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THE CHANGES IN NEW ZEALAND'S INCOME DISTRIBUTION

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ABSTRACT

This paper summarises recent research on changes in New Zealand's income distribution. It describes how the income distribution has changed during the period 1981 to 1996. It then looks at factors accounting for these changes in the income distribution. The main focus is on social trends, such as household composition, and changes in individual characteristics, such as age, qualifications and employment status.

The first part of the paper looks at trends in the income distribution. This shows that income inequality rose in the 1980s and 1990s in New Zealand. The rate of growth was fastest in the 1980s. New Zealand's level of income inequality has risen substantially relative to the levels in other OECD countries.

Wellbeing measured in income terms depends not just on income at a given point in time, but also on the extent to which that income position persists through time. The second major part of this paper focuses on recent research on income 'dynamics'. Analyses using tax data show that incomes do vary considerably from period to period. However, there is also a considerable degree of income 'persistence'.

The final part of the paper looks at factors contributing to the increase in income inequality. Changes in household composition, (such as the growth in sole parent households and older households without children), account for some of the increase in household income inequality. A growing proportion of workers in their prime earning years, and with higher educational qualifications, has also increased income inequality. These factors can explain up to 50-60% of the overall increase in income inequality.

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The Changes in New Zealand's Income Distribution

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(HES stands for Household Economic Survey)

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Executive Summary

Purpose of discussion paper

1. This working paper describes how income inequality has changed during the period 1981 to 1996. It then looks at factors accounting for these changes in inequality. The main focus is on social trends such as household composition, and changes in individual characteristics such as age, qualifications and employment status.

2. The paper does not provide an exhaustive literature survey of all aspects of income inequality. It focuses on broad trends for individuals and households and gives some attention to the varying experience of different groups in society. Although it does not look in detail at such important issues as the experience of Mäori, and regional dimensions of inequality, it does provide a reference point for ongoing inquiries into aspects of New Zealand's income distribution.

Summary of changes in New Zealand's income distribution

3. Income inequality rose in the 1980s and the 1990s in New Zealand. This conclusion is reached regardless of how income is measured: individual or household incomes, before or after tax, from different data sources, and after adjusting for changes in household size and composition.

Timing of the changes

4. Income inequality rose most substantially in the late 1980s, but continued to increase more slowly during the 1990s.

5. Income inequality did not fall during the economic expansion in the 1990s. This provides some evidence that it was driven by structural changes to the fabric of the economy or society, not just by the business cycle.

How do we compare internationally?

6. Income inequality also increased in Australia, the United Kingdom and the United States over the last two decades. The increase in New Zealand's income inequality seems, however, to have been proportionately larger than that seen in most other developed economies. New Zealand now appears to have one of the highest levels of inequality in the OECD. These international comparisons are difficult because of differences in data sources and measurement methods between countries. However, it can be said with confidence that New Zealand's level of income inequality has risen substantially relative to the levels in other OECD countries.

Changes in the shape of the distribution

7. Charts of the income distribution show that the proportion of middle-income households has fallen, and the proportion in the low income and top income bands has increased. The reduced share of middle-income households makes the distribution look flatter and more spread out. The figure below illustrates these changes.[1]

Distribution of Household Gross Incomes
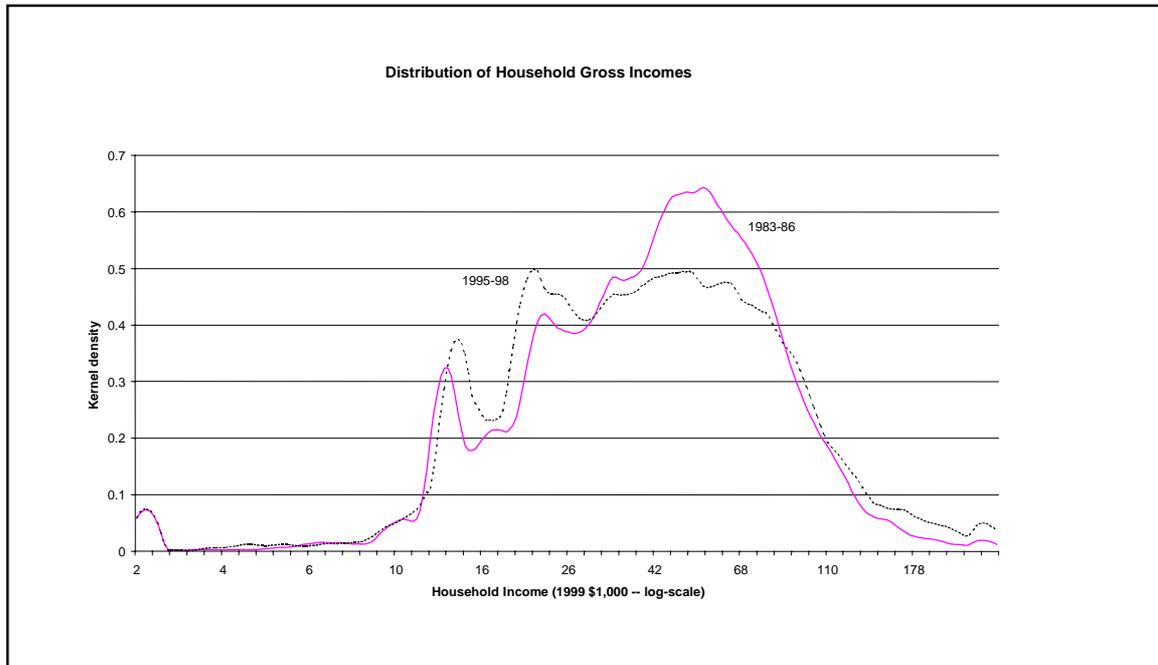
Trends in real incomes

8. The average incomes of those in the top tenth of households have risen significantly in real terms between 1982 and 1996. Average real incomes of those in the lower and middle-income groups fell.

9. There was a significant reduction in the real incomes of those in the bottom ten percent of households, by about 5 percent on average. Nonetheless, the decline seems to have been less than for those groups further up the distribution. Certain household types – particularly sole parent families - make up a larger proportion of the 'lowest income' group than formerly; whereas the elderly have on the whole improved their position.

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[1] The horizontal axis of the graph measures incomes on a logarithmic scale. This expands the lower and middle parts of the income distribution, making it visually easier to discern changes in these parts of the distribution. It also, however, visually compresses changes at the top end of the distribution. The 'kernel density' is a technical method for showing the proportion of households at each (log) income level. It is calculated by allocating the sample households, ranked from poorest to richest, into 250 'bins', each with an equal number of households. The resulting bar-chart is then smoothed. If the sample were uniformly distributed over the income range, there would be 1/250th (0.4 %) of the sample at each point. Looking at the peak of the 1983-86 graph, we see for instance that around 0.64 percent (about two thirds of one percent) of households had incomes around $55,000. In 1995-98, only about 0.47 percent of households had incomes around $55,000.

10. The mid 1980s represent an historical break in real income growth, especially for men. Up until the 1980s, a person at a given age could expect to earn on average a higher real income than a person older than him or her had earned at the same age. This ceased to hold, for men in particular, from 1981, because of a substantial fall in labour force participation by males, which has yet to be fully recovered.

11. Slow income growth continues to be a key factor in welfare outcomes. Mean household after-tax incomes grew by 0.4% per year over the 1986 – 1996 period, or 0.7% per annum if adjustment is made for falling average household size. However, median household incomes after tax declined over this period, and this is a better indicator of how the 'typical' household fared.

Income dynamics

12. Some people who were 'high' income in one period, may move to lower income groups in a subsequent period, and vice versa. These income dynamics are important for studying the welfare consequences of income inequality. Income differences have greater welfare implications when they persist over time.

13. There have been recent studies of short-term income mobility in New Zealand using IRD tax data for individuals. This evidence shows that there exists substantial period-to-period income volatility. However, income differences also show significant persistence over time. At the end of a few years, around half of the population will remain in the income group they started in, and around half will have moved.

14. There is less information about income mobility over a longer time-frame. It would be useful to have more information on links between background characteristics (such as family background, schooling), the development of skills and people's level of wellbeing over time. There is a paucity of information with which to answer these questions, given the lack of large-scale surveys that follow people over a long period. Yet, these issues are central to analysing the effect of policy change on welfare outcomes in New Zealand.

Poverty dynamics

15. Analysis of data from the Christchurch Health and Development Study (CHDS) shows that most families in the study over a 14-year period did not experience poverty, or did so only 'transiently'. Poverty was defined as family income of less than 60% of the median income of those in the survey. Under this definition, two-thirds (67%) of the children in the study over a 14-year period were in families that did not experience poverty, or did so for at most one year in the fourteen. Only 2 percent experienced chronic poverty (spells never separated by more than one year) or poverty for the whole 14 years, but this group accounted for 13 percent of all those in poverty at a given point in time. The percentages vary for different poverty line assumptions. Overseas panel surveys show a similar picture.

16. An important policy issue is whether 'poverty persistence' tends to be worsened as a result of receiving a social welfare benefit (for example, due to the stigmatising effects of benefit receipt). Investigation of longitudinal incomes data for benefit recipients, using tax sources, suggests that the answer may be no. It may be individual characteristics (such as skill levels) which make them more likely to be a benefit recipient. The receipt of a benefit in itself does not appear to have an independent effect on someone's ability to get off the benefit system. However, further work should test this result against evidence drawn from benefit system statistics and qualitative research.

Contributors to the change in cross-sectional income inequality

17. A number of investigators have tried to identify the precise reasons for the increase in inequality since the early to mid 1980s. They have used different techniques and data sets, and do not reach identical conclusions, but there are some common elements.

Changes to individual income inequality

18. Analyses from Census data show about 60 percent of the increase in income inequality among the employed over the period 1986 to 1996 to be accounted for by shifts in labour force composition and by widening income differentials by occupation, education, industry and age.

19. An analysis of the increase in wage and salary inequality between 1984 and 1997, measured in terms of HES data on weekly full-time earnings, found just under 30% to be accounted for by changes in workers' formal qualifications and age (as a proxy for potential experience), and in returns to those attributes.

20. The increases in weekly earnings dispersion were substantially larger than the increases in hourly earnings dispersion. The increase in inequality of weekly earnings is partly accounted for by an increase in average hours worked by those in full-time employment, with the increase being greater for those with higher earnings.

