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DEMOGRAPHIC TRENDS AND CONSUMPTION INEQUALITY IN AUSTRALIA BETWEEN 1975 AND 1993

BY GARRY F. BARRETT

University of New South Wales

THOMAS F. CROSSLEY

The Australian National University and York University

AND

CHRISTOPHER WORSWICK

Carleton University

We examine trends in consumption inequality among Australian households using the Australian Bureau of Statistics Household Expenditure Surveys collected over the period 1975 to 1993. We find that the distribution of consumption is much more equal than that of income and that both income and consumption inequality rose by significant amounts over the period. However, consumption inequality rose by much less (the Gini coefficient for income inequality rose by 17 percent while that for nondurable consumption rose by 9 percent). We then examine the effects of demographic trends, specifically population aging and changing family structures, and find they account for only a minor fraction in the overall growth in economic inequality.

I. INTRODUCTION

In this paper we examine trends in the distribution of household income and consumption in Australia over the period 1975–93. Research over the past decade has found a significant increase in wage and earnings inequality in Australia, paralleling the rise in inequality witnessed in other developed countries (see the survey by Borland, 1999). However, since income and earnings may be poor measures of household welfare we examine the distribution of consumption which is a more direct measure of household well-being. Consistent with our focus on household welfare, we implement normative measures of inequality to analyze trends in Australian consumption inequality. Additionally we examine whether the major demographic trends of the changing age and family structure of the

[1]Blundell and Preston (1998) demonstrate that anticipated consumption growth may lead to changes in the distribution of consumption with age that do not reflect changes in the welfare distribution unless preferences are homothetic or the real interest rate is always equal to the discount rate. Intuitively, this requires either that consumption does not respond to relative prices or there is no price variation over time. Uncertainty can also drive a wedge between consumption and welfare. This is avoided if there is no uncertainty or if consumption responds to uncertainty in a way that is proportional to the response of welfare to uncertainty. The latter corresponds to preferences which exhibit constant absolute risk aversion.

Note: Garry Barrett was a visitor at the Australian National University during the preparation of this paper and thanks members of that institution for their hospitality. The authors also thank Michael Veall and seminar participants at the Australian National University for comments and suggestions. The usual caveat applies.

Australian population served to exacerbate or ameliorate the changes in economic inequality.

By analyzing trends in the distribution of consumption in Australia we contribute to the recent literature examining the distribution of consumption expenditures in different countries. Furthermore by comparing the distribution of consumption with the distribution of various definitions of income we are able to compare the effects of private redistribution (through saving and borrowing) to the effects of public redistribution (through the tax-transfer system) on the distribution of household well-being at a point in time. This comparison is of independent interest, especially in the Australian context where the social safety net is tightly targeted.

The empirical analysis presented in this paper is based on the series of four Household Expenditure Surveys (HES) collected by the Australian Bureau of Statistics (ABS) over the period 1975 to 1993. We begin by examining the distribution within each cross section to provide a comparison with existing research on Australian income and earnings inequality (Borland, 1999; Harding, 1997) and the international literature on consumption inequality (Cutler and Katz, 1992; Johnson and Shipp, 1997; Pendakur, 1998; Blundell and Preston, 1998; Gouiveia and Tavares, 1995). We find that, as in other developed countries, the distribution of consumption is much more equal than that of income. In fact, in Australia the decrease in inequality as one goes from net (after taxes and transfers) income to consumption is as large as the decrease in inequality going from private (before taxes and transfers) to net income. Looking across the years, we find increases in both income and consumption inequality over the period but the former is much larger. This suggests that a significant fraction of the change in income inequality may represent an increase in the variance of temporary income fluctuations which households have some facility to smooth.

We then investigate the interplay of demographic trends and inequality in Australia. We use normative measures of inequality which are decomposable by population sub-group to investigate the contribution of these demographic changes to the rise in Australian consumption inequality over the period covered by our data.

Deaton and Paxson (1994) point out that an implication of intertemporal optimization by households is that the variance of expenditures within a birth cohort will increase as the cohort ages and shocks to "permanent income" accumulate. Consequently, an increase in cross-sectional expenditure inequality may simply reflect population aging without any change in the underlying economic processes. Therefore we examine how consumption inequality has evolved over time *within* specific cohorts, and whether more recent cohorts have experienced greater inequality than older cohorts did at *the same age*. Blundell and Preston (1998) show that cross-age or cross-cohort differences in consumption will reflect differences in welfare only when preferences, or the economic environment, satisfy certain restrictions.[1] Of course, interpreting income differences as welfare differences implies an even stronger set of restrictions.

A second important demographic trend in Australia has been the change in the distribution of the population across different family types, as has been emphasized by Harding (1997). For example, the proportion of individuals living

in sole parent families more than doubled between 1975 and 1993 from 3.7 percent to 7.9 percent. We also examine the effect of changes in family structure on Australian consumption inequality.

Our principle findings are that in Australia, as found for Britain by Blundell and Preston (1998), consumption inequality has progressively increased among more recent cohorts. However, somewhat surprising and in contrast to the results of Johnson and Shipp (1997) for the U.S., demographic change has played a minor role in the growth of economic inequality in Australia over the period 1975 to 1993.

The outline of the current paper is as follows. The next section describes the data upon which the analysis is based. In Section III we discuss the methods used in our analysis. The results of the analysis of inequality in the separate cross-sectional distributions of family income and consumption are presented in Section IV. In Section V we decompose levels of inequality in each year, and changes in inequality between years, across demographic groups. Section VI provides a discussion of the results and concluding comments.

II. The Data

The analysis presented in this paper is based on unit record data from the ABS HES for the years 1975–76, 1984, 1988–89 and 1993–94. The information on demographic characteristics, income and infrequent expenditure items (e.g. vehicle and property purchases, household bills) were recorded by personal interview and details of all other expenditures made by each household member, aged 15 years or more, during a 2 week period were recorded in personal diaries.[2] The surveys were representative of the Australian population and the sample of households were enumerated evenly over the respective 12 month periods.

The HES records expenditures while the main object of our analysis is consumption. Expenditure and consumption will differ at a point in time in the case of durable goods since by definition durables provide a flow of consumption services over multiple periods. To minimize the problems of imputing consumption flows to durable expenditures, and avoid the infrequency problem of durable expenditures given the 2 week reference period, we focus on the distribution of *non-durable* consumption.[3] To obtain a measure of non-durable consumption that is consistent across all surveys, we define non-durables as expenditures on food, alcohol and tobacco, fuel, clothing, personal and medical care, transport, recreation and current housing. Ideally, it would be preferable to include expenditures on household operations; however, this item is combined with durables (household equipment) in the 1975 survey and is therefore excluded from the analysis.

