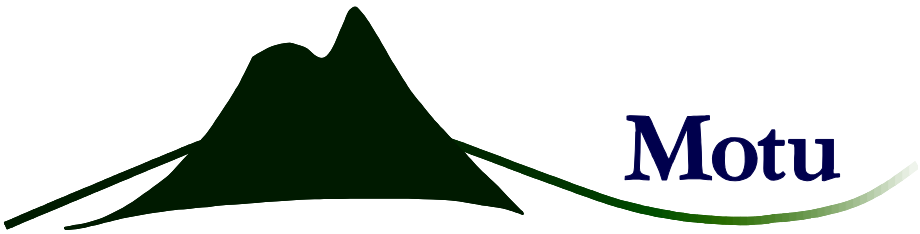

The Relationship between Individual Labour Market Outcomes, Household Income and Expenditure, and Inequality and Poverty in New Zealand from 1983 to 2003

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Abstract
This paper investigates the relationship between individual labour market outcomes, household income and expenditure, and inequality and poverty in New Zealand using detailed data from the 1983/84 – 2003/04 Household Economic Survey (HES). We begin by discussing and summarising measures of income and expenditure calculated from the HES. We next examine the relationship between individual labour market outcomes, and household income and expenditure for households with different characteristics. In particular, we focus on how this relationship varies over the life cycle and over time. This analysis is then extended to examine inequality in labour market outcomes, household income and household expenditure. In the last section, we examine the determinants of the levels and changes in poverty in New Zealand using both expenditure and income data. We also apply a newly developed methodology for combining income and expenditure data to produce poverty indicators.

JEL codes
J31, I31, I32

Keywords
Income, expenditure, inequality, poverty, living standard, New Zealand

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1. Introduction

Economic theory predicts that permanent income more accurately measures the availability of resources and material wellbeing than current income because individuals and households can typically access both financial and informal markets to make up for temporary shortfalls in income and to save temporary windfalls (e.g. Blundell and Preston 1998). However, previous analyses on inequality and poverty in New Zealand typically have focused on the distribution of current income (for example, Hyslop and Maré 2005; Ballantyne et al. 2004; Perry 2007).[1] This is largely due to data on current incomes being readily available. This focus has potentially led to erroneous conclusions about the degree of inequality and poverty in New Zealand, because not only does current income not necessarily have a strong relationship with lifetime resources, but dramatic changes in New Zealand's taxation and benefit regimes over the last two decades have altered the effective level of resources available to families with similar measured incomes.

While permanent income is not observed, except in long-running (30+ years) longitudinal datasets, none of which exist in New Zealand, the life-cycle theory of permanent income implies that current consumption will be closely related to permanent income because lifetime utility for a risk adverse individual is maximised when the marginal utility of consumption is kept constant over time. Hence, in the absence of complete credit constraints, savings and borrowing is used to help smooth consumption in the face of temporary shocks to current income. For example, during periods of temporarily low income, an individual or family may run down past savings and/or may borrow against (expected) future income to fund consumption. Fortunately, like many countries, New Zealand does collect high quality data on current expenditure, which can be used to proxy for current consumption and hence permanent income as well.

This paper investigates the relationship between individual labour market outcomes, household income, proxy measures of household consumption, and inequality and poverty using unit record data from the 1983/84 – 2003/04 Household Economic Survey (HES). We begin by discussing and summarising several measures of income and consumption calculated from the HES, drawing on previous work by Gibson and Scobie (2001). We examine the suitability of derived measures of income and consumption from the data collected in the HES for analysing

1 There are exceptions as well. For example, Perry (2009) and Salmond (2006) focus on multidimensional measures of individual living standards. However, these approaches do not allow for a direct examination of either inequality or poverty because in both cases the index of living standards is created by combining a number of ordinal questions.

economic behaviour. We extend Gibson and Scobie (2001) by considering a range of income and consumption measures, such as before-tax and after-tax income, food expenditure, expenditure on non-durable goods, expenditure on non-durable goods and services, expenditure on non-durable goods and services less housing costs, and total expenditure.

We next examine the relationship between individual labour market outcomes, household income and proxy measures of household consumption for households with different characteristics. In particular, we focus on how this relationship varies over the life cycle and over time. We also examine how this relationship varies for different birth cohorts. This analysis is then extended to examine inequality in these different measures of living standards.

In the last section, we examine the determinants of the levels and changes in poverty in New Zealand using both income and expenditure data. Alternative approaches are used to create a richer understanding of how living standards vary across different households and how these patterns have changed over time. We also apply a newly developed methodology for combining income and expenditure data to produce poverty indicators.

As in previous work, such as Hyslop and Maré (2005), we find that employment, real wages, and household income and expenditure declined sharply between 1983 and 1993, and then rose sharply between 1993 and 2003. The changes in household outcomes are generally larger than those for individual outcomes as they are exacerbated by assortative mating (i.e. similarities the characteristics of partners) and the polarisation of employment across households, although progressive taxation does moderate this relationship.

Focusing on inequality, below the median, individual income inequality declined over time, but household income inequality rose across the entire time period, especially in the 1980s. Household expenditure inequality also increased, but less so than income inequality, suggesting that changes (declines) in household income during this time period were viewed as temporary. On the other hand, there was little change in either income or expenditure inequality in the upper end of either distribution.

Turning to our analysis of poverty rates, we find that headcount rates and the mean poverty gap vary quite substantially across the five different methods of calculating poverty that we examine in the paper, with poverty rates typically the highest when measured using disposable income, with only slightly lower rates found using total or food expenditure. Lower rates are found using the newly developed methodology for combining income and expenditure data to produce poverty indicators and when jointly using income and expenditure thresholds.

Overall, our results suggest that the common approach of using disposable income to measure poverty rates is the least desirable.

However, changes in poverty over time are quite similar regardless to the method used. For example, each of the five methods shows headcount poverty rates increasing fairly steadily between 1983 and 1992-94, with a total increase of between 5 and 9 percentage points. Poverty rates then remained fairly stable for the remainder of the sample period. We also find that controlling for changes in household composition, demographics, education, and employment rates does not explain the increase in poverty that occurred in the 1980s. Taken in conjunction with previous work by Gibson and Harris (1996), Dalziel (2002) and Stillman et al. (2011), these results suggest that the structural reforms undertaken in the 1980s led to permanent changes in the distribution of resources across households in New Zealand, in particular a reduction in resources for the poorest households.

2. Data

2.1. HES Description[2]

In this paper, we use data from the 1983/84 to 2003/04 Household Economic Survey (HES),[3] which is the full sample of data to which we have access in a consistent format. A cross section of approximately 3,000 households is surveyed in each year, with information collected about both the household and the individuals living in it.[4] The survey collects detailed expenditure and income data, together with a range of household and individual characteristics.

The HES is designed to meet three principal objectives:

> (a) in years when the Consumers Price Index (CPI) is revised, to provide expenditure statistics for use in the revision of the CPI and, in non-revision years, to provide similar statistics to check on how up-to-date the weighting base of the index is;
>
> (b) to provide expenditure statistics for use in preparing New Zealand's system of national accounts (NZSNA);
>
> (c) to provide selected socio-economic statistics on households and their members.

[2] The material in this section draws on the on-line documentation available from the Survey Directory on Statistics New Zealand's website http://www.stats.govt.nz.

[3] The survey commenced on 1 July 1973 and operated on a July to June year until 30 June 1975. It was then changed to an April to March survey year for the year ending March 1976. It was run annually until 1997/98, and triennially thereafter. From 2000/01 it has reverted to June year. The survey was originally named the Household Survey, then was known as the Household Expenditure and Income Survey (HEIS) from 1983/84 to 1992/93 before getting its current name.

[4] The survey target population is New Zealand resident households living in permanent dwellings. The sample was a simple random sample until the 1987/88 year, when stratified sampling was introduced.

In pursuing these objectives, the survey collects information that is relevant for the analysis of household consumption behaviour, although presumably not as accurately as it would if the survey had been designed for that purpose. The first objective of this paper is to gauge whether the information collected contains a sufficiently strong signal of household consumption behaviour, or whether the noise and potential biases in the data preclude such analyses.

2.2. Inferring Economic Behaviour from Survey Data

Even if survey data were collected for the primary purpose of understanding household consumption behaviour, there would be unavoidable challenges in deriving measures of consumption. In particular, there is no objective way of measuring the value of consumption for some types of goods and services. For instance, a household that owns the dwelling in which it lives consumes housing services, but there is no observable expenditure item that can reveal the value of those services. In addition, there are challenges that arise from the fact that the data actually collected in a survey provide an imperfect measure of what is, in principle, measurable.

The way that the inherent and data-related challenges are addressed or resolved depends to a great extent on the nature of the questions that researchers are attempting to address. Studies of aggregate income and consumption patterns are less demanding of the data since aggregation or averaging helps to overcome some of the conceptual or data challenges. For instance, expenditure on durable goods by a particular household will lead to a potentially large discrepancy between expenditure and consumption, whereas aggregate expenditure on durables in a year may be a reasonable approximation to the value of consumption from the stock of durable goods. Similarly, while errors in the measurement of income and expenditure may lead to considerable inaccuracy at the level of the household (especially in estimates of the joint behaviour of income and consumption), these errors will tend to cancel out at the aggregate level, giving more robust estimates for total income and consumption.

Studies that examine household level income and consumption, either separately or jointly, or that examine the variation of income or consumption across households, must take more care in gauging the strengths and weaknesses of the data. They may also choose to use different proxies for income or consumption – ones that give less weight to confounding variation. For instance, in estimating the average propensity to consume (APC), the ratio of aggregate expenditure to aggregate income may be an acceptable approximation, whereas at the household level, durable expenditures will lead to huge fluctuations in the estimated APC. For household level analysis, it may therefore be desirable to exclude durable expenditures, and accept a downward bias in estimates of APC in exchange for a measure that is likely to be more

highly correlated with actual consumption (see Deaton and Muellbauer 1980 for more information).

2.3. Analytical Sample

The majority of our analysis examines household measures of income and consumption, reflecting the standard presumption that consumption choices are generally made at the level of the household. We only include households in our analysis that have at least one member aged 25-59. The relationship between income and consumption is expected to be quite different in households containing no prime-aged workers (typically, these contain only young individuals or only retired individuals) and examining this is outside the scope of our current work. We also present results that focus on individual labour market outcomes and income. The analytical sample for this work is restricted to individuals aged 25-59.

Consumption needs and household returns to scale (i.e. the gains from sharing the same housing and other non-perfectly excludable goods) differ greatly depending on both the composition and size of households. Hence, all our household analysis uses equivalence scales to adjust for different resource needs for different size households. We examine below whether this adjustment materially affects our findings.

2.4. Measuring Income

The HES defines income as "all receipts which are received regularly or are of a recurring nature". The survey aims to collect actual before-tax income received in the 12 months before the interview date for each respondent. In some cases, this needs to be estimated from available data. Regular Income is estimated based on the latest amount received, which is annualised. Irregular Income is based on gross amount received in the 12 months prior to the interview date (and includes income from businesses, farms and investments). Self-Employment Income is obtained from the latest available balance sheet or profit and loss account. If this is negative, it is attributed as a business loss rather than as negative self-employment income.

The income measure that is relevant for household decision making is the income that the household is able to either consume or save, i.e. their disposable income. Since the HES collects information on gross income, this needs to be adjusted for tax payments, rebates, and price levels to produce a measure of real disposable income. The main tax rebates are directly collected in the HES as a form of regular income. Hence, we calculate disposable income by applying PAYE income tax rates to taxable income and ACC levy rates to earnings for each

individual.[5] We apply PAYE tax rates and ACC levy rates based on the quarter during the year in which a household was surveyed, using a weighted average of tax and levy rates when the previous 12 months overlaps with more than one tax year. We assume that all income was earned smoothly throughout the year.

When comparing income (and consumption levels) across years, we need to adjust for changes in average price levels to more closely approximate the value of goods and services that could be purchased. This is done using the CPI. Annual incomes (consumption) are adjusted according to the CPI for the middle quarter of the year in which the income was earned (consumption occurred). In other words, the CPI is lagged two quarters from the interview data. We use the CPI series which incorporates the price changes that occurred because of the introduction of the GST in 1986 and its expansion in 1989.

2.5. Measuring consumption

The HES collects information on household expenditure, or expenditure commitment, on goods and services acquired by a household in a particular reference period, whether or not those acquisitions were consumed during that period. Expenditure data are collected by three different methods: (i) 12-month recall (generally for single payments of $200 or more); (ii) latest payment (for regular commitments such as electricity, telephone, rates, rent, insurance, and superannuation); and (iii) 14-day diary keeping.[6] Goods and Services Tax (GST) is included in all expenditure statistics. Whereas the variety of collection methods can be expected to produce reliable estimates of average expenditure for large groups of households, the survey only provides proxy measures of each particular household's actual annual expenditure.

Economic measures of consumption aim to reflect the value of goods and services consumed within a period. There is an inherent difficulty in deriving consumption measures from expenditure data, largely due to expenditures on durable goods and services that yield a flow of consumption benefits over a number of periods, or due to other timing differences between expenditures and consumption (e.g. the storage of certain foods). As with income, comparison of consumption measures across time requires an adjustment for changes in price levels.

[5] This approach ignores minor tax rebates, treats business and interest earnings as wage/salary income in regards to tax rates and ignores many complicated facets of the tax system. In theory, it is possible to design a comprehensive model that incorporates this information, but we see this as beyond the scope of this paper and believe our fairly simple measure of disposable income is a good proxy for available resources in the great majority of households. Prior to 1998, there were two larger rebates, Principal Earner Rebate and Family Rebates, and we accounted for these when appropriate.

[6] All expenditure conceptually covered by the expenditure questionnaire that is reported in diaries is deleted from the diaries at the data processing stage.

We create four different expenditure based proxies for consumption that differ in their treatment of expenditures on durable goods and services, and housing costs. We then examine whether our results are sensitive to the choice of consumption proxy.

Our first measure is total household expenditure, including those on durables and housing. While this may give a reasonable estimate of overall consumption, it produces a consumption proxy that is more volatile at the household level than is actual consumption. It is also most affected by household preferences that are unrelated to wellbeing such as the relative value of leisure time versus consumption and the relative value of long-term investments in human capital such as health and education.

Our second measure excludes expenditure on durable goods.[7] This understates current expenditure levels, but generates a proxy that is more highly correlated with actual household consumption patterns because durable goods are typically consumed over long time periods.

Our third measure further excludes expenditure on 'durable services'. In particular, both health and education expenditures typically impact on wellbeing both at the time that the expenditures are made and in future time periods. Hence, current consumption may be better proxied by excluding expenditure on these services.

Our final measure of household consumption excludes expenditure on durable goods, durable services and housing costs. Because homeowners are both investing in a capital good and consuming housing while renters are only consuming housing, someone paying the same amount towards a mortgage is not getting the same consumption as someone paying that amount towards rent. Excluding both types of expenditure from our measure of consumption removes this inequity.[8] However, one downside of this measure is that it does not allow for increases in housing costs to negatively impact welfare unless households choose to maintain the same level of housing quality while reducing other expenditure.

When we examine poverty rates, we also focus on food expenditure alone. While expenditure on food is, on average, less than 20 percent of total expenditure, food expenditure is quite price inelastic and hence differences across households are likely to be strongly related to household living standards (this is the idea behind using Engel Curves, the proportion of total expenditure spent on food, to measure the wellbeing of different groups).

[7] Durables goods are defined as in Gibson and Scobie (2001).
[8] An alternative approach is to impute the consumption value of owned homes. This approach is complex and we decided that it was outside the scope of this project.

3. The Relationship between Individual Labour Market Outcomes and Household Income and Expenditure

In this section, we examine the time-series pattern of individual labour market outcomes, and household income and expenditure and discuss the link between each of these outcomes. We also first present information on how key demographic characteristics have been changing over the sample period. Furthermore, in Appendix 1, we validate the data in the HES on labour market outcomes by comparing the patterns to those obtained for the same variables in the Household Labour Force Survey and the Quarterly Economic Survey.

3.1. Demographics

Figure 1 displays the age composition of all members of the households in our analytical sample. Over the period 1983-2003,[9] the share of children (aged 0-17) dropped from 36.5% to 31.5%, while the share of elderly (aged 65+) was around 1.7% throughout the time period (recall, this only includes individuals living with prime-aged adults). The average age of individuals in our sample, as well as of households, also trended upwards (Figure 2). These patterns are consistent with the aging trend in the population, so we can take comfort in the quality of the data.

Figure 3 shows how household composition has changed over time. Although 'couple with children' is the most common household type throughout the sample period, the proportion of households that are this type has decreased by 13 percentage points over the period (from 53% in 1983 to 40% in 2003). By contrast, all other household types have become more common. Consistent with this decline of couples with children, Figure 4 shows that average household size has been declining throughout the sample period. Despite this overall decline, the average number of elderly household members has increased over time, replicating the findings in Figure 1. Overall, these changes in household composition have been quite gradual over time which is quite reassuring for our analysis.

3.2. Labour Market Outcomes

We first examine how labour market outcomes have changed over time for individuals. Labour earnings are by far the largest component of gross household income. Mean weekly labour earnings can be decomposed into three components, the average employment rate, mean hours worked conditional on employment and mean hourly wages (which are implicitly

[9] Each survey is conducted over a 12 month period that spans two calendar years. Our income and expenditure measures cover the year prior to the interview date, while most other measures are based on current activities at the time of the interview. We refer to each survey by the year in which it started. For example, the 1983/84 survey is referred to as collecting data on 1983.

conditional on employment). Multiplying these by each other results in mean weekly labour earnings.

Figure 5 (and Table 1) show how the average employment rate has varied over time. The employment rate was fairly steady at 76-78% between 1983 and 1988, then declined steadily until bottoming out at 71% in 1991 and then increased steadily to 80% in 2003. As we will show in Section 4.1, these numbers match very closely to the official employment rate. Figure 6 then shows how mean weekly hours worked for employed individuals has changed over time. Average working hours (conditional on employment) increased gradually between 1983 and 1996 and has been declining gradually since then. Figure 7 shows that real hourly wages trended down to a trough of $16.90 per hour in 1993 before steadily increasing to $18.70 per hour by 2003. This is consistent with the overall pattern of aggregate economic growth during the sample period.

Table 1 shows how weekly labour earnings and its three components have changed during the sample period. Similar to the wage rate, real weekly labour market earnings declined between 1983 and 1993. From that point, weekly labour earnings grew steadily, reaching $593 by 2003. Overall, between 1993 and 2003, weekly labour earnings grew by 28%. In the same time period, employment rates increased by 11%, mean hours worked fell by 1% and mean hourly wages increased by 11%.

3.3. Benefit Receipt

Figure 8 shows how the proportion of individuals receiving benefits has changed over time. When looking at benefit receipt rates it is important to distinguish between core benefits (Unemployment Benefit, Sickness Benefit, Invalids Benefit and Domestic Purposes Benefit) and total benefits, because prior to the 1991 benefit reforms, many families received family and child benefits which then were paid as tax credits after the reform. Looking first at core benefits, we see that the proportion of individuals receiving any core benefit increased steadily from 7% in 1983 to 18% in 1993. This then started to decline gradually, reaching 14% in 2003. Discounting the structural break in 1991, the trend in the proportion receiving any benefits is much less noticeable, increasing from 36% in 1983 to 40% in 1989 and then declining from 22% in 1992 to 20% in 2003.

Figure 9 shows how the average amount of benefits received for individuals receiving benefits has changed over time. Again, focusing on just core benefits shows that benefits slightly increased in generosity between 1983 and 1987 before declining substantially until 2000. For example, the average core beneficiary received $11,600 per year in 1987, but only $8,300 per year in 2000 (both in 2003 prices). Average receipt did then increase substantially between 2000 and

2003 to $9,700. The figures for all benefits are quite similar to those for core benefits after 1991, while prior to that the average for all benefits is much lower because of the low value of family and child benefits and the larger number of people receiving only these benefits.

3.4. Income

We next examine how the components of total income have changed over time. Labour income is by far the largest component of income and made up between 84% and 90% of regular income during the sample period. The other sources of income are: benefit income, other regular income and irregular income. Benefit income consists of all types of government transfers. Other regular income is from investment (rental properties, interests and dividends), (private) superannuation payments, trusts, spousal and child support payments, scholarships, and all other regular and recurring income. Irregular income includes those of one-off nature like inheritances, divorce property settlement, premium redemption of inflation-adjusted bonds, lottery/casino winnings, gifts, and lump sum payments from accident compensation, maintenance or child support, private superannuation, life insurance policies and government transfers.

Figure 10 and Table 2 report annualised average personal income by source over time, as well as total gross and disposable individual income. Changes in mean real gross income are driven by the pattern in labour income. Average benefit income, other regular income and irregular income remain relatively stable over the period. While benefit income increased by over 60% from a mean of $1,400 per annum in 1983 to a mean of $2,300 per annum at the height of the recession in 1991, this increase only made up 23% of the decline in labour earnings experienced during this period. Mean real gross income was relatively stable between 1983 and 1994 and then increased throughout the remainder of the sample period. Mean real net income followed a similar pattern, but increases were smaller during the 1995 to 2003 period as a result of both tax increases and the general impact of progressive taxation on growing incomes.

We next examine how the tax burden has changed in more detail, with Figure 11 graphing the ratio of net to gross individual income over time. The average estimated tax burden ranged from 23.6% to 30.2% between 1983 and 2003. Tax rates declined during the early part of the sample period and this led to a decline in the average tax burden. This reached its lowest point during the sample period in 1991 when the economy was at the height of the recession. This is as expected in a country with a progressive tax system. The average tax burden has been fairly steady since 1993 at 25-26%.

Finally, we total up individual income for members of the same household and examine how household resources have changed over time. These figures are produced with one observation per household, but with the sample weights multiplied by the number of 25-59 year-old adults in the household. Hence, they are equivalent to calculating the average household income for each sample individual. In other words, we are reporting the household income for the average sample adult. This does not account for the fact that this income has to provide for more than one individual or that larger households benefit from economies of scale. We will discuss these issues further in the next section.

Figure 12 shows mean household non-benefit earnings, mean gross household income and mean net household income. Not surprisingly, mean gross regular income is about 30-40% higher than disposable income, which reflects the impact of the adjustments for taxes and ACC levy. All three measures of household income fell to a trough in 1993, following the pattern of personal labour income discussed above. This figure also shows mean individual non-benefit earnings. As can be seen, household income declined more than individual income in the period up to 1993 and then increased more than individual income after that point. This occurred because similar people are more likely to live in the same households. This phenomenon is called assortative mating and leads to a greater divergence in household level outcomes than those found for individuals.

Comparing gross to net household income, we can see that from 1983 to 1989, the tax burden was falling and as a consequence, even though real gross household income was stagnant, disposable household income, which reflects the money available to buy things, was increasing. On the other hand, the average household tax burden increased from 1994 to 2003, resulting in faster increases in gross household income than net household income. This mainly reflects the mechanical effect that progressive income taxes have when incomes are increasing, and is as expected.

3.5. Household Expenditure

Table 3 summarises how eight categories of expenditure have changes over time along with total expenditure. These eight categories are i) Food; ii) Housing; iii) Clothing iv) Health; v) Education; vi) Durable goods; vii) Other services; and viii) Other goods. Full definitions of these components are provided in Appendix 2. This information is also presented in Figure 13 with other goods aggregated with other services and health with education.

Housing expenditures have changed little over time in both real terms and as a proportion of total expenditure. In 1983, the average household spent 19.1% of their budget on

housing, rising to 21% in 2003. Consistent with the overall small increase in total expenditure during the sample period, spending on food as a proportion of total expenditure remained fairly steady over time at 17% (Engel's law states that spending on food as a proportion of total expenditure declines as total expenditure increases). It is interesting to note that while expenditure on goods (clothing, durables and other goods) declined in both real terms and as a proportion of total expenditure, expenditures on services (health, education and other services) followed the opposite trend.

Next, in Table 4 and Figure 14, we compare the time-series pattern of mean real disposable household income with that of mean consumption. As noted above, we distinguish four proxy measures of household consumption. First, looking at Figure 14, the five series follow a fairly similar pattern over time. The main exceptions are that expenditure declined faster than disposable income during 1983-1987 while rising more slowly than disposable income during 1996-1997. These two exceptions lead to household income being more volatile than household expenditure during the sample period, which is exactly what is predicted by the permanent income hypothesis. That is, during 'bad' times, households use their savings to smooth consumption against income losses and during 'good' times households save for later consumption. Given that there is typically significant measurement error in both income and expenditure data, both because of the data collection methods and the potential sensitivity of the data (especially for income), it is quite reassuring from a data quality standpoint, that on average household disposable income is nearly the same as household expenditure during the sample period.

In contrast to the widely quoted figures from national accounts (Statistics New Zealand 2006), the results in Table 4 indicate that households have, on average, been saving a substantial proportion of disposable income in each year since 1995. Furthermore, spending on non-durable goods and services as a proportion of disposable income has been generally in decline over the entire sample period. For example, in 1983, households spent 85% of disposable income on non-durable goods and services while by 2003 this had declined to 78%.

Figure 15 presents the same information as in Figure 14, but now we first take the log of each variable to reduce the impact of outliers on the results. The resulting measures are known as geometric means. Differences over time can now be interpreted as percentage changes, for example if mean log gross income goes from 10.9 to 10.8, then mean gross income has decline by 10%. Changing to the log scale reduces the volatility in mean household income more than for mean household expenditure since it is subject to more measurement error. Geometric mean total expenditure is found to have declined at a faster pace between 1983 and the bottom of the

recession in 1992 than geometric mean disposable income (expenditure fell by 44% while disposable income only fell by 17%). It then also increased at a slower pace in the recovery period (expenditure increased by 14% from 1992 to 2003, while disposable income increased by 21%).

