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DEMOGRAPHIC TRENDS AND CONSUMPTION
INEQUALITY IN AUSTRALIA 1975-1993

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Abstract

We examine trends in consumption inequality among Australian households using the Australian Bureau of Statistics Household Expenditures Surveys collected over the period 1975 to 1993. We find that consumption is much more equal than 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% while that for nondurable consumption rose by 9%). We then examine the effects of demographic trends, specifically population ageing 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 1975-1993. Research over the past decade has found a significant increases 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 direct measure of household well-being. Consistent with our focus on household welfare, we implement normative measures of inequality to analyse trends in Australian consumption inequality. Additionally we examine whether the major demographic trends of the changing age and family structure of the Australian population served to exacerbate or ameliorate the changes in economic inequality.

By analysing trends in the distribution of consumption in Australia we contribute to 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 observed at a point in time. This comparison is of independent interest in itself. In addition, an examination of the Australian situation is particularly enlightening given the tight targeting of the social safety net in that country.

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). We find that, as in other developed countries, consumption is much more equal than income. In fact, in Australia the increase in inequality as one goes from net (after taxes and transfer) income to consumption is as large as the increase in equality between private (before taxes and transfers) and 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 changes in income inequality represent increases 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. Deaton and Paxson (1994) point out that an implication of intertemporal optimization by households is that the variance of expenditure within a birth cohort will increase as the cohort ages and shocks to “permanent income” accumulate. Thus the cross sectional inequality in expenditure in an economy may increase simply as a consequence of an ageing population without any change in the underlying economic processes. The relevant question is therefore whether more recent cohorts are experiencing more inequality than older cohorts did *at the same age*.

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% to 7.9%.¹ We use normative measures of inequality which are decomposable by population subgroup to investigate the contribution of these demographic changes to the rise in Australian consumption inequality over the period covered by our data. Our principle findings are somewhat surprising and contrast those of Johnson and Shipp (1997) for the US: demographic change appears to be an insignificant factor in the growth in economic inequality in Australia over the period 1975-1993.

The outline of the current paper is as follows. The next section describes the ABS Household Expenditure Survey data upon which the analysis is based. In section 3 we discuss the methods used in our analysis. The results of the analysis of inequality in the separate cross-sectional distributions of family consumption are presented in section 4. In Section 5 we decompose both levels of inequality in each year and changes in inequality between years across demographic groups. Finally, Section 6 provides a discussion of the results and concluding comments.

¹ Authors’ calculations based on the Australian Bureau of Statistics’ Household Expenditure Surveys, 1975 and 1993.

II. Data.

The analysis presented in this paper is based on unit record data from the Australian Bureau of Statistics' Household Expenditure Survey (HES) for the years 1975-76, 1984, 1988-89 and 1993-94. The information on demographic characteristics, income and infrequent expenditure items (eg. 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 information on 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 a number of periods. To minimise the problems of imputing consumption flows to durable expenditures (or alternately making the strong assumption that all durables are consumed during the 2-week reference period) we focus on the distribution of *non-durable* consumption. Furthermore, to ensure that we have a measure of non-durable consumption that is consistent across the four surveys, we define non-durables as expenditures on food, alcohol and tobacco, fuel, clothing, medical care, transport, recreation and current housing. Ideally, it would be preferable to include additional items such as expenditures on household operations and personal care; however, these items are combined with durables in the 1975 survey and are 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) rent payments. For families who owned or were purchasing their accommodation, we needed to impute a consumption flow and adopted the method used by Pendakur (1998). For each survey year separately we performed OLS regressions of rent on a series of indicator variables for number of bedrooms and location of residence. For households that owned their accommodation the

²In the 1975-76 and 1984 HES the diary period for rural respondents was 4 weeks. For all households in all survey years, the expenditure items correspond to average weekly amounts.

consumption flow from housing was imputed as the family's predicted rent from those regressions.

In selecting the sample of observations for analysis we impose several exclusions. First, we confine our sample to single family households. Multiple family households represent a small and approximately constant portion of the population over our study period. Most multiple family households are 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. By doing so we attempt to minimise the effects of labour force entry at earlier ages, and retirement and exit at later ages. Additionally, to minimise the potential influence of measurement error and 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. Finally, a very small number of households reported negative expenditures in the components of nondurable consumption we examine and are therefore dropped from the analysis.

We also adjust the nominal values of income and consumption for changes in prices over time. We take the national consumer price index for each survey year and inflate the values to 1998 dollars. Ideally we would use state-specific CPI series for the data period to take account of regional differences in the cost of living, but unfortunately the public release version of 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 criteria.³ To check for Lorenz dominance relations,

³The Lorenz dominance criteria states that distribution **a** is more equal than distribution **b** if it is possible to move from **b** to **a** by a sequence of transfers from richer to poorer households. This property is known as the "principle of transfers" and is widely accepted as a minimal property for normative measures of inequality. One distribution Lorenz dominates another if its corresponding Lorenz curve lies

and unambiguous differences in inequality over time, we estimate Lorenz curves $L(p)$, which show the cumulative share of total income going to the poorest p percent of the population, for income and consumption in each year.

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

A limitation of Lorenz (and Generalised Lorenz) curves for inequality analysis is 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 obtain a complete ordering of distributions, and to quantify the “distance” between distributions in terms of their inequality content, 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

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

where μ is mean income and ξ is the “equally distributed equivalent income”.⁴ 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.

Formally, the Gini coefficient is given by:

$$Gini = 1 - \frac{1}{m} \sum_{i=1}^n (2i-1)y_{(i)}$$

everywhere above (or closer to the line of equality) than the other.

⁴The EDE income, by definition, 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, note that the EDE income is (ordinally equivalent) to measures of social welfare.

where $y_{(1)} > \dots > y_{(i)} > \dots > y_{(n)}$ is the income vector arranged into descending order and i corresponds to the rank of the individual in the ordered distribution and n is the size of the population. Geometrically, the Gini coefficient is equal to twice the area between the line of equality and the Lorenz Curve, and the difference between two Gini coefficients is simply the area between the two corresponding Lorenz curves.

The Atkinson indices are defined as:

$$I^a(y) = \begin{cases} 1 - \frac{1}{m} \left[\frac{1}{n} \sum_{i=1}^n y_i^{1-a} \right]^{\frac{1}{1-a}}, & a \geq 0, a \neq 1 \\ 1 - \frac{1}{m} \prod_{i=1}^n y_i^{\frac{1}{n}}, & a = 1 \end{cases}$$

where 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. Specifically, 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.⁵ In addition, the indices corresponding to larger values of α place progressively greater social weight on transfers involving individuals with the smallest income shares. In the limit as α approaches ∞ , the index places all the social weight on the income share of the poorest individual.⁶

An additional advantage of the Atkinson indices is that they are readily decomposable by population subgroup. The aggregate inequality index value for a given distribution can be decomposed into a component due to inequality within population subgroup (I_w) and a

⁵ The Atkinson indices satisfy the “sensitivity to diminishing transfers” property whereas the Gini coefficient does not.

⁶ The corresponding SWF is the maximin income (which is sometimes referred to as the Rawlsian SWF).

component due to inequality between subgroups (I_B). Following Blackorby, Bossert and Donaldson (1995), the decomposition is given by:

$$I^a(y) = I_W^a(y) + I_B^a(y)$$

where

$$I_W^a(y) = 1 - \frac{\sum_{k=1}^K n_k x_k}{nm} = \sum_{k=1}^K s_k I_k^a(y)$$

where s_k is subgroup k 's share of total income, and

$$I_B^a(y) = \frac{\sum_{k=1}^K n_k x_k - nx}{nm}$$

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 subgroup EDE incomes.⁸ This decomposition is used to decompose aggregate inequality by age group and family type in each of the surveys.

In addition to decomposing inequality at a point in time, 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. This represents an extension of the technique used in Doiron and Barrett (1996). With this technique we are able to isolate the contribution of demographic change (component (c)) to

⁷Note that subgroup k 's share of total income can be expressed as subgroup k 's share of the total population multiplied by the ratio of subgroup k 's mean income to the population mean income. This fact is used to decompose *changes* in the inequality indices over time into the 3 components described in the text.