The definition of non-durables does include current housing costs. For families residing in rental accommodation, this simply corresponds to average weekly

[2]Regular but infrequent bills are prorated and the expenditure items correspond to average weekly amounts.

[3]Non-durable consumption will be an exact indicator of welfare if within-period utility functions are homothetic.

rent payments.[4] For families who owned or were purchasing their accommodation, we imputed a consumption flow following the method used by Pendakur (1998). For each survey, we performed OLS regressions of rent on a series of indicator variables for number of bedrooms and location of residence. For home owners and purchasers, the consumption flow from housing is imputed as the family's predicted rent from those regressions.

In selecting the sample for analysis several exclusions are imposed. First, we confine our sample to single family households. Multiple family households represent a small and constant portion of the population over our study period. Multiple family households are predominately comprised of unrelated young adults and the household income and expenditure information obtained from interviewing one household member is notoriously inaccurate. Secondly, we focus on families headed by an individual aged between 25 and 59 years of age to minimize the effects of labor force entry at earlier ages, and retirement and exit at later ages. To ensure our results are robust to outliers in the data, we trimmed the top and bottom 3 percent of observations based on the distribution of income. Lastly, a very small number of households reported negative expenditures in the components of non-durable consumption we examine and are therefore dropped from the analysis.

We also adjust nominal values of income and consumption for changes in prices over time. All nominal values are converted to 1998 dollars using the national consumer price index.[5] Ideally we would use state specific CPI series to account for regional variation in the cost of living but unfortunately the 1988 HES does not report state of residence.

III. Methods

A. *Measures of Inequality*

In order to compare our results with the existing literature on earnings and income inequality in Australia, the 90th–10th percentile ratio and the variance of log income are calculated. However, these summary measures have a number of important limitations as normative measures of inequality (see Atkinson, 1970; Sen, 1973). Most importantly, neither measure satisfies the Lorenz dominance criterion. To check for Lorenz dominance relations we estimate Lorenz curves $L(p)$, which show the cumulative share of total resources going to the poorest p percent of the population, for income and consumption in each year.

We also construct the Generalized Lorenz, curve $GL(p) = \mu L(p)$, which is obtained by scaling the Lorenz curve by the mean level of income. The Generalized Lorenz curve incorporates information regarding both equity ($L(p)$) and efficiency (μ) and thereby provides a measure of the level of welfare in the distribution (Shorrocks, 1983).

[4]The proportion of the sample who were renters in each year was: 1975–76 (26 percent), 1984 (24 percent), 1988 (25 percent) and 1993–94 (28 percent).

[5]Note that using a single price index to deflate expenditures of all households, irrespective of their actual consumption bundle, is appropriate only if preferences are homothetic.

A limitation of Lorenz (and Generalized Lorenz) curves for inequality analysis are that they only provide a partial ranking of distributions. If two Lorenz curves intersect it is not possible to rank one distribution as more equal than another distribution by the dominance criterion. To ensure a complete ordering of distributions it is necessary to use an inequality index. The indices we use are members of the Atkinson–Kolm–Sen (AKS) family of normative inequality indices which can be represented as

$$I(y) = 1 - \frac{\xi}{\mu}, \tag{1}$$

where μ is mean income and ξ is the "equally distributed equivalent" (EDE) income. The EDE income is that level of income which if it were equally distributed to everyone in the population would generate the same level of social welfare as the actual income distribution. Consequently the AKS relative inequality indices can be interpreted as measuring the share of total income which could be wasted with social indifference if the remainder were redistributed equally. Further, the EDE income is ordinally equivalent to measures of social welfare. Since the indices are relative indices, they are homogeneous of degree zero in income and hence scale free. The members of the AKS family which we estimate are the Gini coefficient and several of the Atkinson (or mean of order r) inequality indices.

The Atkinson indices are defined as:

$$I^{\alpha}(y) = \begin{cases} 1 - \dfrac{1}{\mu}\left[\dfrac{1}{n}\sum_{i=1}^{n} y_i^{1-\alpha}\right]^{1/(1-\alpha)}, & \alpha \geq 0,\ \alpha \neq 1 \\ 1 - \dfrac{1}{\mu}\sum_{i=1}^{n} y_i^{1/n}, & \alpha = 1 \end{cases} \tag{2}$$

where y_i is income or consumption of household i, n is the size of the population and α is the "inequality aversion" parameter with larger values of α corresponding to greater inequality aversion.

Both the Gini coefficient and Atkinson indices satisfy the Lorenz dominance criterion. The main difference between the two classes of indices is in their sensitivity to transfers between different points in the distribution. The Gini coefficient weights transfers according to the differences in the rank order of the individuals involved. In contrast, the Atkinson indices weight a given transfer according to the income shares of the individuals.[6] The Atkinson indices corresponding to larger values of α place progressively greater social weight on transfers involving individuals with the smallest income shares.

A further advantage of the Atkinson indices is that they are readily decomposable by population sub-group. The aggregate inequality index value for a distribution can be decomposed into a component due to inequality within population sub-groups (I_W) and a component due to inequality between sub-groups (I_B). Following Blackorby, Bossert and Donaldson (1995), the decomposition is given by:

$$I^{\alpha}(y) = I_W^{\alpha}(y) + I_B^{\alpha}(y) \tag{3}$$

[6]The Atkinson indices satisfy the "principle of diminishing transfers" property whereas the Gini coefficient does not.

with

$$I_W^{\alpha}(y) = 1 - \frac{\sum_{k=1}^{K} n_k \xi_k}{n\mu} = \sum_{k=1}^{K} s_k I_k^{\alpha}(y) \tag{4}$$

where s_k is sub-group k's share of total income, and

$$I_B^{\alpha}(y) = \frac{\sum_{k=1}^{K} n_k \xi_k - n\xi}{n\mu}. \tag{5}$$

The within-group inequality measure is a weighted sum of the inequality index values calculated over the separate subgroup distributions, with the weights equal to the subgroup's share of total income.[7] The between-group inequality measure is calculated as the inequality among the sub-group EDE incomes. An intuitive interpretation of this decomposition is that the within-group component measures the proportion of total income that may be saved by moving from the actual distribution to a second distribution where each individual receives their sub-group's EDE income. The between-group component then measures the proportion of total income which may be saved by moving from that hypothetical distribution to another where each individual receives the population EDE income. This method is used to decompose aggregate inequality by age group and family type in each of the surveys.