3.6. The Impact of Equivalisation on Changes in Household Income and Expenditure over Time

Household of different compositions and sizes require different levels of resources to achieve similar standards of living. Given that there are economies of scale as household size increases, that children may cost less than adults, and that resource requirements may vary with intra-household living arrangements (a two-adult household can be a couple or two unrelated flatmates), household resources are typically standardised before comparison are made across different household types or all household types are pooled together. This standardisation is known as equivalisation. In this paper, we consider three equivalisation scales: the OECD scale, the BLS scale, and the 1988 Revised Jensen Scale More details on each of these are presented in Appendix 3. In general, our results are not sensitive to the choice of equivalence scale. Hence, most of the analysis below uses the 1988 Revised Jensen Scale, as it lies between the OECD and the BLS scales and is the most common scale used in New Zealand research. In Section 5.2, we examine in more detail whether poverty measurements are sensitive to the choice of equivalence scale.

We now examine whether this pattern of changes in income and expenditure over time is sensitive to whether we adjust for changes over time in household size and composition. Figure 16 graphs the exact same measures as Figure 15, but first equivalises the household figures using the 1988 Revised Jensen Scale. Perhaps surprisingly given the large change in household composition and size over the sample period, equivalisation has no observable impact on the pattern of changes in any of the measures of household wellbeing. However, to maintain consistency with the literature, all our remaining results for household measures are equivalised.

3.7. Changes in Household Income and Expenditure by Household Characteristics

We next examine how changes over time in household income and expenditure vary for households with different characteristics. We first examine how the patterns vary for households with different demographic compositions. Specifically, we divide households into four types: i) couple only; ii) couple with children; iii) single parent; and iv) other household types (this includes sole occupants, unrelated individuals living together as well as complicated family

structures, such as multigenerational families living in the same household). Figure 17 graphs mean log equivalised income and expenditure for each of these four groups.

Income and expenditure are generally highest for couple only households followed by other households and couple with children households. They are both quite substantially lower for single parents. It is also apparent that mean incomes for single parents have been in decline across the entire sample period, perhaps due to changes in the composition of single parents over time and also perhaps to the declining generosity of benefit payments during the sample period. In contrast, for the other three groups of households, income fell from the beginning of the sample period until the mid-1990s, but has been mostly rising since then.

Another prominent difference across household types is that for households generally without children (i.e. couple only and other), disposable income is generally greater than total expenditure by a wide margin (on average 20-40%), while, for households with children, mean disposable income is generally quite similar to mean total expenditure. This is consistent with life-cycle consumption models that imply that households should generally be saving when they are young and without children so they can maintain living standards when the expense of children are added to the household.

We next examine how the patterns vary for households with different educational qualifications. We divide households into four groups based on the highest qualification that any adult household member holds; i) no qualifications, ii) school qualifications, iii) post-school, non-degree qualifications, and iv) university degrees. Figure 18 graphs mean log equivalised income and expenditure for each of these four groups.[10]

Household with more qualified members have higher income and expenditure. Furthermore, the decline in income from the beginning of the sample period to the mid-1990s is progressively larger for the households with less qualified members. The relationship between disposable income and total expenditure is also stronger for households with either no qualifications or school qualifications, for which the two figures are quite similar in most years, than for households with more qualified members, for which disposable income is typically greater than total expenditure. In other words, households with more educated members seem more likely to save a large proportion of their income.

Finally, we examine how the patterns vary for households born in different decades. We divide households into five groups based on the decade in which the oldest member was born

[10] Data for 1986 are exclude from this figure (and instead interpolated), because the HES did not collect information on qualifications in this year. This is obviously also the case in all other figures in the paper that stratify results by qualifications.

and graph mean log equivalised income and expenditure for each of these groups in Figure 19 (individuals born prior to 1920 and after 1969 are excluded since they are only in the relevant age range for our sample in a few years). These are known as synthetic cohort graphs. Now, the mean for each year is calculated off a representative sample of the same group of individuals (i.e. those born in a particular decade). For individuals born in the 1930s, 1940s, and 1950s, we can observe mean outcomes for these individuals over a 20 year period.

Looking at each graph, we can see that mean disposable income and total expenditure are generally similar when individuals are in their 20s and early 30s and then disposable income is greater than expenditure in all remaining years. This is not consistent with a simple life-cycle savings model which says that older individuals should start dissaving once their children are out of the household. However, models that also include bequest motives and/or uncertain life spans can result in households continuing to save well into their 60s. Interestingly, the cohort of individuals born in the 1960s stands out for the fact that, compared to those born in the 1940s and 1950s, mean incomes and expenditure have generally been declining in real terms over their entire lifetimes. This is quite likely related to the fact that this is the cohort which was just getting started in the labour market when New Zealand underwent comprehensive economic reforms.

4. Inequality in Wages, Earnings, Income and Expenditure over Time

4.1. The Distribution of Wages, Earnings, and Household Income and Expenditure over Time

We next examine how the distribution of eight measures of individual and household wellbeing has varied over our sample period. In particular, in Figure 20, we graph the 10^{th}, 25^{th}, 50^{th} (i.e. the median), 75^{th}, and 90^{th} percentile of the distribution of: i) log individual hourly wages, ii) log individual weekly earnings if employed, iii) log individual gross income, and iv) log individual disposable income, in each sample year. Then, in Figure 21, we do the same for: i) log equivalised household gross income, ii) log equivalised household disposable income, iii) log equivalised household total expenditure, and iv) log equivalised household expenditure excluding durable goods.

First, looking at the results in Figure 20 for hourly wages, we see that real hourly wages declined across the entire wage distribution between 1983 and 1993. In fact, the decline was fairly similar at all five points in the distribution ranging from 16% at the 75^{th} percentile to 11% at the 25^{th} percentile and median. A noticeable divergence then occurred between 1993 and 2003,

with real wages at the median and below remaining fairly stagnant (growing by 3-6%) while wages at the 75th percentile increased by 11% and at the 90th percentile by 15%. As will be seen in section 4.3, this means that inequality in the upper half of the wage distribution increased between 1993 and 2003 after not changing in the 1980s and early 1990s.

Turning to weekly earnings, we find that the changes were less extreme than those for hourly wages. This likely indicates that individuals faced with declining real wages increased their work hours on average. In particular, weekly earnings only declined by 6-14% between 1983 and 1993 at the various points in the wage distribution. Furthermore, weekly earnings increased by a similar amount between 1993 and 2003 at all points in the earnings distribution (by 7-12%). Hence, all of the increase in wage inequality in the upper half of the wage distribution was mitigated by increased work hours for lower paid workers relative to high paid workers.

Next, looking at total and disposable individual income, we see that changes in employment rates (and potentially differences in the characteristics of employed individuals) had important impacts on the income distribution for low income workers (recall that non-employed individuals do not influence the distribution of hourly wages or weekly earnings above). In fact, we now find that the reduction in real income between 1983 and 1993 was larger in the middle of the wage distribution, with median income declining by 19% before taxes (20% after taxes) versus declining by 13% (12% after taxes) at the 75th percentile and 8% (11% after taxes) at the 25th percentile. Interestingly, gross incomes actually increased by 20% at the 10th percentile, although less generous transfers for low income individuals resulted in disposable income declining by 2% at this part of the distribution. Then, in the 1993-2003 period, incomes increased more at the lower end of the income distribution than at the upper end, although changes in the tax system did benefit individuals more at the top end of the income distribution. Looking at disposable incomes, real income increased by 87% at the 10th percentile, 29% at the 25th percentile, 25% at the median, 19% at the 75th percentile and 21% at the 90th percentile, leading to reduced income inequality between 1993 and 2003.

Now, examining household income in Figure 21 reveals that although individual income inequality did not increase between 1983 and 1993, household income inequality certainly did. For example, while gross equivalised household income fell by 5% (3% after taxes) at the 90th percentile in the income distribution over this time period, it fell by 13% (14% after taxes) at the median and 24% (35% after taxes) at the 25th percentile. This illustrates the importance of the propensity of like individuals to live together (called assortative mating) and the polarisation in labour market participation that occurred at the household level during this time period (Singley and Callister 2004). On the other hand, the increase in household income between 1993 and

2003 occurred fairly evenly across the income distribution with gross income increasing by 18-27% in this time period and disposable income by 22-27%.

However, over the entire sample period, inequality in household income grew substantially, for example, between 1983 and 2002, household gross income did not change at the 10th percentile, increased by 4% at the 25th percentile, 12% at the median, 10% at the 75th percentile and 17% at the 90th percentile. The corresponding figures for household disposable income are, -14%, 0%, 12%, 16% and 19%, respectively, indicating that changes in the tax system lead to relative declines in disposable income for poor people compared to the rich.

The overall patterns for expenditure are quite similar to those for disposable income. The main differences are that the decline in expenditure that occurred at the lower end of the distribution between 1983 and 1993 were about one-quarter smaller for total expenditure and one-third smaller for non-durable expenditure than the decline in income and that the corresponding increases that occurred between 1993 and 2003 are also smaller by similar amounts.

4.2. Inequality below the Median

We now examine more closely how inequality in the lower end of each distribution described above has changed over time. Figure 22 graphs the difference between the 50th and 10th percentile in the distribution of: i) log individual hourly wages, ii) log individual weekly earnings if employed, iii) log individual gross income, and iv) log individual disposable income, in each sample year. This is equivalent to the ratio of the 50th and 10th percentile of the distribution of these variables in levels. Figure 23 instead graphs the difference between the 50th and 25th percentile in the distribution of each of these outcomes.

Both figures show that there was little change in either wage or earnings inequality at the lower end of the distribution of either of these outcomes over the entire sample period. On the other hand, individual income inequality whether measured by total income or disposable income declined at the lower end of the income distribution over the entire sample period when measured as the 50/10 percentile ratio and during the 1980s when measured at the 50/25 percentile ratio.

Figure 24 then graphs the difference between the 50th and 10th percentile in the distribution of: i) log equivalised household gross income, ii) log equivalised household disposable income, iii) log equivalised household total expenditure, and iv) log equivalised household expenditure excluding durable goods, while Figure 25 graphs the difference between the 50th and 25th percentile for these outcomes.

As discussed in the previous section, these results highlight that unlike inequality in individual income, inequality in household income increased at the lower end of distribution during the sample period, as did inequality in expenditure. For both income and expenditure this increase occurred mainly between 1983 and 1993 and resulted in a 10-20% increase in the 50/10 and 50/25 ratio for all four measures of household wellbeing.

4.3. Inequality above the Median

We next examine how inequality in the upper end of each outcome distribution has changed over time. Figure 26 graphs the difference between the 90th and 50th percentile in the distribution of: i) log individual hourly wages, ii) log individual weekly earnings if employed, iii) log individual gross income, and iv) log individual disposable income, in each sample year. Figure 27 instead graphs the difference between the 75th and 50th percentile in each distribution.

For all four outcomes, there is little evidence of any changes in the 75/50 percentile ratio over the sample period; however, inequality at the top of the distribution (i.e. the 90/50 ratio) did increase for each. In particular, the ratio of hourly wages and weekly earnings increased gradually throughout the sample period and was 5-6% higher in 2003 than in 1983. A similar size increase also occurred for both measures of individual income with all the change occurring between 1983 and 1993.

Figure 28 (90/50 percentile ratio) and Figure 29 (75/50 percentile ratio) graph the results for the household outcomes. These results are similar to those for the individual outcomes, overall there was little change in inequality between the median and the 75th percentile, while household income and expenditure inequality at the top of the distribution (measured by the 90/50 percentile ratio) increased by around 6% for income and a larger 13-15% for expenditure.

4.4. Inequality within Educational Groups

In the final part of this section, we examine how inequality in both individual and household outcomes has changed for individuals with different educational qualifications. The goal is to examine whether changes in inequality have primarily reflected changes in labour market returns to qualifications and assortative mating on this characteristic as opposed to changes in inequality within groups of similar individuals (along this one dimension).

Figure 30 graphs the 10th, 25th, 50th, 75th, and 90th percentiles of the log hourly wage distribution for individuals in one of four qualifications groups (no qualifications, school qualifications, post-school non-degree qualifications and university degrees). In this figure, we normalise each value by the corresponding point in the wage distribution in 1983 for each

qualification group. In other words, the figure shows how the wage distribution has changed over time for each qualification group.

For example, the panel for individuals with no qualifications show that wages have declined across the entire wage distribution over the sample period for these individuals. There has also been a small increase in within-group inequality as wages at the median and above declined by about 5% during the sample period versus 7% for the 25th percentile and 8-9% for the 10th percentile. The findings are actually quite similar for all four qualification groups. Only at the 90th percentile of the wage distribution for individuals with university degrees do we find higher wages. Interestingly, this suggests that the growth in mean hourly wages that occurred between 1993 and 2003 mainly happened because the population was upskilling.

Figure 31 now graphs the same for log individual gross income. For individuals with less than a university degree, inequality in the low end of the income distribution has declined over time with income increasing at the 10th and 25th percentile for individuals with no qualifications and school qualifications and at the 10th percentile for individuals with post-school qualifications while there has been little change at the other points in the income distribution. On the other hand, income inequality has increased in the low end of the distribution among individuals with degree qualifications, with the 10th and 25th percentile declining over time while the remaining percentiles have been constant.

We next examine changes in log equivalised household total income in Figure 32. We now classify households based on their most educated adult. While there is not a great deal of variation over time, it is apparent that the decline in household income that occurred between 1983 and 1993 was concentrated among all households with no qualifications and those households with school and post-school qualification in the lower half of the income distribution. On the other hand, there was little change in any of the percentiles over this time period for households with a member with a university degree. However, for these households, there is some evidence of increasing income inequality at the top of the income distribution between 1993 and 2003 as incomes grew at the 75th and 90th percentile while remaining stagnant at that other points in the income distribution.

In Figure 33, we examine changes in the log equivalised household disposable income distribution by education. Tax changes over this time period reinforced the underlying trend towards more inequality. For example, we now see that, within each educational group, the income distribution is wider in 2003 than it was in 1983. We also find that disposable incomes at the 10th and 25th percentile of the income distribution for households with no qualifications and

at the 10th percentile of the income distribution for all other households never recovered from the decline between 1983 and 1993 and real disposable incomes for these households were lower in 2003 than in 1983. It is worth noting though that the scale of these differences is fairly small with incomes at most 3% lower.

Finally, in Figure 34, we examine changes in the log equivalised household expenditure distribution by education. The results here are quite similar to those reported in Figure 33. The only noticeable difference is that, among households with no qualifications, total expenditure never recovered to the levels recorded in 1993 for households at any point of the expenditure distribution.

5. Poverty over Time and for Different Households

5.1. Measuring Poverty Using Household Income and Expenditure

In this section, we examine how poverty rates and mean poverty gaps have changed over our sample period and how they vary across individuals in households with different characteristics. The major contribution that this analysis makes is that it considers five different ways of measuring poverty.

The first is a traditional measure of Relative Income Poverty. Here, the poverty line is defined as 60% of the sample median of equivalised household disposable income. A household is then classified as being in poverty if its equivalised disposable income is below the poverty line. This is how poverty has been measured in almost all previous papers on poverty in New Zealand (Ballantyne et al. 2004; Perry 2007).

We next consider two similarly constructed measures that use expenditure data instead of income data to assess which households are in poverty. Since current expenditure is more closely related to lifetime resources than current income and more reflective of the actual living standards faced by particular households, this approach should better identify households which are poor. Specifically, the second measure (Relative Total Expenditure Poverty) defines the poverty line as 60% of the sample median of equivalised total household expenditure (in other words including expenditure on durable goods and housing). A household is then classified as being in poverty if its equivalised total expenditure is below the household expenditure poverty line.

One downside of using total expenditure to define the poverty line is that it will be sensitive to differences across households in preferences towards owning goods versus taking leisure time and also to the decision on whether to rent or own a home. Food on the other hand

is quite price inelastic and hence differences across households in food expenditure are likely to be strongly related to household living standards. Our third measure of poverty (Relative Food Expenditure Poverty) thus defines the poverty line as 60% of the sample median of equivalised household food expenditure. A household is then classified as being in poverty if its equivalised food expenditure is below this poverty line.

While current expenditure is more strongly related to permanent resources and current living standards than current income, differences also reflect household preferences, such as preference for home production versus purchased goods or to commute on a bicycle instead of in a car. Hence, relying on it alone to measure poverty does have some limitations. A recent paper by Garner and Short (2000) proposes a methodology for using data on income and expenditure together to calculate a more robust measure of poverty (Income Relative to Derived Expenditure Basket Poverty). This method uses expenditure data to calculate a poverty threshold which data on disposable income is then compared to directly.

Unlike traditional approaches which use expenditure data to calculate absolute poverty thresholds (e.g. the income required to purchase food that provides a minimum number of calories), this approach accounts for expenditure on a wide range of necessities and allows for the cost of purchasing these goods to change over time. In particular, the derived expenditure basket is an estimate of 'average' expenditure in each year by a reference family of a couple with two children on the following goods and services: i) food, at home and away from home, ii) clothing, iii) utilities (including telephone), iv) medical care, and v) housing costs (this is calculated over the full sample of owners and renters, hence the poverty line is insensitive to the homeownership decisions of particular households). This is then adjusted using equivalence scales to calculate poverty lines for all households. A household is then defined as poor if its disposable income is below the equivalised threshold. Further information on the how this poverty measure is calculated is provided in Appendix 4.

Our final measure of poverty again combines both income and expenditure data, but does this in a much more simplistic fashion. Now, households are defined as poor if both their disposable income and total expenditure are below the 60% of the median thresholds discussed above. This is called being in Joint Relative Income and Expenditure Poverty.

For each of these five measures, we calculate a headcount poverty rate, which is the percentage of households that are below the discussed poverty thresholds. For each measure but the last, we also calculate the poverty gap for each household, which is defined as:

$$\text{Poverty Gap} = (1 - Y) / \text{Poverty Line}$$

where Y is the resource being measured (e.g. household disposable income, household total expenditure or household food expenditure) and poverty gap = 0 for non-poor households and =1 for households with negative resources. This is then averaged over all households to calculate the mean poverty gap for each measure, which is sensitive to both the absolute number of households with low resources and inequality at the bottom of the resource distribution.[11] This is not calculated for our fifth measure of poverty since it is not clear how to do so for an approach that makes a joint comparison.

As in each of the previous sections, all results here are weighted by the number of adults in the household and hence represent the proportion of adults that are in poverty and the poverty gap for the average adult, as opposed to proportion of households in poverty.

5.2. Sensitivity of Poverty Lines to Different Equivalence Scales and Methodologies

Before delving into our main results, we examine whether the choice of equivalence scale is likely to have an important impact on measured poverty rates. Figure 35 graphs the Relative Income Poverty Line over time calculated using three different equivalence scales, the OECD scale, the BLS scale, and the Jensen scale. These results show that the choice of scale has little impact on the measured poverty lines. The poverty line is highest when the OECD scale is used and lowest when the BLS scale is used but in all cases the difference is at most a few hundred dollars. The Jensen is between the two alternatives. Given that it is used in the New Zealand literature, we continue to rely on it for the remaining analysis.

We next examine how the measured poverty line varies by choice of methodology (Figure 36). First, one can see that the Relative Income Poverty Line is sensitive to the overall strength of the economy. As median disposable income declined between 1989 and 1993 so did the Relative Income Poverty Line from around $31,000 to about $27,000. It then increased substantially as median incomes increased between 1993 and 2003, reaching $35,000 by the end of the sample period. Interestingly, the Relative Total Expenditure Poverty Line is almost exactly the same as the Relative Income Poverty Line. As the results in section 4 show, this occurs because total expenditure and disposable income track each other quite closely over time. On the other hand, the Income Relative to Derived Expenditure Basket Poverty Line is less sensitive to the overall business cycle and instead increases fairly steadily over time indicating that average expenditure on 'necessities' has steadily increased over the sample period (perhaps, related to the

[11] Alternative measures of poverty depth that put greater weight on those furthest from the poverty line can be calculated using the more general formula of Poverty Depth = $[(1 - Y) / \text{Poverty Line}]^{\alpha}$. We do not examine these additional measures in this paper given its more general overall focus.

real increase in house prices that occurred in the 1990s in New Zealand). This poverty line is also lower than the Relative Income Poverty Line implying that calculated poverty rates will be lower using this methodology. Finally, the Relative Food Expenditure Poverty Line keeps more or less the same value ($5,000) over the entire sample period demonstrating that expenditure on food is not generally sensitive to short-run changes in economic conditions.

5.3. Overall Poverty Rates and Mean Poverty Gaps over Time

We now examine how poverty rates and the mean poverty gap have varied over the sample period. Figure 37 graphs the poverty rate calculated using each of the five methods described above in each year of the sample period. While poverty rates vary in levels across the five methods, the time series pattern is quite similar. Each method shows poverty increasing fairly steadily between 1983 and 1992/93/94 (depending on the measure), with a total increase in poverty of 5-9 percentage points depending on the method. Poverty rates then remain fairly stable for the remainder of the sample period, with little increase found in Relative Income, Relative Total Expenditure or Income Relative to Derived Expenditure Basket Poverty, a small increase found in Relative Food Poverty and a small decline found in Joint Relative Income and Expenditure Poverty.

Because the time series pattern for each measure is similar, we can easily discuss the variation in the level differences in poverty across measures. The poverty rate is highest when measured using either Relative Income or Relative Total Expenditure and is generally quite similar with either method, although it is 2-5 percentage points higher after 1992 when measured using Relative Income as opposed to Relative Total Expenditure. The poverty rate is then 2-7 percentage points lower when measured using Relative Food Expenditure, 8-13 percentage points lower using Income Relative to Derived Expenditure Basket and 9-14 percentage points lower using Joint Relative Income and Expenditure.

Figure 38 is identical to Figure 37 except that it graphs the mean poverty gap. These results show a similar pattern to those in the previous figure, the poverty gap increased steadily from 1983 to 1992/93/94 and then remained at the same level throughout the remainder of the sample period. The mean poverty gap is also similar when measured using either Relative Income or Relative Total Expenditure and is only slightly less when measured using Relative Food Expenditure. On the other hand, the mean poverty gap is about half the size when measured using Income Relative to Derived Expenditure Basket.

Overall, these results demonstrate that the choice of poverty line is crucial for judging the amount of poverty in the population, but less important for examining how poverty has

changed over time. We will continue to present results using all five methods for the remainder of this section.

5.4. Poverty Rates and Mean Poverty Gaps by Household Characteristics over Time

We next examine how poverty rates (Figure 39) and the mean poverty gap (Figure 40) have changed over time for adults in households in different age groups. We divide households based on the age of the oldest adult member into four ten-year age-groups.

First, examining poverty rates, we see that poverty is generally the lowest among individuals in 45-54 year-old households and then at similar levels in other prime-aged households. The patterns found in the previous section for all individuals are also found for all four household age groups (i.e. increasing poverty from 1983-1993 followed by little change). The most interesting finding is that the difference in poverty rates measured using Relative Income, Relative Total Expenditure and Relative Food Expenditure (referred to as group 1 measures for the remainder of the paper) versus those measured using Income Relative to Derived Expenditure Basket or Joint Relative Income and Expenditure (referred to as group 2 measures for the remainder of the paper) is larger for individuals in older households, especially those in the oldest age group.

Next, examining poverty gaps, we now find poverty is, on average, the lowest for individuals in households in the 35-44 age-group. However, if poverty is measured using the Income Relative to Derived Expenditure Basket, it is actually individuals in the oldest households that have the lowest mean poverty gap, while they have the highest mean poverty gap using the group 1 measures. This indicates that while many older households have low levels of disposable income, total expenditure and food expenditure, very few have less disposable income than what is required to purchase a basket of necessities.

We next examine how poverty rates (Figure 41) and the mean poverty gap (Figure 42) have changed over time for adults in households with different composition. Again, we break households into four groups, couple only, couple with children, single parent and other.

Examining poverty rates, we see that poverty is generally the lowest among adults in couple only households, slightly higher for those in couple with children and other households and substantially higher among single parents. There is now more variation in the time-series pattern of poverty rates. Poverty among adults in couple only households increased moderately throughout the entire sample period using most methods. A steady increase in poverty is also seen among adults in other households, but the change is larger (poverty rates are 5-13

percentage points higher in 2003 than in 1983). Poverty rates for adults in couple with children households followed the pattern seen for all adults, increasing in the first half of the sample period and remaining steady for the remainder. Poverty rates for single parents increased tremendously between 1983 and 1992, by 10-23 percentage points before levelling off or increasing at a slower rate in the remainder of the sample period depending on the measure used. Overall, poverty rates are quite high for single parents regardless of the measure used, but seem particularly overstated by the Relative Income approach. For example, the poverty rate in 2003 among single parents is 35% using Joint Relative Income and Expenditure, and 41-45% using the remaining non-Relative Income measures, versus 59% using Relative Income. Examining the mean poverty gap instead of the poverty rate leads to essentially the same conclusions.

Finally, we examine how poverty rates (Figure 43) and mean poverty gaps (Figure 44) have changed over time for adults in households with different educational qualifications. Again, we break households into four groups based on the highest qualification of any adult member. Poverty rates and the mean poverty gap are higher for adults in households with less educated members, with substantially higher rates for adults in household with no qualifications or school qualifications. Poverty rates and mean poverty rates have also increased the most over time for these households. In particular, for household with only adults with no qualifications, poverty has become more prevalent and deeper steadily over the entire sample period, while for those with school qualifications in the household poverty only increased in the first half of the sample period. Again, we also see that the different in rates measured using the group 1 methods and the group 2 methods is most apparent among the household groups with the highest poverty rates (i.e. those with no qualifications).

