denote, respectively, the number of adults in the household, children under 5 years old, dependents aged between 5 and under 15 years old, and dependents aged between 15 and 25 years old, living in the household. While the  $\delta$ s represent their corresponding resource cost, as a proportion of an adult,  $(1 - \theta)$  reflects the economies of scale in household size [see Buhmann, et al (1988), Lancaster, Ray and Valenzuela (1997b)]. EP is the number of ‘adult equivalent’ persons in the household in the base year when prices are normalised at unity. Note, therefore, that the single adult, for which  $EP = 1$ , is the reference household.

The choice of values of the  $\delta$ s and  $\theta$  will decide the nature and magnitude of the equivalence scale. This study uses 5 alternative scales, and the results presented later provide evidence on the sensitivity of the inequality magnitudes and trends to the scale employed.

The alternative scales are as follows:

#### Demand System Based Scales (PS-GAI, PS-AI)

The equivalence scale parameters  $(\delta_i, \theta)$  are estimated, along with the demand parameters from the demographic demand systems, PS-GAI and PS-AI – see Blacklow and Ray (1998, Appendix) for full details on the commodity breakdown, the estimation procedure, and the parameter estimates. Note, incidentally, that the PS-AI scales assumed absence of economies of household size (ie.  $\theta = 1$ ).

#### Engel

EP is set at the value at which two households with the same per adult equivalent expenditure,  $\tilde{x}_h$ , have identical budget share of Food (see Binh and Whiteford (1990), Lancaster and Ray (1998) for more details and Australian estimates of Engel scales].



## OECD

A standard equivalence scale used in OECD studies is to assign a value of one for the first adult in the household with every extra adult in the household worth 0.7, and every child worth 0.4 of a single adult household.

## Per Capita

$\delta_1 = \delta_2 = \delta_3 = \theta = 1$ , ie. EP equals the unweighted number of household members.

### **2.3 Price Indices**

Nominal variables need to be divided by a price index for comparisons under different price levels. The CPI series, constructed by the Australian Bureau of Statistics (ABS), is a weighted average of prices, where the weights are the average budget shares of working households. The CPI, in using fixed weights, does not explicitly consider consumer preferences and the substitution effects of price changes. This is allowed in the true cost of living index (TCLI). The TCLI measures the cost of obtaining the same level of utility in two different price situations. In the calculations reported below, the PS-GAI demographically modified utility function was used for deriving the TCLI expression [see Blacklow and Ray (1998) for more details].

### **3. THE DATA**

All estimation and analysis are based on a pooled cross section of the unit record files from the Household Expenditure Surveys (HES) conducted by the Australian Bureau of Statistics (ABS) for the years, 1975/76, 1984, 1988/89 and 1993/94. Certain adjustments had to be made to the data sets to make them comparable (see Appendix). No observations were removed, however, from the full sample of 25,649 households.

The prices used are originally from the ABS Consumer Price Index (CPI) quarterly series but re-weighted to match the HES Commodity Code List (HESCCL) and converted to

have a base period of December 1997. For the 1975/76 and 1984 surveys where the quarter of enumeration was not given, an average of the four quarterly prices was taken to prevail over the survey period. The prices were then re-weighted by the mean budget shares for each period, where necessary, in order to obtain prices for the four items used in the demand estimation, namely, food, accommodation, clothing and miscellaneous (which includes all other expenditure such as entertainment, alcohol and tobacco, health expenses and transport).

Table 1 compares the different equivalence scales implied for the various household types by the 5 alternative scale specifications discussed above. There is little difference between the PS-GAI and PS-AI scales for smaller households, but since the latter ignore economies of household size, they exceed the former as household size increases. The Engel scales generally exceed the utility based scales since the former ignores substitution between food and non food items induced by household composition changes. The OECD scales, in several cases, are quite out of step with the others. The per capita scale tends to overestimate the costs of children by assuming that they have the same resource needs as an adult.

## **4. RESULTS**

### **4.1 Movements of Aggregate Inequality**

Tables 2, 3 report the aggregate income and consumption expenditure inequalities, respectively, using the PS-GAI equivalence scales and the TCLI to correct for household composition changes and price movements. The right hand side of the tables shows the percentage change in inequality (with standard errors) for each sub period. The tables also report, respectively, the disposable income and expenditure per equivalent adult (in December 1997 dollars) for each of these sub periods.