In addition, we present a decomposition of *changes* in inequality over time into components corresponding to (a) changes in inequality within groups, (b) changes in inequality between groups, and (c) changes in population shares. With this technique we are able to isolate the contribution of demographic change (component (c)) to the trends in aggregate inequality.[8]

By estimating the conventional summary measures of inequality plus the Lorenz curve and AKS relative indices, a broad range of normative positions are encompassed in the analysis. This also serves to highlight which segments of the income and consumption distribution experienced most change over time. Furthermore, we present bootstrapped standard errors for the inequality indices estimated which enables us to undertake formal hypothesis testing of the changes in inequality.[9]

B. *Unit of Analysis*

When analysing consumption patterns it is natural to think of the family as the basic spending unit although social (and household) welfare is usually expressed as a function of the well-being of constituent individuals. An individual's well-being will be determined by their access to family resources which will

[7]Note that a sub-group's share of total income can be expressed as the sub-group's population share multiplied by the ratio of the sub-group's mean income to the population mean income. This fact is used to decompose *changes* in the inequality indices over time into the three components described in the text.

[8]The non-linearity of the Atkinson indices means that the decompositions of changes over time are only approximate, since they are based on a first order Taylor's series expansion.

[9]The bootstrap standard errors were calculated by simulating the distribution of each inequality index with 500 replications. We also calculated the asymptotic standard errors for the Atkinson indices following Thistle (1990) and for the Gini coefficient following Barrett and Pendakur (1995). The inferences we draw are invariant to whether we use asymptotic or bootstrapped standard errors, or the percentile-t method for bootstrapping the asymptotic test statistic.

be a function of family characteristics, particularly family size. This is because many goods, such as housing and transportation, have within-family public good features. Similarly, there may be economies of scale in consumption for larger families. Therefore we use an adult equivalent scale (AES) to adjust family income and consumption to individual-equivalent levels that are comparable across individuals in families of differing size.

The adult equivalence scale we adopt is the square root of the number of family members.[10] We adjust family income and consumption by dividing by the AES. Since the HES are weighted at the household level, we then multiply the household weight by family size as recommended by Danziger and Taussig (1979). By this method we generate distributions of individual-equivalent income and consumption that are representative of the population of individuals in Australia. Implicit in this procedure is the assumption that resources are equally shared within the household, which is unavoidable since the HES does not provide details on the consumption of individual family members. An important consequence of this assumption is that the measured level of (adult equivalent) income inequality will by definition be lower than the level of inequality found in analyses of the distribution of individual earnings and income (which implicitly assume no sharing among family members).

IV. Consumption and Income Inequality in Cross Section

A. *Income Inequality*

We begin by examining the distribution of individual-equivalent income and expenditure in each survey year. Since the Lorenz curves for gross income lie close to each other, we plot the *difference* between the line of equality and the Lorenz curve (as recommended in Deaton, 1997) in Figure 1. It is clear that equivalent-income inequality increased between 1975 and 1993. In terms of the sequence of changes over time, income inequality increased from 1975 to 1984, decreased slightly from 1984 to 1988 and then increased again from 1988 to 1993. The decrease in inequality between 1984 and 1988 coincides with the upswing of the business cycle. The Lorenz curves do not cross and hence the distributions are unambiguously ranked. Inequality indices that obey the principle of transfers will assign the same ranking to these distributions although their magnitudes will reflect their sensitivity to various parts of the distribution.

Table 1 reports the summary measures of gross income inequality for the four years. Those measures which do not obey the principle of transfers (the variance of log income and 90/10 percentile ratios) could in principle report a different story, but in this case they do not; every measure indicates increasing inequality from 1975 to 1984, a decrease to 1988 which is more than reversed by 1993. The overall increase in income inequality between 1975 and 1993 was substantial; for example, the Gini coefficient increased by 17 percent.

[10]This AES was used by Pendakur (1998) in analysing Canadian consumption inequality and it lies near the middle of the range of AES examined in Buhmann *et al.* (1987). Note that using a price-insensitive AES requires that all households at the same utility level have the same expenditure shares: see Pendakur (1999) for an analysis of the consequences of this restriction.

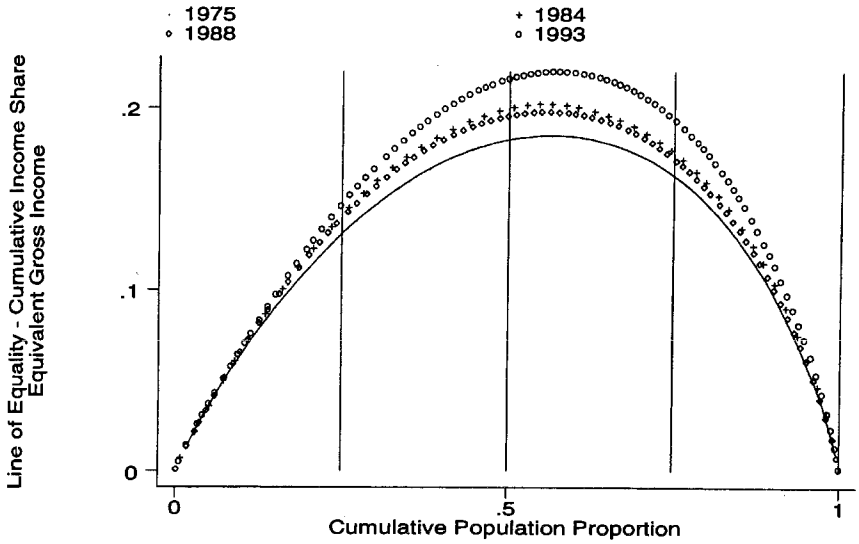

Figure 1. Transformed Lorenz Curve: Income

From Table 1 we see that the Atkinson indices with greater inequality aversion report a higher level of inequality in each survey year; however, the general rise in inequality over time was much smaller. That is, the least inequality averse Atkinson indices show the greatest increase in income inequality. This suggests that most of the change in the distribution did not occur at the very bottom of the income distribution.