5.5. The Multivariate Relationship between Household Characteristics and Poverty

In this last section, we present the results from regression models of the relationship between household characteristics and whether a household is in poverty and their poverty gap. Specifically, for each of the poverty measures discussed above (i.e. five measures of headcount poverty and four measures of the poverty gap), we estimate three regression specifications using unit record data where the particular poverty measure is the outcome variable.[12] In the first specification, we only include indicator variables for the year of observation. Hence, the results

[12] Maximum likelihood probit regression models are estimated when the outcome variable is whether a household is in poverty since this is a discrete variable, while OLS regression models are estimated when the outcome is the poverty gap which is a continuous measure (albeit one that is censored at 0, which we do not account for in our modelling strategy). Data from 1986 are excluded from all our regression estimates because in this year the HES did not collect data on qualifications.

here replicate Figures 37 and 38, but allow the reader to judge whether changes over time are significantly different from zero.

Then, in the second specification, we add control variables for i) household composition (now adding an additional control for sole occupants who were previously included in the 'other' group); ii) household demographics, specifically the age and gender of household members); and iii) household education (again, the highest qualification in the household).[13] These results allow us to judge whether the time-series pattern is related to changes in mean household characteristics over time and how household characteristics themselves are related to whether households are in poverty.

Finally, in the third specification, we add control variables for whether the household has an employed member, the number of employed members, whether the household has a beneficiary (core benefits only), and the number of beneficiaries (core benefits only). Again, we can judge whether changes in these variables over time account for the time-series patterns in poverty and how they directly relate to whether households are in poverty.

The results from the first specification are presented in Table 5. Marginal effects are presented for all nine outcomes along with the corresponding standard errors. We can see that by 1991 poverty rates and mean poverty gaps were significantly higher than in the default year of 1983. For example, adults were 5.8 percentage points more likely to be in Relative Income Poverty, 3.3 percentage points more likely to be in Relative Total Expenditure Poverty, 5.2 percentage points more likely to be in Relative Food Expenditure Poverty, 7.5 percentage points more likely to be in Income Relative to Derived Expenditure Basket Poverty and 3.6 percentage points more likely to be in Joint Relative Income and Expenditure Poverty. They also had 0.017 – 0.034 higher poverty gaps depending on the measure. These figures continued to increase until 1993 or 1994 and then levelled off. Overall, adults in 2003 were 3.4 – 12.0 percentage points more likely to be in poverty then than in 1983 and the mean poverty gap was 0.026 – 0.047 higher.

Table 6 presents the results for the second specification. Controlling for household composition, demographics and qualifications does not explain the increase in poverty that occurred during the sample period. In fact, these results indicate that, if it was not for changes in these variables that made households less likely to be in poverty (such as increasing educational

[13] We do not include controls for ethnicity because of the difficulties in classifying households where members may have different (and multiple) ethnicities, and because of the more generic focus of this paper. An alternative approach would be estimate the poverty regressions at the individual level assigning the poverty indicator for the household to each member.

levels), poverty rates would have increased by an even larger margin. This can be seen by looking at the coefficients on say the year 1993. These indicate that relative to 1983, adults were 4.9 – 15.2 percentage points more likely to be in poverty once controlling for changes in household characteristics. This is also seen when examining the increase in the prevalence of poverty between 1983 and 2003.

Turning to examining the particular characteristics that are related to poverty, we find a number of interestingly relationships. First, looking at household composition, couples without children are generally the least likely to be in poverty, while single parents are more likely to be in poverty than couples with children regardless of the poverty measure (even though we are controlling for other characteristics about these households that may be related to poverty, such as lower qualifications). Second, looking at household demographics, we find that adults in households containing no adult men are more likely to be in poverty although typically by a small amount. Furthermore, adults in households with children and especially young children are more likely to be in poverty. For example, for each child aged 0-4 in the household, adults in these households are 4.5 – 13.0 percentage points more likely to be in poverty. This relationship works in the opposite direction for adults in household with more individuals aged 15 – 54, these adults are less likely to be in poverty. Finally, looking at household qualifications, we find that adults in households with more qualified members are significantly less likely to be in poverty. The qualification / poverty gradient is very strong, with adults in households where the highest degree holder has a university degree 9.5 – 19.0 percentage points less likely to be in poverty than adults in household were no adult holds a school qualification.

Table 7 presents the results from the third specification. Adding in controls for whether adults in the household work and/or receive benefits reduces the impact of 'time' on poverty rates. However, even controlling for this relationship, we find that the likelihood that adults are in poverty increased significantly between 1983 and 1992 regardless of the measure used. The early 1990s recession appears to have lead to reductions in income at the bottom of the distribution even when accounting for declining employment rates and these increased poverty rates remained even after employment rebounded in the late 1990s. On the other hand, difference in employment and beneficiary status explain most of the relationship between household composition and demographics and poverty rates. Now, none of these variables are consistently related to higher poverty rates except having 0-4 year-olds in the household. However, even with these additional controls, household education remains strongly related to whether adults are in poverty reflecting the strong relationship between education and wages.

Finally, turning to the labour force status variables, we see that having at least one worker in the household is associated with adults having a 4.2 – 19.3 percentage point lower likelihood of being in poverty and that having additional employed household members makes it even less likely to be in poverty. On the other hand, even though beneficiaries receive income from the government, adults in households with members receiving core government benefits are 3.4 – 14.0 percentage points more likely to be in poverty. Having additional beneficiaries, however, is not generally related to whether adults living in household which are in poverty and, in fact, appears to lead to a reduction in poverty gaps.

Overall, these results indicated that: i) the increase in poverty observed between 1983 and 1993 and the sustained higher poverty levels observed between 1993 and 2003 are not explained by either changes in the characteristics of households over time or changes in household employment patterns; ii) qualifications are the main household characteristics that are related to whether adults are likely to be in poverty, with adults in highly qualified households much less likely to be in poverty; and iii) adults living in households with at least one employed adult are much less likely to be in poverty while those living in households with at least one beneficiary are much more likely to be in poverty. Also noticeable when examining the full set of regression models is that the relationship between these covariates and poverty tends to be much stronger when it is measured using Relative Income versus other methods, which suggests that this method may not be ideal for measuring long-term or persistent poverty.

6. Conclusions

This paper investigates the relationship between individual labour market outcomes, household income, proxy measures of household consumption, and inequality and poverty using unit record data from the 1983/84 – 2003/04 Household Economic Survey (HES). As in previous work, such as Hyslop and Maré (2005), we find that employment, real wages, and household income and expenditure declined sharply between 1983 and 1993, and then rose sharply between 1993 and 2003. The changes in household outcomes are generally larger than those for individual outcomes as they are exacerbated by assortative mating (i.e. similarities the characteristics of partners) and the polarisation of employment across households, although progressive taxation does moderate this relationship.

Focusing on inequality, below the median, individual income inequality declined over time, but household income inequality rose across the entire time period, especially in the 1980s. Household expenditure inequality also increased, but less so than income inequality, suggesting that changes (declines) in household income during this time period were viewed as temporary.

On the other hand, there was little change in either income or expenditure inequality in the upper end of either distribution.

Turning to our analysis of poverty rates, we find that headcount rates and the mean poverty gap vary quite substantially across the five different methods of calculating poverty that we examine in the paper, with poverty rates typically the highest when measured using disposable income, with only slightly lower rates found using total or food expenditure. Lower rates are found using the newly developed methodology for combining income and expenditure data to produce poverty indicators and when jointly using income and expenditure thresholds. Overall, our results suggest that the common approach of using disposable income to measure poverty rates is the least desirable.

However, changes in poverty over time are quite similar regardless to the method used. For example, each of the five methods shows headcount poverty rates increasing fairly steadily between 1983 and 1992-94, with a total increase of between 5 and 9 percentage points. Poverty rates then remained fairly stable for the remainder of the sample period. We also find that controlling for changes in household composition, demographics, qualifications, and employment rates does not explain the increase in poverty that occurred in the 1980s. Taken in conjunction with previous work by Gibson and Harris (1996), Dalziel (2002) and Stillman et al. (2011), these results suggest that the structural reforms undertaken in the 1980s led to permanent changes in the distribution of resources across households in New Zealand, in particular a reduction in resources for the poorest households.

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8. Figures and Tables

Table 1 Individual Labour Market Outcomes over Time

Year	Mean Employment Rate	Mean Weekly Hours Worked if Employed	Mean Hourly Wage Rate[1]	Mean Weekly Labour Earnings[1]	% Change in Employ Rate Since Prior Year	% Change in Hours Work Since Prior Year	% Change in Hourly Wage Since Prior Year	% Change in Earnings Since Prior Year
1983	0.76	39.5	19.3	525				
1984	0.77	39.5	18.8	530	0.012	0.000	-0.026	0.010
1985	0.78	40.3	18.6	531	0.005	0.020	-0.011	0.002
1986	0.78	40.5	19.4	566	0.001	0.005	0.043	0.066
1987	0.77	40.3	18.1	524	-0.010	-0.005	-0.067	-0.074
1988	0.76	40.3	18.0	511	-0.017	0.000	-0.006	-0.025
1989	0.74	40.0	18.7	515	-0.021	-0.007	0.039	0.008
1990	0.73	40.9	18.0	499	-0.019	0.023	-0.037	-0.031
1991	0.71	40.7	17.6	461	-0.019	-0.005	-0.022	-0.076
1992	0.72	41.1	17.7	477	0.007	0.010	0.006	0.035
1993	0.72	41.1	16.9	463	0.007	0.000	-0.045	-0.029
1994	0.75	41.5	17.6	502	0.037	0.010	0.041	0.084
1995	0.76	42.1	17.4	519	0.013	0.014	-0.011	0.034
1996	0.76	42.0	17.6	518	0.001	-0.002	0.011	-0.002
1997	0.78	41.6	17.7	538	0.026	-0.010	0.006	0.039
2000	0.79	41.2	18.5	563	0.014	-0.010	0.045	0.046
2003	0.80	40.5	18.7	593	0.013	-0.017	0.011	0.053

(1) In June 2003 prices.

Table 2 Individual Annual Income by Source over Time

Year	Mean Labour Income[(1)]	Mean Benefit Income[(1)]	Mean Other Income[(1)]	Mean Total Regular Income[(1)]	Labour Income / Regular Income	Mean Irregular Income[(1)]	Mean Total Gross Income[(1)]	Mean Total Disposable Income[(1)]
1983	28,300	1,400	1,940	31,600	0.896	1,200	32,900	23,600
1984	27,400	1,430	2,500	31,300	0.875	1,300	32,600	23,400
1985	27,400	1,510	2,730	31,600	0.867	1,400	33,000	23,000
1986	29,300	1,460	2,460	33,200	0.883	1,300	34,500	24,300
1987	27,100	1,770	2,010	30,900	0.877	1,400	32,300	23,500
1988	27,200	1,940	2,180	31,400	0.866	1,600	33,000	24,700
1989	27,800	2,250	2,630	32,700	0.850	1,500	34,100	25,800
1990	26,300	2,100	2,560	31,000	0.848	1,600	32,600	24,800
1991	24,500	2,260	2,380	29,100	0.842	1,200	30,300	23,200
1992	25,300	2,040	2,420	29,700	0.852	1,700	31,400	23,600
1993	23,900	2,220	2,160	28,300	0.845	1,400	29,700	22,000
1994	26,500	2,150	2,050	30,700	0.863	1,200	31,900	23,600
1995	27,300	2,040	2,610	32,000	0.853	1,800	33,800	25,000
1996	26,600	2,210	2,650	31,400	0.847	1,300	32,700	24,400
1997	29,100	1,970	2,280	33,400	0.871	1,500	34,900	26,200
2000	29,600	1,950	3,280	34,800	0.851	2,000	36,700	27,400
2003	31,800	2,000	2,320	36,100	0.881	1,400	37,600	27,800

(1) In June 2003 prices.

Table 3 Mean Household Expenditures by Type over Time[1]

Year	Food	Housing	Clothing	Health	Education	Durable Goods	Other Services	Other Goods	Total Expenditure
1983	9,100	10,100	3,300	640	430	8,500	11,700	9,100	52,800
1984	9,500	10,500	3,400	610	390	8,800	11,900	9,800	54,900
1985	9,200	10,200	3,200	640	320	8,500	12,300	9,300	53,600
1986	9,200	11,100	1,900	660	350	9,200	12,600	8,300	53,300
1987	8,600	11,000	2,900	690	340	7,400	13,000	7,900	51,800
1988	8,400	10,800	2,500	790	420	7,100	13,500	7,900	51,400
1989	8,900	12,100	2,500	800	440	6,600	13,400	8,300	53,100
1990	8,700	10,500	2,300	810	510	6,800	12,800	7,900	50,400
1991	8,000	9,200	2,100	900	600	5,600	12,100	7,500	46,000
1992	7,900	8,200	2,300	1,010	710	5,700	12,400	7,400	45,600
1993	7,900	9,500	2,200	930	670	5,300	11,700	7,300	45,500
1994	8,000	10,000	2,200	960	800	6,400	12,400	7,400	48,100
1995	8,100	9,300	2,200	960	810	7,100	13,000	7,500	48,900
1996	7,800	9,400	1,800	980	750	6,900	12,900	7,200	47,800
1997	8,000	8,600	1,900	1,040	920	6,500	13,600	7,500	48,000
2000	8,500	12,000	1,800	1,070	950	5,900	13,400	7,800	51,400
2003	9,200	11,300	2,100	1,200	1,300	6,800	14,100	8,300	54,400

(1) In June 2003 prices and rounded to the nearest ten or hundred.

Table 4 Comparing Household Income and Expenditure over Time

Year	Mean Disposable Household Income[(1)] (1)	Mean Total Household Expenditure[(1)] (2)	Col (2) Excluding Durable Goods[(1)] (3)	Col (3) Excluding Durable Services[(1)] (4)	Col (4) Excluding Housing Costs[(1)] (5)	Expenditure to Income Ratio col (2) / (1)	Expenditure to Income Ratio col (3) / (1)	Expenditure to Income Ratio col (4) / (1)	Expenditure to Income Ratio col (5) / (1)
1983	51,000	52,800	44,300	43,300	33,100	1.035	0.869	0.849	0.649
1984	50,500	54,900	46,200	45,200	34,600	1.087	0.915	0.895	0.685
1985	50,900	53,600	45,100	44,100	33,900	1.053	0.886	0.866	0.666
1986	51,900	53,300	44,100	43,100	32,100	1.027	0.850	0.830	0.618
1987	50,500	51,800	44,400	43,400	32,400	1.026	0.879	0.859	0.642
1988	52,000	51,400	44,300	43,100	32,300	0.988	0.852	0.829	0.621
1989	54,100	53,100	46,400	45,200	33,100	0.982	0.858	0.835	0.612
1990	51,400	50,400	43,500	42,200	31,700	0.981	0.846	0.821	0.617
1991	48,800	46,000	40,400	38,900	29,800	0.943	0.828	0.797	0.611
1992	49,100	45,600	39,900	38,200	29,900	0.929	0.813	0.778	0.609
1993	45,500	45,500	40,200	38,600	29,100	1.000	0.884	0.848	0.640
1994	47,900	48,100	41,700	40,000	30,000	1.004	0.871	0.835	0.626
1995	51,000	48,900	41,800	40,000	30,700	0.959	0.820	0.784	0.602
1996	50,400	47,800	40,900	39,200	29,800	0.948	0.812	0.778	0.591
1997	53,500	48,000	41,500	39,600	31,000	0.897	0.776	0.740	0.579
2000	55,500	51,400	45,400	43,400	31,400	0.926	0.818	0.782	0.566
2003	57,800	54,400	47,500	45,000	33,700	0.941	0.822	0.779	0.583

(1) In June 2003 prices and rounded to the nearest hundred.

Table 5 Regression Estimates of the Likelihood of being in Poverty and the Mean Poverty Gap[1][2]

	(1) Relative Income Poverty	(2) Relative Total Expend Poverty	(3) Relative Food Expend Poverty	(4) Income Relative to Derived Expend	(5) Joint Relative Income & Expend Poverty	(6) Poverty Gap using Measure (1)	(7) Poverty Gap using Measure (2)	(8) Poverty Gap using Measure (3)	(9) Poverty Gap using Measure (4)
1984	-0.016	-0.006	0.022+	-0.025*	-0.014	0.005	0.011+	0.008+	0.002
	(0.012)	(0.012)	(0.013)	(0.010)	(0.009)	(0.005)	(0.006)	(0.004)	(0.004)
1985	-0.009	-0.009	0.023+	0.026*	-0.009	0.007	0.005	0.008+	0.007+
	(0.012)	(0.012)	(0.013)	(0.012)	(0.009)	(0.005)	(0.005)	(0.004)	(0.004)
1987	0.010	-0.010	0.036**	0.021+	-0.010	0.014*	0.011*	0.017**	0.010*
	(0.013)	(0.012)	(0.013)	(0.012)	(0.009)	(0.006)	(0.006)	(0.005)	(0.005)
1988	0.009	0.007	0.039**	0.032*	0.001	0.011+	0.020**	0.014**	0.005
	(0.014)	(0.014)	(0.014)	(0.014)	(0.010)	(0.006)	(0.007)	(0.005)	(0.004)
1989	0.029*	0.023+	0.022	0.014	0.005	0.017**	0.026**	0.016**	-0.001
	(0.015)	(0.014)	(0.013)	(0.013)	(0.010)	(0.006)	(0.007)	(0.005)	(0.004)
1990	0.024	0.035*	0.066**	0.074**	0.024*	0.026**	0.034**	0.035**	0.015**
	(0.015)	(0.015)	(0.016)	(0.016)	(0.012)	(0.006)	(0.008)	(0.007)	(0.005)
1991	0.058**	0.033*	0.052**	0.075**	0.036**	0.034**	0.027**	0.025**	0.017**
	(0.015)	(0.014)	(0.014)	(0.015)	(0.012)	(0.006)	(0.007)	(0.005)	(0.005)
1992	0.068**	0.051**	0.055**	0.122**	0.050**	0.038**	0.047**	0.028**	0.027**
	(0.014)	(0.013)	(0.013)	(0.015)	(0.011)	(0.005)	(0.006)	(0.005)	(0.004)
1993	0.063**	0.039**	0.066**	0.124**	0.030**	0.038**	0.038**	0.034**	0.029**
	(0.015)	(0.014)	(0.014)	(0.016)	(0.011)	(0.006)	(0.007)	(0.005)	(0.005)
1994	0.064**	0.033*	0.059**	0.148**	0.032**	0.041**	0.027**	0.033**	0.039**
	(0.015)	(0.014)	(0.015)	(0.017)	(0.012)	(0.007)	(0.007)	(0.006)	(0.005)
1995	0.061**	0.029*	0.066**	0.100**	0.022*	0.033**	0.037**	0.030**	0.020**
	(0.015)	(0.014)	(0.015)	(0.015)	(0.011)	(0.006)	(0.007)	(0.005)	(0.005)
1996	0.094**	0.047**	0.086**	0.132**	0.038**	0.058**	0.042**	0.041**	0.036**
	(0.016)	(0.015)	(0.015)	(0.017)	(0.012)	(0.007)	(0.007)	(0.006)	(0.006)
1997	0.057**	0.022	0.060**	0.116**	0.019+	0.035**	0.037**	0.031**	0.022**
	(0.015)	(0.015)	(0.014)	(0.016)	(0.012)	(0.006)	(0.008)	(0.006)	(0.005)
2000	0.076**	0.018	0.076**	0.098**	0.018	0.043**	0.031**	0.039**	0.021**
	(0.016)	(0.015)	(0.016)	(0.016)	(0.012)	(0.007)	(0.007)	(0.006)	(0.005)
2003	0.068**	0.047**	0.093**	0.120**	0.034**	0.043**	0.047**	0.039**	0.026**
	(0.016)	(0.015)	(0.016)	(0.016)	(0.012)	(0.007)	(0.008)	(0.006)	(0.005)
R^2	0.004	0.206	0.146	0.018	0.075	0.010	0.000	0.000	0.010
# Obs	38,222	38,222	38,222	38,222	38,222	38,222	38,222	38,222	38,222

(1) Columns (1)-(5) present marginal effects from probit regression models while (6)-(9) present coefficient estimates from OLS regression models.

(2) Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 6 Regression Estimates of the Likelihood of being in Poverty and the Mean Poverty Gap[(1)(2)]

	(1) Relative Income Poverty	(2) Relative Total Expend Poverty	(3) Relative Food Expend Poverty	(4) Income Relative to Derived Expend	(5) Joint Relative Income & Expend Poverty	(6) Poverty Gap using Measure (1)	(7) Poverty Gap using Measure (2)	(8) Poverty Gap using Measure (3)	(9) Poverty Gap using Measure (4)
1984	-0.017	-0.006	0.018	-0.021*	-0.012+	0.003	0.010+	0.006	0.002
	(0.012)	(0.012)	(0.012)	(0.010)	(0.007)	(0.005)	(0.006)	(0.004)	(0.004)
1985	-0.003	-0.003	0.025*	0.029*	-0.004	0.008	0.006	0.007+	0.008*
	(0.013)	(0.012)	(0.013)	(0.012)	(0.008)	(0.005)	(0.005)	(0.004)	(0.004)
1987	0.032*	0.006	0.039**	0.032*	0.001	0.017**	0.013*	0.015**	0.013**
	(0.014)	(0.013)	(0.013)	(0.013)	(0.008)	(0.006)	(0.006)	(0.004)	(0.005)
1988	0.031*	0.026+	0.040**	0.044**	0.012	0.011*	0.020**	0.011*	0.008+
	(0.015)	(0.015)	(0.014)	(0.014)	(0.010)	(0.006)	(0.007)	(0.005)	(0.004)
1989	0.062**	0.050**	0.023+	0.028*	0.019+	0.019**	0.027**	0.012**	0.003
	(0.016)	(0.015)	(0.013)	(0.014)	(0.010)	(0.005)	(0.007)	(0.005)	(0.004)
1990	0.060**	0.067**	0.068**	0.097**	0.047**	0.028**	0.035**	0.031**	0.019**
	(0.017)	(0.016)	(0.016)	(0.017)	(0.013)	(0.006)	(0.007)	(0.007)	(0.005)
1991	0.104**	0.065**	0.058**	0.100**	0.058**	0.039**	0.030**	0.023**	0.022**
	(0.017)	(0.016)	(0.015)	(0.017)	(0.013)	(0.006)	(0.007)	(0.005)	(0.005)
1992	0.119**	0.091**	0.064**	0.153**	0.076**	0.043**	0.050**	0.027**	0.032**
	(0.016)	(0.015)	(0.013)	(0.017)	(0.012)	(0.005)	(0.006)	(0.004)	(0.004)
1993	0.111**	0.075**	0.073**	0.152**	0.049**	0.042**	0.040**	0.032**	0.034**
	(0.017)	(0.016)	(0.015)	(0.018)	(0.011)	(0.006)	(0.007)	(0.005)	(0.005)
1994	0.114**	0.070**	0.064**	0.179**	0.055**	0.044**	0.029**	0.030**	0.044**
	(0.017)	(0.016)	(0.015)	(0.019)	(0.013)	(0.006)	(0.007)	(0.005)	(0.005)
1995	0.118**	0.073**	0.077**	0.136**	0.051**	0.038**	0.041**	0.030**	0.025**
	(0.017)	(0.016)	(0.015)	(0.018)	(0.012)	(0.006)	(0.007)	(0.005)	(0.005)
1996	0.167**	0.095**	0.101**	0.176**	0.074**	0.066**	0.047**	0.042**	0.043**
	(0.018)	(0.016)	(0.016)	(0.020)	(0.014)	(0.007)	(0.007)	(0.006)	(0.006)
1997	0.126**	0.071**	0.077**	0.158**	0.052**	0.042**	0.041**	0.031**	0.029**
	(0.018)	(0.016)	(0.015)	(0.019)	(0.013)	(0.006)	(0.008)	(0.006)	(0.005)
2000	0.159**	0.072**	0.101**	0.144**	0.061**	0.053**	0.036**	0.042**	0.029**
	(0.019)	(0.017)	(0.017)	(0.019)	(0.014)	(0.006)	(0.007)	(0.006)	(0.005)
2003	0.163**	0.113**	0.126**	0.183**	0.084**	0.057**	0.055**	0.045**	0.035**
	(0.019)	(0.017)	(0.018)	(0.020)	(0.015)	(0.006)	(0.008)	(0.005)	(0.005)
Couple No Kid	-0.001	-0.050**	-0.077**	-0.017+	-0.025**	-0.020**	-0.037**	-0.112**	0.000
	(0.014)	(0.011)	(0.010)	(0.009)	(0.007)	(0.007)	(0.008)	(0.008)	(0.005)
Couple Kids	0.022	-0.062**	-0.108**	-0.003	-0.012	0.003	-0.018+	-0.124**	-0.007
	(0.016)	(0.015)	(0.015)	(0.010)	(0.009)	(0.008)	(0.010)	(0.009)	(0.005)
Sole Parent	0.149**	0.049**	-0.019*	0.060**	0.045**	0.064**	0.034**	-0.069**	0.007+
	(0.015)	(0.012)	(0.009)	(0.010)	(0.009)	(0.007)	(0.008)	(0.008)	(0.004)
Other Multi	0.000	-0.033*	-0.056**	-0.022+	-0.015	-0.017+	-0.023*	-0.113**	-0.016**
	(0.019)	(0.015)	(0.013)	(0.011)	(0.010)	(0.009)	(0.010)	(0.009)	(0.005)
No Men	0.084**	0.016+	0.021*	0.022**	0.023**	0.051**	0.005	0.031**	0.003
	(0.011)	(0.010)	(0.009)	(0.008)	(0.007)	(0.006)	(0.006)	(0.006)	(0.004)

(1) Columns (1)-(5) present marginal effects from probit regression models while (6)-(9) present coefficient estimates from OLS regression models.