⁸Note that this is not an index over the subgroup mean incomes but rather over the subgroup EDE incomes (or, equivalently, the subgroup mean incomes discounted by their level of inequality).

the trends in aggregate inequality.⁹

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.

b. Unit of Analysis

When analysing consumption patterns it is natural to think of the family as the basic spending unit although social welfare, 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 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. Note that implicit in this procedure is the assumption that resources are equally shared within the household. This assumption is unavoidable since the HES does

⁹ However, the nonlinearity of the Atkinson indices means that decompositions of changes over time are only approximate, since they are based on a first order Taylor's series expansion.

¹⁰ This implies that a family of two people requires $\sqrt{2}=1.41$ times the consumption of a single person for all to be considered equally well off. This AES was used by Pendakur (1998) in his analysis of Canadian consumption inequality and it lies near the middle of the range of AES examined in Buhmann et.al. (1987).

not provide details on the consumption of individual family members (for an analysis of intra-household inequality see Haddad and Kanbur, 1990). 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 of the four survey years. Figure 1a presents the Lorenz curves for income. Since the Lorenz curves lie close to each other and it is hard to distinguish them we plot the *difference* between the line of equality and the Lorenz curve (as recommended in Deaton, 1997) in Figure 1b. With this transformation of the Lorenz curves 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 may be related to a general improvement in macroeconomic conditions. 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 rank to these distributions although their magnitudes will reflect their sensitivity to various parts of the distribution.

Table 1 reports alternative measures of income inequality in each of 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, an improvement to 1988 which is more than reversed by 1993. The indices reveal that the increase in income inequality between 1975 and 1993 was substantial; for example, the Gini coefficient increase by 17 percent.

As we increase the inequality aversion parameter of the Atkinson index the measure becomes increasingly sensitive to inequality at the bottom of the distribution. From Table 1 we see that the 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. It is the least

inequality averse Atkinson indices which show the greatest increase in income inequality. This suggests that most of the change in the distribution did not occur at the very bottom.

In addition, Table 1 reports bootstrapped standard errors for each inequality index. The final column of Table 1 presents tests of the equality of each index in 1975 and 1993, which show that the rise in inequality over time was indeed statistically significant

We conclude this step of the analysis by examining the combined effects of changing inequality and income growth. Even with increasing inequality, it could be that there was sufficient economic growth to ensure that all members of society experienced increasing welfare. In Fig. 2 we present 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% population share. 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 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 wellbeing. We begin with a comparison of income and consumption inequality. Figures 3 illustrates the 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 then reports the cumulative proportion of total consumption received by the bottom fraction of the population *ordered by income*. 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

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

income distribution.

The equalising 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 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. Figures 4a and 4b, for 1988 and 1993 respectively,¹² further highlight this point. The lowest curve in each figure is the Lorenz curve for "private income", that is, gross income minus government transfers and benefits. The next curve is the concentration 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 (which results from the tax and transfer activities of the state). In a purely descriptive sense, private redistribution through consumption smoothing and insurance activities are as important as the welfare state. The latter appears to be more important towards the bottom of the distribution.¹⁴

¹²These are the only two years for which we can do these calculations. The information on transfer income and taxes are not available in the 1975 and 1984 HES data files.

¹³An important caution is that taxes are not reported taxes paid but rather taxes payable as imputed by the ABS. Nonetheless, Harding (1997) reports that for 1994 the ABS's imputations match quite well with Taxation Statistics produced by the Australian Tax Office. Furthermore, we suspect that, if anything, imputed taxes payable are more progressive than actual taxes paid, and thus data on actual taxes paid would only strengthen the point we are making here.

¹⁴As a cautionary note, it is important to recognize that these graphs have no counterfactual content. From the graphs alone we cannot infer the consequences of a reduction in public redistribution. Taking extreme (and implausible) cases to illustrate, public smoothing and redistribution may simply crowd out private mechanisms. In that case, changes to public provisions would have no impact on the consumption concentration curve. At the other extreme, it could be that private activities are completely unresponsive to the activities of the state. In this case, a reduction (or increase) in public provisions would cause the consumption concentration curve to move by an amount comparable to the net income concentration curve. In context of Figures 4a and 4b, it may be that state provisions appear more important at the bottom of the distribution exactly because that is where they are targetted and hence low income individuals smooth via public mechanisms because they have access to them.

We next examine changes in consumption inequality over our study period. Figure 5a plots the consumption Lorenz curve for each of the 4 survey years; they are indistinguishable. In order to improve the visual separation, we again plot the *difference* between the line of equality and the Lorenz curves in Figure 5b. It is evident that there was a slight increase in consumption inequality between 1975 and 1984, 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% in 1975, above 8% in 1984, fell by approximately 2% to 1988 and then rose to over 10% by 1993 (Borland and Kennedy, 1998). Comparing Figure 5b with 1b, it is also evident that the rise in consumption inequality between 1988 and 1993 was considerably less dramatic than the deterioration in income inequality. One interpretation of these findings is that part of the recent increase in income inequality reflects an increase in transitory fluctuations which households have been able to smooth to some degree.

As with income, the Lorenz curves for consumption do not cross, so the distributions are unambiguously ranked. The inequality indices are presented in Table 3. Among the Atkinson indices, consumption inequality growth is largely independent of the inequality aversion parameter. By every measure 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 economically significant and, as the second last column of the table shows, statistically significant.

The analysis of consumption so far has focused on inequality alone. 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 nondeclining over the period for all segments of the population. Some

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).

portions of the population experienced real gains. Table 4 once again draws attention to the middle of the distribution. We see that the bottom and top quarters and the middle each experienced rising average real equivalent expenditure. The greatest absolute gains were at the top, though but the bottom quarter had the greatest proportional gains.

We conclude this section by noting that in another paper (Barrett, Crossley and Worswick, 1999), we investigate the sensitivity of the principle results of this section to a number of methodological choices 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.^{15,16} This theoretical proposition has been shown to hold in several countries. Thus ageing alone could generate increasing inequality in a society.

(a) Demographic Trends.

We begin this section with an examination of basic demographic trends in Australia over the period covered by our data. Figure 7 presents the distribution of ages of household heads in our data, in each of the four sample years. Note that for these calculations, households are again weighted by household size, so that the interpretation is the *fraction of individuals living in a household with a particular set of characteristics*. The four panels indicate a clear

¹⁵As is well known, if households optimize intertemporally and under certain assumptions about preferences, changes in consumption will follow a random walk regardless of the properties of income shocks.

¹⁶If households are fully insured (risk sharing is complete) then they will experience only aggregate shocks. Thus, the existence of idiosyncratic household shocks implies some market failure.

trend to a greater fraction of the population living in households headed by older individuals. This pattern reflects both the general ageing of the population (that is, of individuals) as well as changes in the distribution of individuals across household types. We turn to the latter next.

Figure 8 shows the profile of the mean household size (again, with the mean taken over individuals) plotted against age of household head for 5-year birth cohorts.¹⁷ Two patterns emerge from this picture. First, taken together the age profiles of the different cohorts trace out a humped shaped life cycle profile of household size. Second, the household size - age profile of successive cohorts lies *below* the profile of the previous cohort. This indicates a shift to smaller households, conditional on age of head, among more recent cohorts.

The next series of figures (Figures 9a through 9d) plot the proportion individuals living in households of various types versus age of head, also by 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 revealed. In Figure 9a we see that single person households are a common living arrangement among the young and the elderly. Additionally, the lines for younger (more recent) cohorts lie *above* those for older cohorts, indicating an increasing prevalence of single person households, especially among the young. Figure 9b indicates that 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 (Figure 9c). The pattern of cohort lines indicates fewer such household in more recent cohorts which is consistent with the declining Australian birth rate. Finally, Figure 9d indicates that 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 population of Australian households 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

¹⁷In a country with as much immigration as Australia, samples from birth cohorts in different survey years are inevitably drawn from slightly different populations.

decompose inequality in each year into inequality within and between demographic groups.¹⁸ We then examine the role that demographic change played in the evolution of inequality through time. The decomposability of the Atkinson indices also allows us to separate the overall change in population inequality into the fractions due to: (1) the changes in inequality within demographic groups, (2) the changes in inequality between groups and (3) demographic trends (or changing population shares).