TABLE 1

INCOME INEQUALITY IN THE FOUR HOUSEHOLD EXPENDITURE SURVEYS

Measure of Inequality	1975	1984	1988	1993	Δ 1993–75 [z-stat.]	%Δ 1993–75
Variance of ln (income)	0.247	0.283	0.280	0.330	0.083	34%
	(0.009)	(0.008)	(0.007)	(0.009)	[6.52]	
90/10 ratio	3.551	4.245	4.143	4.433	0.882	25%
	(0.136)	(0.103)	(0.152)	(0.074)	[5.70]	
Gini coefficient	0.259	0.280	0.275	0.302	0.043	17%
	(0.004)	(0.004)	(0.004)	(0.003)	[8.60]	
Atkinson ($\alpha = 0.5$)	0.054	0.062	0.060	0.072	0.018	33%
	(0.002)	(0.002)	(0.002)	(0.001)	[8.05]	
Atkinson ($\alpha = 1.0$)	0.109	0.124	0.122	0.143	0.034	31%
	(0.003)	(0.003)	(0.003)	(0.002)	[9.43]	
Atkinson ($\alpha = 2.0$)	0.220	0.244	0.243	0.279	0.059	27%
	(0.007)	(0.006)	(0.007)	(0.005)	[6.86]	

Notes:

1. Standard errors in round parentheses, z-statistics in square parentheses.

2. For a two tailed test of 1993 = 1975 the 5 percent critical value for the z-statistic is 1.96. For a 1 tailed test of 1993 > 1975, the 5 percent critical value for the z-statistic is 1.65.

3. Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights × household size).

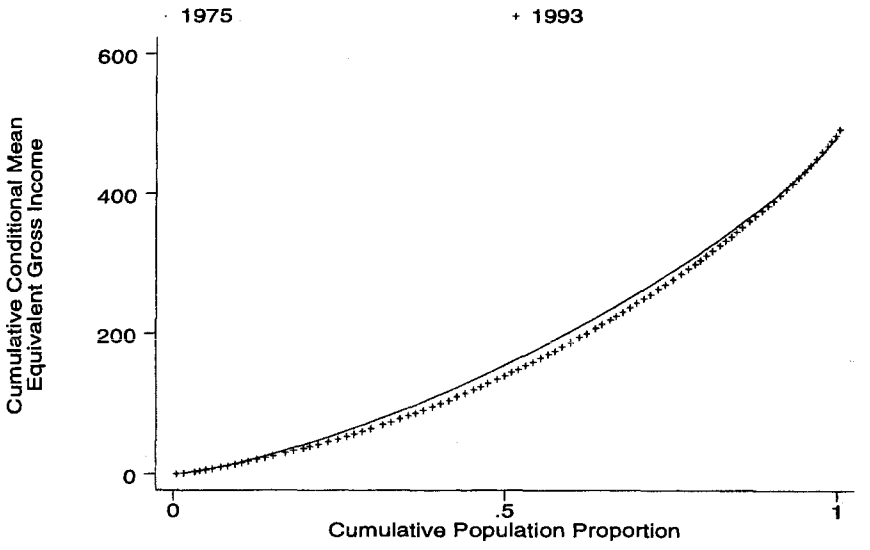

Figure 2. Generalized Lorenz Curves: Income

Bootstrapped standard errors for each inequality index are reported in Table 1. The second last column of Table 1 also presents tests of the equality of each index in 1975 and 1993, which shows that the rise in inequality over time was statistically significant.

We conclude this step of the analysis by examining the combined effects of changing inequality and income growth on welfare. Even with increasing inequality, economic growth may be sufficient to ensure that all members of society experienced increasing welfare. In Figure 2 we present the Generalized Lorenz curves for the 1975 and 1993 survey years. The curve for 1993 dips below the 1975 curve and then catches up, with the turning point around the 50 percent population percentile. This indicates real welfare losses by the bottom of the income distribution and real welfare gains by the top half of the distribution (where the welfare measure is equivalent gross income). Table 2 draws attention to the middle of the distribution, where we can see that the average real equivalent

TABLE 2

PERFORMANCE OF TOP, MIDDLE AND BOTTOM (INCOME)

Year	Bottom 25%	Middle 50%	Top 25%	Overall Mean Weekly Equivalent Gross Income, 1998 ($)
	Group Mean Weekly Gross Equivalent Income, 1998 ($) (Differences in Generalized Lorenz Ordinates Scaled by Population Fraction)			
1975	234.7	449.9	805.7	489
1984	212.5	450.2	819.2	483
1988	213.9	463.3	833.6	495
1993	203.9	449.5	877.1	495

Note: Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights × household size).

income of the bottom quarter of the income distribution fell from 1975 to 1993 while top quarter experienced real gains. The average real equivalent income of the middle remained relatively constant.

B. *Consumption Inequality*

We now turn our analysis from equivalent income to equivalent consumption, which we believe is a superior measure of household well-being. We begin with a comparison of income and consumption inequality. Figure 3 illustrates the

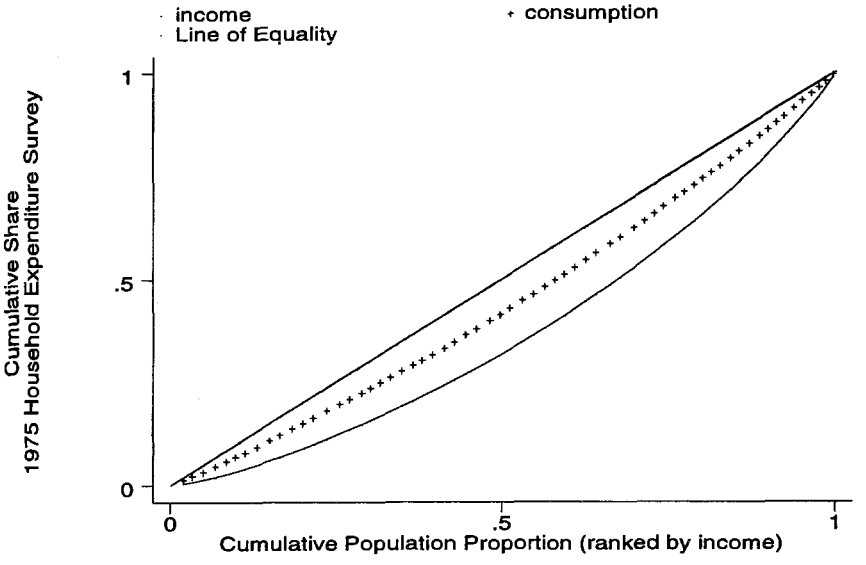

Figure 3. Concentration of consumption relative to income

income Lorenz curve and consumption concentration curve for 1975.[11] The income Lorenz curve for 1975 showed that the bottom 25 percent of individuals (or individuals with income below $321) received 13.7 percent of total income. The concentration curve for consumption reports the cumulative proportion of total consumption received by the bottom fraction of the population *ordered by income*.[12] The consumption concentration curve for 1975 shows that individuals with income below $321 received 21 percent of total consumption. This clearly shows that household saving and borrowing activities effectively redistribute resources toward the bottom of the income distribution, serving to reduce the level of inequality evident in a snapshot of the income distribution.