The following conclusions follow:

- (i) The  $I_c$  inequality measures show that, over the sample period as a whole (ie. 1975/76 to 1993/94), while income inequality increased, expenditure

inequality fell. For example, in the mid '80s, while all the three GE inequality measures record large and significant increases in income inequality, the corresponding increases in expenditure inequality were much smaller and statistically insignificant. In the late '70s, however, large and statistically significant declines in expenditure inequality coexisted with relatively stagnant income inequality. In other words, the  $I_c$  based picture on inequality movement over this period is highly sensitive to the choice of income or expenditure as the welfare variable. Note, however, that the picture on inequality movement is quite robust between the income and expenditure based estimates if one uses the Gini index of inequality. The Gini income inequality estimate is out of step with the GE income inequality measures, possibly due to its insensitivity to the tails of the welfare distribution. However, the picture on movements in expenditure inequality is quite robust both between the Gini and the GE measures, and within the latter itself (ie.  $I_c$ ) as well.

- (ii) In absolute terms, while increasing the parameter  $c$ , ie. reducing the 'inequality aversion', in the GE inequality measure,  $I_c$ , monotonically increases the expenditure inequality estimates (Table 3), this is not the case for income inequality (Table 2). For example, in 1993/94, the income inequality estimate falls sharply from the mean logarithmic deviation ( $I_0$ ) to Theil Index ( $I_1$ ) but, then, rises again in case of half the square of the coefficient of variation index ( $I_2$ ) to almost the  $I_0$  level. In contrast to income, the expenditure inequality estimates in 1993/94 are remarkably similar between the  $I_0$  and  $I_1$  measures. This suggests that, over our sample period, not only the trend, but, also, the nature of inequality has been sharply different between disposable income and aggregate expenditure. Keeping in mind the fact that  $I_0$  is more sensitive to inequality in the left hand tail of the distribution and  $I_2$  to the right hand tail, Table 2 suggests that, for much of this period, and especially in the late '80s and early '90s, the income disparities among the poor and among the upper classes dominated that among the middle income groups. The  $I_0$ ,  $I_1$  and  $I_2$  estimates of Table 3 show that, in contrast to income, consumption disparities within the lower and middle expenditure groups are quite similar but lower than that within the upper classes. It is interesting to note, therefore, that the difference between the income and expenditure inequality magnitudes recorded at the end of our sample period (1993/94) is much more in case of the mean logarithmic deviation ( $I_0$ ) than for the other inequality measures.
- (iii) The non robustness of the picture on inequality, evident from a comparison of Tables 2 and 3 is, further, reflected in the movement over time in the scale adjusted per 'equivalent adult' means of disposable income and aggregate expenditure. While the former fell, the latter rose over our sample period, 1975/76 to 1993/94. Consequently, there was net dissaving at the end of our sample period. It is worth noting, however, that the contrary movements in the two per 'adult equivalent' figures is only in the first sub period (1975/76 to 84) – they have moved in the same direction in the second half of our sample period.
- (iv) A comparison of the  $I_c$  based inequality estimates between Tables 2 and 3 shows that, while at the beginning of our sample period (1975/76), the expenditure inequality estimates exceed the corresponding income inequality figures, the reverse was the case at the end (1993/94). Let us focus on  $I_0$  which is particularly sensitive to the bottom tail of the distribution. In 1975/76,

expenditures were much more unequal than income (.1873 for the former inequality, .1449 for the latter). There was a sharp rank reversal in the end (.1502 for the former, .1961 for the latter). This would suggest that while income disparities increased, over the two sub periods, namely, 1975/76 to 1984 and 1988/89 to 1993/94, when the contrary movements in the two inequalities were at their peak, the ultra poor, that  $I_0$  pays special attention to, were able to smooth out the income fluctuations by either dipping into their savings or, in many cases, borrowing, as suggested by Blundell and Preston (1998). It is worth noting that, over 1988/89 to 1993/94, a large part of which was characterised by severe recession, our sample figures suggest that Australia went into negative savings because of, apart from other reasons, excessive borrowings by the less well off to smooth out their income fluctuations. However estimates of savings from the HES must be treated cautiously, (see appendix).