(b) Ageing 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 (which is the weighted average of the inequality indices for each separate age group) 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 subgroup 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.¹⁹ 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 separately identifiable.

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 population share (demographic change) and changes in between group inequality.²⁰ The results show that the predominant share (79-84 %) of the growth in population inequality occurred within groups. The results also show that the ageing of the

¹⁸ Decompositions of Gini Coefficients have been proposed; however, they involve a difficult to interpret residual (Deaton, 1997).

¹⁹ There may be a counter cyclical pattern in the between age group inequality. This would be consistent with the cyclical sensitivity of new labour market entrants.

²⁰ Because of the nonlinearity of the indices, the decomposition is approximate, and there is a small residual which we do not report.

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. It is evident from this table that all age groups experienced an increase in inequality; hence both the young and the middle-aged experienced more inequality in recent years than similarly aged individuals of previous generations.²¹ The greatest growth in consumption inequality has occurred amongst the younger age groups. However, these groups have accounted for a diminishing share of the population over the study period. Thus the ageing of the Australian population has tended to reduce the aggregate level of inequality.

(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 % 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. Additionally, it is apparent that the trends in partnering and childrearing 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 rapid growth in inequality

²¹While comparisons of individuals from different cohorts made at the same age are more attractive than unconditional comparisons, it should be noted that the welfare interpretations of such can still be compromised if the cohorts experienced very different real interest rate histories to the age of comparison (see Blundell and Preston, 1998). Because we see a very similar pattern of rising inequality across a range of age groups - with each series of within age group observations representing a different sequence of cohorts - it seems extremely unlikely that changes in the real interest rate could explain our results.

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; 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 income net of taxes and transfers, 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 fair 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 consumption, though the difference between the two measures was not so dramatic. However, in the US, 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 targetting of social programs).

There were several important demographic shifts over the period. We have also investigated the role that demographic change has played in changing inequality in Australia. We 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. The ageing of the Australian population playing a minor role in offsetting the general rise in inequality, while 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. Likewise, as outlined earlier, if shocks to permanent income accumulate and have some uninsured household specific component, then one would expect older populations to be more unequal. 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 US. 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.

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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	268.4	500.2	688.8	518
1984	258.8	498.8	674.4	526
1988	248.8	513.8	704.4	529
1993	238.4	507.0	727.2	538
Notes: 1. Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights x household size).				

TABLE 4: Performance of Top, Middle and Bottom (Consumption).				
Year	Bottom 25%	Middle 50%	Top 25%	Overall Mean Weekly Equivalent Nondurable Consumption, 1998\$
	Group Mean Weekly Equivalent Nondurable Consumption, 1998 \$ (Differences in Generalized Lorenz Ordinates Scaled by Population Fraction)			
1975	193.3	305.6	448.4	321
1984	216.4	312.6	453.6	338
1988	208.4	314.8	465.6	338
1993	231.2	333.0	484.4	362
Notes: 1. Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights x household size).				

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 [% of Total]	0.030 [94%]	0.035 [92%]	0.034 [94%]	0.035 [92%]
Between Age Groups [% of Total]	0.002 [6%]	0.003 [8%]	0.002 [6%]	0.003 [8%]
Atkinson Inequality Index, $\alpha=1$				
Total	0.063	0.075	0.071	0.075
Within Age Groups [% of Total]	0.060 [95%]	0.070 [93%]	0.068 [96%]	0.069 [92%]
Between Age Groups [% of Total]	0.003 [5%]	0.005 [7%]	0.003 [4%]	0.006 [8%]
Atkinson Inequality Index, $\alpha=2$				
Total	0.123	0.147	0.140	0.144
Within Age Groups [% of Total]	0.117 [95%]	0.136 [93%]	0.134 [96%]	0.133 [92%]
Between Age Groups [% of Total]	0.006 [5%]	0.011 [7%]	0.006 [4%]	0.011 [8%]
Notes: 1. Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights x household size).				

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 [%of Total]	0.031 [97%]	0.037 [97%]	0.034 [94%]	0.036 [95%]
Between Family Types [%of Total]	0.001 [3%]	0.001 [3%]	0.002 [6%]	0.002 [5%]
Atkinson Inequality Index, $\alpha=1$				
Total	0.063	0.075	0.071	0.075
Within Family Types [%of Total]	0.061 [95%]	0.072 [96%]	0.068 [96%]	0.071 [95%]
Between Family Types [%of Total]	0.002 [5%]	0.003 [4%]	0.003 [4%]	0.004 [5%]
Atkinson Inequality Index, $\alpha=2$				
Total	0.123	0.147	0.140	0.144
Within Family Types [%of Total]	0.119 [97%]	0.140 [95%]	0.133 [95%]	0.136 [94%]
Between Family Types [%of Total]	0.004 [3%]	0.007 [5%]	0.007 [5%]	0.008 [6%]
Notes: 1. Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights x household size).				

TABLE 7: Decomposition of Changes in Atkinson Inequality Indices for Equivalent Consumption, 1975-1993			
	$\alpha=0.5$	$\alpha = 1$	$\alpha = 2$
By Age Group			
Total	0.0062	0.0120	0.0216
Within Group [% Total]	0.0052 [84%]	0.0098 [81%]	0.0171 [79%]
Demographics [% Total]	-0.0002 [-3%]	-0.0004 [-3%]	-0.0003 [-1%]
Between Group [% Total]	0.0013 [21%]	0.0026 [22%]	0.0049 [23%]
By Family Type			
Total	0.0062	0.0120	0.0216
Within Group [% Total]	0.0046 [74%]	0.0089 [74%]	0.0163 [75%]
Demographics [% Total]	0.0003 [5%]	0.0005 [4%]	0.0005 [2%]
Between Group [% Total]	0.0013 [21%]	0.0026 [22%]	0.0048 [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 x household size).			

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 [0.161]	0.088 [0.130]	0.090 [0.118]	0.075 [0.103]
30-34	0.064 [0.192]	0.067 [0.203]	0.070 [0.172]	0.078 [0.181]
35-39	0.065 [0.189]	0.068 [0.217]	0.067 [0.211]	0.068 [0.202]
40-44	0.049 [0.142]	0.065 [0.179]	0.065 [0.214]	0.066 [0.182]
45-49	0.062 [0.139]	0.068 [0.111]	0.061 [0.121]	0.071 [0.153]
50-54	0.053 [0.102]	0.071 [0.079]	0.058 [0.099]	0.056 [0.110]
54-59	0.063 [0.075]	0.062 [0.081]	0.071 [0.065]	0.069 [0.068]
Notes: 1. Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights x 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 [0.019]	0.082 [0.033]	0.089 [0.042]	0.086 [0.049]
Couples, With Children	0.061 [0.927]	0.071 [0.871]	0.066 [0.863]	0.070 [0.841]
Couples, no Children	0.072 [0.037]	0.090 [0.079]	0.081 [0.076]	0.073 [0.091]
Lone Parents	0.044 [0.017]	0.041 [0.017]	0.074 [0.019]	0.074 [0.019]
Notes: 1. Calculations are based on Australian Bureau of Statistics' Household Expenditure Survey and are weighted by (survey weights x household size).				