Changes to 'couple' incomes

21. Changes in the relative proportion of 'no income', 'one income', and 'double income' couple households explain a part of the increase in income inequality in the late 1980s.

Changes in household income inequality

22. A Department of Labour/Treasury research programme is investigating the contributors to changes in household income inequality. This work is still in progress. However, preliminary findings show that 10-25% of the increase in inequality is associated with changes in household composition (such as the growth of sole parent households and older households without children). A further 25% is associated with changes in the age-mix, employment status and

qualifications of the population. For example, a growing proportion of workers in their prime earning years tended to increase income inequality. Similarly, a growing proportion of the workforce with higher educational qualifications also increased income inequality.

23. Surprisingly, job losses during the 1980s had little effect on most overall measures of income inequality. Employment losses were experienced across the whole of the distribution. They had the effect of compressing the bottom half of the distribution and, by dragging down the median, increasing inequality in the top half of the distribution. These two effects largely offset each other, thus having little effect on the overall measure of inequality.

24. The remaining proportion (around 50 percent) is still unexplained. It could be due to factors such as shifts in industry specific unemployment rates during the 1980s, or increased dispersion of earnings within groups with the same educational qualifications and other factors.

25. An independent study using Census data generated similar results. This study also found that household composition accounted for a significant proportion of the change in inequality (around 20 per cent). However, this study attributed a greater share to changes in the employment status of families. The two studies employ quite different methodologies, so their findings are not directly comparable.

26. While household composition and other demographic factors appear to account for some of the increase, more fundamental drivers may lie behind these trends. For example, the stress of economic restructuring probably contributed to the acceleration in family dissolution during the 1980s. However, it is difficult to disentangle the effect of government policy from systemic social change.

Sources of income, taxes and welfare transfers

27. Another approach looks at 'sources of income', for example the shares of self-employment, wages and salary or capital income and the effect of taxes and welfare transfers.

28. The overall impact of the 1980s tax reforms has not been fully assessed. Work to date shows a strong contribution to increasing inequality arising from changes in the direct/indirect tax mix in the 1980s. On the other hand removing tax loopholes and significant increases in company tax rates may have partially off-set this effect. Furthermore, the behavioural changes have not been assessed (such as the extent to which people changed their level of work effort in response to the tax changes).

29. In the latest period, 1990/91 to 1995/96, direct tax changes appear to have made a contribution to reducing income inequality. However, this finding may simply reflect an increase in the share of total income earned in higher tax brackets. The analysis summarised in this paper does not include effects of changes to

independent family tax credit and family support since 1996, nor other recent tax changes.

30. Benefits tended to reduce income inequality in the late 1980s, with more people relying on benefits as a source of income during the recession. They made only a small contribution to increased inequality in the 1991-96 period.

31. The inequality of income from both self-employment and wages and salary sources increased. In fact, this increase in inequality of labour market incomes accounted for a bigger part of the overall increase in inequality. Labour market income inequality increased further in the 1990s.

Conclusion and policy implications

32. Inequality has increased in New Zealand over the past two decades. The number of middle-income families has reduced, some moving further down the distribution, and others moving up. There have been winners and losers, but the overall picture (combined with only modest increases in average incomes over the period) should be a source of concern for policy makers.

33. Allowing more people to share in real income growth will require policies to raise national income per person, alongside policies to redistribute income growth.

34. A number of potentially competing objectives are subsumed within a broad 'distributional' heading. Policies could aim to address:

- situations of unacceptable hardship;

- issues relating to the spread of incomes across individuals and families, and across different ethnic groups, and regions; and

- issues concerning fairness across different generations.

35. The choice of objectives will depend on political judgements about such things as societal views on fairness and equality of opportunity, and consideration of implications for other government objectives.

36. Whatever objectives are chosen, it is important to identify which policy approaches are likely to be most effective. A starting question is: which of the factors causing rising inequality are within the government's control? This paper is a contribution to well-informed debate on this important question.

37. Further work might look more closely at different aspects of income inequality, and factors affecting particular groups in society. Potential candidates for further work include:

- looking more closely at groups of less skilled individuals and policies that will be effective in raising the income earning opportunities of these groups;

- reviewing the impact of government policy on the welfare of Māori, and achieving a better understanding of factors influencing the position of Māori in New Zealand society;

- exploring the implications of income dynamics for policy. This might involve looking more closely at the welfare implications of people moving frequently between the benefit system and low paid work;

- investigating the regional dimension of income inequality and reviewing which policies will be most effective in addressing regional income disparities; and

- looking at the effect of government policy on intergenerational redistribution (for example, the effect of superannuation policy on the distribution of income between generations).

The Changes in New Zealand's Income Distribution

Introduction

1.   The purposes of this paper are –

-    to describe the changes in New Zealand's income distribution in recent years;

-    to set out what is known about the causes of these changes;

-    to discuss possible policy implications.

2.   To do this the paper summarises the relevant New Zealand research. It also draws on overseas research where helpful.

The relationship between income and wellbeing

3.   The reason for studying the income distribution, and changes in the distribution, is that income has a vital role in determining the 'wellbeing' of individuals and of families. We are interested in –

(a)   absolute levels of income, for the population in general, and for specific population sub-groups, and how they are changing over time, and what this implies for the 'standard of living' of various groups within the community;

(b)   relative incomes, and changes in the relativities, and to what extent such changes can, or should, be seen as 'equitable' or 'fair'.

4.   Whether or not a given outcome in terms of income inequality is seen as desirable is decided by the value judgements of the community, and of the government of the day. There is probably a wider range of opinion in discussing the distribution of income about what is 'fair' and what is 'unfair' than in any other part of economic life. This paper tries not to make judgements about 'fairness'. Its purpose is to supply information which will make such judgements better informed.

5.   It should be remembered that income is not necessarily the ideal measure of wellbeing. Clearly, an individual's sense of wellbeing is influenced by a range of non-monetary factors including social interactions, the quality of the environment, job satisfaction and so forth. Even in the narrower case of pecuniary welfare, income may not always be the best guide. For instance the welfare of retired people may vary widely depending on the private savings available to them, even when their current incomes are very similar. Young people may prefer a lower income now in the expectation of a higher future income, and may borrow money to finance their current standard of living, and pay this off from higher income in the future. This suggests that expenditure patterns may sometimes be a better guide to welfare than current income.

6. Ideals are rarely totally achievable in practice, and that is the case here. Most of the available data-sets provide information on incomes, and hence most of the material summarised here concerns the distribution of income. However, expenditure studies are used to provide a useful cross check on the income based picture when available.

Unit of analysis: individual, family or household?

7. We may get different pictures of wellbeing depending on whether we study individual or family income distribution. Income is most commonly received by individuals from their activities in the market-place. The incomes of families are predominantly the sum of individual incomes, so it is important to understand the distribution of individuals' incomes in order to understand the distribution of family incomes. Individuals may have access to income provided by other family members, most commonly but not exclusively when sharing the same house (Fleming, 1997, reports on studies of income sharing in New Zealand families). The type of social changes experienced in New Zealand and other Western countries over the last few decades means that the traditional focus of analysis, the 'nuclear family' – a parent or parents plus children - is becoming a less typical social grouping. Many individuals will be part of extended families, perhaps be a member of a 'blended' family, and perhaps share living space with unrelated individuals, for example people flatting together. This means that it is important to monitor distributional changes from the perspective of individuals and also of other social groupings.

8. This report summarises material on individual income distribution and household or family income. One specific aim of this paper is to provide some evidence on how families in general, and specific kinds of family, have fared in the changing social environment. In particular, is the proportion of families 'under pressure' for income reasons increasing? How many are just temporarily 'under pressure', and how many are permanently or regularly so? Some research results relating to these questions are given later in the paper.

9. Unfortunately, analysis is limited by the way statistics tend to be collected with reference to a 'household' and it is extremely difficult to explore the range of social units now existing in society, or to analyse the traditional family unit itself. Different family members may live in separate households (for instance when student children go flatting). The 'household' analysis may therefore miss important linkages between individuals (for instance, child support paid to the custodial parent in the case of separation). On the other hand, a household analysis may assume transfers within the household that do not take place (for instance where a principal earner's income is not shared equitably between all household members).

Income dynamics

10.   The best measure of welfare will provide information on how people's level of wellbeing changes over time. This is known as a dynamic picture of welfare. For instance, we want to know which groups are more likely to experience long periods of low income, and which groups may experience a temporary income shock but recover at a later period. The typical measure of income distribution does not provide this level of information because it takes a snap-shot of a particular time period. Thus similar degrees of income inequality at this point in time may generate quite different welfare implications, depending on whether the underlying distribution is linked to persistent or transitory income inequality. This has important implications for policy. In particular, people experiencing persistent low income are less likely to be able to ride out these periods without government assistance. It may also have implications for the level of assistance required, given the erosion of private resources it entails and the likely linkages with other deprivation measures such as health outcomes.

11.   Given the importance of a dynamic picture, this paper pulls together those studies that analyse income trends from this perspective. Unfortunately, much of this analysis is limited by the absence of a large longitudinal panel survey in New Zealand. Some recent unpublished Treasury research using tax data is explored, along with a special study of family incomes in Christchurch over a 14 year period. These findings are discussed in part B.

Scope of report

12.   To contain this report to a reasonable length some matters have been left outside its scope. They include –

(a)   The definition and measurement of 'poverty'. There has been good work in recent years using community focus groups to help determine 'poverty lines', (Stephens et. al., 1995; Waldegrave et. al., 1996) It is clear, however, that it is not easy to define measures which will give results across time and for communities across the whole country which will be accepted by all (Easton, 1997. Stephens, et. al., 1997).

(b)   'Non-cash' transactions, and also government provided services. The analyses discussed in this report are of 'cash' incomes, for which information is more readily available. A fuller picture would be obtained from including also 'non-cash' income; e.g. fringe benefits, capital gains in many instances; and from including the value of free or subsidised government services, particularly education and health. The last study to include the second of these items was the Fiscal Impact study by Statistics NZ, published in 1990.

(c)   Regional income distribution. Martin (1999) found regional differentials to be increasing; but otherwise there has been little investigation of this topic.