(2) Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 6 (cont)

	(1) Relative Income Poverty	(2) Relative Total Expend Poverty	(3) Relative Food Expend Poverty	(4) Income Relative to Derived Expend	(5) Joint Relative Income & Expend Poverty	(6) Poverty Gap using Measure (1)	(7) Poverty Gap using Measure (2)	(8) Poverty Gap using Measure (3)	(9) Poverty Gap using Measure (4)
# Age 0 - 4	0.130**	0.093**	0.045**	0.067**	0.063**	0.015**	0.001	-0.001	0.028**
	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
# Age 5 - 14	0.082**	0.061**	0.007*	0.046**	0.042**	-0.001	-0.010**	-0.012**	0.018**
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
# Age 15 - 24	-0.023**	-0.010*	-0.035**	-0.016**	-0.014**	-0.029**	-0.029**	-0.020**	-0.004**
	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
# Age 25 - 44	-0.082**	-0.018+	-0.030**	-0.051**	-0.036**	-0.050**	-0.031**	-0.024**	-0.012**
	(0.012)	(0.010)	(0.010)	(0.007)	(0.007)	(0.004)	(0.005)	(0.005)	(0.002)
# Age 45 - 54	-0.063**	-0.010	-0.038**	-0.036**	-0.024**	-0.041**	-0.030**	-0.027**	-0.004+
	(0.011)	(0.010)	(0.011)	(0.007)	(0.007)	(0.004)	(0.006)	(0.005)	(0.002)
# Age 55 - 64	-0.026*	0.024*	-0.019*	-0.029**	0.001	-0.035**	-0.021**	-0.021**	-0.009**
	(0.012)	(0.010)	(0.010)	(0.007)	(0.007)	(0.004)	(0.005)	(0.005)	(0.003)
# Age 65+	-0.050**	0.066**	-0.019+	-0.069**	-0.011	-0.064**	-0.006	-0.027**	-0.022**
	(0.013)	(0.011)	(0.011)	(0.012)	(0.008)	(0.006)	(0.008)	(0.005)	(0.002)
School Quals	-0.110**	-0.112**	-0.072**	-0.052**	-0.058**	-0.049**	-0.055**	-0.046**	-0.011**
	(0.006)	(0.006)	(0.005)	(0.004)	(0.003)	(0.004)	(0.005)	(0.004)	(0.003)
Vocat Quals	-0.160**	-0.156**	-0.106**	-0.086**	-0.093**	-0.069**	-0.062**	-0.060**	-0.026**
	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
Uni Quals	-0.190**	-0.182**	-0.139**	-0.095**	-0.098**	-0.081**	-0.071**	-0.084**	-0.029**
	(0.005)	(0.005)	(0.005)	(0.004)	(0.003)	(0.004)	(0.005)	(0.004)	(0.003)
R^2	0.143	0.105	0.002	0.096	0.005	0.100	0.050	0.120	0.040
# Obs	38,222	38,222	38,222	38,222	38,222	38,222	38,222	38,222	38,222

(1) Columns (1)-(5) present marginal effects from probit regression models while (6)-(9) present coefficient estimates from OLS regression models.
(2) Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 7 Regression Estimates of the Likelihood of being in Poverty and the Mean Poverty Gap[1][2]

	(1) Relative Income Poverty	(2) Relative Total Expend Poverty	(3) Relative Food Expend Poverty	(4) Income Relative to Derived Expend	(5) Joint Relative Income & Expend Poverty	(6) Poverty Gap using Measure (1)	(7) Poverty Gap using Measure (2)	(8) Poverty Gap using Measure (3)	(9) Poverty Gap using Measure (4)
1984	-0.018	-0.007	0.018	-0.019*	-0.010+	0.003	0.010+	0.005	0.002
	(0.012)	(0.012)	(0.012)	(0.009)	(0.006)	(0.005)	(0.006)	(0.004)	(0.004)
1985	-0.006	-0.004	0.025*	0.026*	-0.005	0.007	0.005	0.007+	0.008*
	(0.012)	(0.012)	(0.013)	(0.012)	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)
1987	0.021	-0.001	0.035**	0.025*	-0.004	0.013*	0.011+	0.013**	0.012*
	(0.014)	(0.012)	(0.013)	(0.012)	(0.006)	(0.006)	(0.005)	(0.004)	(0.005)
1988	0.007	0.010	0.031*	0.030*	-0.001	0.004	0.015*	0.007	0.006
	(0.014)	(0.014)	(0.014)	(0.013)	(0.007)	(0.006)	(0.007)	(0.005)	(0.004)
1989	0.020	0.023+	0.007	0.006	-0.004	0.007	0.020**	0.006	0.001
	(0.015)	(0.014)	(0.012)	(0.012)	(0.007)	(0.005)	(0.007)	(0.005)	(0.004)
1990	0.013	0.036*	0.048**	0.062**	0.015	0.015*	0.027**	0.025**	0.016**
	(0.015)	(0.015)	(0.015)	(0.016)	(0.009)	(0.006)	(0.007)	(0.007)	(0.005)
1991	0.043**	0.024+	0.033*	0.056**	0.013	0.022**	0.019**	0.015**	0.018**
	(0.015)	(0.014)	(0.014)	(0.014)	(0.008)	(0.006)	(0.007)	(0.005)	(0.005)
1992	0.061**	0.053**	0.039**	0.106**	0.029**	0.027**	0.040**	0.019**	0.029**
	(0.014)	(0.014)	(0.012)	(0.015)	(0.009)	(0.005)	(0.006)	(0.004)	(0.004)
1993	0.050**	0.034*	0.046**	0.104**	0.007	0.025**	0.030**	0.024**	0.030**
	(0.016)	(0.015)	(0.014)	(0.016)	(0.007)	(0.006)	(0.007)	(0.005)	(0.005)
1994	0.062**	0.036*	0.044**	0.136**	0.018*	0.030**	0.020**	0.023**	0.041**
	(0.016)	(0.015)	(0.015)	(0.017)	(0.009)	(0.006)	(0.007)	(0.005)	(0.005)
1995	0.074**	0.044**	0.058**	0.100**	0.019*	0.026**	0.033**	0.024**	0.023**
	(0.017)	(0.015)	(0.014)	(0.017)	(0.009)	(0.006)	(0.007)	(0.005)	(0.005)
1996	0.124**	0.063**	0.081**	0.138**	0.036**	0.053**	0.039**	0.036**	0.040**
	(0.018)	(0.015)	(0.016)	(0.018)	(0.011)	(0.007)	(0.007)	(0.005)	(0.006)
1997	0.090**	0.047**	0.064**	0.125**	0.025**	0.032**	0.035**	0.026**	0.027**
	(0.017)	(0.015)	(0.015)	(0.017)	(0.010)	(0.006)	(0.008)	(0.006)	(0.005)
2000	0.125**	0.046**	0.084**	0.114**	0.030**	0.043**	0.030**	0.037**	0.027**
	(0.019)	(0.017)	(0.017)	(0.018)	(0.011)	(0.006)	(0.007)	(0.006)	(0.005)
2003	0.134**	0.091**	0.111**	0.151**	0.052**	0.048**	0.049**	0.041**	0.033**
	(0.018)	(0.017)	(0.017)	(0.019)	(0.012)	(0.006)	(0.008)	(0.005)	(0.005)
Couple No Kid	0.059**	-0.019	-0.058**	0.014	0.002	-0.010	-0.033**	-0.106**	0.003
	(0.016)	(0.013)	(0.011)	(0.010)	(0.009)	(0.007)	(0.008)	(0.008)	(0.004)
Couple Kids	0.029+	-0.055**	-0.100**	-0.003	-0.005	-0.018*	-0.034**	-0.131**	-0.011*
	(0.016)	(0.016)	(0.016)	(0.010)	(0.008)	(0.008)	(0.010)	(0.009)	(0.005)
Sole Parent	0.041**	-0.007	-0.044**	-0.001	-0.005	0.002	-0.005	-0.095**	-0.005
	(0.013)	(0.011)	(0.009)	(0.008)	(0.005)	(0.007)	(0.008)	(0.008)	(0.004)
Other Multi	-0.049**	-0.058**	-0.066**	-0.044**	-0.032**	-0.046**	-0.043**	-0.125**	-0.021**
	(0.017)	(0.015)	(0.013)	(0.008)	(0.007)	(0.008)	(0.010)	(0.009)	(0.005)
No Men	0.048**	-0.006	0.012	0.004	0.007	0.026**	-0.010+	0.020**	-0.001
	(0.011)	(0.009)	(0.008)	(0.007)	(0.005)	(0.005)	(0.006)	(0.006)	(0.004)

(1) Columns (1)-(5) present marginal effects from probit regression models while (6)-(9) present coefficient estimates from OLS regression models.

(2) Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 7 (cont)

	(1) Relative Income Poverty	(2) Relative Total Expend Poverty	(3) Relative Food Expend Poverty	(4) Income Relative to Derived Expend	(5) Joint Relative Income & Expend Poverty	(6) Poverty Gap using Measure (1)	(7) Poverty Gap using Measure (2)	(8) Poverty Gap using Measure (3)	(9) Poverty Gap using Measure (4)
# Age 0 - 4	0.059**	0.052**	0.017**	0.034**	0.030**	-0.021**	-0.021**	-0.018**	0.018**
	(0.005)	(0.005)	(0.004)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
# Age 5 - 14	0.028**	0.031**	-0.012**	0.021**	0.019**	-0.033**	-0.029**	-0.027**	0.010**
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
# Age 15 - 24	0.024**	0.011*	-0.016**	0.008*	0.004	-0.014**	-0.023**	-0.011**	0.002
	(0.006)	(0.005)	(0.005)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
# Age 25 - 44	-0.018	0.010	-0.006	-0.014*	-0.004	-0.028**	-0.020**	-0.012*	-0.004
	(0.012)	(0.011)	(0.011)	(0.007)	(0.006)	(0.004)	(0.005)	(0.006)	(0.003)
# Age 45 - 54	0.003	0.019+	-0.014	0.001	0.007	-0.019**	-0.019**	-0.015*	0.004
	(0.011)	(0.011)	(0.012)	(0.007)	(0.006)	(0.005)	(0.006)	(0.006)	(0.003)
# Age 55 - 64	-0.003	0.030**	-0.011	-0.012+	0.012+	-0.026**	-0.018**	-0.016**	-0.005
	(0.012)	(0.011)	(0.010)	(0.007)	(0.007)	(0.005)	(0.005)	(0.006)	(0.003)
# Age 65+	-0.067**	0.060**	-0.025*	-0.070**	-0.012+	-0.067**	-0.008	-0.029**	-0.023**
	(0.015)	(0.011)	(0.011)	(0.012)	(0.008)	(0.006)	(0.008)	(0.005)	(0.002)
School Quals	-0.062**	-0.085**	-0.053**	-0.025**	-0.031**	-0.025**	-0.041**	-0.034**	-0.005
	(0.006)	(0.006)	(0.006)	(0.004)	(0.003)	(0.004)	(0.005)	(0.004)	(0.003)
Vocat Quals	-0.101**	-0.119**	-0.081**	-0.052**	-0.054**	-0.042**	-0.045**	-0.046**	-0.019**
	(0.006)	(0.006)	(0.006)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)
Uni Quals	-0.139**	-0.149**	-0.117**	-0.064**	-0.063**	-0.050**	-0.052**	-0.069**	-0.022**
	(0.006)	(0.006)	(0.005)	(0.004)	(0.003)	(0.004)	(0.005)	(0.004)	(0.003)
Has Worker	-0.193**	-0.114**	-0.042**	-0.089**	-0.058**	-0.211**	-0.146**	-0.086**	-0.043**
	(0.016)	(0.014)	(0.013)	(0.010)	(0.012)	(0.007)	(0.008)	(0.007)	(0.005)
# Adult Work	-0.085**	-0.042**	-0.043**	-0.040**	-0.038**	-0.001	0.006*	-0.006**	-0.006**
	(0.008)	(0.007)	(0.006)	(0.005)	(0.006)	(0.003)	(0.003)	(0.002)	(0.002)
Rec Benefit	0.140**	0.068**	0.034*	0.107**	0.068**	0.094**	0.046**	0.037**	0.019**
	(0.017)	(0.016)	(0.013)	(0.013)	(0.010)	(0.007)	(0.009)	(0.006)	(0.004)
# Rec Benefit	0.003	0.026**	0.018*	-0.015*	0.004	-0.034**	-0.016**	-0.010*	-0.008**
	(0.009)	(0.009)	(0.008)	(0.006)	(0.004)	(0.005)	(0.006)	(0.004)	(0.003)
R^2	0.194	0.004	0.256	0.164	0.287	0.170	0.070	0.140	0.050
# Obs	38,222	38,222	38,222	38,222	38,222	38,222	38,222	38,222	38,222

(1) Columns (1)-(5) present marginal effects from probit regression models while (6)-(9) present coefficient estimates from OLS regression models.

(2) Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%.