FIGURES

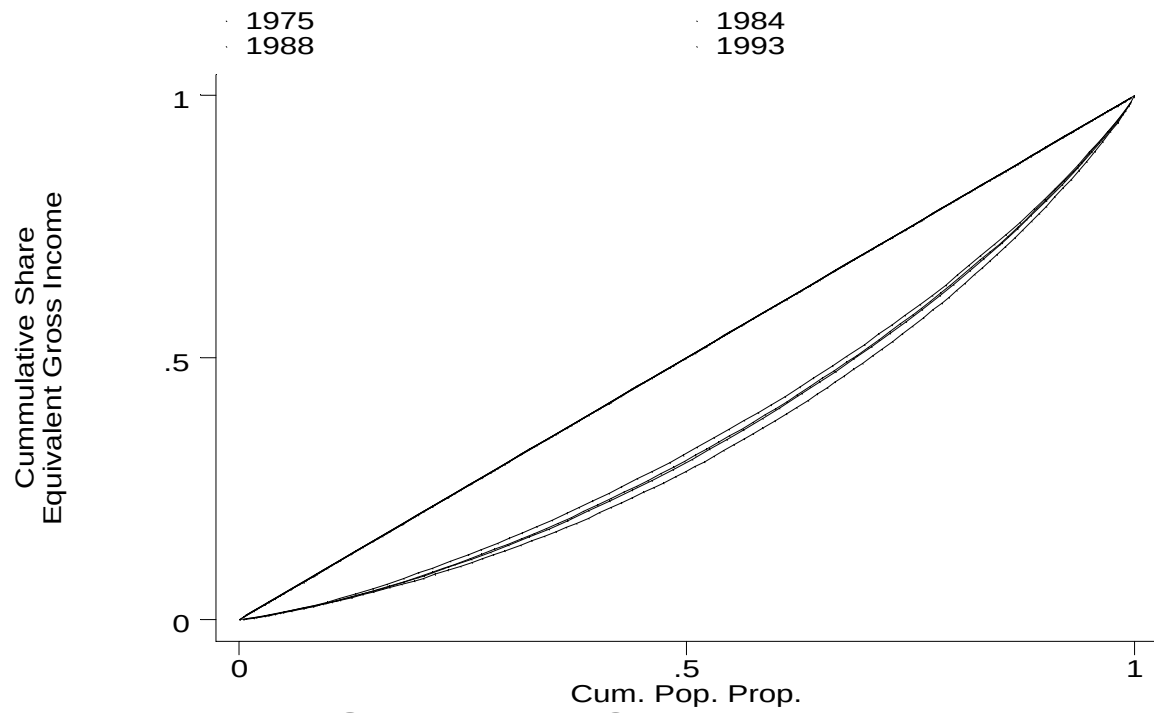


FIG 1a: Lorenz Curves: Income

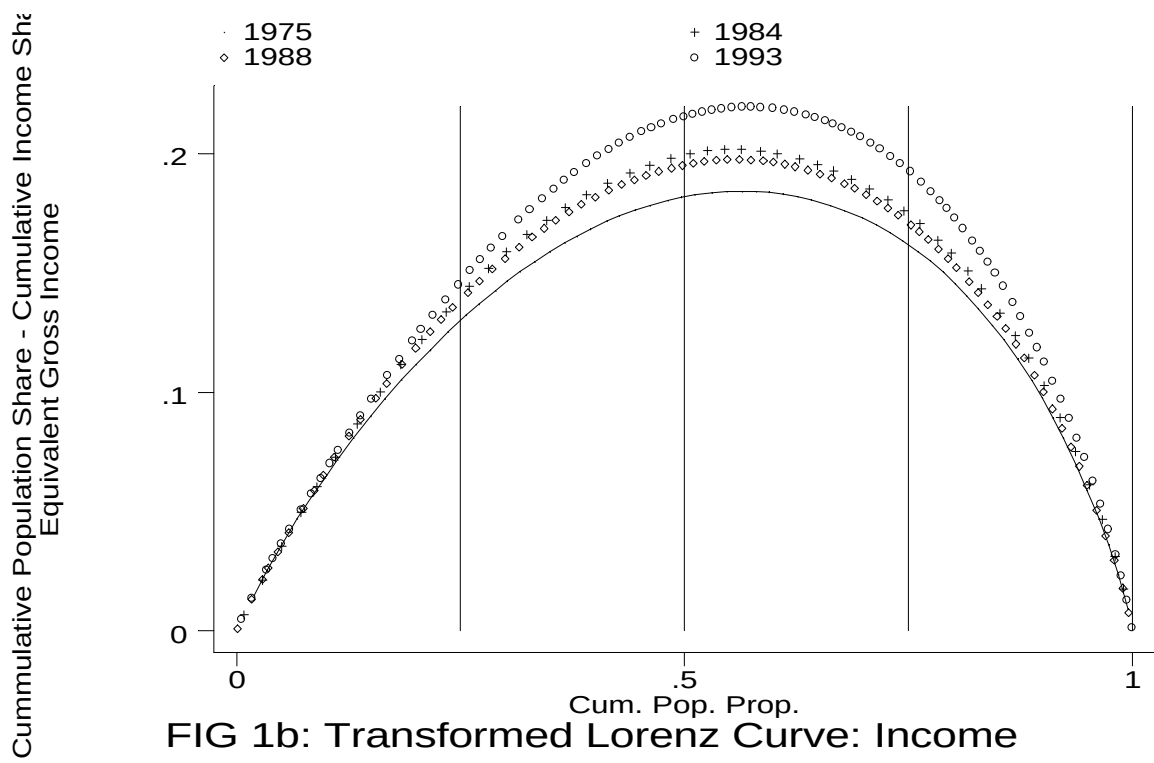


FIG 1b: Transformed Lorenz Curve: Income

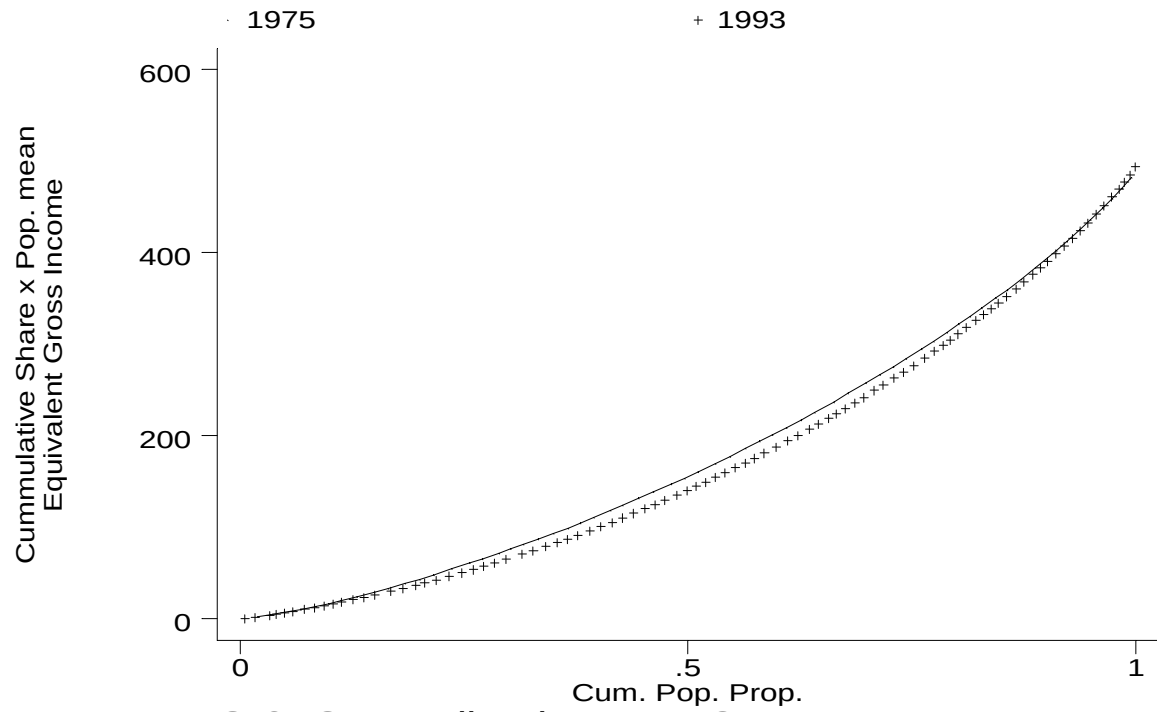