## 4.2 The Inequality Estimates by Household Composition

The above discussion raises the question: Is the picture on aggregate inequality presented above robust between the various household types, distinguished by their household size and composition?

Tables 4, 5 present the disaggregated picture on inequality by reporting the income and expenditure inequality estimates, respectively, for six household types. The following features are worth noting.

- (i) The picture, presented earlier, of income inequality increasing and expenditure inequality decreasing over the sample period as a whole seems to hold for most household types. The significant exception is old age pensioners for whom income inequality fell quite sharply in the first half of our sample period, and increased only marginally in the second half, before falling again. Single parent families are also an exception, experiencing a significant decline in income inequality before a moderate increase in the last sample period.
- (ii) The contrary movements of income and expenditure inequalities are particularly striking for households with one adult and no children. In the mid 1970s, such households faced much higher expenditure inequality than income inequality. However, by the mid 1990s, the situation had reversed itself quite sharply, thus, suggesting that the propensity to smooth consumption, in the face of exogenous income shocks by drawing on savings or borrowing, is at its highest for single adults with no dependent children. The tables, also, show that single parent families experienced lower income and expenditure inequalities than single adult households with no dependent children. It is worth noting from Table 4 that single parent households and old age pensioners are the only household types that witnessed a decline in income inequality over the sample period, 1975/76 to 1993/94.

We exploit the additive decomposability property of the  $I_c$  inequality measure to present the breakdown of total inequality into ‘within’ and ‘between’ group inequalities, where the six demographically varying household types of the previous discussion constitute the various groups. Tables 6, 7 present the inequality decomposition, using  $I_0$ , of income and expenditure inequality respectively. It is clear that, for both types of inequality, the ‘within group’ inequality dominates the ‘between group’ component. Moreover, most of the movements in aggregate inequality over our sample period has been an account of changes in the ‘within group’ inequality. In comparison, the ‘between group’ inequality, that measures the differences in the relative means of the population subgroups, has not changed much, especially over the period 1984 to 1993/94.

#### **4.3 Sensitivity of Inequality Estimates to the Equivalence Scale and the Price Deflator**

Tables 8, 9 present the aggregate income and expenditure inequality estimates, respectively, under the 5 alternative equivalence scales discussed earlier (see Table 1). Once again, the trends in inequality movements are quite robust to the treatment of household size and composition. However, the inequality magnitudes are quite sensitive to the household size deflator. The ‘per capita’ figures, that treat all individuals as identical ignoring household composition, overstate inequality in relation to the others that incorporate adult/child relativities. This is consistent with the cross country evidence presented in Lancaster, Ray and Valenzuela (1997a). In contrast, the inequality estimates are fairly robust to the rank of the demand system, namely, between the quadratic and ‘almost ideal’ demand models.

Table 10 presents evidence on the sensitivity of inequality estimates to the price deflator by reporting the calculations using the preference based TCLI and the fixed weight, CPI, as price indices. The picture of contradictory movements in income and expenditure

inequalities is quite robust to the price deflator used. However, unlike in the case of equivalence scales, the inequality magnitudes are also quite insensitive to the price index used in converting the current figures into constant prices.

## 5. CONCLUSION

Much of the inequality literature in Australia is based on the use of income as the welfare variable. This paper attempts to contribute to the almost non-existent literature on expenditure inequality in Australia by comparing the nature and movement of the two inequalities over the sample period 1975/76 to 1993/94. The availability of unit record data at the household level has made this study possible.

The principal result of this study is that, while income inequality has been increasing throughout our sample period, expenditure inequality has either fallen sharply, as over 1975/76 to 1984 and 1988/89 to 1993/94, or remained relatively static. Consequently, over the sample period as a whole, rising income inequality has coexisted with a decline in expenditure inequality. The study performed sensitivity exercises to confirm that the picture of contrary movements in income and expenditure inequalities is robust to most household composition changes, to the equivalence scale used as the household size deflator and to the cost of living index used as the price deflator. However, the inequality estimates are quite sensitive to the equivalence scale. Unlike the 'Generalised Entropy' indices, the Gini inequality index shows a consistent pattern between the two inequality movements and, quite significantly, records an income inequality in 1993/94 that is close to the corresponding estimate of expenditure inequality.