Figure 1 **Age Composition of the Analytical Sample**

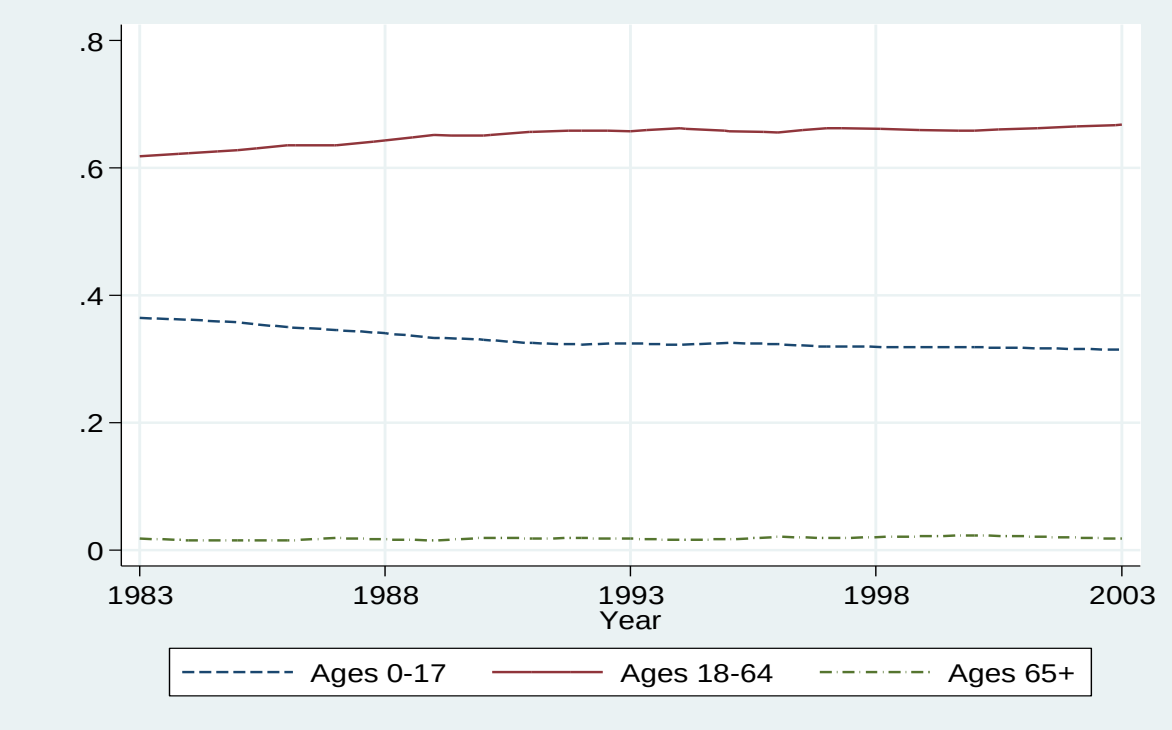

Figure 2 **Mean Individual and Household Age**

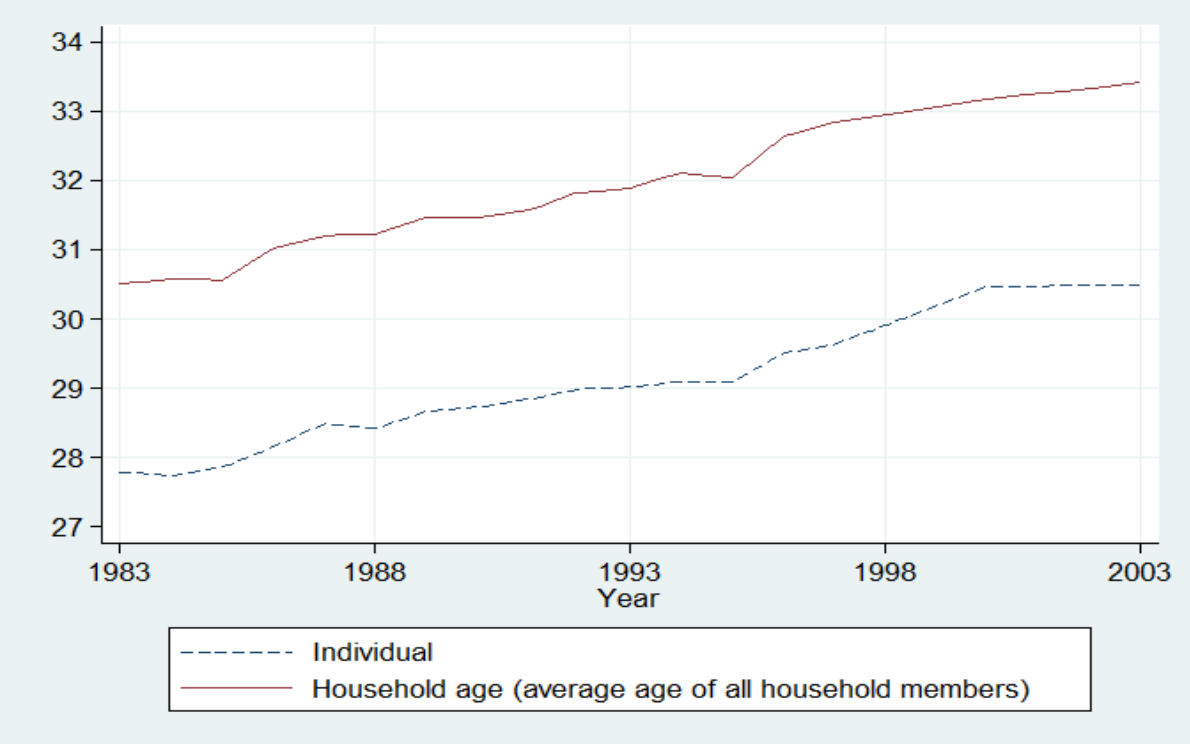

Figure 3 **Household Composition**

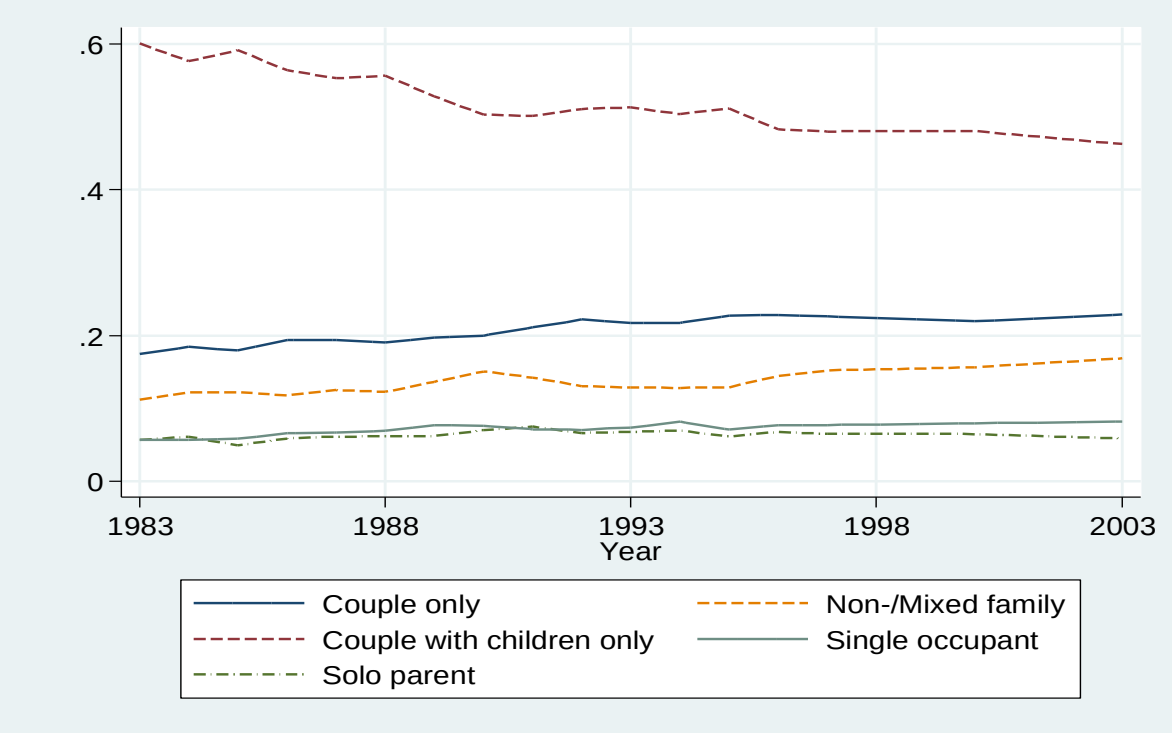

Figure 4 **Mean Household Size**

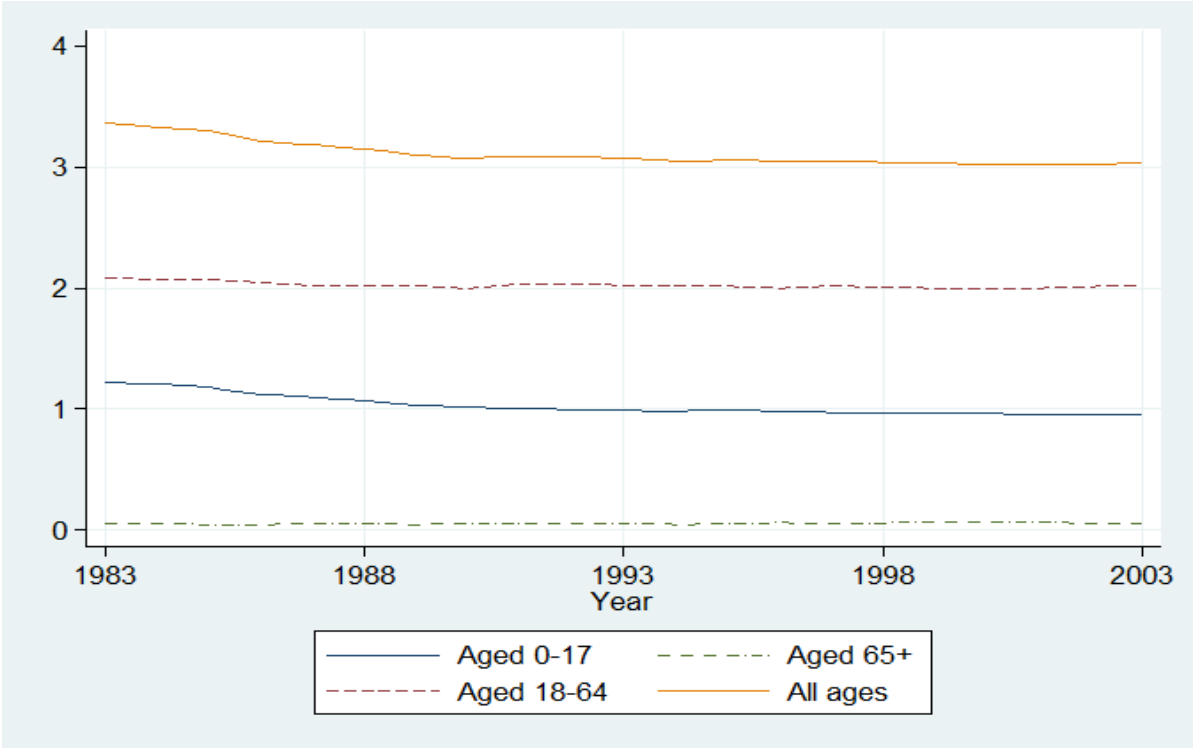

Figure 5 **Employment Rate**

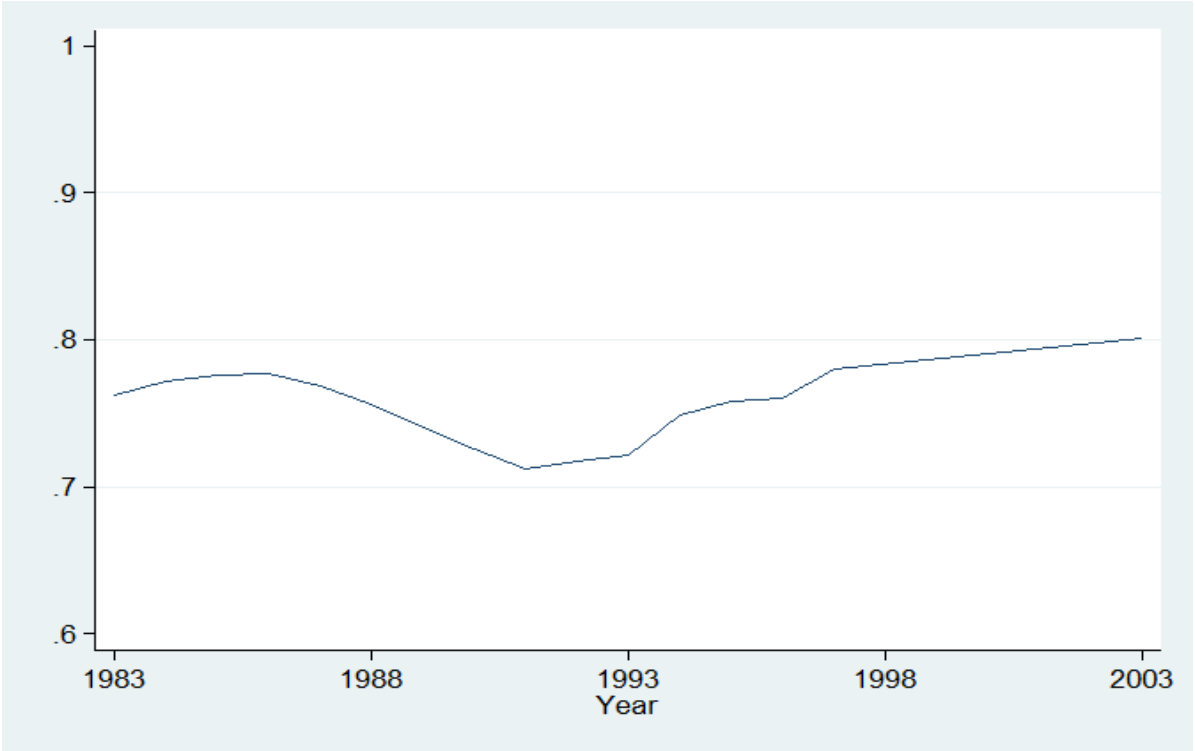

Figure 6 **Mean Hours Worked if Employed**

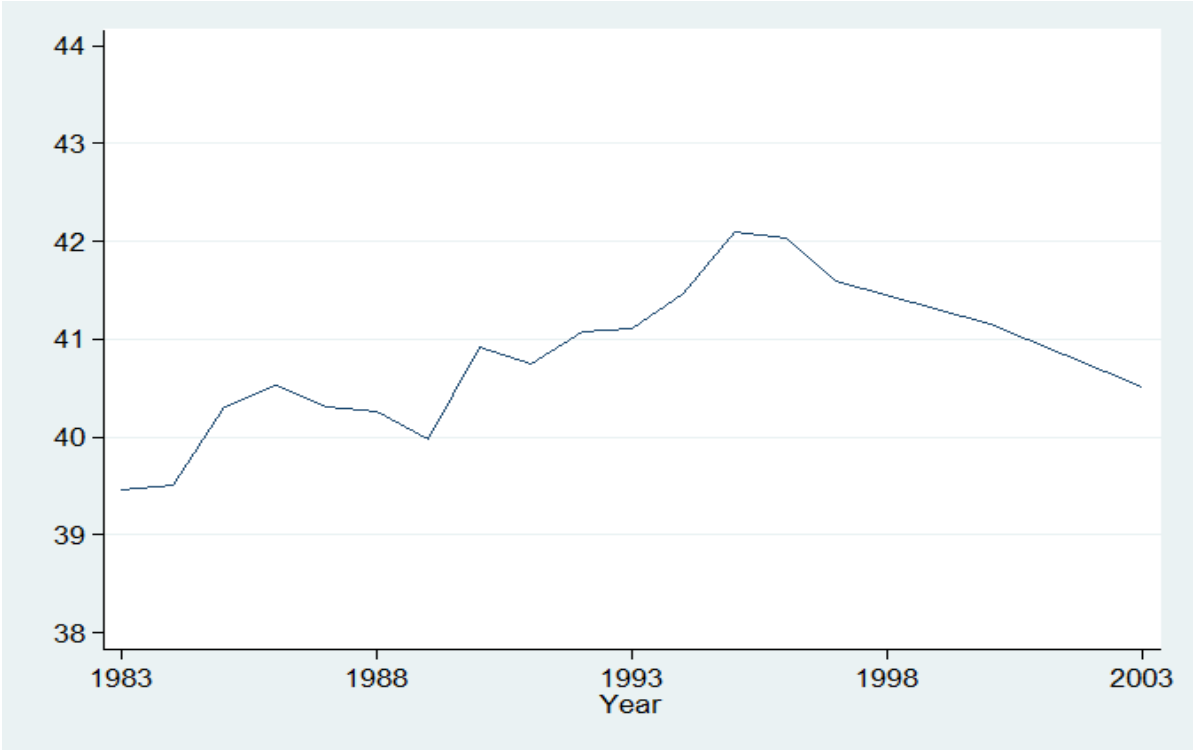

Figure 7 Mean Real Hourly Wage Rate if Employed

Figure 8 Benefit Receipt Rate

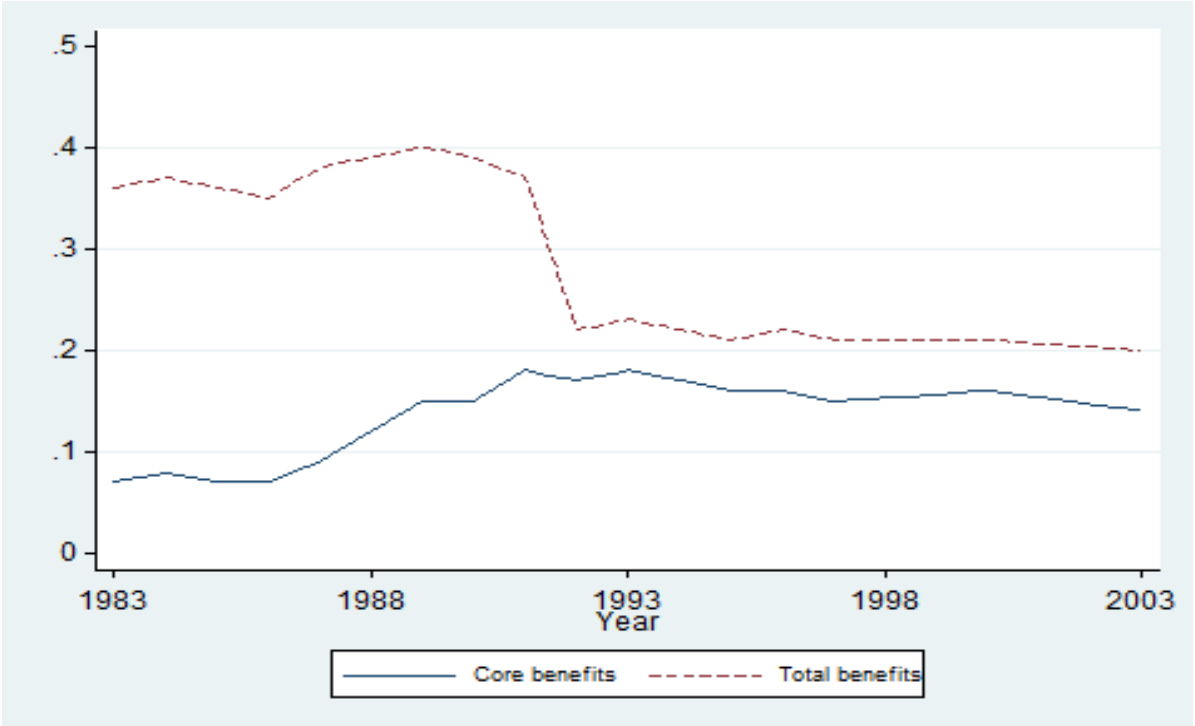

Figure 9 Mean Benefit Receipt if Receiving Benefits

Figure 10 Mean Individual Income by Source

Figure 11 **Mean Ratio of Disposable to Gross Individual Income**

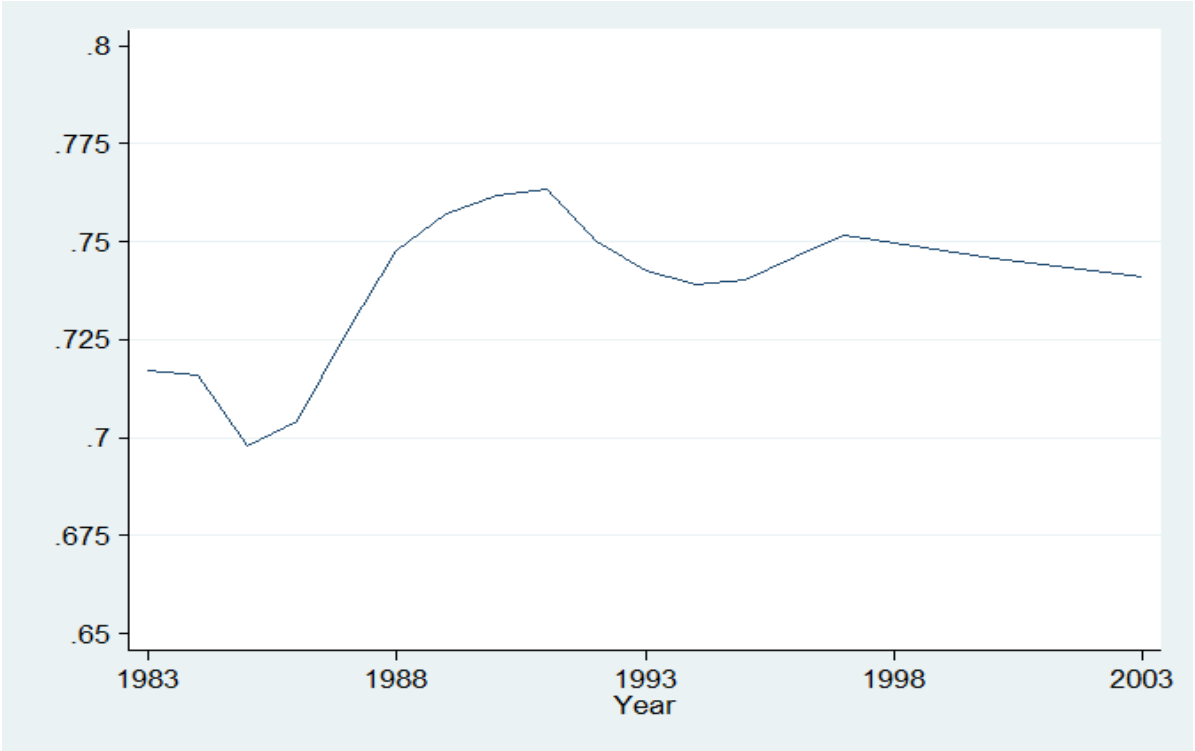

Figure 12 **Mean Household Income by Source**

Figure 13 Mean Household Expenditure by Type

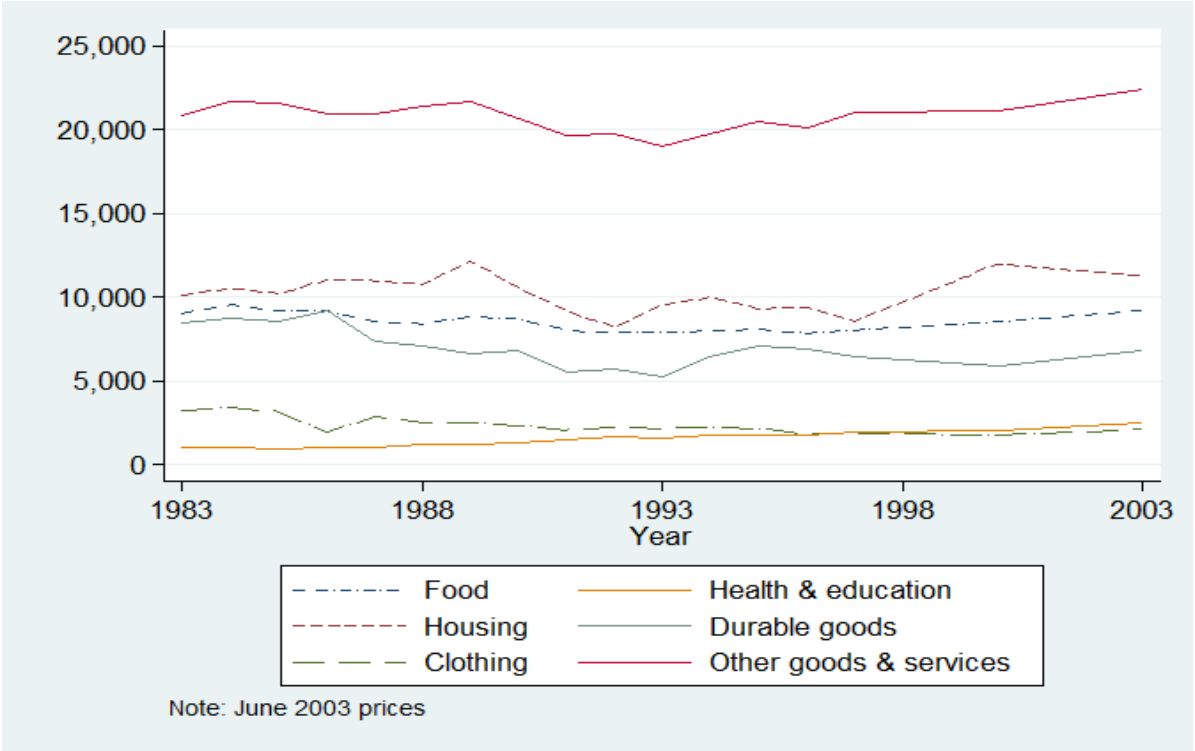

Figure 14 Mean Household Income and Expenditure

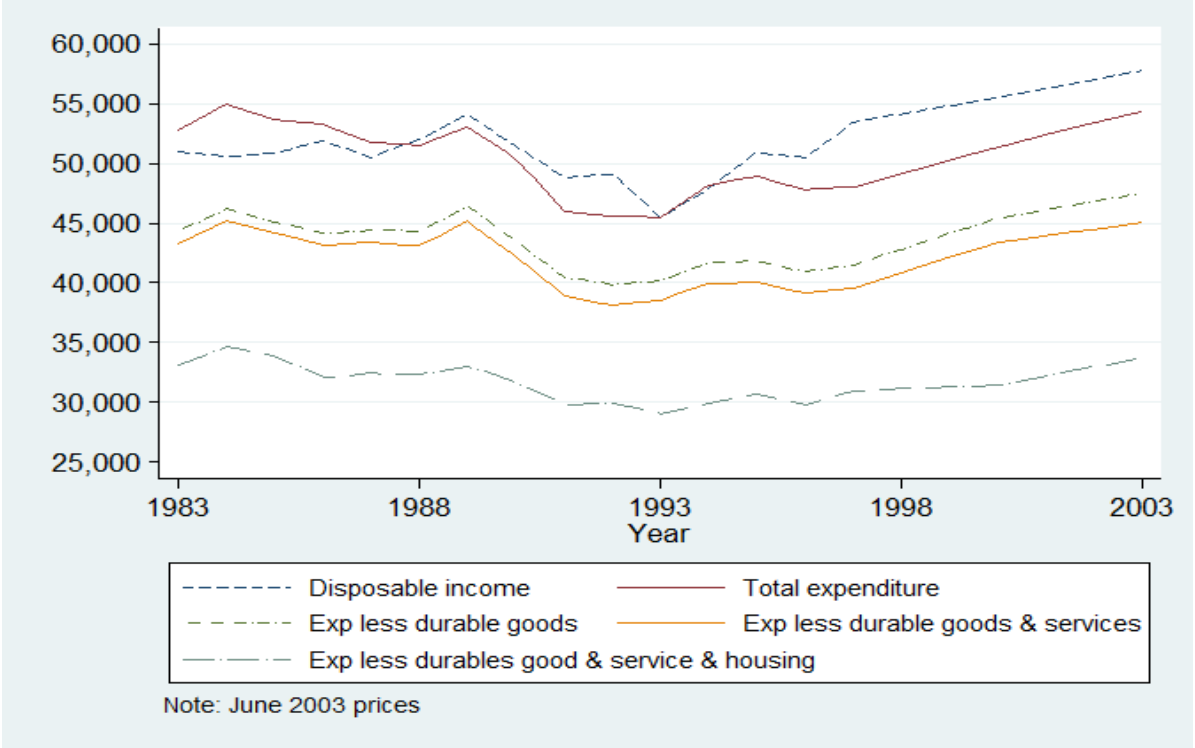

Figure 15 Mean Log Household Income and Expenditure

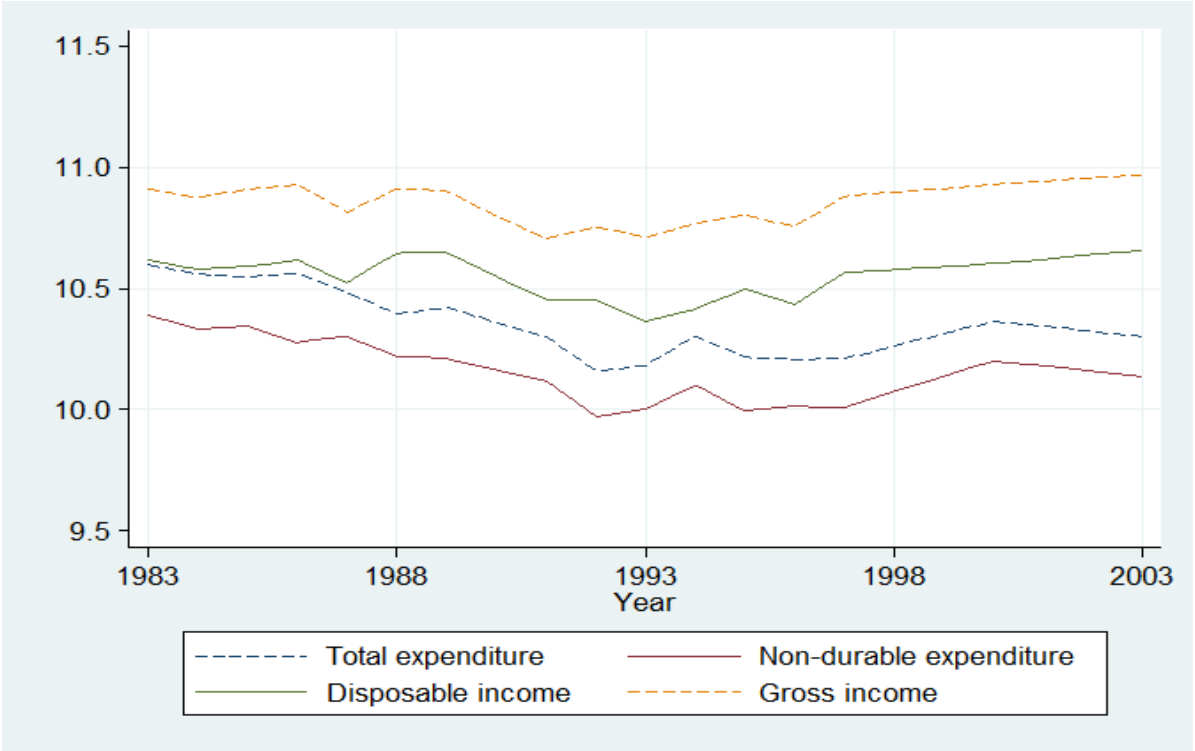

Figure 16 Mean Log Equivalised Household Income and Expenditure

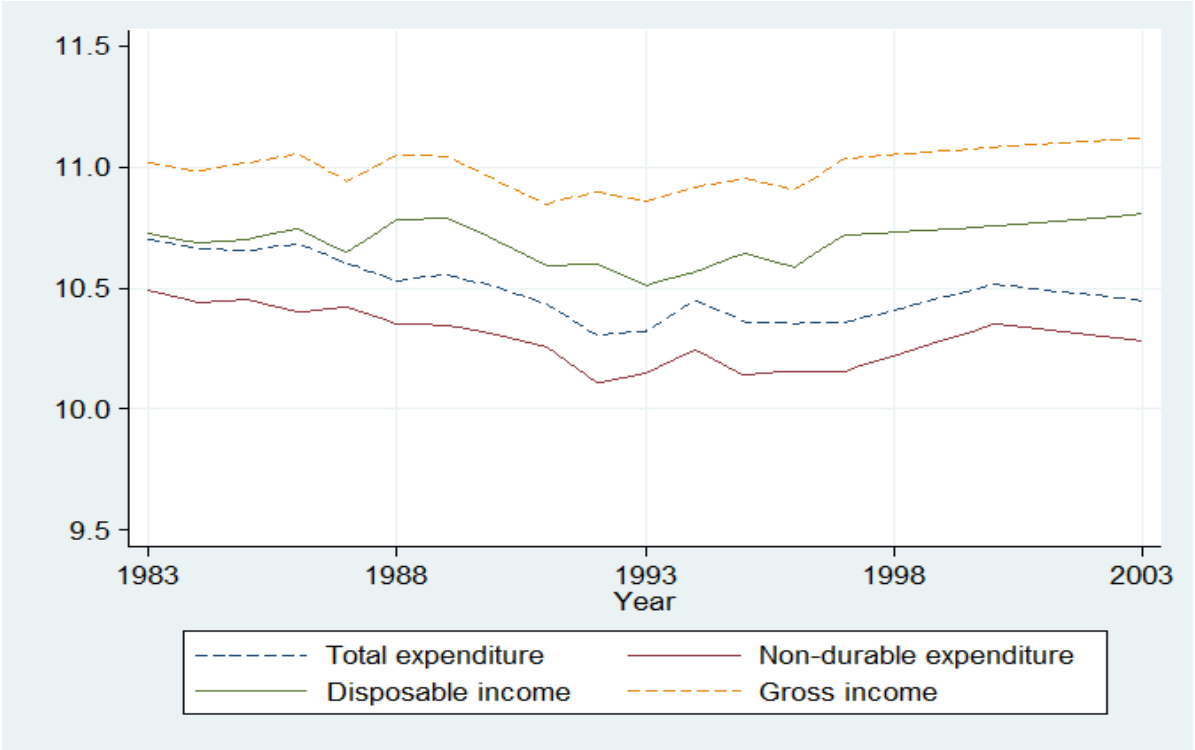

Figure 17 **Mean Log Equivalised Household Income and Expenditure by Hhold Composition**

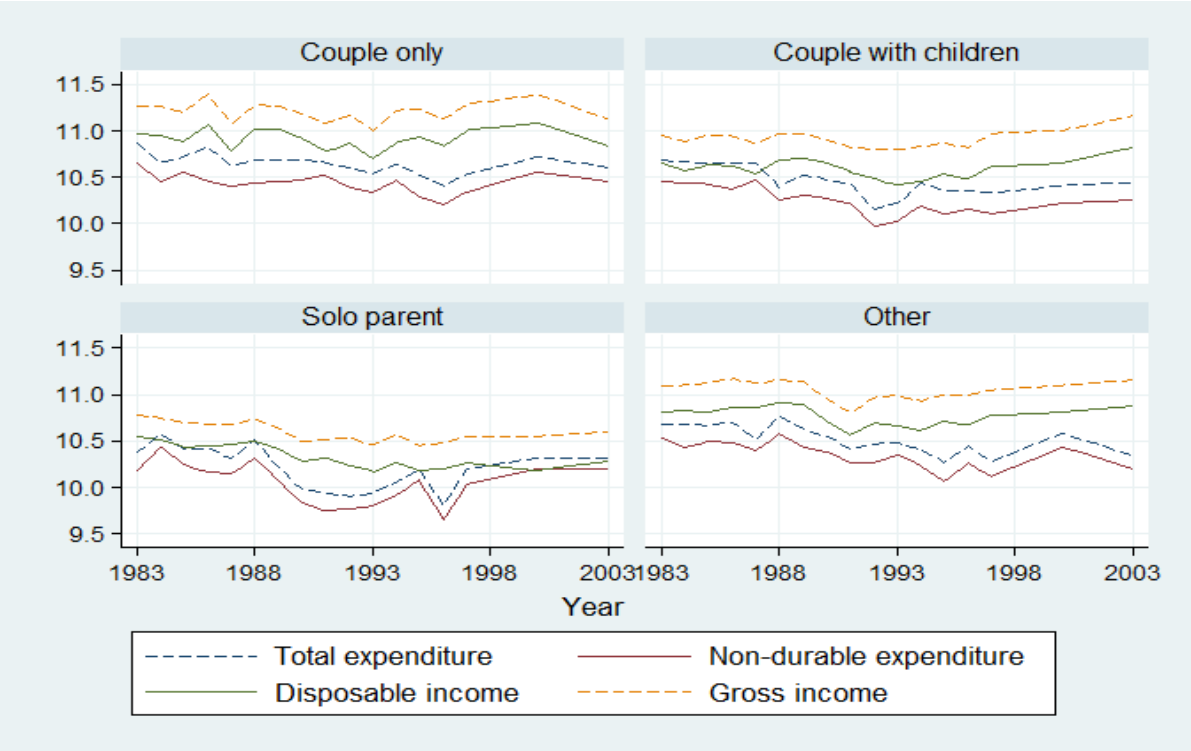

Figure 18 **Mean Log Equivalised Household Income and Expenditure by Education**

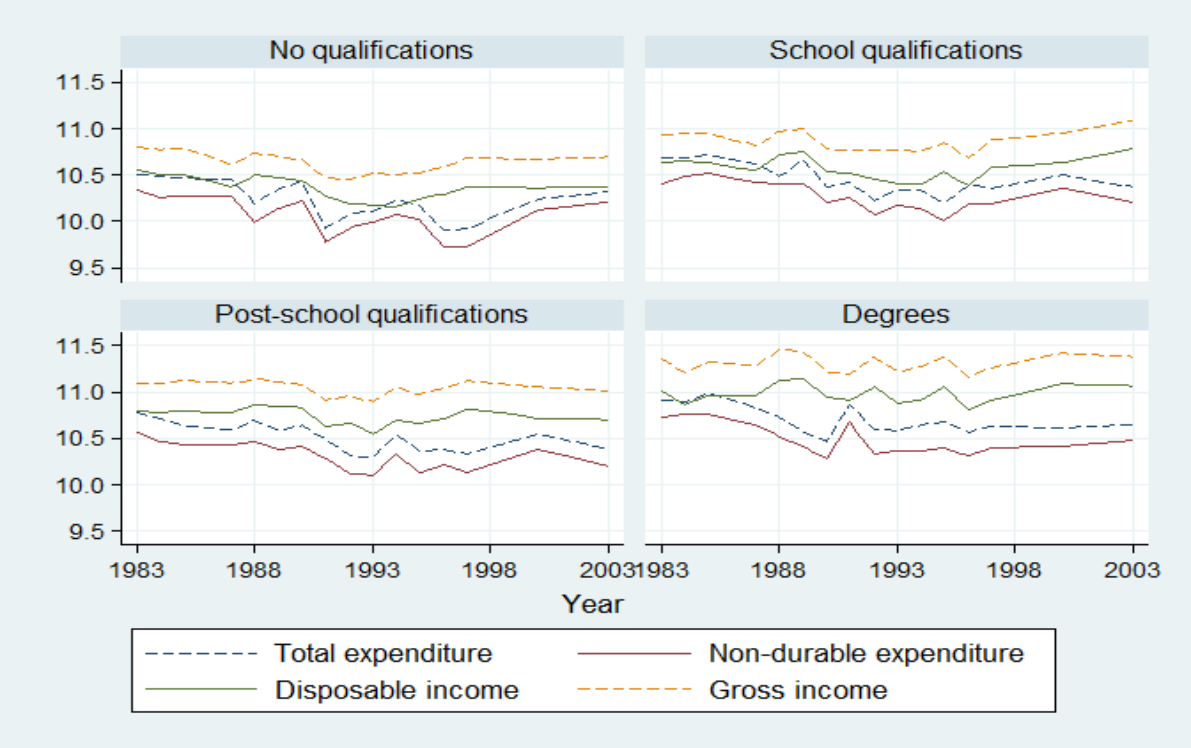

Figure 19 **Mean Log Equivalised Household Income and Expenditure by Birth Cohort**