FIG 2: Generalized Lorenz Curves: Income

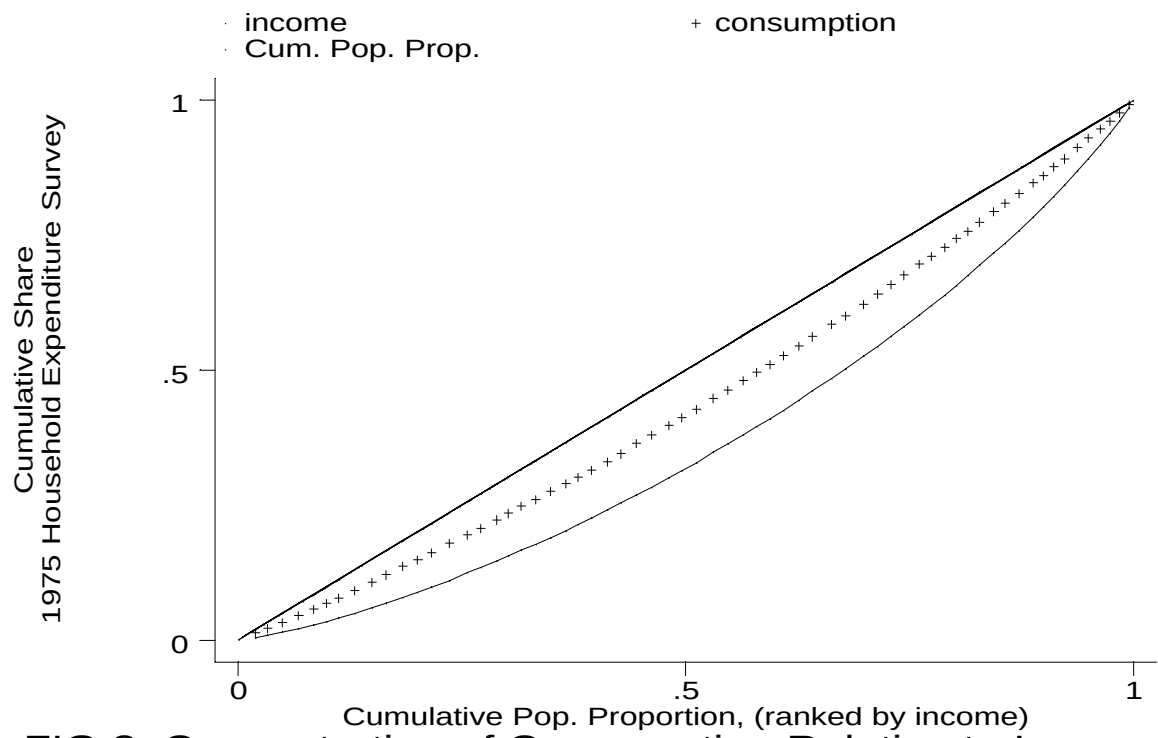


FIG 3: Concentration of Consumption Relative to Income

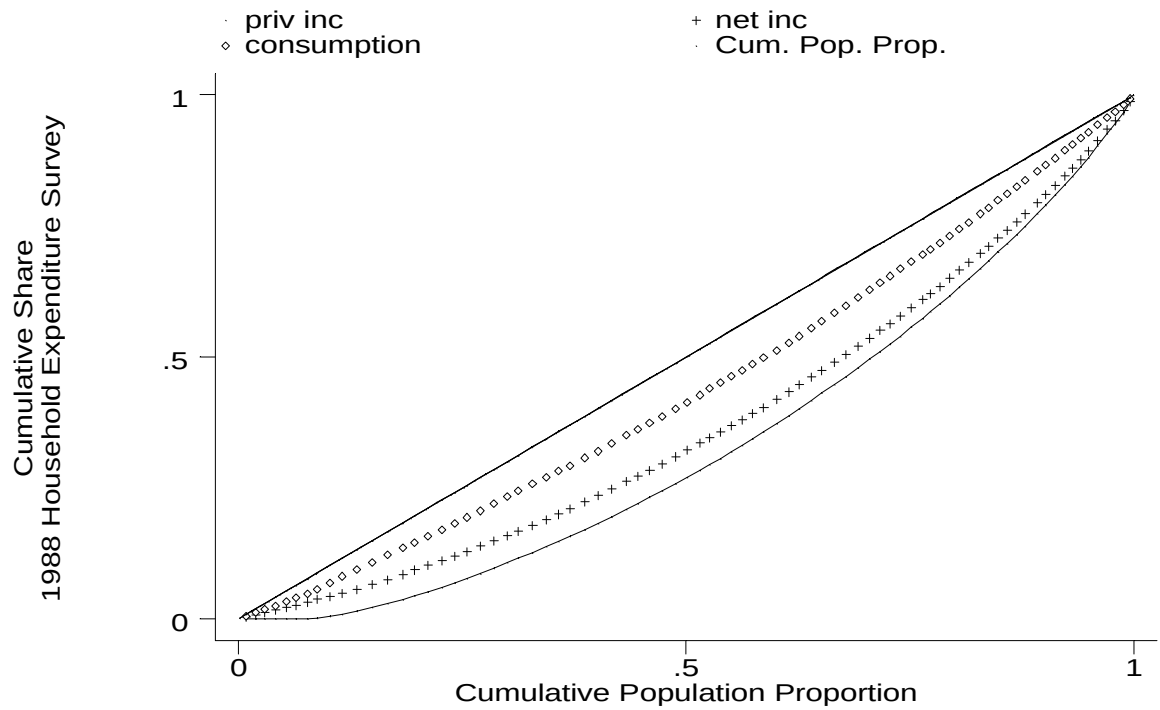