(d) 'Social outcomes' of income differentials. In particular health outcomes are well-known to be associated with income, as part of a general association of poor health with low socio-economic status. There is also at least a suggestion in much recent international work that an increase in community income inequality has an adverse effect on the health of members of that community (Crampton and Howden-Chapman, 1997; Howden-Chapman et al., 2000); although this conclusion is still very much disputed.

13. There are a number of concepts and definitions used in the remainder of this paper which are described in more detail in Appendix A. The more important points are –

- The three most commonly used income concepts are Market income (income from salaries and wages, self-employment, interest, rent, dividends, private pensions, etc.); Gross or pre-tax income, which includes benefits and other transfers as well as Market income; and Disposable income, that is income after tax and tax credits.

- All these exclude 'non-cash' transactions, and also the benefit of goods and services provided free or subsidised by the government.

- The measurement of the 'standard of living' of a given family or household needs to take account of the number of persons drawing on the family or household's income, and also of the different needs of different household members, for example children as against adults. One way of doing this is by adjusting a household's income by an Equivalence scale to calculate its Equivalent income, allowing for the effect of household size and composition on the household's needs.

- Incomes at different periods are adjusted to the same real value by deflating by the Consumers Price Index in the case of Disposable income, and by the Reserve Bank price index excluding GST, for Market and Gross income (to allow for the effect of GST in 1986-1989, and the offsetting reduction in direct taxes).

- The standard time-period for most analyses in this report is the year.

- A number of measures of income inequality are used, including the standard deviation, the Gini coefficient, the Inter-Quartile difference, the Mean Logarithmic Deviation, and decile ratios. More detail is given in the appendix, particularly on the Gini coefficient, which is the most used measure in this report. All these increase in value with increasing income inequality.

- Most New Zealand income distribution measures are based on the Household Economic Survey (HES), and are therefore subject to sampling error.

Structure of report

14.   Part A describes the changes which have occurred to the distribution of household income in recent years, generally since the early 1980s, and summarises evidence from a number of sources showing that income inequality has increased, and increased significantly.

15.   Part B gives examples of what the changes have meant for particular groups in society. This is first done in 'static' terms; that is examining the changes over time in 'cross-sectional' measures of the income distribution made at given points in time. Then some information is given on income 'dynamics', trying to trace the income paths of individuals or of groups of individuals or households through time. This includes some results for low income families.

16.   Part C summarises the results of a number of researchers trying to explain why income inequality has increased.

Part A: Description Of The Changes

A.1 The shape of the current distribution

1.   Income is unequally distributed. Some persons, or households, receive much more in a given period than others.

2.   Chart 1 illustrates this. It shows the distribution of Gross, or pre-tax, household income for 1995/96. The chart is based on data from Statistics New Zealand's Household Economic Survey (HES) – the main New Zealand source of data for income distribution studies.

Chart 1: 1995/96 Distribution of Gross Household Income.
Smoothed
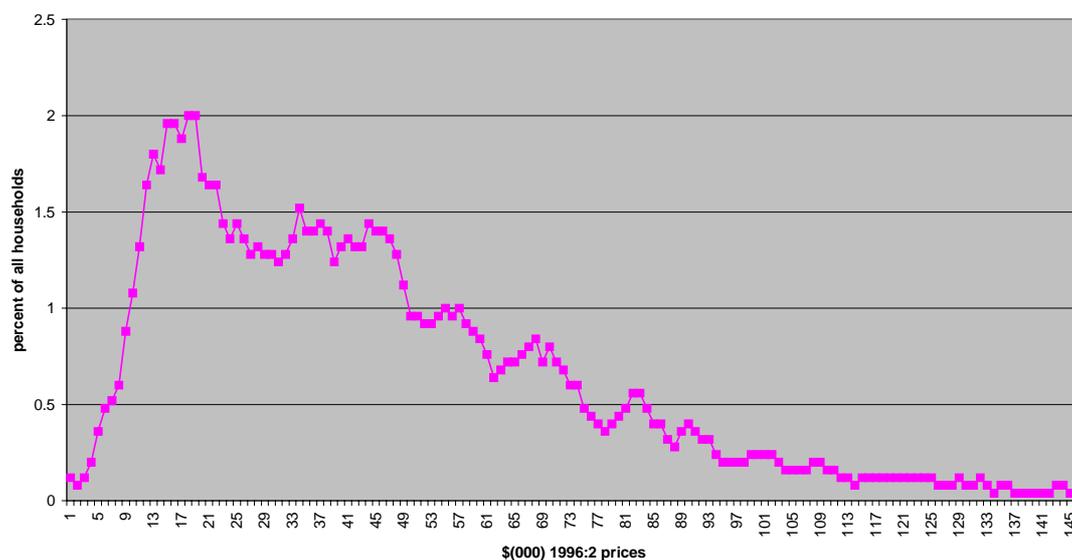
3.   'Gross' income includes regular or recurring income from all sources. In particular it includes social welfare and NZ Superannuation benefits, and family tax credits, as well as all 'market' income (wages and salaries, self-employment income, and investment income) received by the household. It excludes income of an 'irregular' nature, for instance winnings from gambling, gifts, and bequests. The different ways of measuring income are discussed in Appendix A.

4.   The shape of the distribution in Chart 1 is that typically seen for income distributions. There are a small number of households with low incomes, of less than $10,000 a year (there is also a cluster, not shown, of households reporting zero or negative incomes, amounting to less than 0.2 percent of all households, most of these probably being 'self-employed' households, including farming families). Most households are grouped in the 'mid-range', from about $12,000 up to around $50,000 per year. Beyond that, to the right, there is a long 'tail' of high-income households.

5. Chart 1 is not the best way of giving a visual impression of the income distribution. Too much of the detail is crammed in to the left-hand part of the chart. Chart 2, from a recent Treasury seminar presentation by Hyslop and Maré (Sept.1999), also plots the distribution of Gross Household Income, but on a logarithmic scale, and averaged over the three years 1995/96 to 1997/98. (The 'kernel density' on the vertical axis is a measure of relative numbers[2].) The logarithmic scale expands the left part of the distribution relative to the right part. The main part of the distribution is in the $30,000 to $80,000 range, but there are also two 'peaks' in the distribution at lower income points, around $14,000 and $20-22,000. These are mainly 'pensioner' households. An advantage of plotting income distributions using a logarithmic scale is that it makes easier comparisons of relative changes. For example, suppose everyone's income increases 10 percent to match a 10 percent increase in consumer prices, so that no one is better or worse off. On a logarithmic scale the income distribution simply shifts rightward by the same amount for everyone. Whereas on a standard scale, those on higher income move rightward by a greater amount than those on lower incomes, apparently improving their position when in fact they have not.

Chart 2: Distribution of Household Gross Incomes on logarithmic scale.
HES 1995/96-1997/98 aggregated
(From Hyslop and Mare's Figure 1a)

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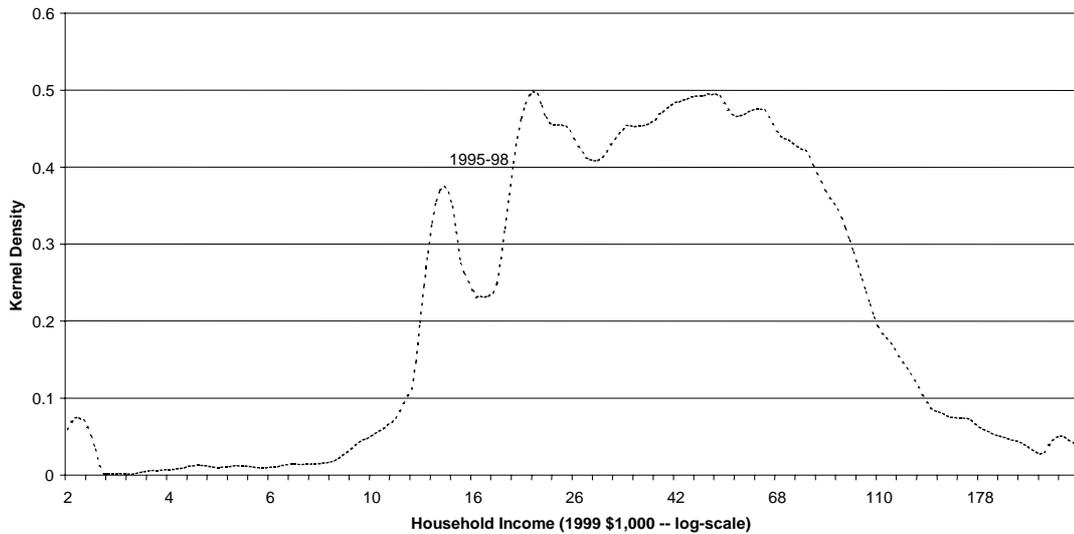
[2] For more detail, see Footnote 1 to the chart in the Executive Summary.

**Chart 3:   Distribution of Household Gross Incomes,
HES data, comparing 1983/84-1985/86 profile with 1995/96-1997/98 profile
(Hyslop and Mare's Figure 1a)**
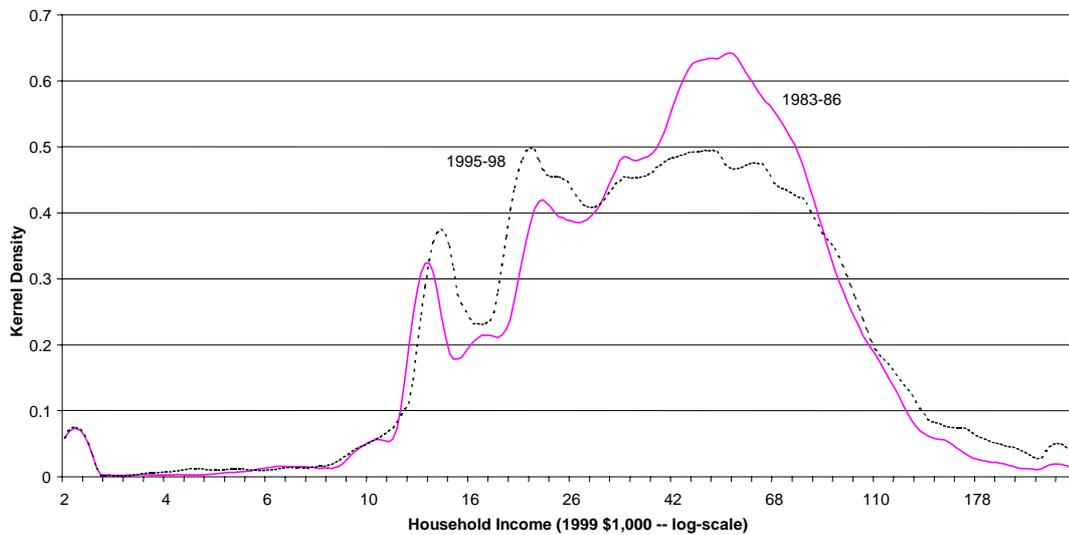
A.2   The recent changes in the income distribution

6.   Chart 3 (again from Hyslop and Maré, 1999) includes, in addition to the information given in Chart 2, the corresponding distribution of gross household income for the period 1983-86 twelve to fifteen years earlier. The intervening period was one in which the New Zealand economy underwent dramatic changes.