The nature of inequality has also varied between income and consumption expenditure. The income disparities in the tails, especially the bottom tail, dominate that among the middle income group. In contrast, consumption disparities within the lower and

middle expenditure groups are quite similar, though appreciably less than that among the upper expenditure classes. The results generally seem to provide support to the view that households tend to smooth out income fluctuations by drawing on their savings or borrowing. Consequently, our results on the HES data suggest, that the net savings per 'equivalent adult' dropped throughout our sample period, and turned negative in the early '90s. Again the HES estimates of savings must be treated with caution, (see appendix). Notwithstanding differences in their nature and temporal movements, income and expenditure inequalities share one common feature, namely, that the 'within group' inequality dominated the 'between group' component throughout our sample period.

**Table 1: Alternative Equivalence Scales**

Household Type <sup>a</sup>				PS-GAI	PS-AI	Engel	OECD	Per Capita
n <sub>a</sub>	n <sub>1</sub>	n <sub>2</sub>	n <sub>3</sub>					
1	0	0	0	1.00	1.00	1.00	1.00	1.00
1	1	0	0	1.06	1.06	1.13	1.50	2.00
1	0	1	0	1.43	1.45	1.53	1.50	2.00
1	0	0	1	1.78	1.84	1.85	1.50	2.00
1	1	1	1	2.26	2.35	2.51	2.50	4.00
2	0	0	0	1.91	2.00	1.98	1.70	2.00
2	1	0	0	1.97	2.06	2.11	2.20	3.00
2	0	1	0	2.33	2.45	2.51	2.20	3.00
2	0	0	1	2.67	2.84	2.83	2.20	3.00
2	1	1	1	3.14	3.35	3.48	3.20	5.00
2	2	0	0	2.03	2.11	2.23	2.70	4.00
2	0	2	0	2.74	2.90	3.04	2.70	4.00
2	1	2	1	3.54	3.80	4.00	3.70	6.00
3	0	0	0	2.80	3.00	2.96	2.40	3.00
4	0	0	0	3.67	4.00	3.93	3.10	4.00
5	0	0	0	4.52	5.00	4.90	3.80	5.00
6	0	0	0	5.36	6.00	5.86	4.50	6.00
7	0	0	0	6.19	7.00	6.83	5.20	7.00
8	0	0	0	7.02	8.00	7.79	5.90	8.00
9	0	0	0	7.84	9.00	8.75	6.60	9.00

<sup>a</sup> n<sub>a</sub> = no. of adults; n<sub>1</sub> = no. of children age 0 – 4 years; n<sub>2</sub> = no. of children aged 5 – 14 years; n<sub>3</sub> = no. of dependents aged 15 – 25 years.



**Table 2: Aggregate Income Inequality<sup>a</sup> (Magnitude and Percentage Change)**

	Magnitude				Percentage Change		
	1975/76	1984	1988/89	1993/94	1975/76 – 1984	1984- 1988/89	1988/89- 1993/94
$\mu^b$	327.74	307.20	297.82	311.17	-6.3 <sup>d</sup>	-3.1 <sup>d</sup>	4.5 <sup>d</sup>
$I_0^c$	0.1449 (.0081)	0.1537 (.0093)	0.1737 (.0079)	0.1961 (.0085)	6.0	13.1 <sup>d</sup>	12.9 <sup>d</sup>
$I_1$	0.1295 (.0098)	0.1353 (.0100)	0.1599 (.0140)	0.1614 (.0104)	4.5	18.2 <sup>d</sup>	1.0
$I_2$	0.1460 (.0133)	0.1461 (.0115)	0.2165 (.0303)	.1946 (.0172)	0.1	48.2 <sup>d</sup>	-10.1
Gini	0.2976 (.0032)	0.2808 (.0036)	0.2921 (.0028)	0.2863 (.0026)	-5.6 <sup>d</sup>	4.0 <sup>d</sup>	-2.0 <sup>d</sup>

<sup>a</sup> The PS-GAI equivalence scale was used as the household size deflator, and the TCLI as the price deflator.

<sup>b</sup>  $\mu$  denotes mean disposable income (in December 1997 dollars) per equivalent adult.

<sup>c</sup> Figures in brackets denote standard errors.

<sup>d</sup> The corresponding absolute change is statistically significant at 5% level.