FIG 4a: Concentration of Consumption Relative to Income

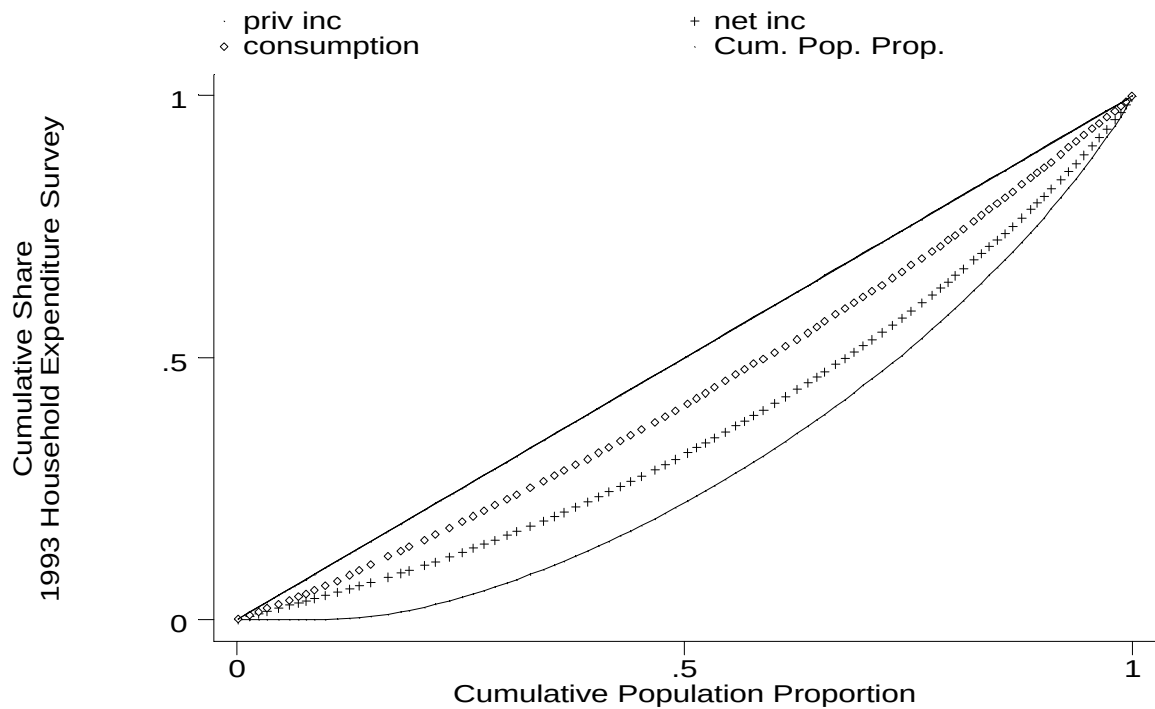
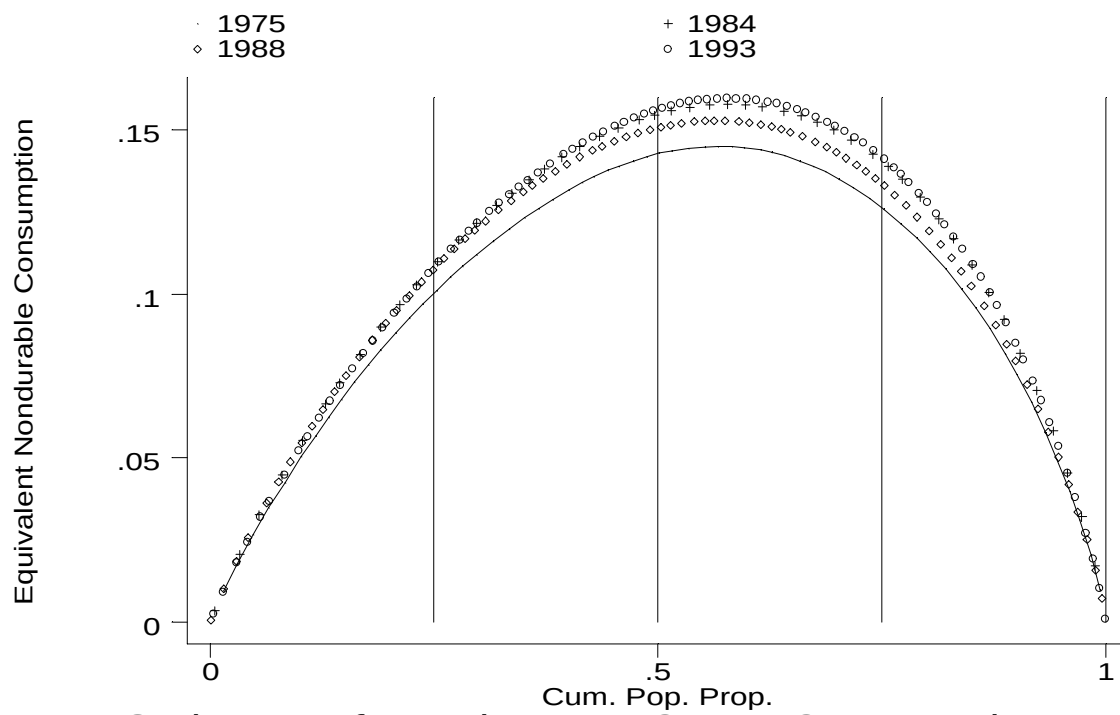
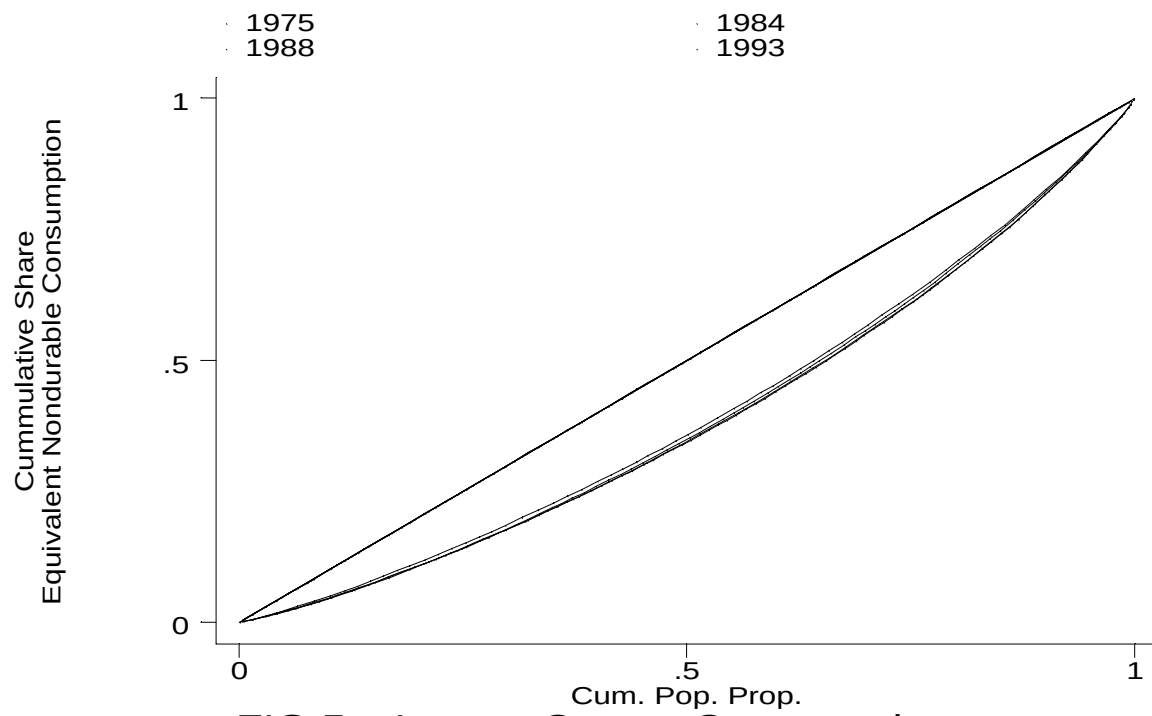