The equalizing effect of a family's saving and borrowing activities is clearly evident in the 1975 consumption concentration curve (Figure 3), and similarly evident in each of the other three years (for which the graphs are omitted). In

[11]The corresponding curves for the years 1984, 1988, and 1993 were very similar to that for 1975.

[12]Concentration curves are one way to illustrate the joint distribution of two variables. More specifically, the consumption concentration curve reflects the correlation between income and consumption shares across quantiles of the income distribution.

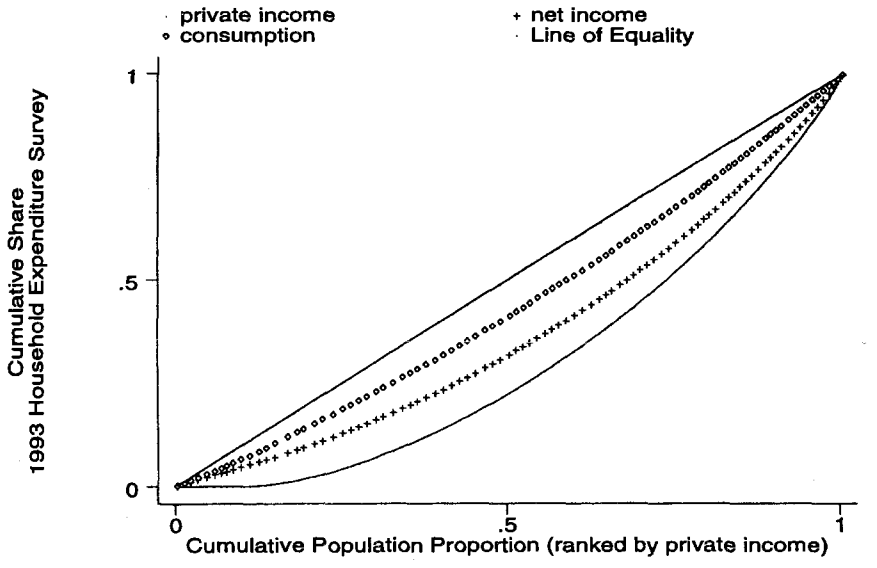

Figure 4. Concentration of consumption relative to income

every survey year consumption is strikingly more equal than gross income. Harding (1997) has emphasized the role that taxes and government transfers have played in equalizing income in Australia. Figure 4 based on the 1993 data further highlights this point. The lowest curve in the figure is the Lorenz curve for "private income," which is gross income minus government transfers and benefits. The next curve is the concentration curve for "net income," which is private income plus government transfers and benefits, minus income taxes.[13] These pictures show the difference in inequality between net income and consumption (the result of private smoothing and redistributive activities) is approximately as large as the difference in inequality between gross and net income (resulting from the tax and transfer activities of the state). In a purely descriptive sense, private redistribution through consumption smoothing and insurance activities is as important as redistribution achieved through the tax-transfer system. The latter appears to be more important towards the bottom of the distribution.[14]

We next examine changes in consumption inequality over the study period. The transformed Lorenz curves for consumption (showing the *difference* between the line of equality and the Lorenz curve) are illustrated in Figure 5. It is evident that there was a slight increase in consumption inequality between 1975 and 1984,

[13]An important caution is that taxes in the 1993 HES are not reported taxes paid but rather taxes payable as imputed by the ABS. We suspect that, if anything, imputed taxes payable are more progressive than actual taxes paid which serves to strengthen the point we are making.

[14]As a cautionary note, it is important to recognize that the graph has no counterfactual content. From this graph alone we cannot infer the consequences of a reduction in public redistribution as the data tell us nothing about what individuals would do in the absence of those mechanisms. Making plausible inferences about such counterfactuals is difficult and requires a source of exogenous variation in public provision (a natural experiment). We are unaware of any Australian studies of this sort; examples for the international literature include Browning and Crossley (1998) and Gruber (1997).

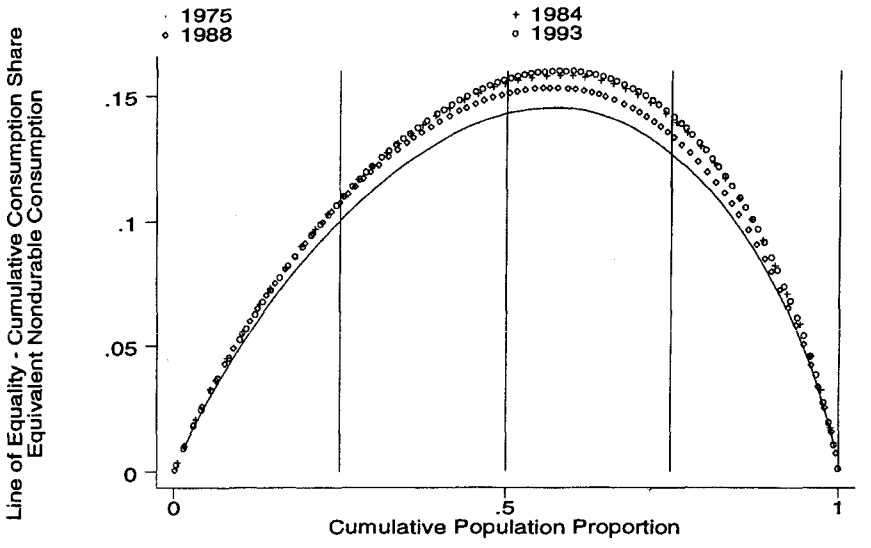

Figure 5. Transformed Lorenz Curve: Consumption

a slight decrease to 1988 which did not completely reverse the changes between 1975 and 1984, and another increase which brought consumption inequality to 1984 levels again in 1993. These changes appear to be related to the business cycle: the unemployment rate was below 5 percent in 1975, above 8 percent in 1984, fell by approximately 2 percent to 1988 and then rose to over 10 percent by 1993 (Borland and Kennedy, 1998). Comparing Figure 5 with Figure 1, it is also evident that the rise in consumption inequality between 1988 and 1993 was considerably less dramatic than the increase in income inequality. One interpretation of these findings is that part of the recent increase in income inequality reflects an increase in transitory income fluctuations which households have been able to smooth to some degree.