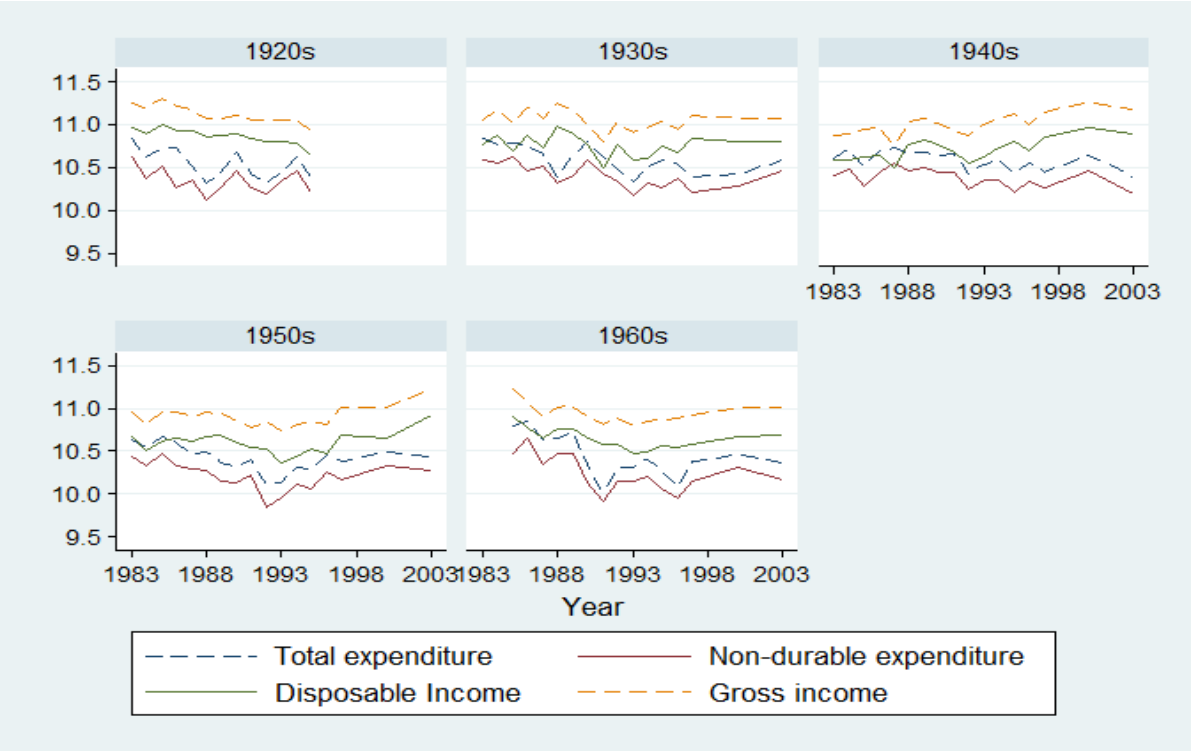

Figure 20 **Distribution of Log Hourly Wage, Weekly Earnings and Individual Income**

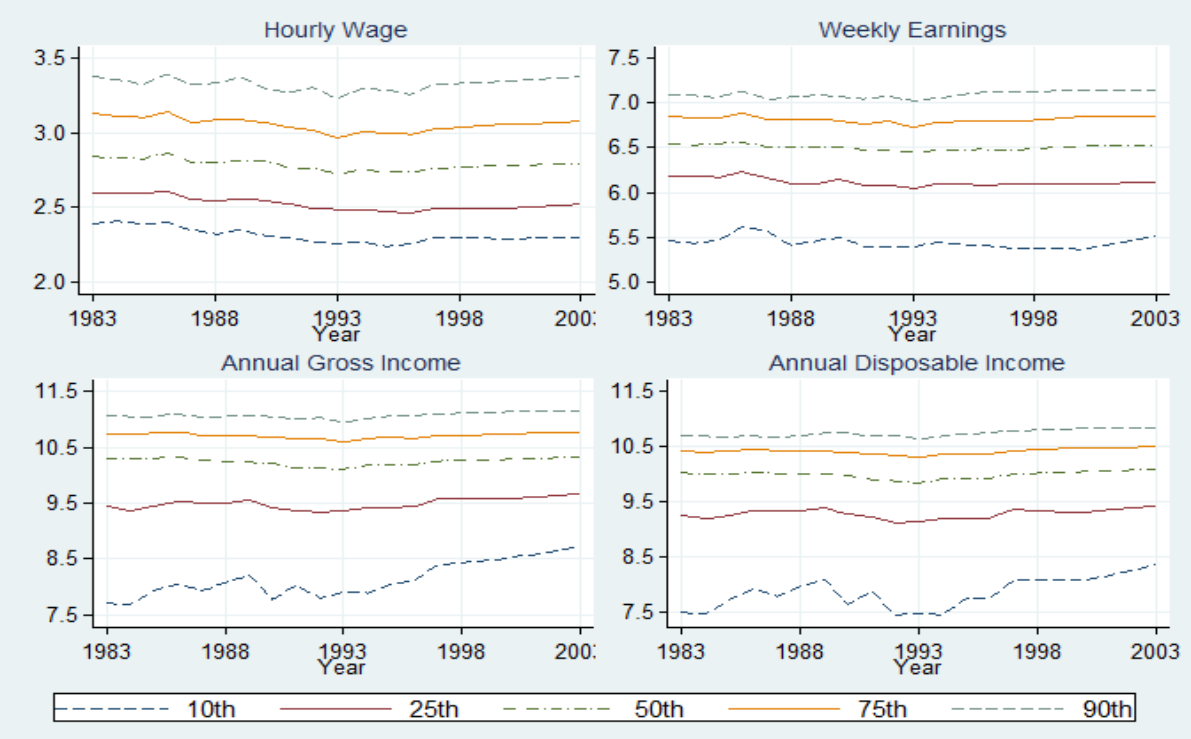

Figure 21 Distribution of Log Equivalised Household Income and Expenditure

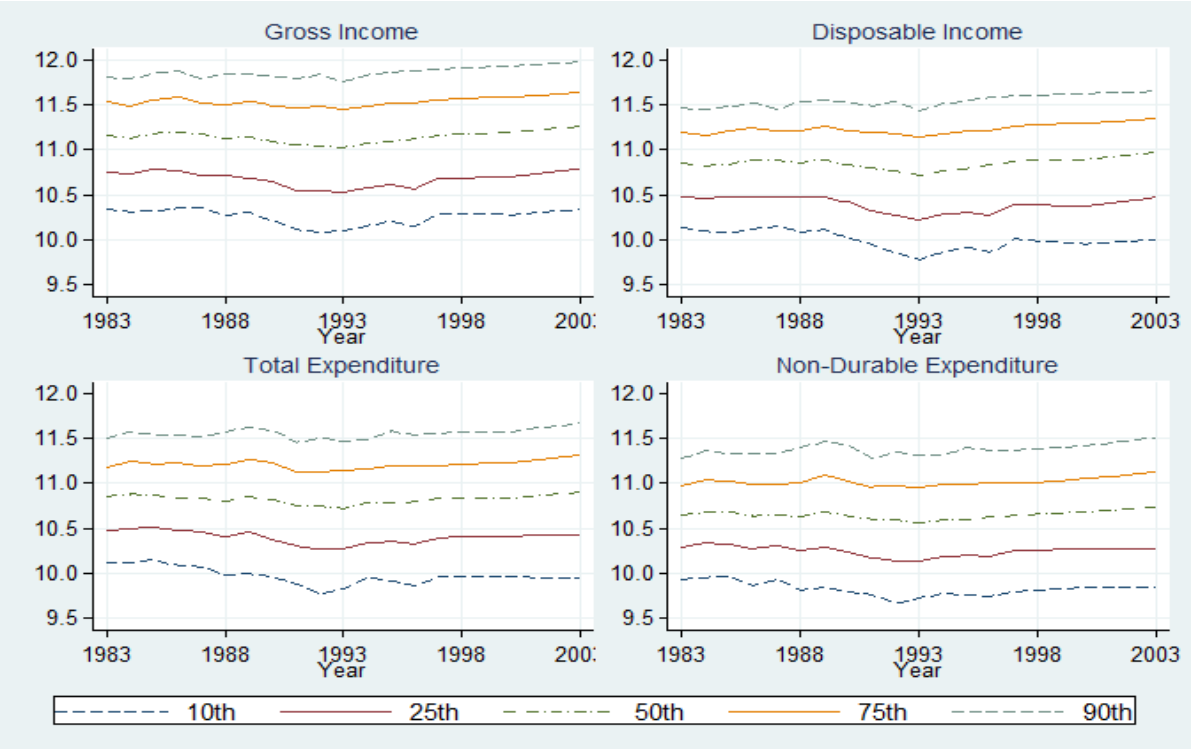

Figure 22 P50-P10 Log Hourly Wage, Weekly Earnings and Individual Income

Figure 23 P50-P25 Log Hourly Wage, Weekly Earnings and Individual Income

Figure 24 P50-P10 Log Equivalised Household Income and Expenditure

Figure 25 P50-P25 Log Equivalised Household Income and Expenditure

Figure 26 P90-P50 Log Hourly Wage, Weekly Earnings and Individual Income

Figure 27 P75-P50 Log Hourly Wage, Weekly Earnings and Individual Income

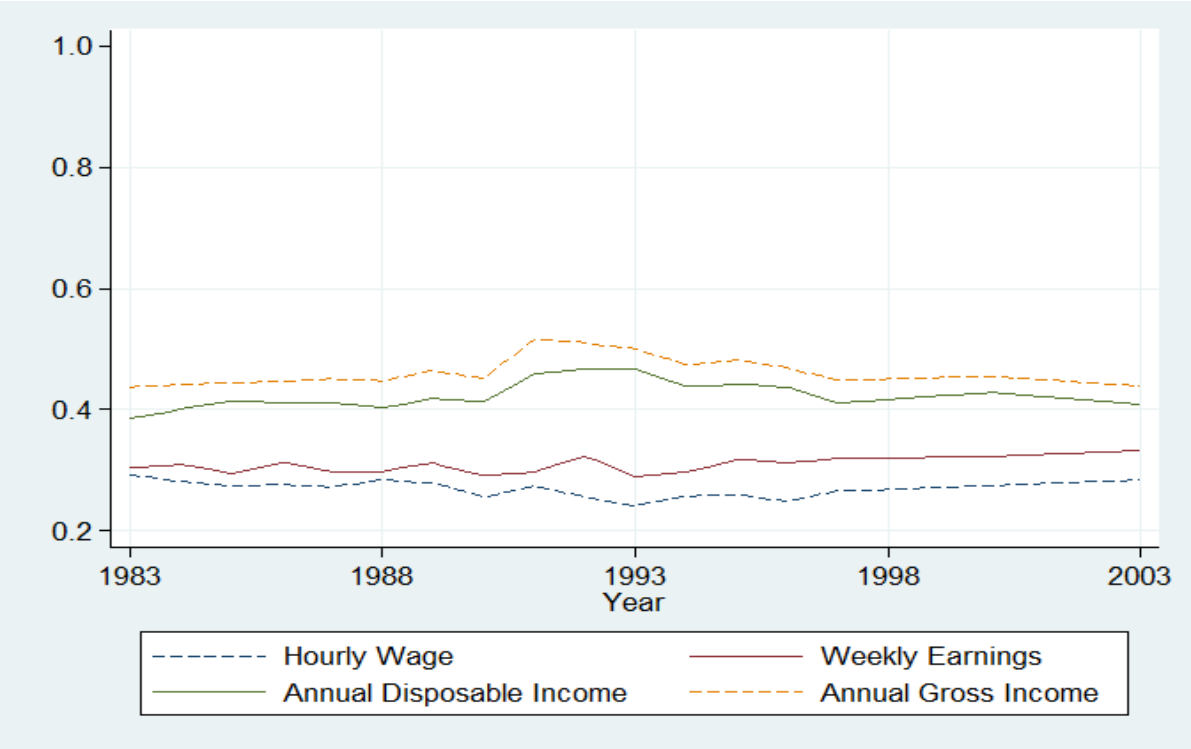

Figure 28 P90-P50 Log Equivalised Household Income and Expenditure

Figure 29 P75-P50 Log Equivalised Household Income and Expenditure

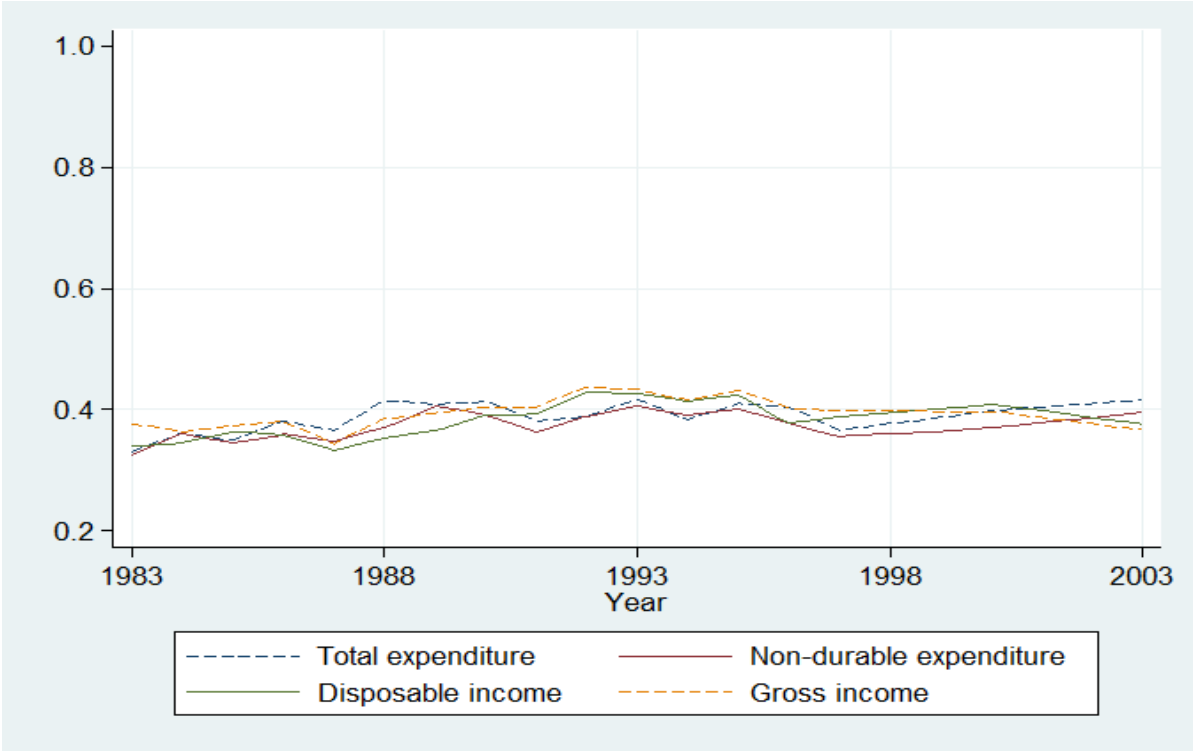

Figure 30 Changes in the Log Hourly Wage Distribution by Education (1983 = 100)

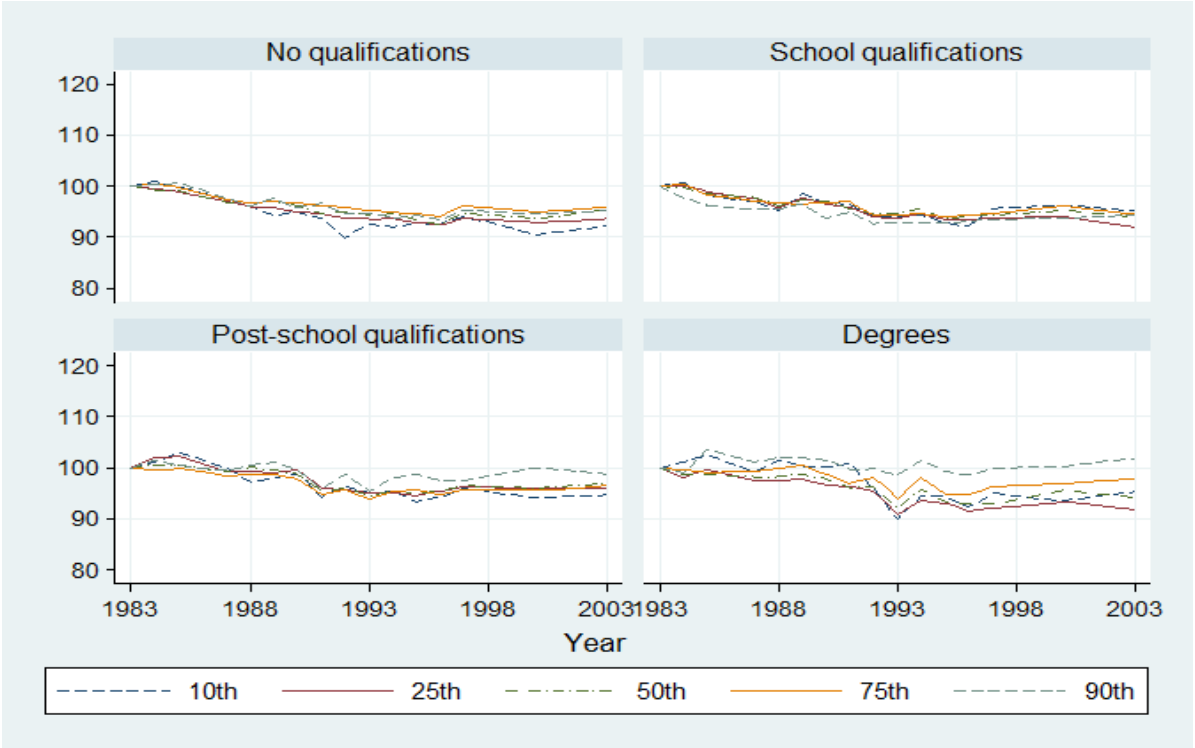

Figure 31 **Changes in the Log Gross Individual Income Distribution by Education (1983 = 100)**

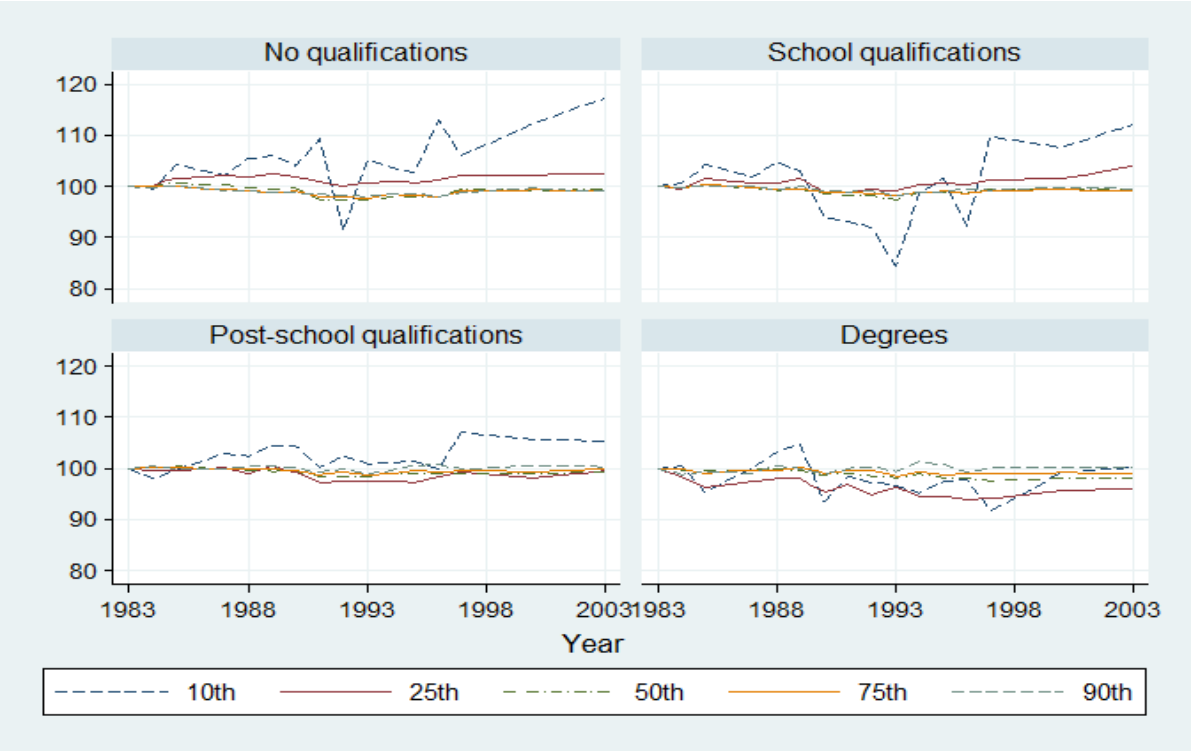

Figure 32 **Changes in the Log Equiv Hhold Gross Inc Distribution by Education (1983 = 100)**

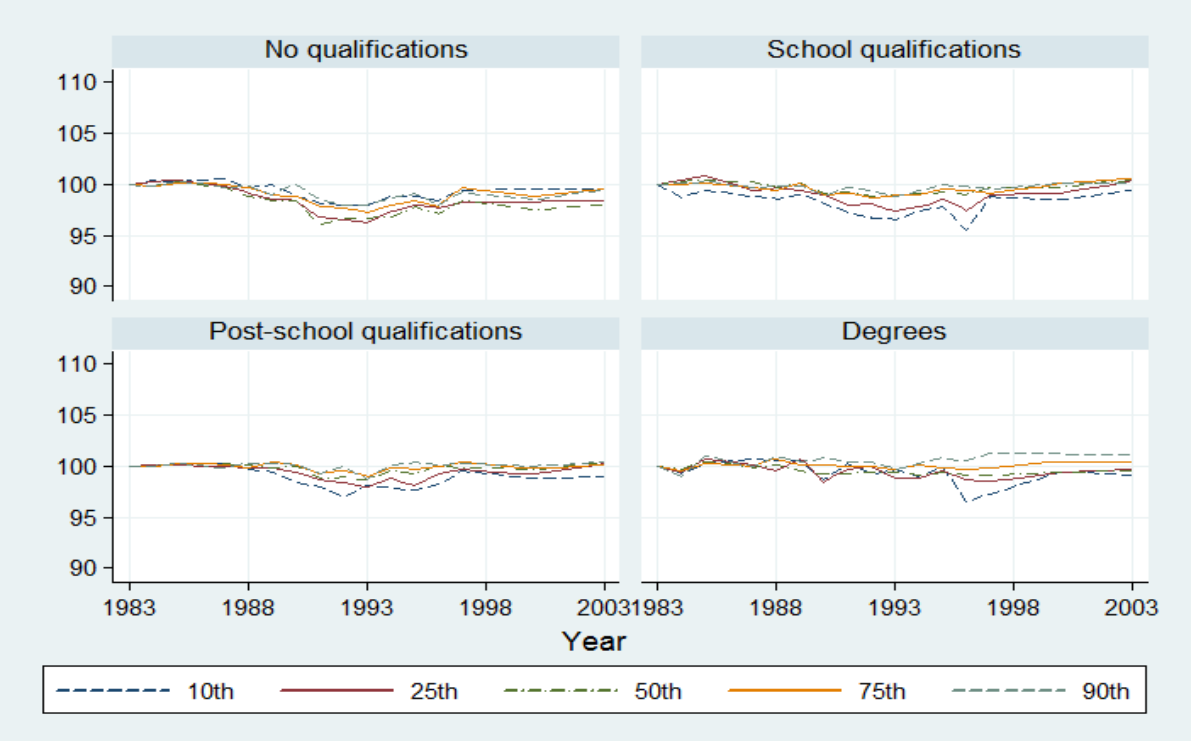

Figure 33 **Changes in the Log Equiv Hhold Net Income Distribution by Education (1983 = 100)**