FIG 4b: Concentration of Consumption Relative to Income



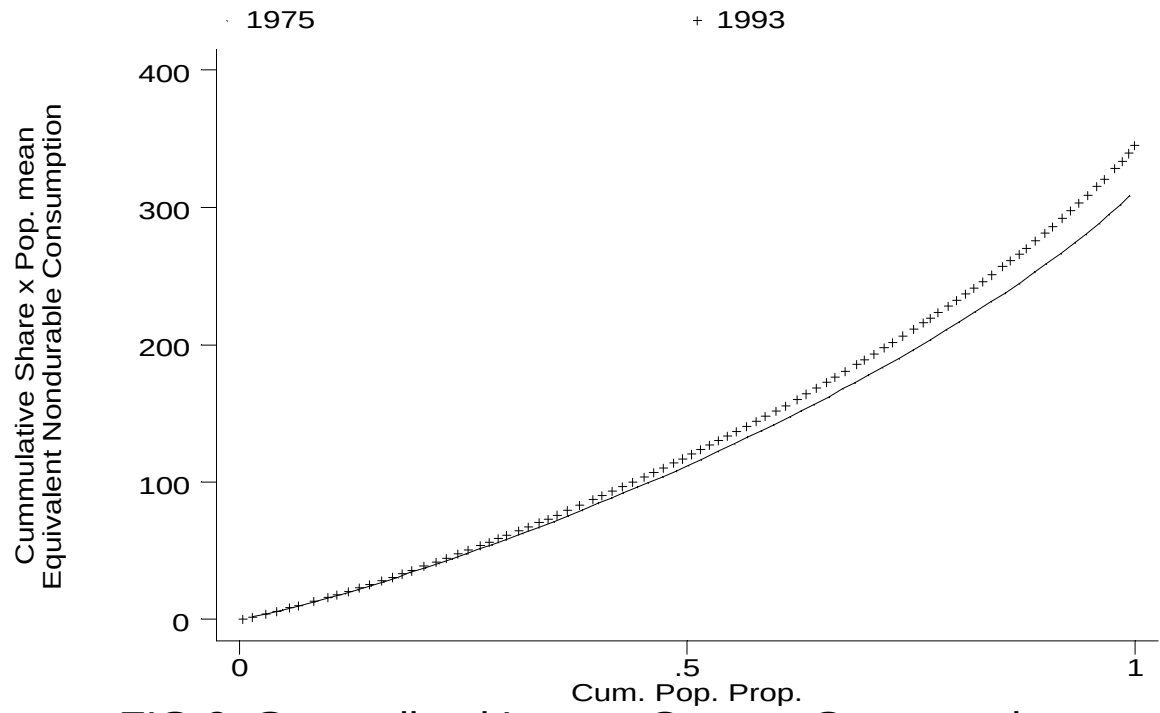


FIG 6: Generalized Lorenz Curves: Consumption

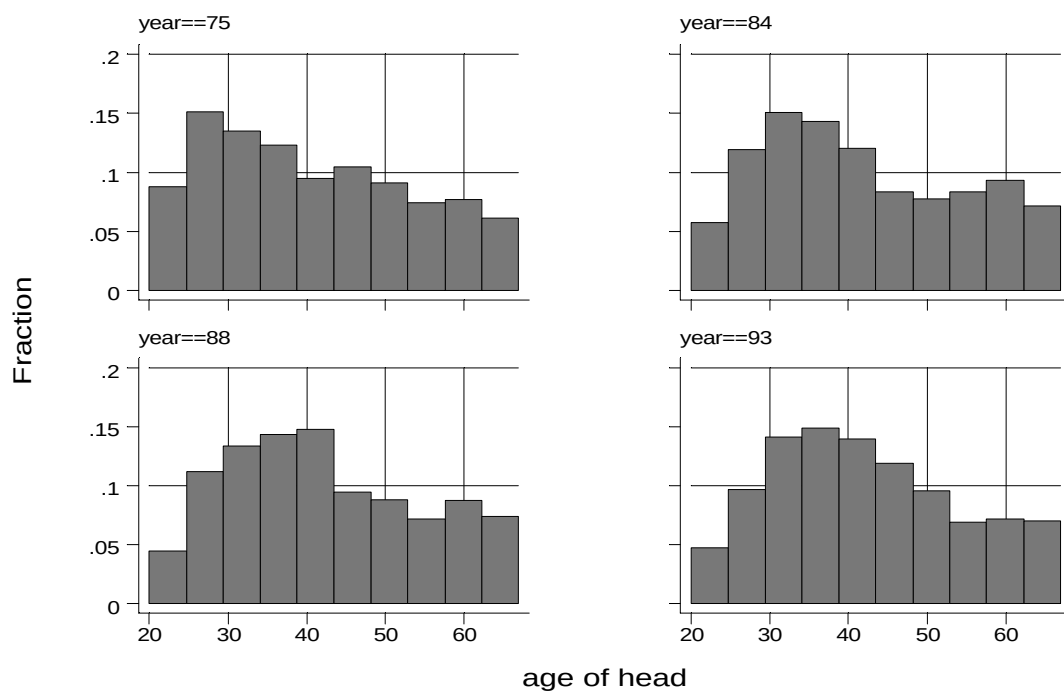


FIG 7: age (of head) distribution by survey year

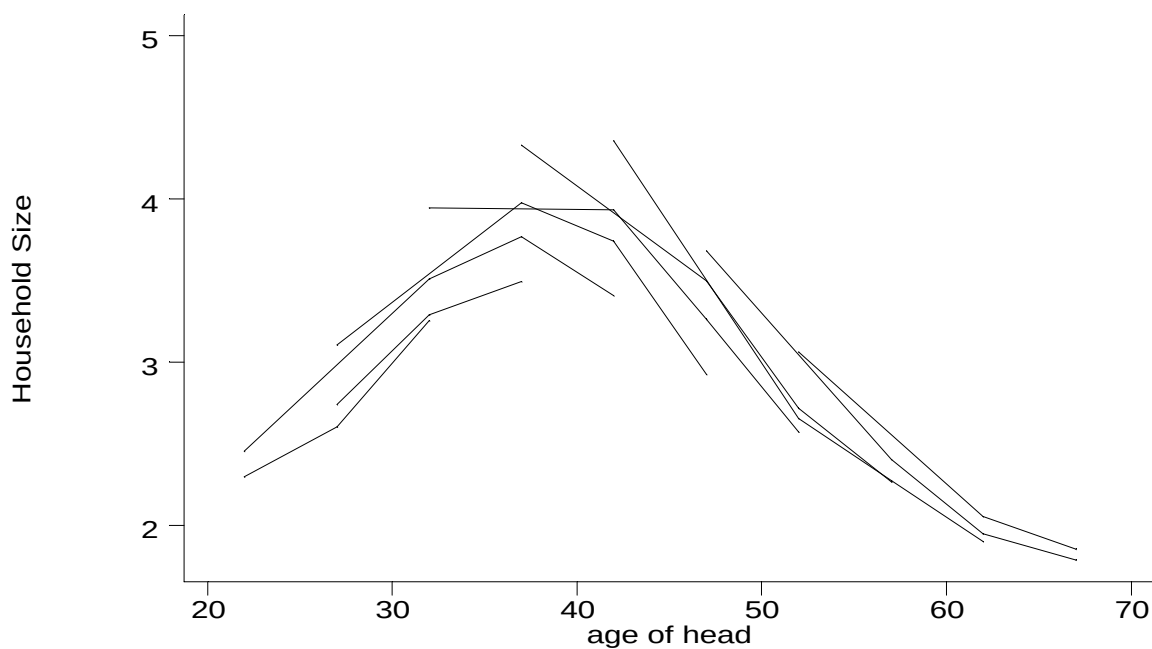


FIG 8: Household Size by Age and Cohort

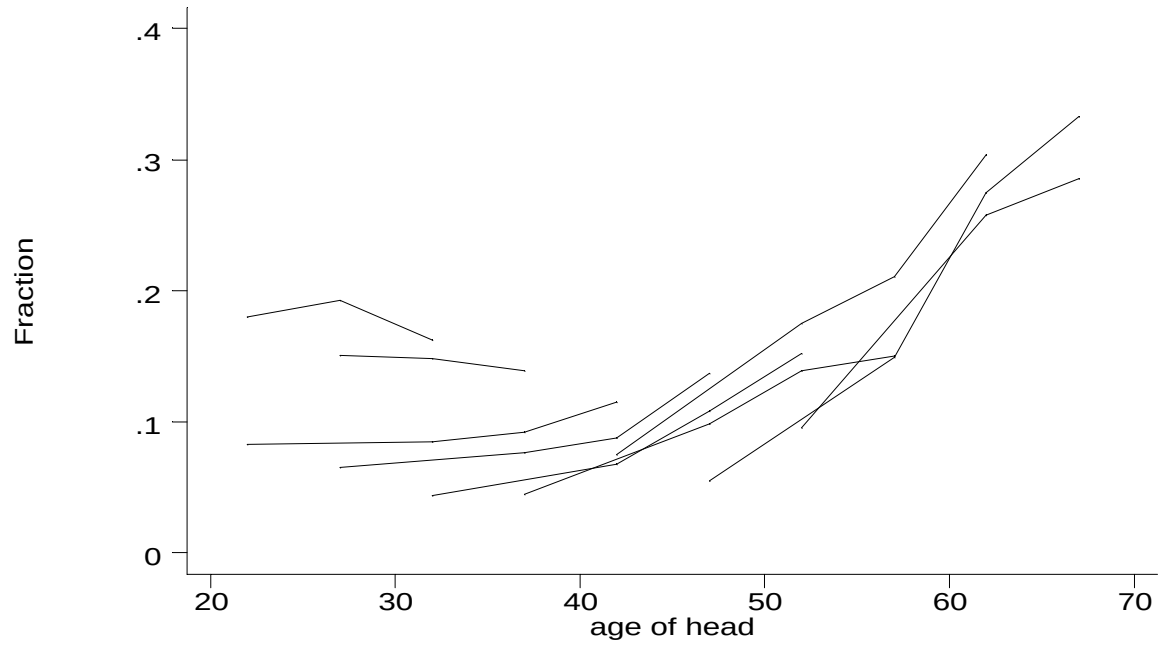