7.   It is very apparent visually that the distribution became 'flatter' and more unequal over this period. The proportion of households in the $30,000 to $100,000 range fell significantly. The proportions in both lower and higher income groups increased. Standard statistical measures of income inequality show sizeable increases.

8.   These results are borne out by other work publicised recently (Podder and Chatterjee – 1998; and Statistics NZ – 1999. Their key results are discussed further below.) Indeed the aim of Hyslop and Maré's work was to pin down more exactly the causes of the changes documented in the two earlier reports.

9.   This increase in inequality in the last decade or so has also been observed in a number of other developed economies, though not all. Chart 4 draws on the Statistics NZ report (1999), giving selected results from OECD publications. Other countries which have seen a growth in inequality include the United Kingdom (not shown in the chart, but the increase in the Gini coefficient from 0.280 to 0.330 is larger than any other country except New Zealand), the United States, and to a lesser extent Australia. These three countries, however, experienced most of their growth in inequality during the 1970s to 1980s period, in contrast with New Zealand, where the increase occurred between the 1980s and 1990s.

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10. It is easy to jump to the conclusion that an increase in inequality is 'bad'. That is not necessarily the case. For example, it is possible to envisage an income distribution which is so equal that there is little incentive for effort, and in consequence the community and its members are worse off than they would otherwise be. Or income inequality could increase because the "rich get richer" while at the same time the poor are no worse off, or perhaps even better off themselves. To judge whether this latter case is an improvement or not requires some form of 'social welfare function' (which not all members of society will necessarily adhere to) which takes distributional objectives explicitly into account. Atkinson (1983) has developed measures which can take into account the importance society attaches to redistribution towards the bottom.

Chart 4: Growth in New Zealand's Income Inequality, relative to other countries. 1970s-1990s. Equivalent Disposable Household Income. (Source: Statistics NZ 1999, page 94)
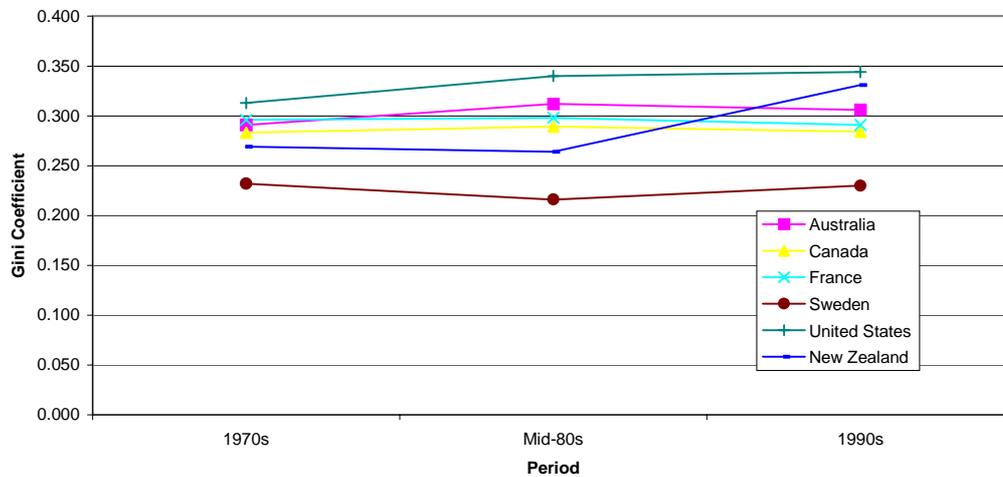
11. Table 1 summarises numerically the change shown in Chart 3. It gives key results from the Hyslop and Maré work. Five different summary measures of inequality are given, with the change in each from 1983-86 to 1995-98. (All, except the Gini coefficient, are in terms of logarithms of income.) The different measures are discussed in a little more detail in Appendix A. An increase in inequality is shown, for every measure given here, by an increase in numerical value. All the measures, except the 50-10 percentile ratio, show an increase in inequality.

Table 1:	Shifts in summary measures of inequality - 1983-86 to 1995-98		
	Gross Household Income		
Hyslop & Mare, 1999			
Measure	**1983-86**	**1995-98**	**Change**
Gini coefficient	0.347	0.398	0.051
SD (log income)	0.717	0.781	0.064
Inter-Quartile Range	0.943	1.085	0.141
90-50 percentile ratio	0.715	0.904	0.188
50-10 percentile ratio	1.051	1.012	-0.038

12. With the one exception, all these increases are substantial. The first three measures can be considered to measure changes for the distribution as a whole. The final two measures – the ratios of the 90th to 50th, and 50th to 10th, percentiles – measure changes in the upper and lower halves of the distribution, respectively, rather than for the whole distribution.

13. The Gini coefficient is probably the most widely used and best known measure of inequality. Its derivation and interpretation is explained in some detail in the Appendix. For most of the results that follow, changes are given in terms of the Gini coefficient. The Gini coefficient can theoretically take values in the range from 0 to 1. In practice the usual values seen for household or family income lie in the range from 0.25 to 0.45, depending on the country and the income measure used.

14. A change in the Gini coefficient needs to be of size 0.01 (e.g. from 0.33 to 0.34) or larger before it can be regarded as having much practical significance; and larger still if based on sample survey data and one wishes to be sure the change is statistically significant. Statistics NZ has calculated (Statistics NZ, 1999; Appendix A3) that any change in the Gini coefficient for equivalised household disposable income between different years as measured from annual HES data needs to be 0.033 or larger before it can be claimed to be statistically significant at the 95% confidence level. This is for household disposable income, equivalised, and the required increases for statistical significance would be larger for other measures, particularly market income, but of the same order of magnitude.

15. The use of three years' survey data combined, by Hyslop and Maré, means that the difference between different periods can be smaller and still be statistically significant. Given this, the change in the Gini coefficient for household gross income in table 1 can be taken as being statistically significant at the 95% confidence level.

Section Summary:

The analyses by Hyslop and Maré show an increase in inequality of household gross incomes over the period from 1983-86 to 1995-98. The increase is statistically significant.

The increase in New Zealand's income inequality appears to have exceeded that observed also in some other (mainly 'Anglo-Saxon') countries. It is inadvisable to compare measures of income inequality directly between countries, because of differences in methods of data collection and treatment. It can be safely said, however, that New Zealand ranks higher internationally in terms of income inequality than it once did.

A.3 The results of other analyses

Analyses using Household Economic Survey (HES) data

16. Do other studies confirm these results? First, some additional tabulations were done for this paper by Statistics NZ, giving income distributions from the Household Economic Survey for the four years 1981/82, 1985/86, 1990/91 and 1995/96. This was for individuals and households, for Market, Gross, and Disposable income, actual and equivalised. The charts are given in the statistical appendix. In brief they show the same picture as Hyslop and Maré. Each distribution became flatter, with higher proportions in the upper tail. That is, Hyslop and Maré's results are not a result of their particular choice of income measure. The shift in all cases occurred mainly between 1985/86 and 1990/91.

17. Second, Table 2 presents published results from two other recent New Zealand studies, using Household Economic Survey data, by Podder and Chatterjee (1998) and Statistics NZ (1999). The dates and income concepts used differ. However both show substantial increases in the Gini coefficient – i.e. increases in inequality – over the 1980s to 1990s period, of a similar order of magnitude to that in Hyslop and Maré. Indeed the Statistics NZ increase is somewhat larger in magnitude than for the other studies, of about 0.07 in total. The numbers in Table 2 point to the increase being concentrated in the late 1980s, though with some further increase thenceforth.

Table 2:			Increase in Gini Coefficients; Other New Zealand studies			
	Concept	**1983/84**	**1985/86**	**1990/91**	**1991/92**	**1995/96**
Podder & Chatterjee	Gross Equiv.	0.353			0.382	0.404
Statistics NZ	Market Actual		0.394	0.453		0.471
	- with Demog. Adj.		0.407	0.454		0.471
Statistics NZ	Disposable Equiv.		0.254	0.305		0.322
	- with Demog. Adj.		0.255	0.303		0.322
Notes:	The Statistics NZ numbers are after adjusting for HES variation; ie for differential non-response by household type. See Appendix A.3 of the Statistics NZ report. The 'Demog.Adj' coefficients are then further adjusted for changes in household type proportions standardising on 1995/96.					

18. It is convenient here to make a first mention of one of the potential contributors to the change in inequality. Namely changes in the proportions of different household types, which can be labelled a 'demographic' change. The alternative Statistics NZ series show the effects of such change (a detailed breakdown, into 15 types, is used). For Actual Household Market income, the increase from 1985/86 to 1995/96 was 0.077. With the "demographic adjustment" this reduces to 0.064. That is, the changes in household proportions appear to explain 0.013, or 17 percent, of the total increase in inequality for household market income over the period. However, the contribution from this factor to the increase in inequality of Disposable Equivalent Income is negligible. In part at least this is because the income differences between different household types are much reduced when measured in terms of Disposable Equivalent Income, compared with Actual Market Income. For example, many sole parent and pensioner households have no market income, but all have some disposable income, however modest, after receiving benefits and pensioners.

19. The Statistics NZ series of annual Gini coefficients for Household Equivalent Disposable income, given in Chart 5, suggests that much of the increase in inequality was concentrated in the period 1987/88 to 1990/91. A recent paper by Bakker and Creedy (1999) associates this timing of the increase with the 'business cycle'. The economy moved into recession at the end of the 1980s, and entered a recovery phase from 1991. This undoubtedly affected to some extent the timing of the increase, but leaves to be explained the fact that inequality did not fall back towards its earlier level during the 1990s.