As with income, the consumption Lorenz curves do not cross and the distributions are unambiguously ranked. The inequality indices for consumption are presented in Table 3. Among the Atkinson indices, the growth in consumption inequality is largely independent of the inequality aversion parameter. By all summary measures, consumption was considerably more equal than income at the beginning of the study period and the growth in consumption inequality was less than that for income inequality over the course of the study period. Nevertheless, the changes in consumption inequality were both statistically and economically significant.

In Figure 6 we present the Generalized Lorenz curves for real equivalent consumption for the 1975 and 1993 survey years. The Generalized Lorenz curve for 1993 lies everywhere on or above the Generalized Lorenz curve for 1975. Thus when welfare is measured by real equivalent consumption, it was non-declining over the period for all segments of the population. Some portions of the population experienced real gains. Table 4 draws attention to average consumption level by different segments of the distribution. We see that all segments experienced rising average

TABLE 3

CONSUMPTION INEQUALITY IN THE FOUR HOUSEHOLD EXPENDITURE SURVEYS

Measure of Inequality	1975	1984	1988	1993	Δ 1993–75 [z-stat.]	%Δ 1993–75
Variance of ln (income)	0.131	0.159	0.152	0.157	0.025	19%
	(0.004)	(0.005)	(0.005)	(0.003)	[4.94]	
90/10 ratio	2.547	2.833	2.768	2.869	0.322	12%
	(0.043)	(0.038)	(0.069)	(0.049)	[5.27]	
Gini coefficient	0.202	0.221	0.214	0.221	0.019	9%
	(0.003)	(0.003)	(0.003)	(0.002)	[4.24]	
Atkinson ($\alpha = 0.5$)	0.032	0.038	0.036	0.038	0.006	19%
	(0.001)	(0.001)	(0.001)	(0.001)	[4.24]	
Atkinson ($\alpha = 1.0$)	0.063	0.075	0.071	0.075	0.012	19%
	(0.002)	(0.002)	(0.002)	(0.002)	[4.95]	
Atkinson ($\alpha = 2.0$)	0.123	0.147	0.140	0.144	0.021	17%
	(0.003)	(0.003)	(0.004)	(0.003)	[4.95]	

Notes:

1. Standard errors in round parentheses, z-statistics in square parentheses.
2. For a two tailed test of 1993 = 1975 the 5 percent critical value for the z-statistic is 1.96. For a 1 tailed test of 1993 > 1975, the 5 percent critical value for the z-statistic is 1.65.
3. Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights × household size).

real equivalent expenditure; however, the greatest absolute and proportional gains were experienced among the top quartile.

We conclude this section by noting that in a companion paper (Barrett, Crossley, and Worswick, 2000), we investigate the sensitivity of the principal results of this section to a number of methodological choices (such as AES and

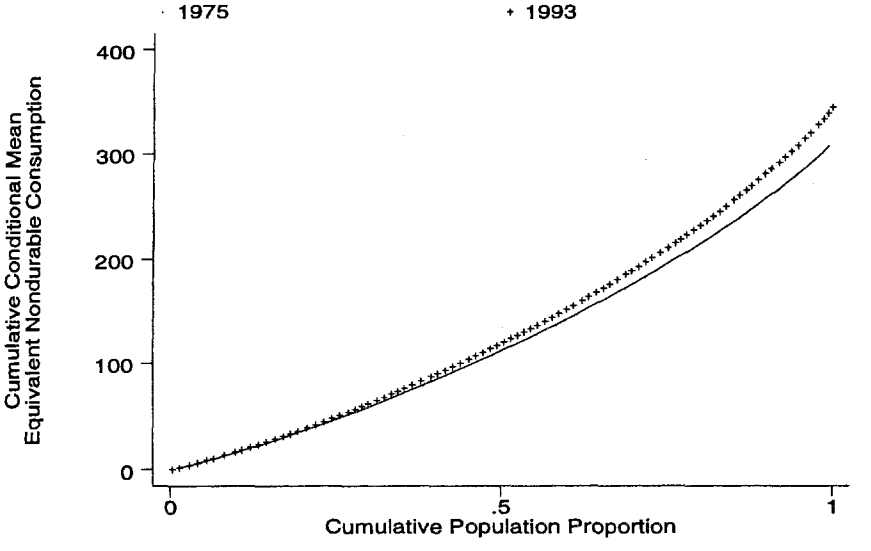

Figure 6. Generalized Lorenz Curves: Consumption

TABLE 4

PERFORMANCE OF TOP, MIDDLE AND BOTTOM (CONSUMPTION)

	Bottom 25%	Middle 50%	Top 25%	Overall Mean Weekly Equivalent Non-durable Consumption 1998 ($)
	Group Mean Weekly Equivalent Non-durable Consumption, 1998 ($) (Differences in Generalized Lorenz Ordinates Scaled by Population Fraction)			
1975	187.8	296.1	472	313
1984	182.7	303.9	505.4	324
1988	185.2	309	500.7	326
1993	196	321.5	541	345

Note: Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights × household size).

definition of non-durables) and potential data problems. The qualitative pattern of our results is very robust.

V. DEMOGRAPHIC CHANGE AND INEQUALITY

In this section we examine the role that demographic change has played in accounting for the observed trends in inequality in Australia. There are a number of reasons, both theoretical and practical, why an analysis of changes in inequality should take care to account for demographic change. For example, Deaton and Paxson (1994) point out that if the shocks that households experience have some permanent component, and are at least in some part idiosyncratic to households, the variance of welfare within a cohort will increase as the cohort ages. This theoretical proposition has been shown to hold in several countries. Thus aging alone could generate increasing inequality in a society.

A. *Demographic Trends*

We begin this section outlining the basic demographic trends in Australia over the data period.[15] First we consider the age distribution of household heads in each of the sample years. The calculations are for households weighted by household size, so that the interpretation is the *fraction of individuals living in a household with a particular set of characteristics*. From 1975 to 1993 there was a clear trend for a greater fraction of the population living in households headed by older individuals. The pattern reflects both the general aging of the population as well as changes in the distribution of individuals across household types. We turn to the latter next.

The time profile of the relationship between mean household size and age of household head for each 5-year birth cohort reveals two important patterns.[16] First, together the age profiles indicate a humped shaped life cycle profile of household size. Second, the household size—age profile of successive cohorts lie *below* the profile of the previous cohort. This indicates a shift to smaller households, conditional on age of head, among more recent cohorts.