FIG 9a: Fraction in Single Person Hhold by Age and Cohort

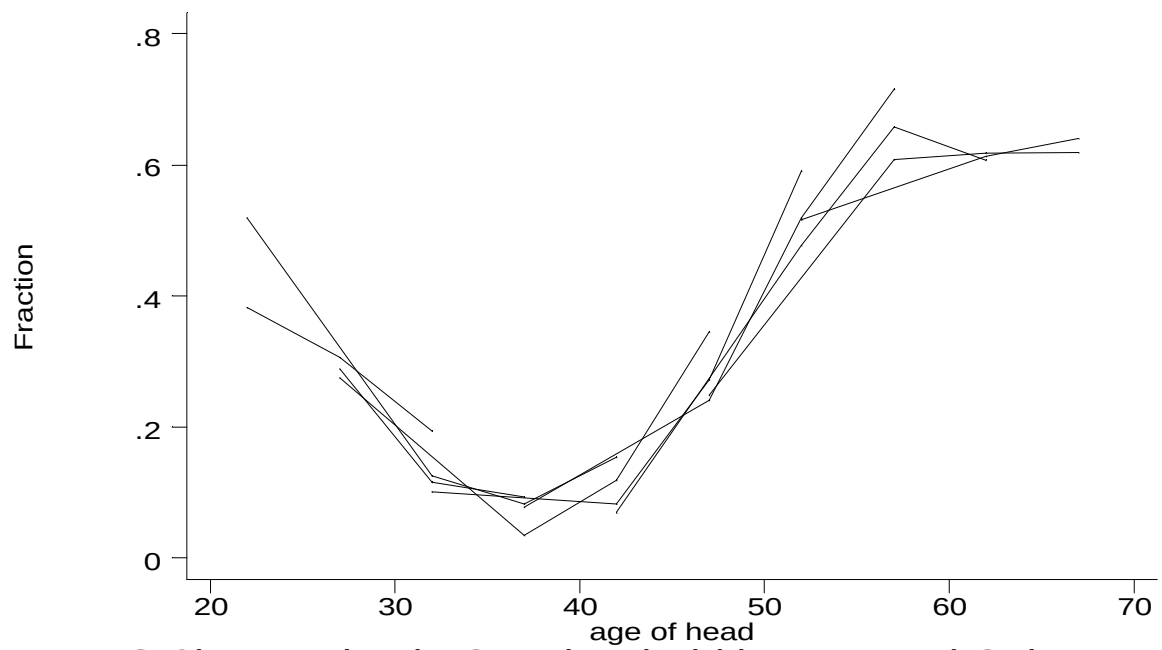


FIG 9b: Fraction in Couple Hhold by Age and Cohort

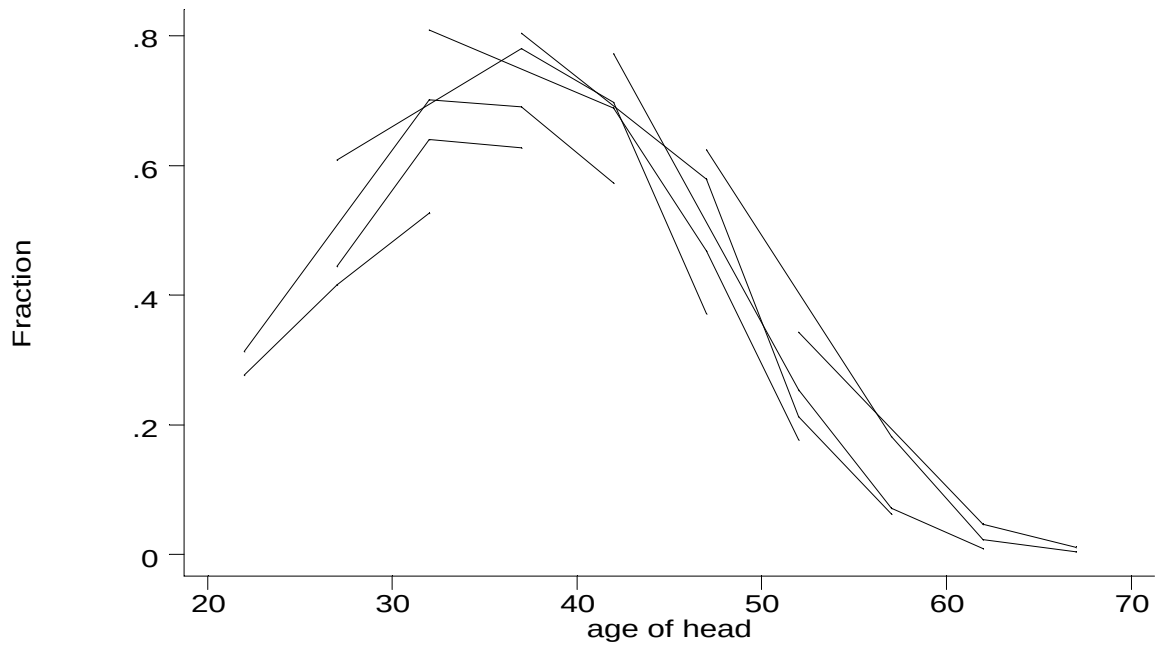


FIG 9c: Fraction in Couple w Kids Hhold by Age and Cohort

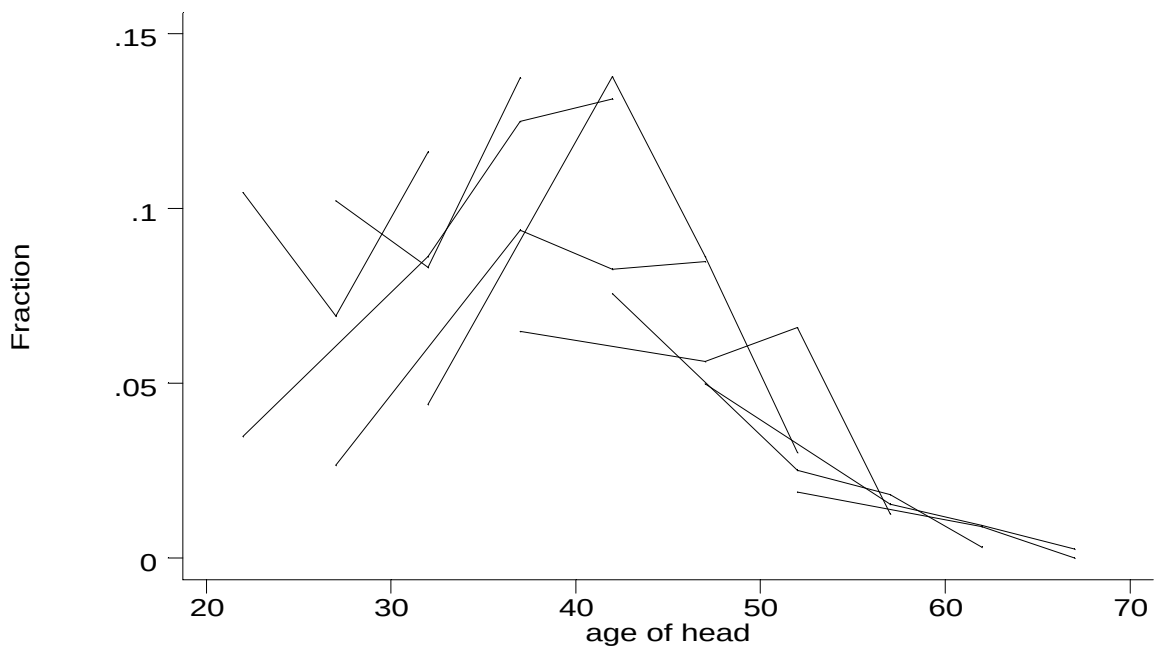


FIG 9d: Fraction in Lone Parent Hhold by Age and Cohort