20. Mowbray (1993) is another report using HES data and showing the increase in inequality in later part of the 1980s. (Publication currently being updated - Mowbray, 2000.)

Chart 5: Gini Coefficients 1987/88 to 1996/97.
Household Equivalent Disposable Income.
(Statistics NZ Appendix A.2)
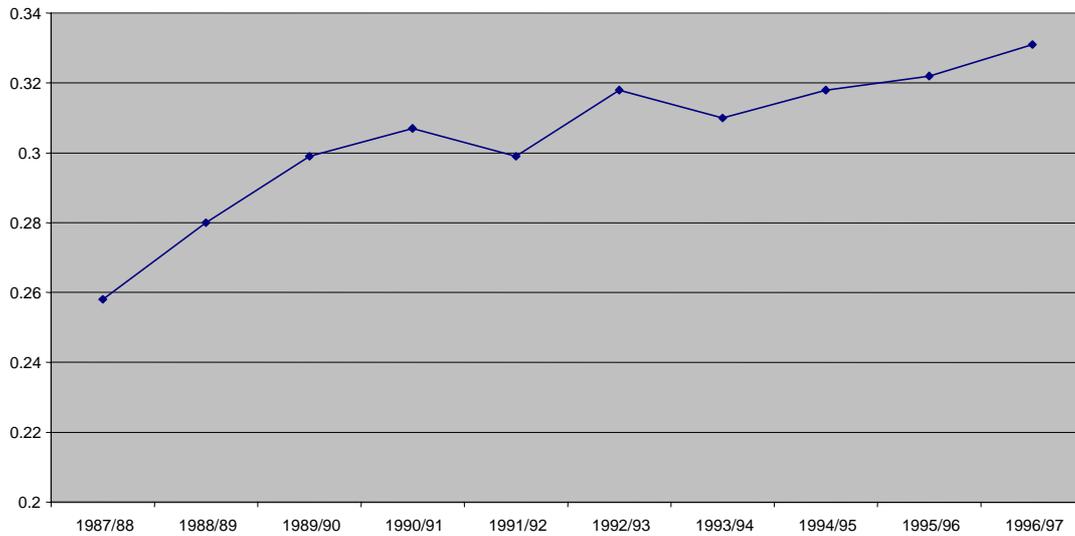
Analyses using Census incomes data

21. A common feature of all the analyses so far discussed in this section is that they are based on Household Economic Survey (HES) data. That they seem to be in good agreement might conceivably, therefore, be the result of some flaw in the common data source.

22. The only practicable alternative to HES as an information source on income distribution is the five-yearly census of population and dwellings. Fortunately a number of recent papers by Martin (1997a, 1997b, and 1998b), based on his thesis (1998a) have explored changes in inequality shown by the census data.

23. Census data on incomes are not perfect. There is a reasonable degree of non-response – around 15 percent, and higher for some ethnic groups, including Mäori. The overall response rate is, however, higher than for HES (about 80 percent). In recent censuses, since 1981, census respondents have been asked to give 'Gross' income, that is pre-tax, including benefits. Martin equivalised the income of sub-groups of families, using the Whiteford scale, which has values very similar to the Revised Jensen scale. In fact, in his words he 'semi-equivalised' the data, as it was not possible to equivalise the incomes of individual families. (Martin, 1998a, page 70.) Respondents give the income interval in which they fall, rather than their exact income. This poses a problem in estimating mean income in the interval, which is at its most serious for the open-ended topmost income interval. Martin addresses this problem by the standard technique of fitting a Pareto distribution for the top end of the income distribution. (Martin, 1998a, page 59; Easton, 1983, page 28).

24. Martin's work extends back to 1951 for individuals. However useful data on family incomes only begins from the 1976 census. Market income was collected in that year. In 1981 the attempt was made to collect market income and Social

Security benefit income separately; an attempt which unfortunately caused much misunderstanding and affected the quality of census data for that year to an unknown extent (Brosnan; 1986). Gross income has been collected in subsequent censuses. Martin has adjusted 1976 data to a comparable basis to later years, and presented analyses from 1976 to the latest, 1996, census.

25.   Martin calculated measures of income inequality for families. These were made up of four household types, these being 'parenting' (dependent children) and 'non-parenting' couples (male aged up to 59), and sole parent female and sole parent male households. That is, his results for families are for a sub-set of all households. They exclude sole-person households and 'extended families', which are included in some broader definitions of 'family' – for example, the 'economic family' defined in the Statistics NZ 1996 census report *Families and Households* as "a financial unit consisting of either a financially interdependent group of people who live together or a financially independent person." (*op. cit.* Page 17). Another definition of family is the 'income unit' or 'inner family' concept used in Australia (Redmond, 1998); comprising single people and couples with dependent children.

Table 3:	A comparison of Census Income Inequality 1976-1996 as Measured by the Gini Coefficient: Families and Men				
	1976	**1981**	**1986**	**1991**	**1996**
A: All Labour Force statuses					
Families	0.3108	0.3325	0.313	0.3731	0.4017
Men	0.3724	0.3982	0.3734	0.4364	0.476
B: Employed Only					
Families	0.2753	0.2995	0.2779	0.3174	0.3517
Men	0.3013	0.3213	0.3154	0.3779	0.4373

Note: 'Employed' families include couple families where one or both partners are employed full-time; and Sole parents, either part-time or full-time. But not Couples if only employment is part-time. The latter is an insignificant category.

Source: Martin 1998a. Table 11.4.

26.   Table 3 gives Martin's key results in terms of Gini coefficients. Income inequality increased somewhat between 1976 and 1981, fell from 1981 to 1986, and then rose very sharply to 1991, and again by a substantial amount to 1996. These results hold both for 'All families' and 'Employed families', as well as individual males, 'All' and 'Employed'.

27.   In summary, Martin's census-based results are in good agreement with the survey-based results in the reports by Hyslop and Maré, Podder and Chatterjee, and Statistics NZ. It is important to note, however, that Martin's results are for 'sole parent' or 'couple' families, and also exclude elderly couples, so are for a part only of the total population of private households covered in the other analyses.

28. Martin's work also provides useful information on long-term trends in income inequality, although prior to 1976 for individuals only. Up until the early or mid-1970s there had been an ongoing slight reduction in income inequality, at least for the post-war period. This was accompanied by a steady increase in the real value of incomes. Then, as shown in Table 3, inequality increased from 1976 to 1981, fell from 1981 to 1986, perhaps because of the strong economic growth New Zealand experienced in the early 1980s; and since 1986 has risen sharply.

29. Up until 1976, the outcomes could be said to be consistent with the 'Kuznets hypothesis'; that "income inequalities will actually increase during industrialisation or modernisation, but will eventually fall to a lower degree of inequality when industrialisation has been completed and then stabilise." (Kuznets, 1955). But not since 1976.

30. Aghion et. al. (1999) provide an up-to-date review of theoretical developments in this area. They conclude, first, that for countries with imperfect capital markets, a redistribution to the less well-off can increase economic growth; and, second, that technical change, particularly 'general purpose technologies' affecting the whole economic system (e.g. computers), helps explain the recent upsurge in wage inequality in a number of developed economies, including New Zealand. The question they pose is whether or not this increase is beginning to level off, perhaps eventually reducing. They think there is "an important efficiency role for *sustained* redistribution." (*Op. cit.* Page 1656.)

Section Summary: Confirmation that cross-sectional income inequality has increased

Two further major recent studies using Household Economic Survey data also show that there were substantial increases in cross-sectional household income inequality over the period from the mid-1980s to the mid-1990s. The three used differing income concepts, and somewhat different time periods, but all three recorded increases in excess of any likely sampling error.

An alternative source for incomes data is the census. A study of income inequality trends using census incomes data gave similar results to the three HES-based reports. Income inequality for families rose very strongly between the 1986 and 1991 censuses, and continued to increase for 1991 to 1996. Some care is needed, however, in comparing these census-based results, which are for 'families', defined as sole parent or couple families (male aged under 60), with the HES-based analyses, which are for all households.

The analyses taken together confirm that inequality increased, and increased very substantially, in excess of any likely statistical errors. In general the rate of increase was largest in the late 1980s, but has continued into the 1990s.

Part B: Interpretation Of The Changes – In Static And Dynamic Terms

B.1   What have the changes meant for population sub-groups?

1.   The earlier Chart 2 gave a "cross-sectional" or "static" picture of the income distribution at a given period. Ideally we would know as well the 'dynamics' of this distribution; that is how the incomes of the individual households making up the distribution change from period to period and, in doing so, form new and perhaps quite different distributions. The knowledge we currently have of 'income dynamics' is discussed in later sections. In many respects it is quite limited, and for most of our analyses we have to rely on 'cross-sectional' measures of the income distribution. These can, however, still tell us quite a bit. Cross-sectional analyses at different points in time can be used to show how the community as a whole, and different groups in the community have fared over the intervening period.

2.   This is illustrated graphically in a number of different ways below. The first approach is to examine how the 'average' or 'typical' household has fared, by tracking the change over time in the average or arithmetic mean, or in some other 'central' measure such as the median. The median is the income of the household precisely at the midpoint of the ranking of households from top to bottom.

3.   Chart 6 shows the changes in average household disposable income and also in median household income, from 1981/82 to 1995/96, based on Household Economic Survey (HES) data (Statistics NZ, 1999. Page 67.). The values in the chart are 'actual' incomes. That is, they have not been adjusted for changes in household size and composition. Average household size fell over this period, from 3.02 persons per household in 1981/82 to 2.74 persons per household in 1995/96, or by about 9 percent.

4.   The median is not affected by changes in the 'tails' of the income distribution in the way that the mean is. This shows clearly in the chart. Mean income increased from 1986 to 1996, by 0.4 percent per year (equivalent to 0.7 percent per year if adjusted for the fall in average household size and other changes in household composition). Over the same period median household income fell. The mean increased because of the increased share of income received by households in the upper part of the income distribution, rather than because of a general increase for all households.