[15]Tables describing the demographic trends outlined in this subsection are available from the authors on request.

[16]In a country with as much immigration as Australia, samples from birth cohorts in different survey years are inevitably drawn from slightly different populations.

We then consider the distribution of individuals by household type and age of head for each birth cohort. The family types we examine are: singles, couples without children, couples with children, and lone parent families. Again both life cycle and cohort patterns are evident. Single person households are a common living arrangement among the young and the elderly. There is an increasing prevalence of single person households among more recent cohorts, especially at younger ages. Couples without children is also an important living arrangement among the young and elderly, and a living arrangement whose prevalence is remarkably unchanged across cohorts. Couples with children is the predominate living arrangement among individuals living in households with a middle-aged head. However, the predominance of couples with children is declining among more recent cohorts which is consistent with the falling Australian birth rate. Finally, lone parent households are much more common among young households and more recent cohorts.

Having documented the basic demographic trends (towards older household heads, smaller households, and more singles and lone parents) in the Australian population over the 1975 to 1993 period, we now examine whether these trends tended to generate or mitigate inequality. We exploit the decomposability of Atkinson indices to decompose inequality in each year into inequality within and between demographic groups.[17] We then examine the role that demographic change played in the evolution of inequality through time.

B. *Aging and Inequality*

Table 5 presents the decomposition of the Atkinson indices for consumption inequality by age group in each of the survey years. The consistent message from this table is that the within age group inequality is much more important than between age group inequality. For all the indices considered and for each survey year the between-group component accounts for less than 10 percent of the aggregate level of inequality. Therefore, at a point in time, it is clear that the predominant share of inequality is generated within the population sub-group distributions defined by age.

It is difficult to discern from Table 5 the relative contribution of within and between group inequality and demographic trends to changes in inequality over the study period.[18] Furthermore, while survey to survey changes in the population shares contribute to the change in within group inequality (via the weights), their contribution is not readily apparent. Accordingly, we present in the top panel of Table 7 a further decomposition of the *changes* in inequality between 1975 and 1993 into the components due to changes in within group inequality, changes in the populations share (demographic change) and changes in between group inequality.[19] The results show that the predominant share (79–84 percent) of the growth in population inequality occurred within groups. The results also show

[17]Decompositions of Gini Coefficients have been proposed; however, they involve a difficult to interpret residual (Deaton, 1997).

[18]There is evidence of a countercyclical pattern in the between age group inequality component. This would be consistent with the cyclical sensitivity of labor market entry.

[19]Because of the non-linearity of the indices, the decomposition is approximate, and there is a very small residual which we do not report.

TABLE 5

INEQUALITY IN EQUIVALENT CONSUMPTION BY AGE GROUP AND YEAR

	1975	1984	1988	1993
	Atkinson Inequality Index ($\alpha = 0.5$)			
Total	0.032	0.038	0.036	0.038
Within age groups	0.030	0.035	0.034	0.035
(% of total)	(94)	(92)	(94)	(92)
Between age groups	0.002	0.003	0.002	0.003
(% of total)	(6)	(8)	(6)	(8)
	Atkinson Inequality Index ($\alpha = 1$)			
Total	0.063	0.075	0.071	0.075
Within age groups	0.060	0.070	0.068	0.069
(% of total)	(95)	(93)	(96)	(92)
Between age groups	0.003	0.005	0.003	0.006
(% of total)	(5)	(7)	(4)	(8)
	Atkinson Inequality Index ($\alpha = 2$)			
Total	0.123	0.147	0.14	0.144
Within age groups	0.117	0.136	0.134	0.133
(% of total)	(95)	(93)	(96)	(92)
Between age groups	0.006	0.011	0.006	0.011
(% of total)	(5)	(7)	(4)	(8)

Note: Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights × household size).

that the aging of the population had a minor impact tending to *reduce* the level of population inequality.

Inequality indices for the distribution of equivalent consumption by age group are reported in Appendix Table 1. The evolution of inequality within birth cohorts can be traced by reading diagonally down the table. For example, the first entry in the table, 0.062, corresponds to the cohort born in 1945–49 who were aged 25–29 years in 1975. By age 35–39 years (1984) the level of inequality within the cohort increased to 0.68.[20] At ages 40–44 (1988) and 45–49 (1993), the level of inequality was 0.065 and 0.071, respectively. From examining the time path of inequality within the birth cohorts it is apparent that the 1945–49 and older cohorts experienced increasing inequality as they aged (apart from a slight decrease in 1988 associated with the peak of the business cycle). Cohorts born after 1949 experienced relatively high levels of inequality at the initial stage of their life-cycle which either remained static (the 1950–54 cohort) or declined over time.

By reading along the rows of Appendix Table 1 one can readily compare the inequality experienced by different cohorts at the same age. It is strikingly apparent that all age groups have witnessed an increase in inequality over time, indicating that successive generations have experienced progressively greater inequality than previous generations at the same age. In addition, the greatest growth in consumption inequality has occurred at the earliest stage of the life-cycle. However, since the more recent cohorts account for a diminishing share of the population over the study period, the aging of the Australian population has tended to reduce the level of aggregate inequality at a point in time.

[20]Unfortunately, given the age grouping in the raw data and the uneven spacing of the surveys, it is not possible to obtain an exact alignment of birth cohorts across the 4 surveys.

C. *Family Structure and Inequality*

Table 6 presents a decomposition of Atkinson indices for consumption inequality by family type. As with age groups, we see that the within-group inequality (94–97 percent of total inequality) is much more important than between group inequality. Turning to the decomposition of changes in inequality in the bottom panel of Table 7, we see the general rise in inequality has occurred across all family types, with changes in the within-group component accounting for 74–75 percent, and the between-group component accounting for 21–22 percent, of this growth in population inequality. The trends in partnering and child-rearing have had a minor effect of augmenting the growth in consumption inequality.

Appendix Table 2 reports the inequality indices for the separate family types across the survey years. The striking feature of this table is the dramatic increase in consumption inequality among lone parent families. Inequality among lone parent families increased by over 68 percent over the study period, compared to an increase of 1 percent among couples without children. Although lone parent families represented an increasing share of the population over time, they only account for a minor fraction of all families and hence the rapid growth in inequality among lone parent families is not strongly reflected in the decompositions in Table 6.