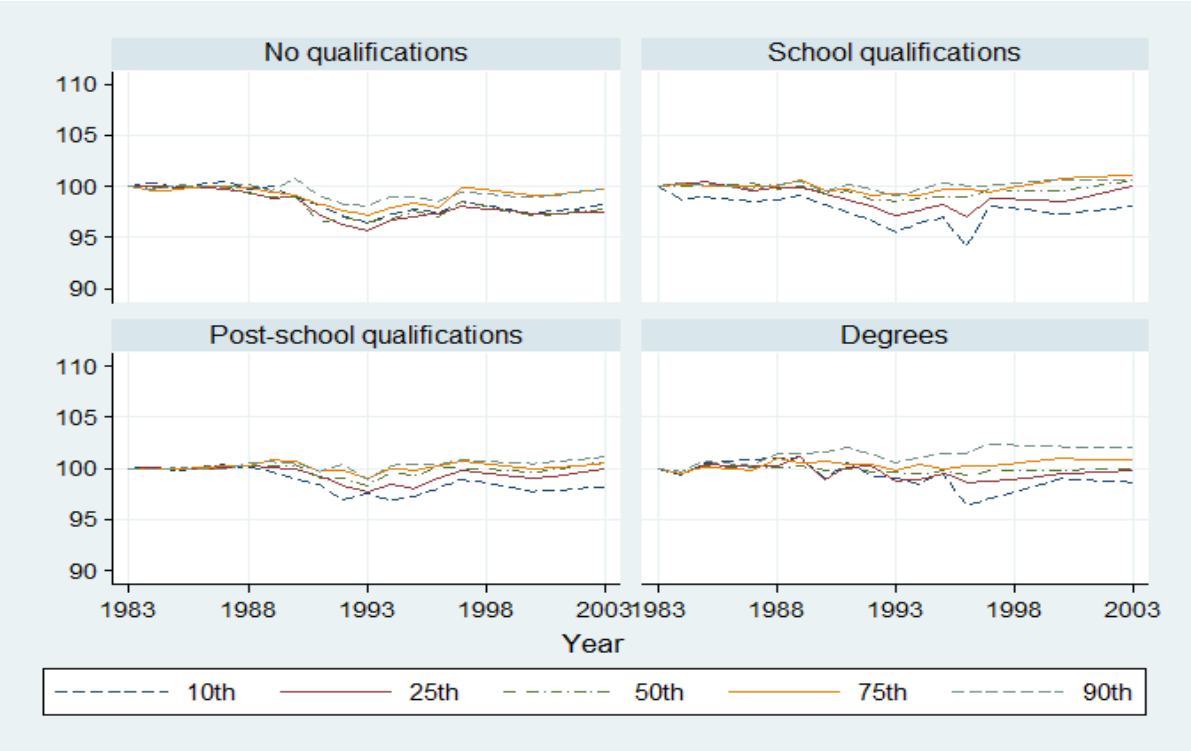

Figure 34 **Changes in the Log Equiv Hhold Total Expend Distribution by Education (1983 = 100)**

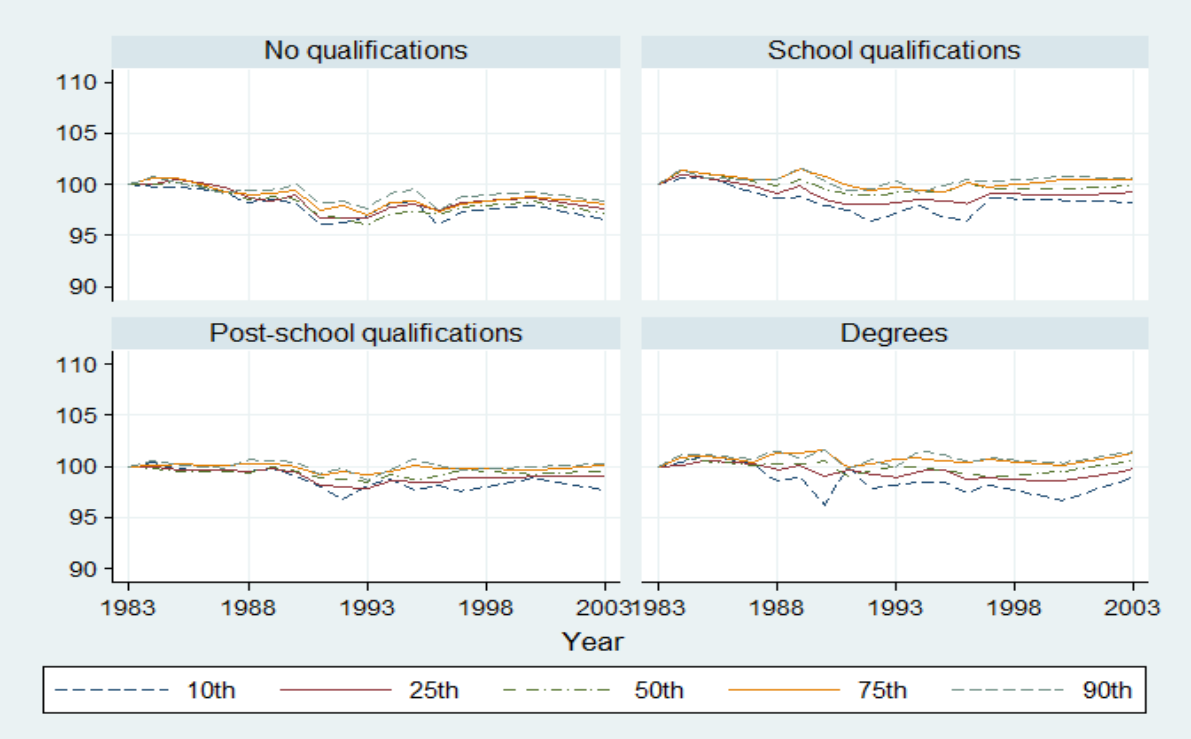

Figure 35 **Poverty Lines for 60% Median Net Income using Different Equivalence Scales**

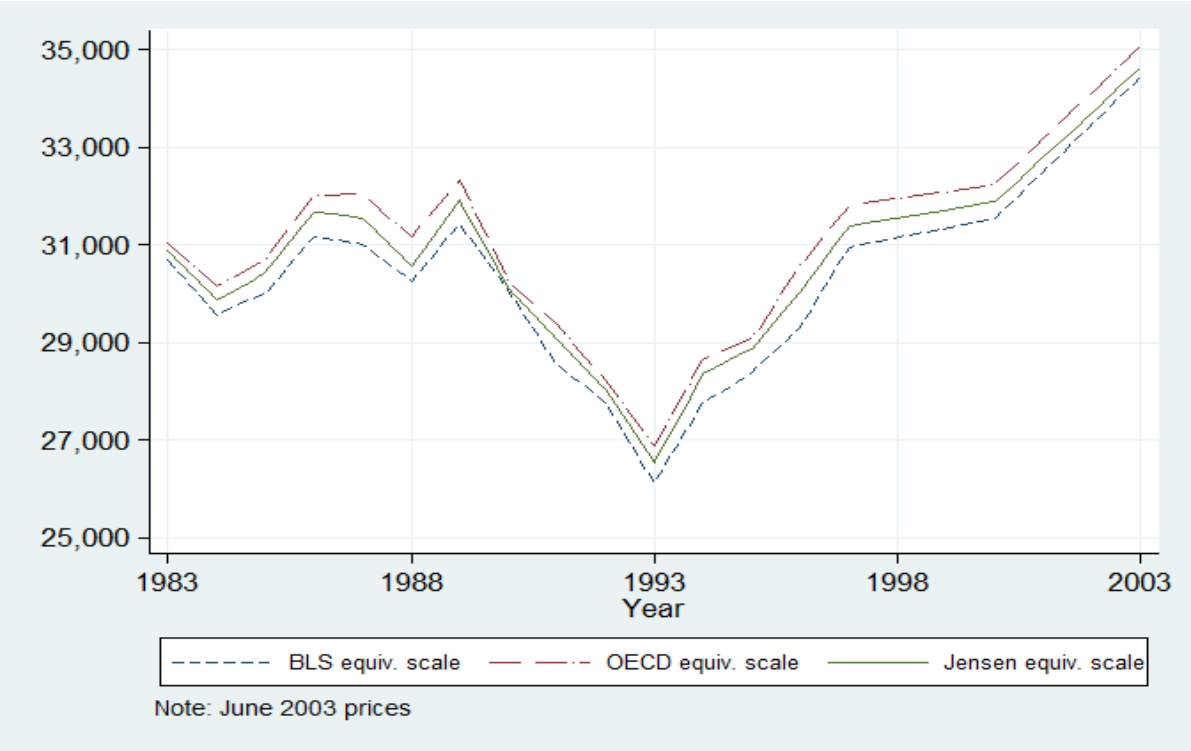

Figure 36 **Poverty Lines using Different Methodologies (Jensen Equivalence Scales)**

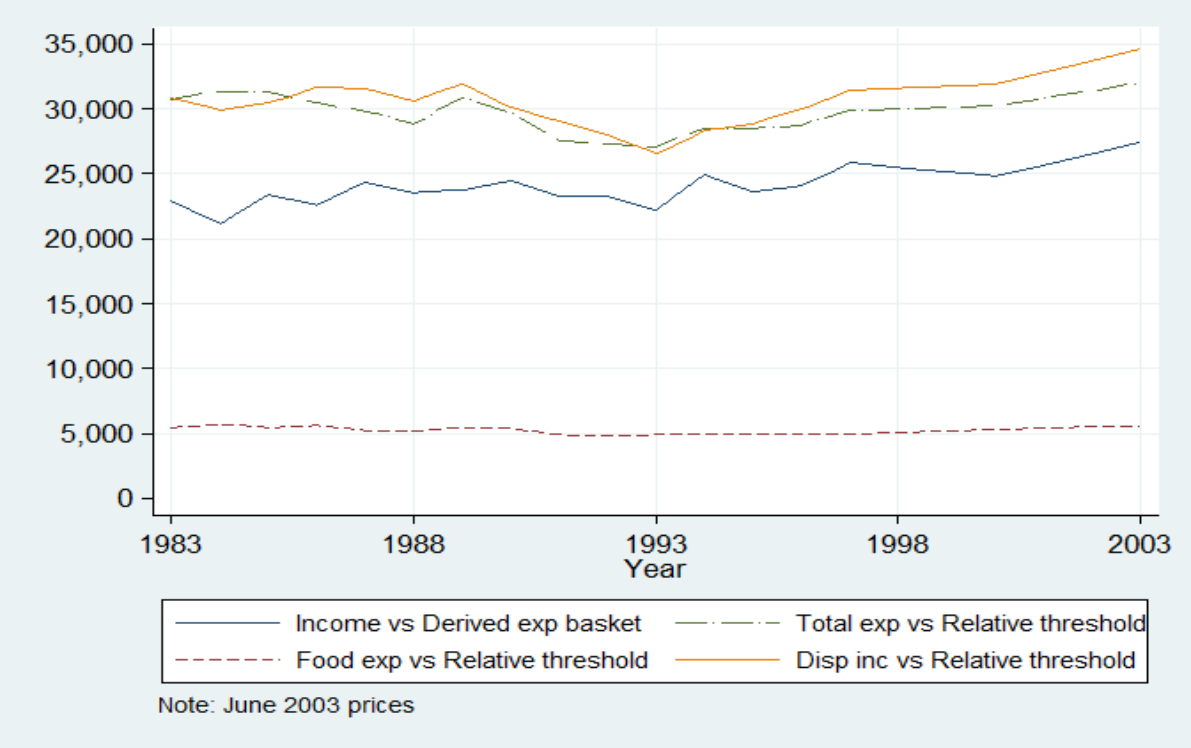

Figure 37 Poverty Rates using Different Methodologies (Jensen Equivalence Scales)

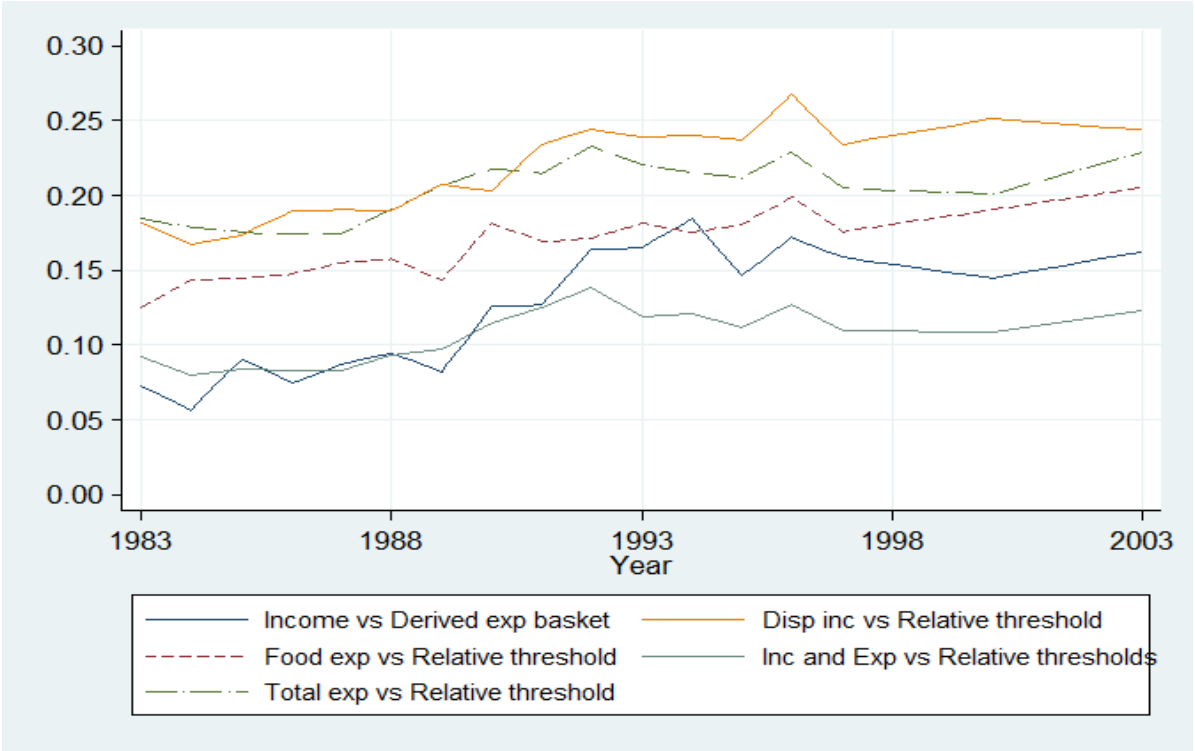

Figure 38 Mean Poverty Gap using Different Methodologies (Jensen Equivalence Scales)

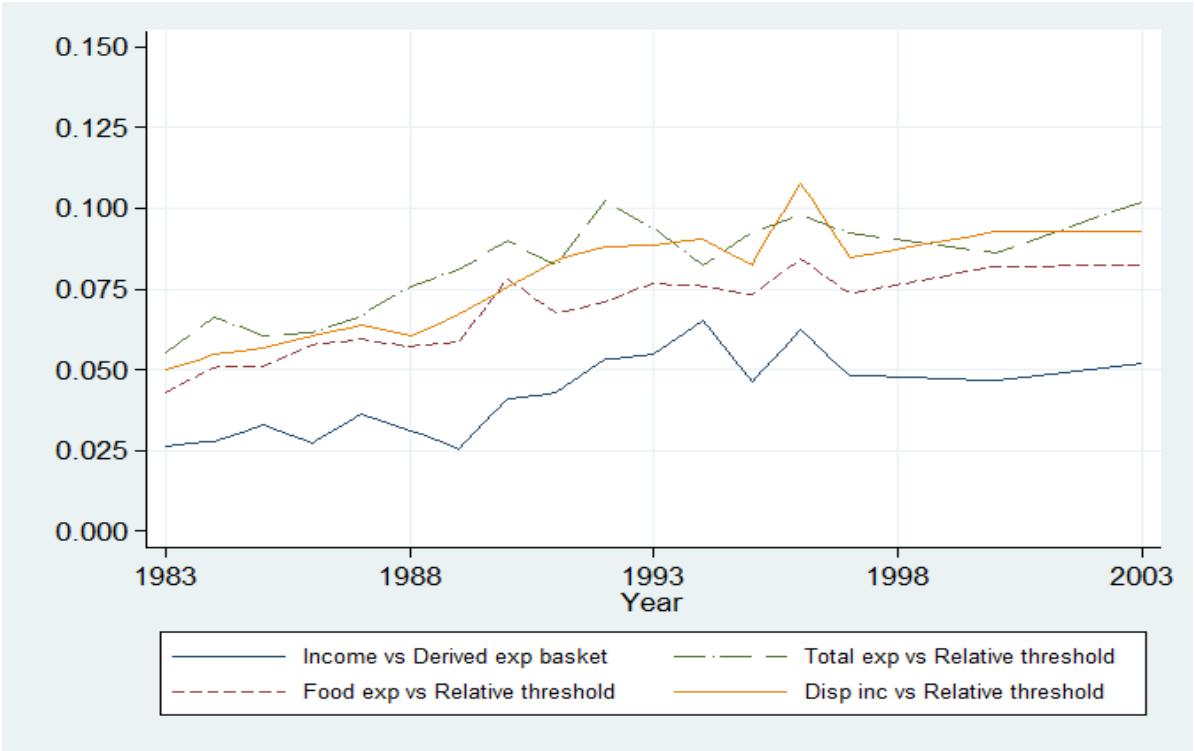

Figure 39 Poverty Rates using Different Methodologies by Age Group

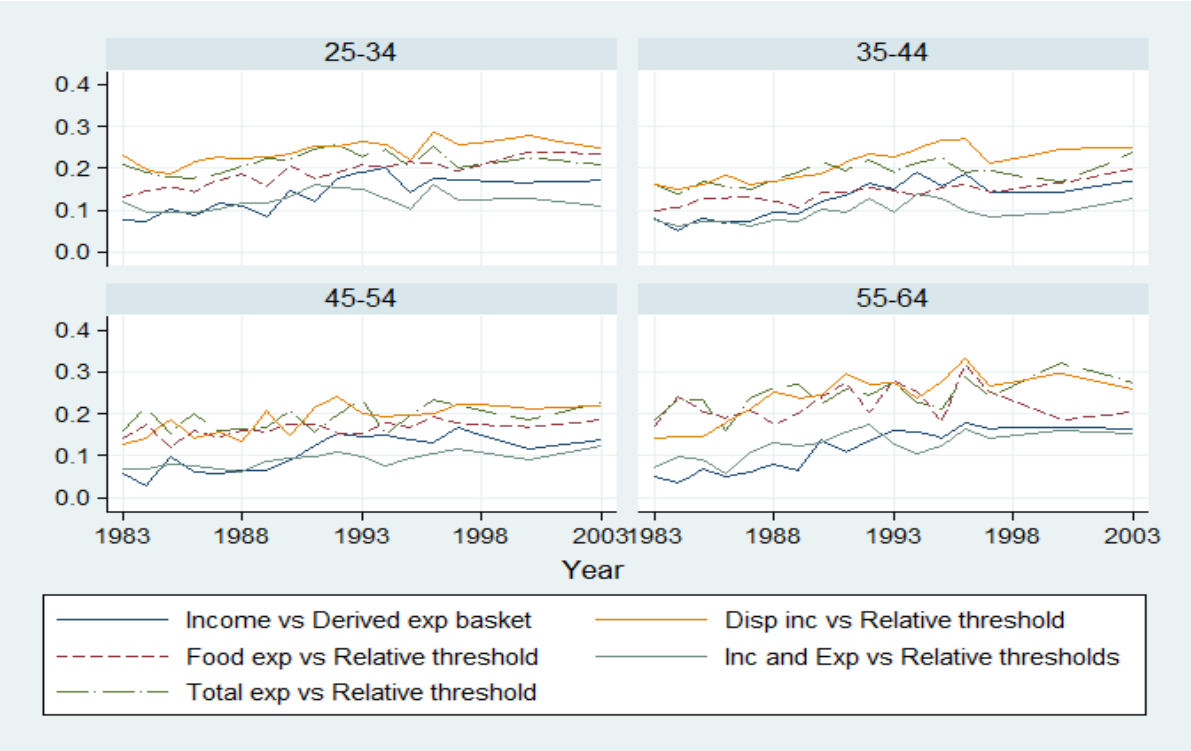

Figure 40 Mean Poverty Gap using Different Methodologies by Age Group

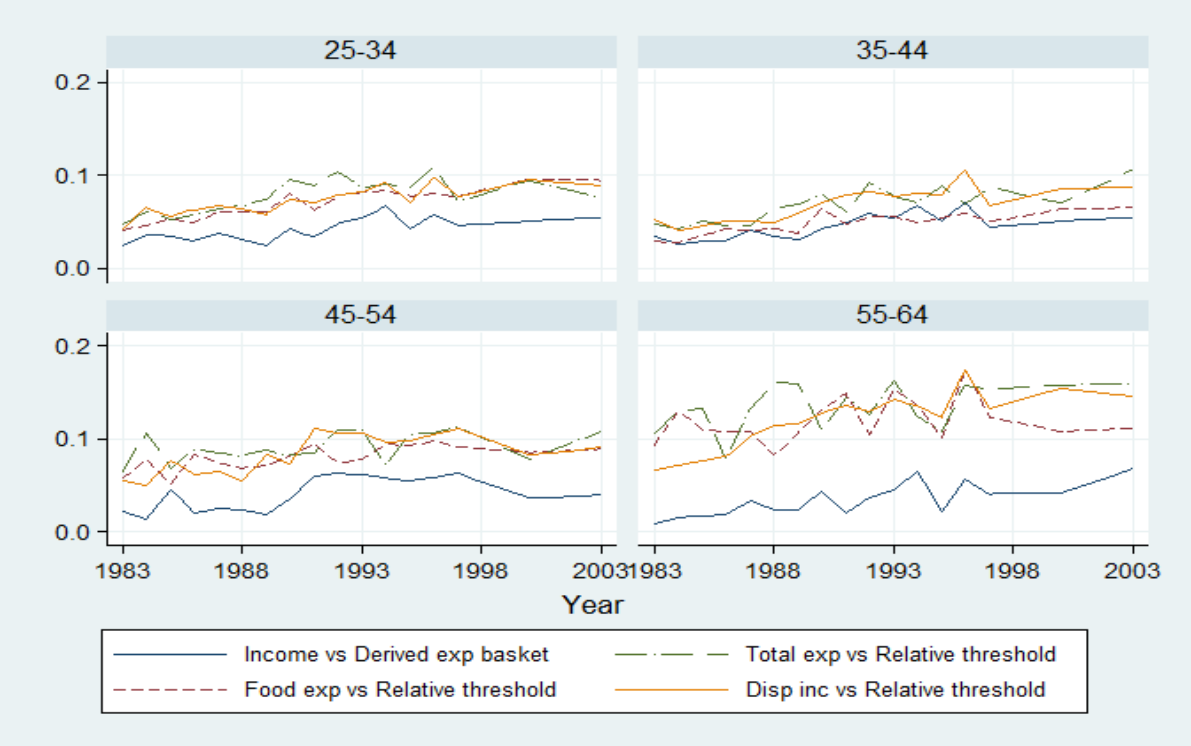

Figure 41 Poverty Rates using Different Methodologies by Household Composition

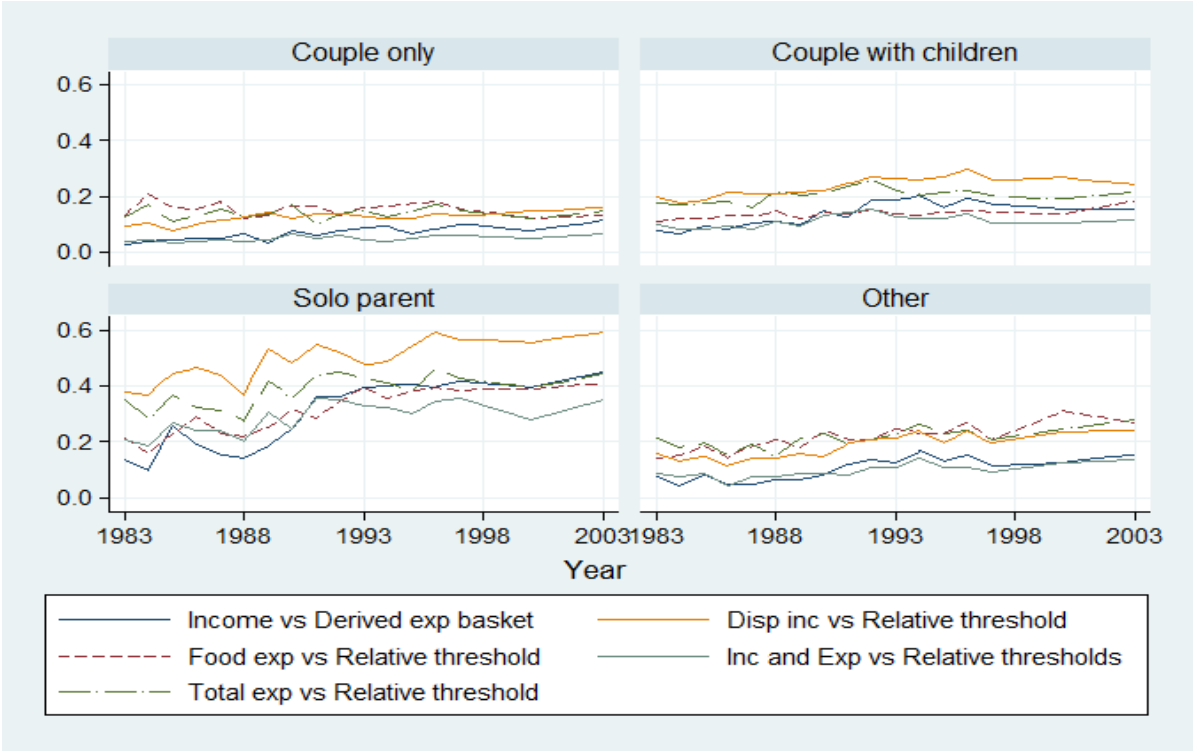

Figure 42 Mean Poverty Gap using Different Methodologies by Household Composition