**Chart 6: Trends in Mean and Median Household Disposable Income.
1981/82 to 1995/96**
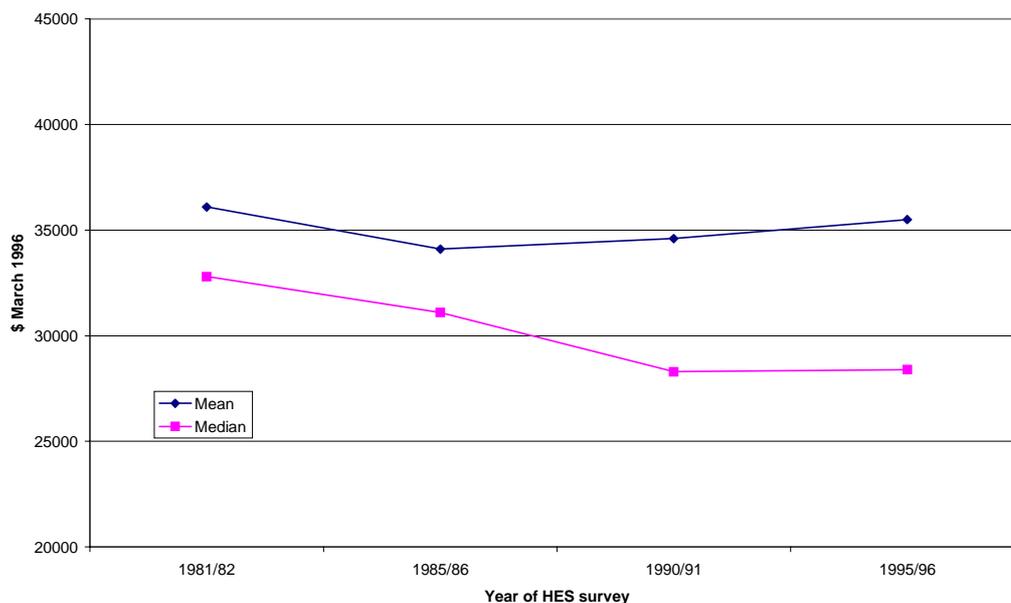
5. This is an unusual situation in that means and medians usually move more or less in parallel. The fact that they have not in recent years shows in itself that there have been significant changes to the income distribution. These disparate trends have bedevilled discussion of 'poverty' over this period. If a 'poverty line' is defined as some percentage of the median, as it often is by researchers in the area, then a decline in the median can result in a lower percentage of families apparently being 'in poverty', even when the position of those near the bottom end of the distribution is perhaps worsening, and their numbers increasing. To instead define poverty relative to the mean might on the other hand show an increasing percentage, when perhaps 'genuine' poverty is not increasing.

6. One approach to tracking change over the whole range of the income distribution is shown in Chart 7. It shows trends in equivalent household disposable income at different points in the income distribution – the ten 'decile' groups from the poorest 10 percent of households in decile 1 to the richest 10 percent in decile 10. There is some fall in average income for the bottom two deciles over the 1982 to 1996 period, not by very large amounts statistically, (4 to 5 percent), but certainly significant for those on low incomes. The falls are larger in percentage terms in the 'middle' deciles – between 8 and 11 percent for deciles 3 to 5, and between 5 and 7.5 percent for deciles 6 and 7.

Chart 7: Average Household Equivalent Disposable Income by Decile. 1982-1996.
(Figure 5.5 in Statistics NZ, 1999)
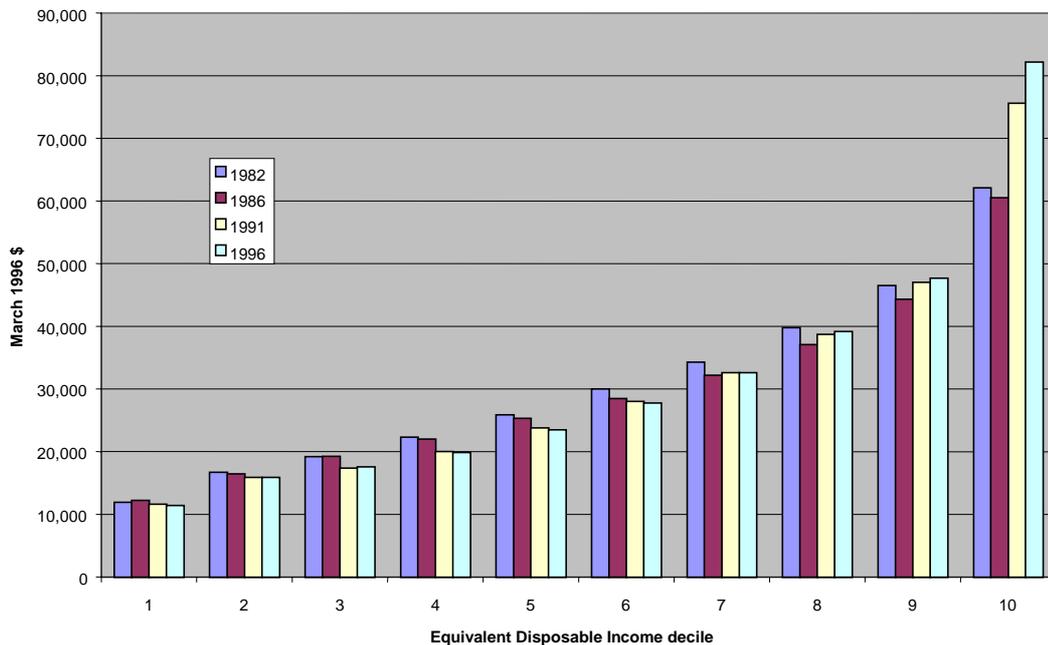
7.   The feature that stands out is the 32.4 percent increase in average income for the top decile. Most of this occurred between the 1986 and 1991 surveys. It has to be added that because these estimates are based on sample survey data, the inter-period changes for any given decile are not necessarily statistically significant – they could fall within the range of possible sampling error. As mentioned earlier, however, in Part A, the Statistics NZ 1999 report shows that the increased inequality for the distribution as a whole is definitely statistically significant.

8.   It appears then that households in the lower and middle income deciles have suffered a loss in economic wellbeing over this period. And those in the top 10 percent have improved their absolute and relative position very significantly. In saying this, it should be remembered that households change over time, and move up and down the income distribution. Those households in the bottom decile in the 1980s will not be identical to those in the bottom decile in 1996.

9.   Another approach is to look at the experience of different household types.

10. Chart 8, again for household equivalent disposable income, gives a breakdown by household 'life-stage' type. 'Couple' households, with or without children, have been sub-categorised according to the age of the female partner. Some caution is needed in assuming that inter-period changes are statistically significant, but it appears that –

     -   Sole parent households suffered a worsening in their economic position;
     -   As also did "sole occupant' households with the occupant aged under 40;
     -   'Elderly' households improved their position (sole occupant) or held their own (couple, female aged 65+);

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- 'Couple with children' families in general improved their economic position, particularly the more 'mature' households.

Chart 8

Statistics NZ (1999) Figure 5.6
Household Equivalent Disposable Income by Life-stage Type, 1982-1996

Source: Statistics New Zealand, Household Economic Surveys
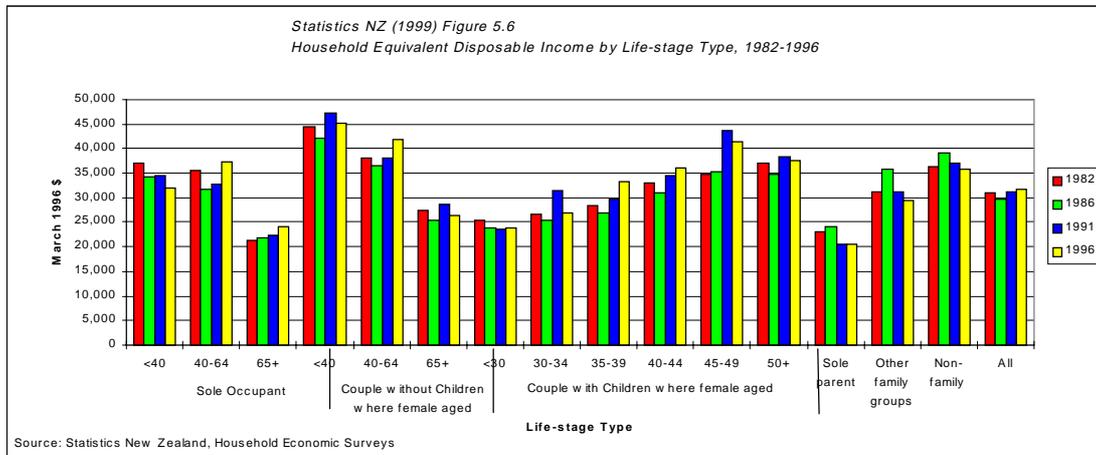
11. Yet another approach to the tracking of welfare changes over time, using cross-sectional studies, is to examine changes in the characteristics of the individuals and households within broad income bands. The OECD report (Atkinson, et. al., 1995), based on the Luxembourg Income Study, split households and individuals into three relative income bands. The middle band ranged from 80 percent of the median to 150 percent, with the bottom band under 80 percent, and the top band above 150 percent.

12. The Statistics NZ 1999 report contained a number of charts using this approach. Chart 9 reproduces Figure 5.8 in that report. It displays clearly the shift of households out of the 'middle' band between 1985/86 and 1990/91; mostly to the top band, but some to the bottom band.