**Table 3: Aggregate Expenditure Inequality<sup>a</sup> (Magnitude and Percentage Change)**

	Magnitude				Percentage Change		
	1975/76	1984	1988/89	1993/94	1975/76 – 1984	1984- 1988/89	1988/89- 1993/94
$\mu^b$	302.45	303.13	296.53	316.85	0.2	-2.2 <sup>e</sup>	6.9 <sup>d</sup>
$I_0^c$	0.1873 (.0080)	0.1570 (.0083)	0.1604 (.0066)	0.1502 (.0059)	-16.2 <sup>d</sup>	2.2	-6.4
$I_1$	0.2019 (.0185)	0.1598 (.0139)	0.1631 (.0110)	0.1544 (.0099)	-20.9 <sup>e</sup>	2.1	-5.3
$I_2$	0.2910 (.0332)	0.1956 (.0200)	0.1999 (.0157)	0.1899 (.0136)	-32.8 <sup>d</sup>	2.2	-5.0
Gini	0.3591 (.0028)	0.3087 (.0033)	0.3162 (.0026)	0.2943 (.0025)	-14.0 <sup>d</sup>	2.4 <sup>e</sup>	-6.9 <sup>d</sup>

<sup>a</sup> The PS-GAI equivalence scale was used as the household size deflator, and the TCLI as the price deflator.

<sup>b</sup>  $\mu$  denotes mean household expenditure (in December 1997 dollars) per equivalent adult.

<sup>c</sup> Figures in brackets denote standard errors.

<sup>d</sup> The corresponding absolute change is statistically significant at 5% level.

<sup>e</sup> The corresponding absolute change is statistically significant at 10% level

**Table 4: Income Inequality<sup>a</sup> ( $I_0$ ) for Different Household Types**

Household Type	1975/76	1984	1988/89	1993/94
1 Adult (aged 25-64 years) with no children	0.197	0.204	0.252	0.345
1 Adult (aged 25-64 years) with 1 or more children	0.150	0.074	0.087	0.119
2 Adults (aged 25-64 years) with no children	0.134	0.160	0.177	0.195
2 Adults (aged 25-64 years) with 1 or more children	0.109	0.123	0.153	0.147
Pensioners (aged 65 years and above) with no dependents	0.149	0.102	0.136	0.115
Other Households	0.110	0.115	0.103	0.141

<sup>a</sup> The PS-GAI equivalence scale was used as the household size deflator, and the TCLI as the price deflator.

**Table 5: Expenditure Inequality<sup>a</sup> ( $I_0$ ) for Different Household Types**

Household Type	1975/76	1984	1988/89	1993/94
1 Adult (aged 25-64 years) with no children	0.294	0.173	0.202	0.182
1 Adult (aged 25-64 years) with 1 or more children	0.165	0.153	0.127	0.115
2 Adults (aged 25-64 years) with no children	0.175	0.144	0.138	0.135
2 Adults (aged 25-64 years) with 1 or more children	0.128	0.101	0.126	0.108
Pensioners (aged 65 years and above) with no dependents	0.239	0.207	0.164	0.142
Other Households	0.134	0.129	0.113	0.127

<sup>a</sup> The PS-GAI equivalence scale was used as the household size deflator, and the TCLI as the price deflator.

**Table 6: Income Inequality Decomposition by Household Types**

<b>Inequality (<math>I_0</math>)</b>	<b>1975/76</b>	<b>1984</b>	<b>1988/89</b>	<b>1993/94</b>
Within Group	0.1272	0.1325	0.1546	0.1759
Between Group	0.0177	0.0212	0.0191	0.0203
Total	0.1449	0.1537	0.1737	0.1961

<sup>a</sup> The PS-GAI equivalence scale was used as the household size deflator, and the TCLI as the price deflator.

**Table 7: Expenditure Inequality Decomposition by Household Types**

<b>Inequality (<math>I_0</math>)</b>	<b>1975/76</b>	<b>1984</b>	<b>1988/89</b>	<b>1993/94</b>
Within Group	0.1661	0.1399	0.1406	0.1330
Between Group	0.0212	0.0172	0.0198	0.0172
Total	0.1873	0.1570	0.1604	0.1502

<sup>a</sup> The PS-GAI equivalence scale was used as the household size deflator, and the TCLI as the price deflator.