VI. Discussion

In this paper we have investigated economic inequality in Australia, focusing on consumption inequality, over the period 1975 to 1993. We find that consumption is much more equal than gross income, or even income net of taxes and transfers;

TABLE 6

Inequality in Equivalent Consumption by Family Type and Year

	1975	1984	1988	1993
	Atkinson Inequality Index ($\alpha = 0.5$)			
Total	0.032	0.038	0.036	0.038
Within family types	0.031	0.037	0.034	0.036
(% of total)	(97)	(97)	(94)	(95)
Between family types	0.001	0.001	0.002	0.002
(% of total)	(3)	(3)	(6)	(5)
	Atkinson Inequality Index ($\alpha = 1$)			
Total	0.063	0.075	0.071	0.075
Within family types	0.061	0.072	0.068	0.071
(% of total)	(95)	(96)	(96)	(95)
Between family types	0.002	0.003	0.003	0.004
(% of total)	(5)	(4)	(4)	(5)
	Atkinson Inequality Index ($\alpha = 2$)			
Total	0.123	0.147	0.14	0.144
Within age groups	0.119	0.140	0.133	0.136
(% of total)	(97)	(95)	(95)	(94)
Between age groups	0.004	0.007	0.007	0.008
(% of total)	(3)	(5)	(5)	(6)

Note: Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights × household size).

TABLE 7

DECOMPOSITION OF CHANGES IN ATKINSON INEQUALITY INDICES FOR EQUIVALENT CONSUMPTION, 1993–75

	$\alpha = 0.5$	$\alpha = 1$	$\alpha = 2$
	By Age Group		
Total	0.0062	0.012	0.0216
Within group	0.0052	0.0098	0.0171
(% total)	(84)	(81)	(79)
Demographics	−0.0002	−0.0004	−0.0003
(% total)	(−3)	(−3)	(−1)
Between group	0.0013	0.0026	0.0049
(% total)	(21)	(22)	(23)
	By Family Type		
Total	0.0062	0.012	0.0216
Within group	0.0046	0.0089	0.0163
(% total)	(74)	(74)	(75)
Demographics	0.0003	0.0005	0.0005
(% total)	(5)	(4)	(2)
Between group	0.0013	0.0026	0.0048
(% total)	(21)	(22)	(22)

Notes:

1. Total denotes the total change in the inequality index. Within group denotes the change due to changes in the within group inequalities. Demographics denotes the change due to changes in the population shares of the groups. Between groups denotes the change due to changes in between group inequality.

2. Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights × household size).

that income and consumption inequality grew over the study period; and that the level of inequality displays macroeconomic sensitivity. Each of these findings is consistent with the international literature (Pendakur, 1998, Cutler and Katz, 1992). The greater equality of consumption, even compared to net income, highlights the important role of private arrangements for smoothing and redistributing income. However, since the data have no counterfactual content we are unable to infer how households would fare if public programs were to change.

Income inequality grew much more than consumption inequality. For Canada, Pendakur (1998) also found that income inequality grew more rapidly than consumption, though the difference between the two measures was not so dramatic. However, in the U.S., the pattern was reversed where consumption inequality grew more quickly than income inequality (Cutler and Katz, 1992). One interpretation of our result is that in Australia the increase in income inequality in part reflects an increase in the variance of transitory income fluctuations which households can largely smooth (combined with the potentially more effective public redistribution achieved through tighter targeting of social programs).

There were several important demographic shifts over the period. We investigated the role that demographic change has played in changing inequality in Australia and found that within age group consumption inequality is much more

important than between age group inequality in every year. A similar result was obtained for family types. Although more recent cohorts have experienced greater inequality than previous generations at the same age, the aging of the Australian population has had a minor role in offsetting the general rise in inequality. Changing family arrangements (particularly the increase in lone parent families) had the minor effect of reinforcing the rise in inequality. One possible reason for the minor importance of demographic change in accounting for the trend in inequality is our use of equivalence scales. If the "correct" equivalent scale is used then "purely demographic" reallocations of the population across different family types may leave inequality in *equivalent* resources unaffected. Alternately, where such reallocations have an economic component (such as changing the numbers of earners in households) then such a result need not follow and the increasing numbers of lone parents and dual earner couples might be expected to have some impact. However, the decompositions of the inequality indices by age group and family structure clearly show that the economic forces generating the rise in inequality have impacted on all of these demographic groups.

Our findings for Australia regarding the role of demographic change contrast those of Johnson and Shipp (1997) who report that demographic change was a significant factor in the growth of economic inequality in the U.S. An important component of the demographic shifts investigated by Johnson and Shipp involve education categories, which are unavailable in our data. Nevertheless, the results of this paper suggest that further cross-national comparisons of the mechanism of inequality changes, and its relationship to institutions, would be a fruitful area of future research.

APPENDIX

APPENDIX TABLE 1

INEQUALITY IN EQUIVALENT CONSUMPTION BY AGE GROUP AND SURVEY YEAR

	Atkinson Inequality Index with $\alpha = 1$ (Share of Population)			
	1975	1984	1988	1993
25–29	0.062	0.088	0.090	0.075
	(0.161)	(0.130)	(0.118)	(0.103)
30–34	0.064	0.067	0.070	0.078
	(0.192)	(0.203)	(0.172)	(0.181)
35–39	0.065	0.068	0.067	0.068
	(0.189)	(0.217)	(0.211)	(0.202)
40–44	0.049	0.065	0.065	0.066
	(0.142)	(0.179)	(0.214)	(0.182)
45–49	0.062	0.068	0.061	0.071
	(0.139)	(0.111)	(0.121)	(0.153)
50–54	0.053	0.071	0.058	0.056
	(0.102)	(0.079)	(0.099)	(0.110)
55–59	0.063	0.062	0.071	0.069
	(0.075)	(0.081)	(0.065)	(0.068)

Note: Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights × household size).

APPENDIX TABLE 2

INEQUALITY IN EQUIVALENT CONSUMPTION BY FAMILY TYPE AND SURVEY YEAR

	Atkinson Inequality Index with $\alpha = 1$ (Share of Population)			
	1975	1984	1988	1993
Singles	0.074	0.082	0.089	0.086
	(0.019)	(0.033)	(0.042)	(0.049)
Couples, with children	0.061	0.071	0.066	0.070
	(0.927)	(0.871)	(0.863)	(0.841)
Couples, no children	0.072	0.090	0.081	0.073
	(0.037)	(0.079)	(0.076)	(0.091)
Lone parents	0.044	0.041	0.074	0.074
	(0.017)	(0.017)	(0.019)	(0.019)

Note: Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights × household size).

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