Chart 9: Distribution of Households relative to bands around the Median.
Household Equivalent Disposable Income, 1982-1996.
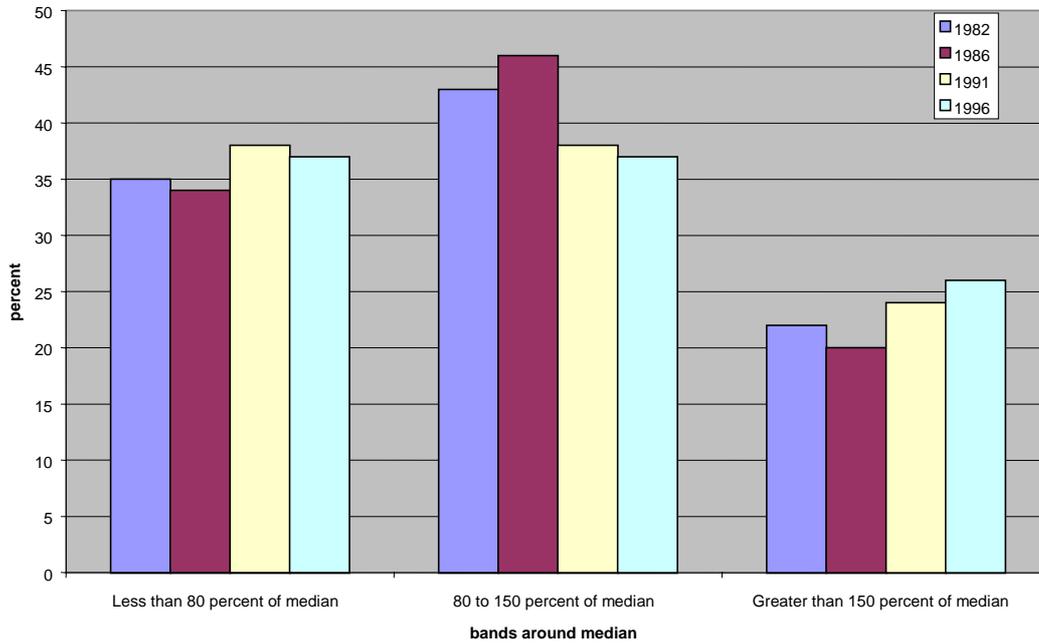
13.   This way of depicting change in the income distribution is also useful for comparing the experience of sub-populations. For example, ethnic groups. Chart 10 for the 'European' ethnic group shows that the proportion of European individuals in the upper income band rose by an amount almost exactly equal to the fall in the middle income band. For Mäori individuals, shown in Chart 11, the 'squeeze' was definitely out of the middle band to the bottom band, notably in the 1986 to 1991 period, with some recovery by 1996. This seems consistent with the discussion in Chapple and Rea (1998), who found using HLFS data that for Mäori ... " all the deterioration [in labour market outcomes] occurred between 1985 and 1992." (page 143).

Chart 10: Distribution of Europeans, by their household income, across bands around Median of Household Equivalent Disposable Income. 1982-1996
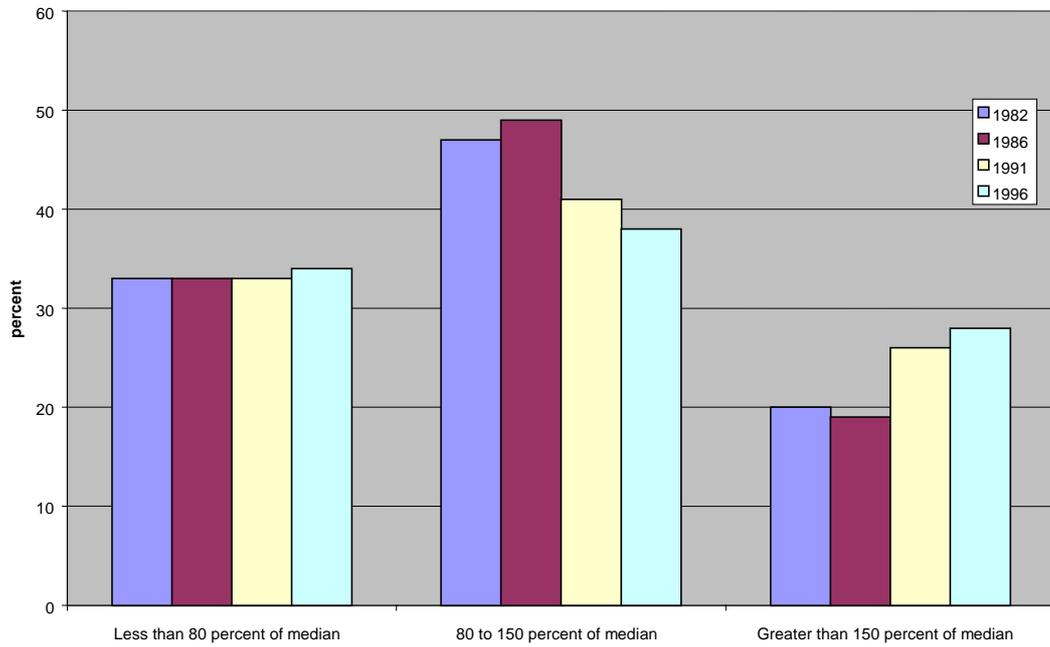
Chart 11: Distribution of Maori, by their Household Income, across bands around the Median of Household Equivalent Disposable Income. 1982-1996.
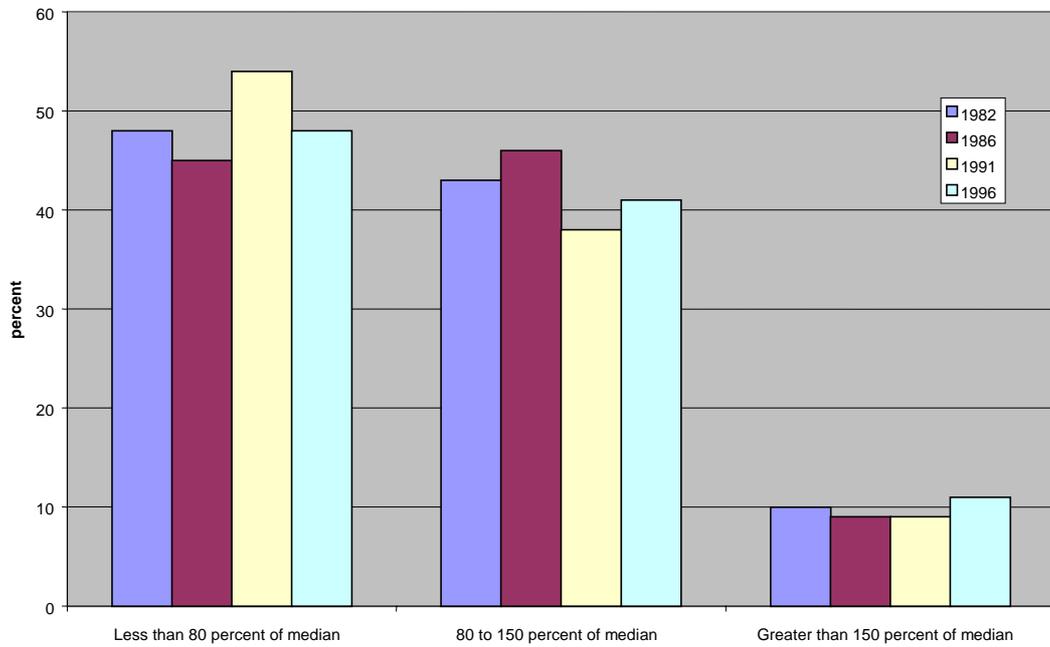
14. Next, we see what might be deduced from examining cross-sectional 'profiles' of individuals' incomes by gender, age, and educational qualification. This is in anticipation of discussion in the following 'Dynamics' section on following sub-population cohorts through time.

The influence of age and education on income

15. Chart 12 shows that there is a systematic lifecycle component to differences in income. Males and females are shown separately in this chart of average income by age, derived from the 1996 Census (Coleman, in recent unpublished work on the Life-Cycle model and savings. 1999). The profile for males is a typical 'inverted U', peaking in the age-range 45-49. Younger males are more likely to still be in full- or part-time study and not earning. As skills and experience are acquired, incomes increase until the peak in middle age. For older ages, people may choose to work less, or take early retirement, and some older workers' skills may become 'obsolete'. For women, the profile is different, in part because of child-bearing and domestic responsibilities. This accounts for the fall in average female income in the early 30s age-group, before a rise to a second peak in the 45-49 age-group.

16. The averages in Chart 12 include those with 'nil' income; that is with no (or negative) market income, and no benefit income. If 'nil' incomes are instead excluded, the average incomes at each age are higher, but the profiles remain very similar to those shown here.

Chart 12: Average Individual Income by age and gender; 1996. Including 'nil' incomes. (Source: Coleman 1999)

39
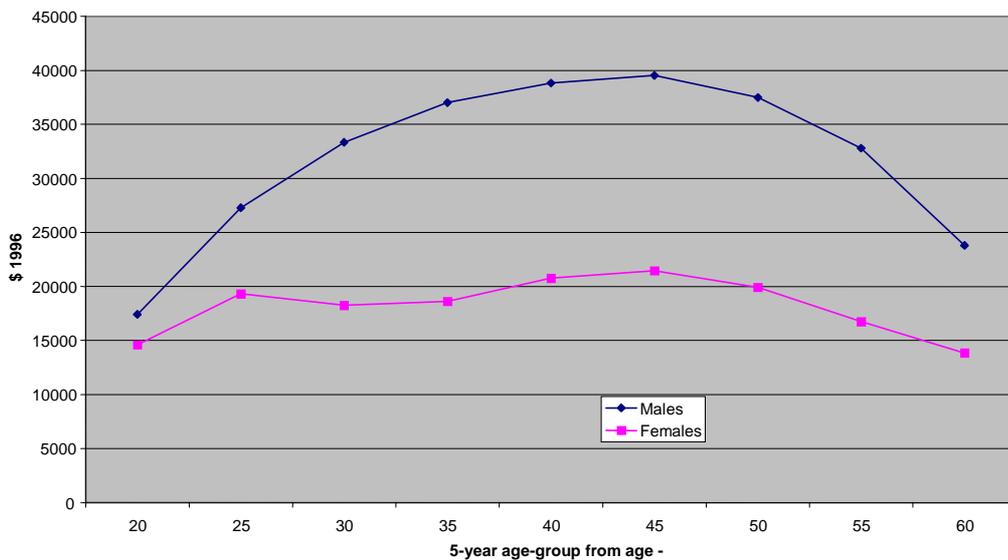
17. Chart 13 shows, for males, changes over time in income at given ages, again drawing on Coleman's paper. Average income at each selected age is plotted over seven censuses. Until 1981 there is a progressive increase in income at each age from census to census. From 1981 to 1986 there is a sharp fall across almost all ages, and a similar or even larger fall from 1986 to 1991. The chart for women – not shown here - shows continuing increases up until 1986 and then a much milder dip from 1986 to 1991.