**Table 8: Aggregate Income Inequality Estimates Under Alternative Equivalence Scales**

Equivalence Scale	Income Inequality <sup>a</sup> ( $I_0$ )			
	1975/76	1984	1988/89	1993/94
PS-GAI	0.1449 (.0081)	0.1537 (.0093)	0.1737 (.0079)	0.1961 (.0085)
PS-AI	0.1458 (.0081)	0.1548 (.0093)	0.1749 (.0079)	0.1970 (.0085)
Engel	0.1519 (.0082)	0.1594 (.0094)	0.1755 (.0080)	0.1978 (.0085)
OECD	0.1610 (.0084)	0.1164 (.0096)	0.1842 (.0081)	0.2065 (.0086)
Per Capita	0.1909 (.0090)	0.1942 (.0102)	0.2082 (.0085)	.2276 (.0089)

<sup>a</sup> Figures in brackets denote standard errors.

**Table 9: Aggregate Expenditure Inequality Estimates Under Alternative Equivalence Scales**

Equivalence Scale	Income Inequality <sup>a</sup> ( $I_0$ )			
	1975/76	1984	1988/89	1993/94
PS-GAI	0.1873 (.0080)	0.1570 (.0083)	0.1604 (.0066)	0.1502 (.0059)
PS-AI	0.1891 (.0080)	0.1584 (.0083)	0.1622 (.0066)	0.1519 (.0059)
Engel	0.1940 (.0081)	0.1617 (.0084)	0.1616 (.0066)	0.1510 (.0059)
OECD	0.1861 (.0081)	0.1575 (.0084)	0.1599 (.0067)	0.1502 (.0060)
Per Capita	0.2237 (.0086)	0.1907 (.0090)	0.1883 (.0071)	0.1776 (.0064)

<sup>a</sup> Figures in brackets denote standard errors.

**Table 10: Inequality Estimates Under Alternative Price Deflators**

Income Inequality	1975/76		1984		1988/89		1993/94		Expenditure Inequality	1975/76	
	TCLI	CPI	TCLI	CPI	TCLI	CPI	TCLI	CPI		TCLI	CPI
I <sub>0</sub>	.1449	.1405	.1537	.1516	.1737	.1737	.1961	.1960	I <sub>0</sub>	.1873	.1771
I <sub>1</sub>	.1295	.1253	.1353	.1333	.1599	.1597	.1614	.1613	I <sub>1</sub>	.2019	.1899
I <sub>2</sub>	.1460	.1409	.1461	.1437	.2165	.2157	.1946	.1943	I <sub>2</sub>	.2910	.2670
Gini	.2976	.2926	.2808	.2785	.2921	.2923	.2863	.2862	Gini	.3591	.3504

<sup>a</sup> The PS-GAI equivalence scale was used as the household size deflator.

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## APPENDIX

### Problems and Adjustments made to HES Data

The major problem of surveys of this nature is that income and even expenditure are often under reported. This is a difficult problem to avoid. We assume a constant level of under reporting by respondents over the four surveys. Although comparisons can be made between income and expenditure, estimating savings as the difference between the two is misleading due to their differing reference periods, coverage and level of under reporting.

While the 1988/89 and 1993/94 surveys are quite similar, the 1984 survey differed in that it treated negative income from business or rental property losses as zero and did not impute income tax paid. Comparison of the results of the past three surveys with the first two in 1974/75, 1975/76, has limitations as the first two surveys used a different approach to constructing the data, reporting period and HES Commodity Code List (HESCCCL). Ideally, we require the negative income values for business and rental property from the 1984 survey, but this is not possible. An alternative is to change any negative income for business and rental property from the 1988/89 and 1993/94 surveys to zero and recalculate disposable income. This approach was used in order to maintain continuity between the surveys.

The data on net direct tax from the 1984 HES is reported by respondents as the tax paid in previous years and so had to be estimated based on the tax system in 1984. The values imputed are, on average, slightly higher than those reported but in line with the aggregate tax to income ratio of the other survey years.

In all the surveys, negative expenditure is possible when refunds, trade-ins, or sales are greater than the costs of acquisitions. This often results in low or negative consumption. The absolute value of any negative values found in broad expenditure categories were added to household expenditure category in order to remove the negative amount. The amount was also added to household income since negative expenditure is a form of income.