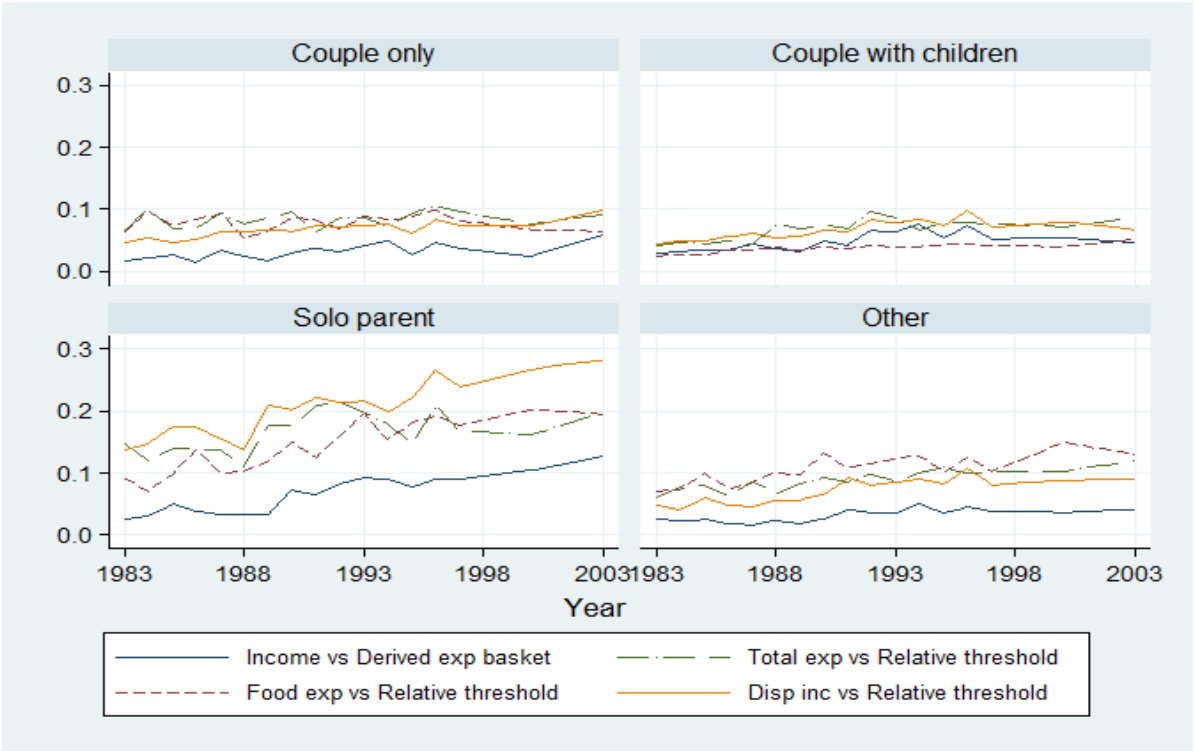

Figure 43 Poverty Rates using Different Methodologies by Education

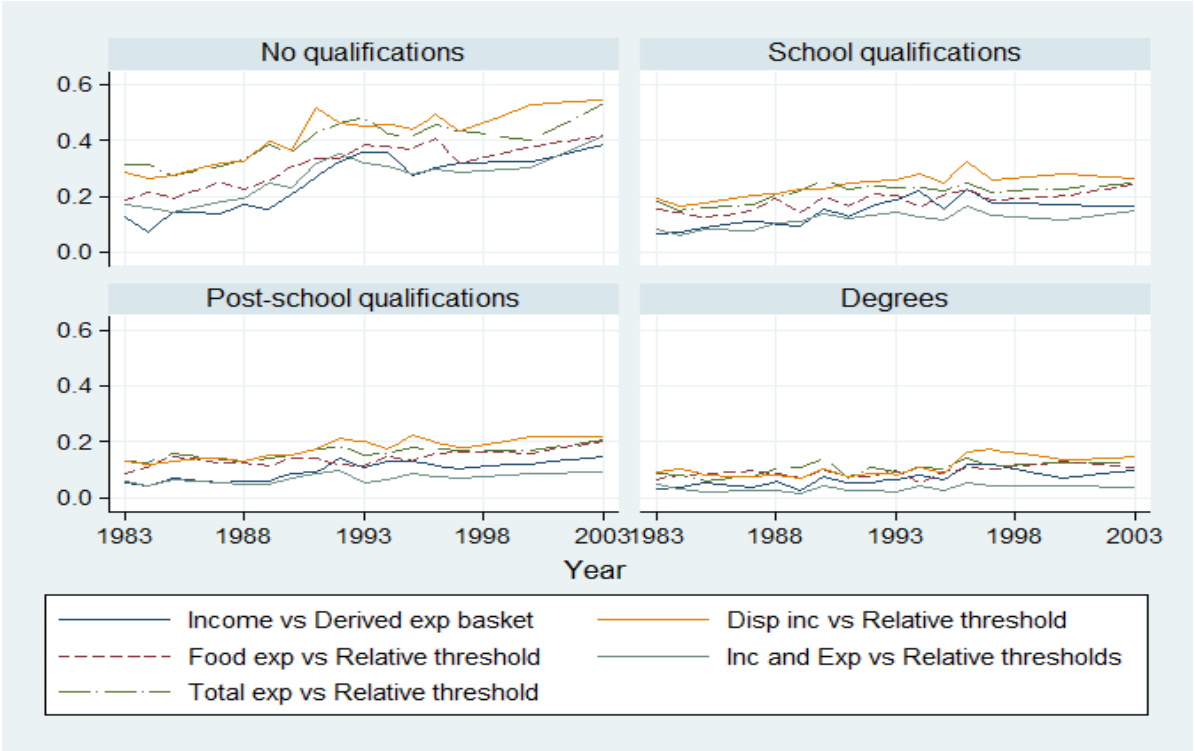

Figure 44 Mean Poverty Gap using Different Methodologies by Education

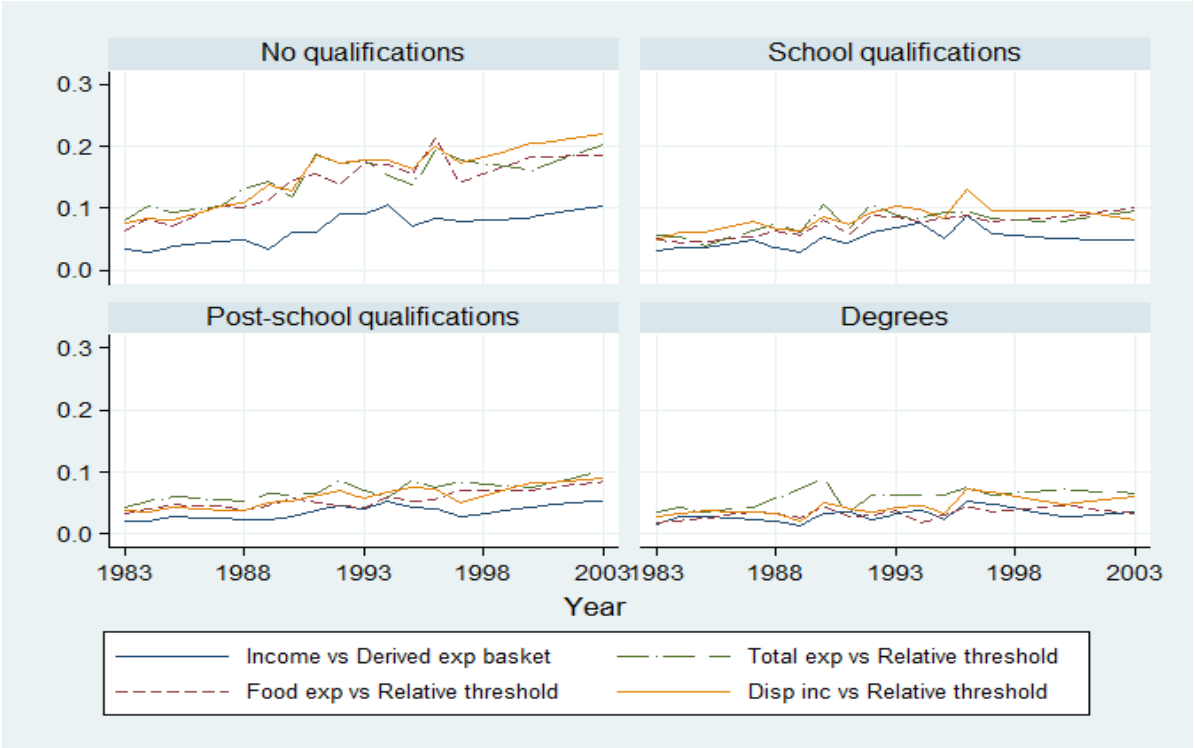

Figure 45 Employment Rates in the HES Compared to the HLFS (Age 15+)

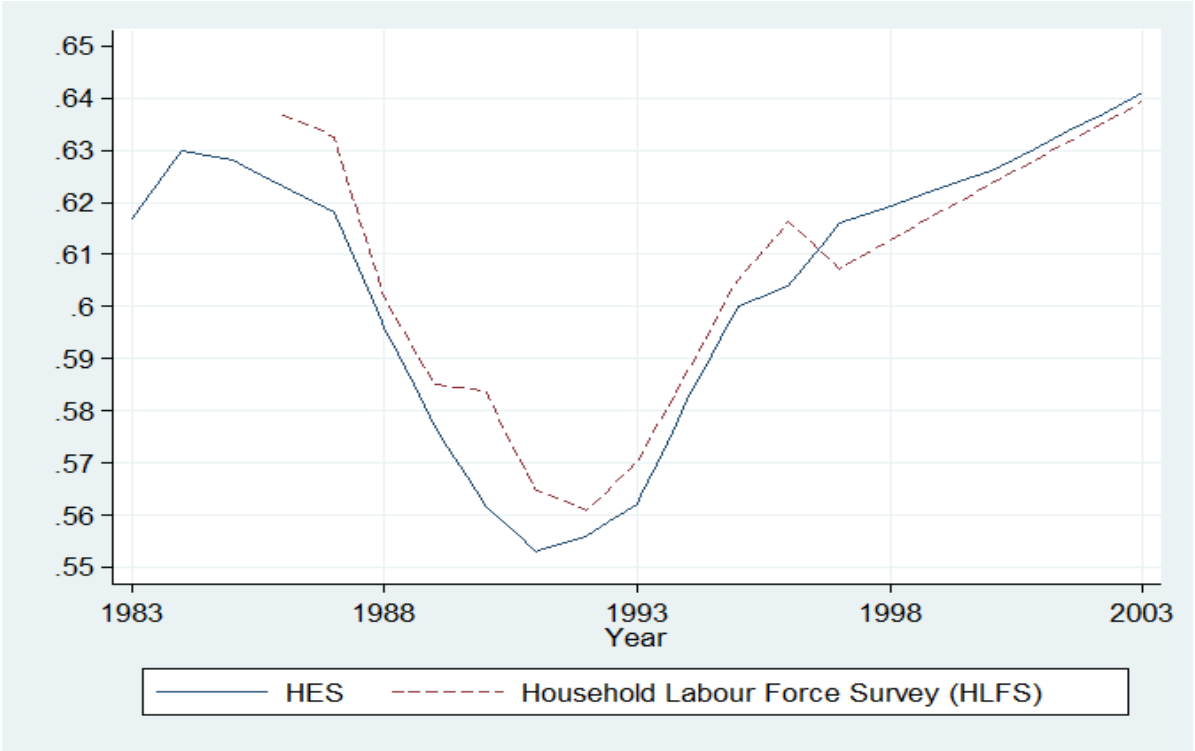

Figure 46 Mean Hours Worked if Employed in the HES Compared to the QES (Age 15+)

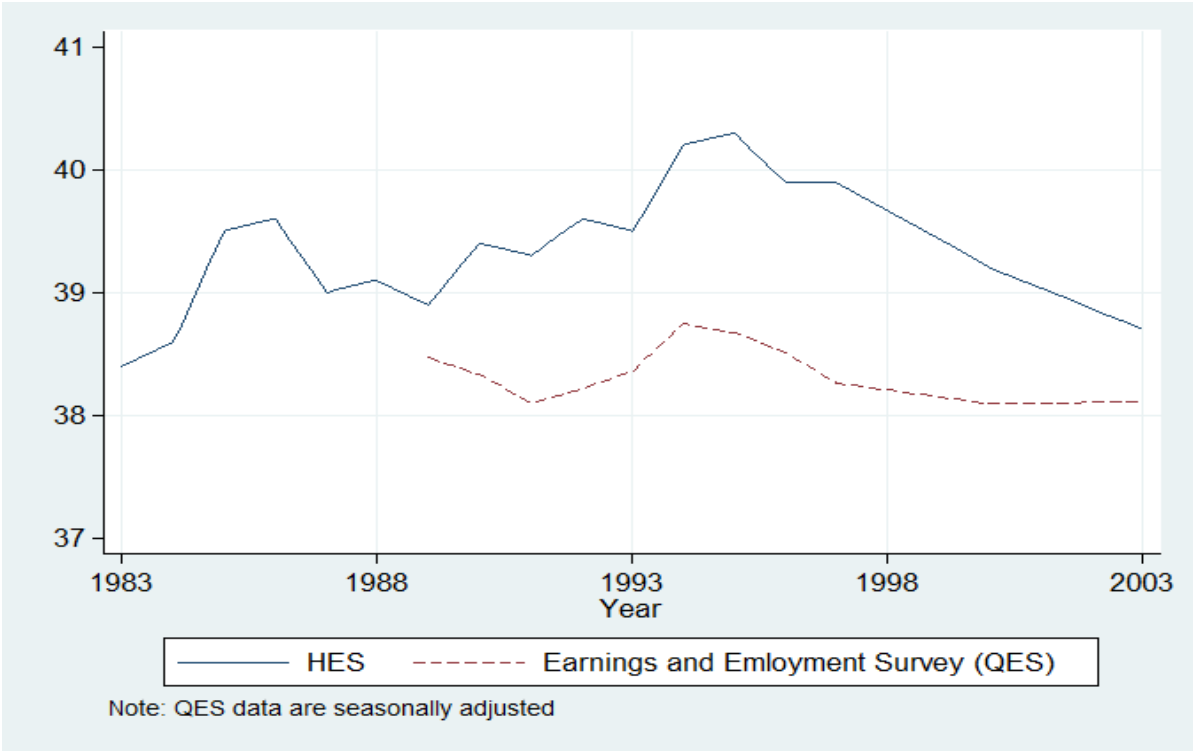

Figure 47 Mean Hourly Wage in the HES Compared to the QES (Age 15+)

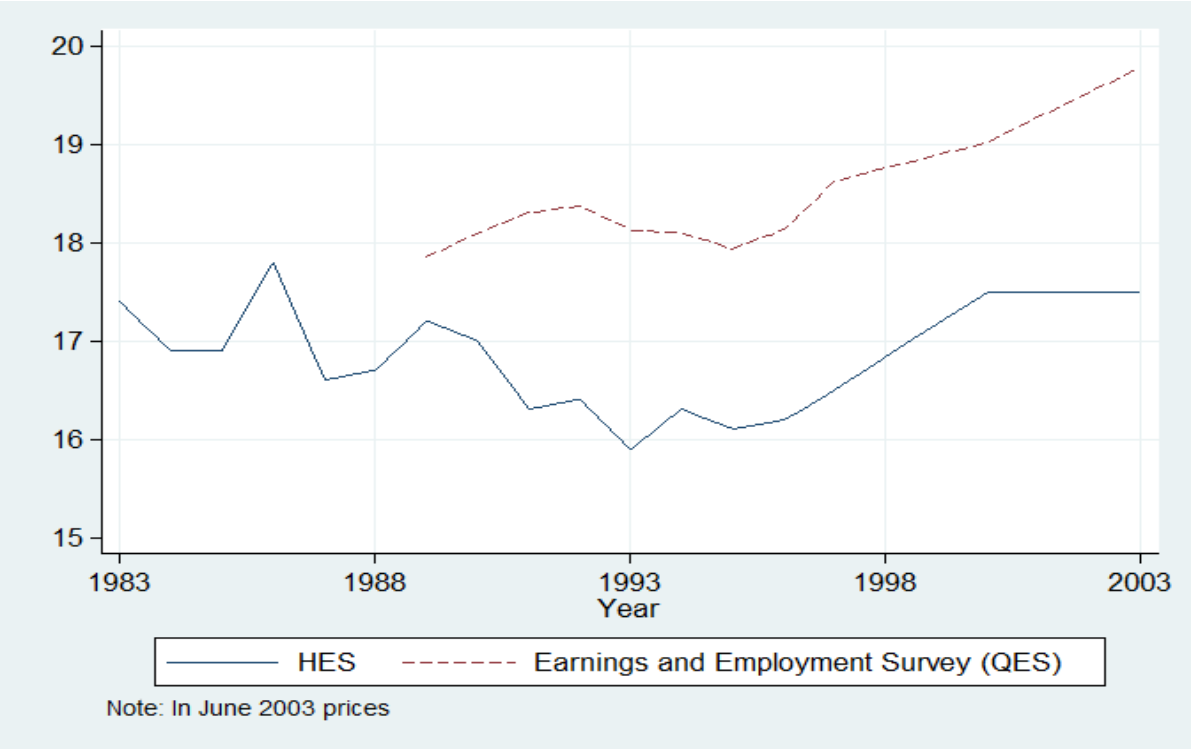

Figure 48 Mean Weekly Earnings in the HES Compared to the QES (Age 15+)

Appendix 1 Validating Socioeconomic Data from the HES

In this section, we compare the patterns for some of the key socioeconomic variables described above to those obtained for the same variables in the Household Labour Force Survey and the Quarterly Economic Survey.

The Household Labour Force Survey (HLFS) is a nationwide survey and is used to calculate official measures of employment and unemployment rates. It provides the only comprehensive ongoing measure of the country's labour force. The survey started in October 1985, and the first results published were for the March 1986 quarter.

The Quarterly Employment Survey (QES) measures quarterly estimates of change in, and levels of, average hourly and average weekly earnings, average weekly paid hours, and the number of filled jobs. The survey commenced in 1947 and since 1989 has been the responsibility of Statistics New Zealand. QES statistics are derived quarterly from approximately 18,000 surveyed business locations in a range of industries and regions throughout New Zealand. Information relates to the pay week ending on, or immediately before, the 20th of the middle month of the quarter. Therefore, the reference months are February, May, August and November. The survey population comprises all business locations owned by economically significant enterprises in surveyed industries that employ staff. The need to maintain a sample that provides good coverage of economic activity means that larger businesses have a higher chance of being surveyed.

Figure 45 shows that employment rates from the HLFS and HES track each other very closely. Hours worked, hourly wage rates and weekly earnings are available from the QES quarterly from 1989. We only select the quarters that match the middle quarter of each HES survey year (for example, the August 1989 QES quarter is compared with the 1989/1990 HES survey). Figures 46, 47 and 18 show that these three variables follow the same trends in both surveys. However, weekly earnings and hourly wage rates are higher in the QES than in the HES while the opposite is true of hours worked. The differences could be due to the fact that the QES only covers employees of 'significant' businesses, while the HES includes all employees and self-employed people.

Appendix 2 Definitions of Household Expenditure Groups

Variable name	Description	Detail
Food	Annual household expenditure on the food group	Includes all expenditure on food items including restaurant and take-away foods. Excludes alcohol.
Clothing	Annual household expenditure on the apparel group	Includes all expenditure on apparel related items such as - men's, women's, boy's, girl's and infants clothing and footwear, and clothing supplies and services (patterns, material, wool, hire of clothing, making of clothing)
Durables	Annual household expenditure on durable goods	Includes all expenditure on home appliances (fridges, freezers, TVs, videos (not computers), household equipment and utensils (ironing boards, cutlery), furniture and furnishings (lounge suites, curtains), floor coverings (carpet, tiles); purchase of road vehicles; recreational vehicles (boats, trailers, hang-gliders), leisure and recreational goods (cameras, musical instruments, sports goods, pool tables, tents, CDs, toys); pets, racehorses and livestock (including equipment for)
Other goods	Annual household expenditure on non-durable goods	Includes all expenditure on other goods such as - tobacco products; alcohol; medical goods, toiletries and cosmetics; personal goods (jewellery, suitcases, hairbrushes, tissues); food for pets, racehorses and livestock; publications, stationery and office-type equipment (papers, magazines, books, pens, pencils, computers, printers); other goods (fireworks)
Education	Annual household expenditure on education	Includes all expenditure on education and tuition services (school fees, university fees, course fees)
Health	Annual household expenditure on	Includes all expenditure on health services (GP fees,

	health	specialist fees, dentist fees, health insurance)
Other services	Annual household expenditure on services other than education and health	Includes all expenditure on transport related items such as - public transport, overseas travel, vehicle ownership expenses (petrol, parts and equipment for repairs to road vehicles, registration fees), private transport costs (car parking fees, rental car charges); household operations related items such as - fuel and power (electricity, gas, coal, firewood), household services (communication services, baby-sitting, shifting charges); personal services (hair-dressing); accommodation services (motel fees, hotel fees); financial, insurance and legal services (accountant's fees, bank fees, interest charges on credit cards, building insurance, vehicle insurance); vocational services (trade union dues, professional fees); leisure services (subscriptions to magazines, sporting clubs, political parties, admission charges to cinemas, theatres, sporting events); other services and outgoings (photocopying fees, crèche and kindergarten fees, gambling (outlay and return), money given to others, cheque duty); contributions to savings (contributions to superannuation and mutual funds, premiums for life/endowment insurance)
Housing	Annual household expenditure on the housing group (including net capital outlay)	Includes all expenditure on housing related items such as - rent payments (including bond payments), mortgage payments (principal and interest), purchase of property maintenance type goods (timber, wall paper, power tools), property maintenance services (fencing services, roofing services, section maintenance services); and expenditure on net capital outlay - purchase of housing (purchase contract price, site-preparation costs, mortgage and loan amounts, loan application fees, valuation fees, legal fees); sale of housing (sale contract price, mortgage and loan amounts repaid, advertising fees, legal fees, real-estate agents fees, auction fees).

Appendix 3 Equivalence Scales

Household of different compositions and sizes require different levels of resources to achieve similar standards of living. Given that there are economies of scale as household size increases, that children may cost less than adults, and that resource requirements may vary with intra-household living arrangements (a two-adult household can be a couple or two unrelated flatmates), household resources are typically standardised before comparison are made across different household types or all household types are pooled together. This standardisation is known as equivalisation.

There exist many equivalence scales. In this paper, we consider three scales:

Square root scale: household resource needs are proportional to the square root of household size. Accordingly, a household of four persons has needs twice as large as a sole occupant household. This scale is labelled the "OECD scale" in this paper as it has been used in many recent OECD publications (e.g. Burniaux et al. 1998; OECD 2008; Whiteford and Adema 2007).

Bureau of Labor Statistics (BLS) scale: assumes that adults cost more than children and allows for a different adjustment for single parents. This scale has been used in several BLS and Census Bureau studies and is also the primary scale used in Garner and Short (2000), a paper we discuss in detail below. The scale is:

- Single individual scale = 1.00
- Childless couple scale = 1.41
- Unrelated multiple adults (no children) scale = (adults)^0.7
- Single adult with children scale = (adults + 0.8 * first child + 0.5 * other children)^0.7
- All other families scale = (adults + 0.5∗children)^0.7

1988 Revised Jensen Scale: This is the scale typically used in the New Zealand studies (e.g. Ballantyne et al. 2004; Perry 2007). It is similar to the BLS scale and assumes that adults cost more than children. Equivalence values are calculated as (a + 0.7163*c)^0.6229, where *a* is number of adults, *c* is number of children.

In general, we found that our results are not sensitive to the choice of equivalence scale. Hence, most of the analysis below uses the 1988 Revised Jensen Scale, as it lies between the OECD and the BLS scales and is the most common scale used in New Zealand research. In

Section 6.2, we examine in more detail whether poverty measurements are sensitive to the choice of equivalence scale.

Appendix 4 Details of Garner and Short (2000) Methodology

We directly follow the approach proposed in Garner and Short (2000) for calculating poverty rates. This is done in the following steps:

(1) selecting a reference family;

The reference household is defined as a couple and two children (aged 0-17). According to Garner and Short, this type of family represents 8.6% of household types and people in these families account for approximately 14% of the U.S. population in 2005. By comparison, this household type makes up 11.3% of households in our 2003 sample (recall that our sample includes households with at least one person aged 25-59).

(2) identifying the goods and services to be included in the threshold;

The thresholds are based on household expenditures on: food, at home and away from home, clothing, utilities (including telephone), medical care and housing costs defined as:

For renters, shelter expenditures

For homeowners, non-vacation shelter expenditures including mortgage interest payments, repayments of mortgage principal, mortgage prepayment penalties, property taxes, maintenance, repairs, insurance, and other related expenditures.

As a shorthand, this expenditure category will be referred to as FCSUM hereafter.

(3) defining the poverty threshold;

The basic poverty threshold is:

(1-smed)*M*((ZL*PL)+(ZH*PH))/2 + smed*M*(PL+PH)/2

smed = medical share of the threshold value, defined as the ratio of average expenditure on health to average total expenditure in each year

ZL = multiplier representing a smaller basic needs bundle, ZL takes the value of 1.15, as in Garner and Short

ZH = multiplier representing a larger basic needs bundle, ZH takes the value of 1.25, as in Garner and Short

PL = lower percentage of median expenditures, defined as p30/p50, where p30 and p50 are respectively the 30th percentile and the median FCSUM expenditure across all households in all years in the sample

PH = higher percentage of median expenditures, defined as p35/p50, where p35 is the 35th percentile FCSUM expenditure across all households in all years in the sample

M = median expenditures for reference family

PL and PH are constant across the entire sample while smed and M vary by year. Garner and Short (2000) discuss why these seemingly arbitrary parameters are used to calculate 'average' expenditure. They are based on both previous research and expert opinion.

(4) defining poverty;

A household is defined as poor if its disposable income is below the equivalised threshold defined in (3). One small difference here compared to our other poverty measures is that only the non-medical portion of expenditure is equivalised since medical costs do not generally have economies of scale. Hence, there is a poverty threshold for each household type for this method.

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