Chart 13: Male Earnings by Age.
Mean incomes including zeros. 1966 to 1996 censuses
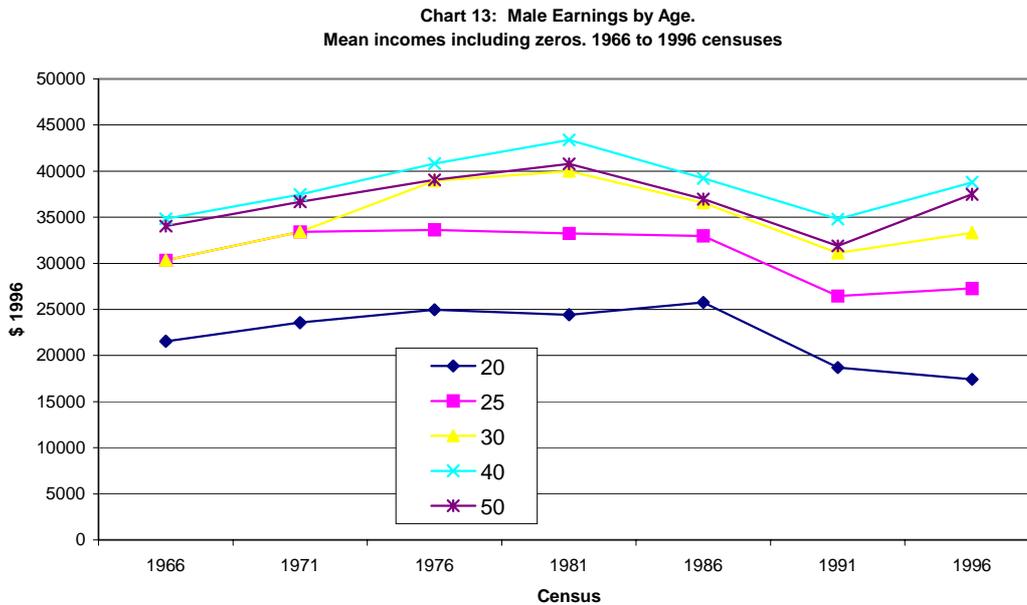
18. Something very significant clearly happened to male income growth in the 1980s. Coleman attributes the outcome for males, plausibly, to the "farming downturn, and the shake-outs within many industrial sectors post 1984". A decline in labour force participation undoubtedly played a large part in bringing average incomes down. Females were perhaps also more affected than the simple comparison with male trends suggests. The very strong growth in female average incomes up to 1986, much stronger than that for males, came to a very sudden halt in the 1986-1991 inter-censal period.

19. An additional dimension to that of age is given in Charts 14 and 15, which presents part of Sholeh Maani's work on income profiles by age and educational qualification. These charts show that workers with a more advanced qualification on average experience larger increases in income early in their working careers, have significantly higher incomes than less educated workers especially during their prime and later working years, and also that their income peaks on average later in life.

Chart 14: Age-Income profile by educational level. All Employed Males 1996

All Employed Males 1996
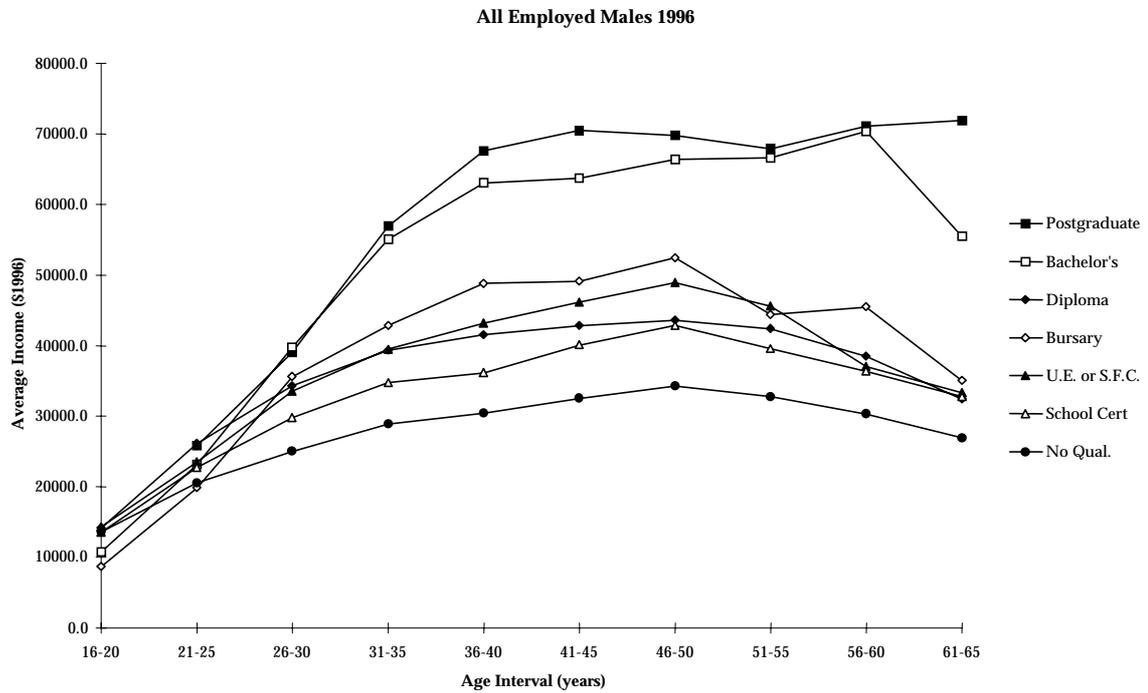
Chart 15: Age-Income profile by educational level. All Employed Females 1996

All Employed Females 1996
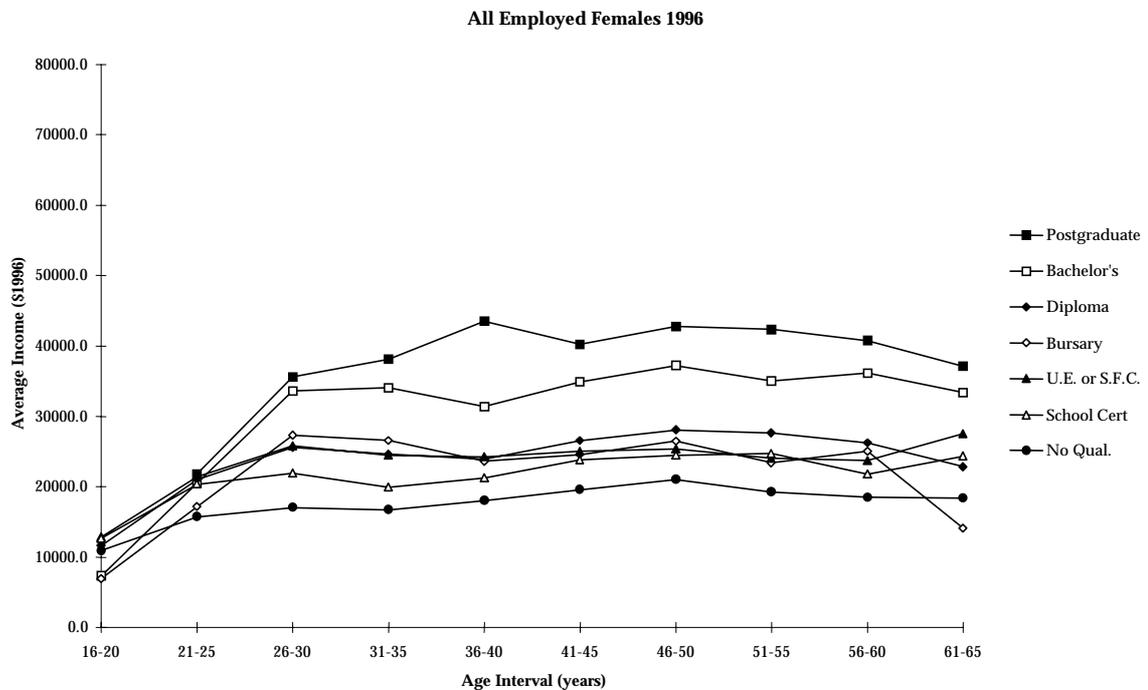
20. Not just individuals' incomes but household incomes also vary with 'life-stage'. This was apparent in Chart 8 above. Extracting the 1996 data for 'couple with children' households from that chart gives Chart 16, showing how the age profiles for individual incomes carry through to household 'maturity' profiles.

Chart 16: Average Equivalent Disposable income of 'Couple with Children' households, by age of female partner. HES 1995/96
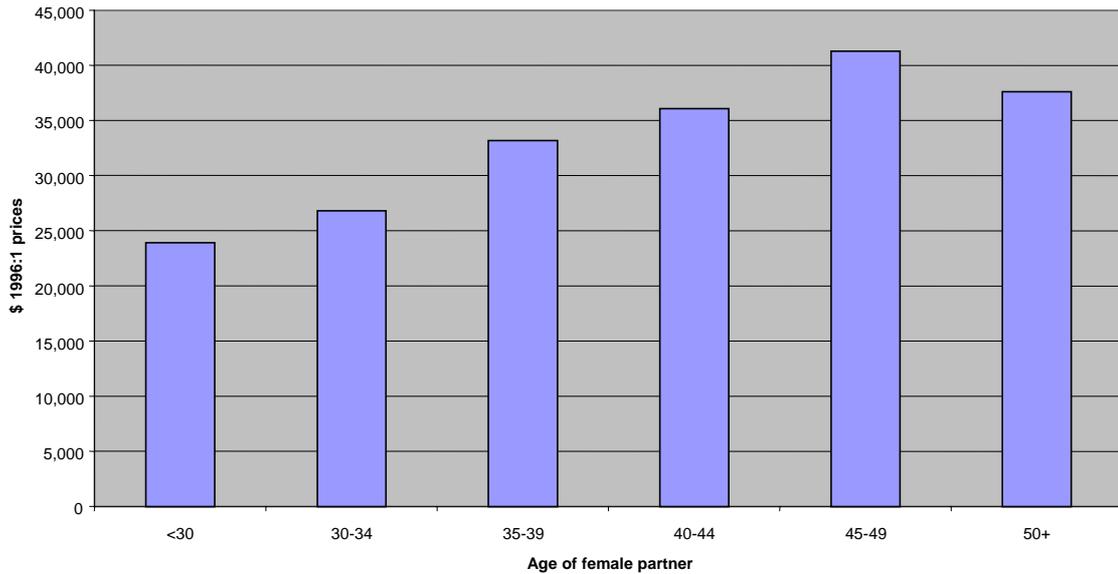
21. Cross-sectional studies are able then to tell us some interesting things about income changes over time. The comparisons they provide are for population sub-groups, and not for individuals.

Section summary: The preceding material shows, using cross-sectional studies, that, over the period 1981/82 to 1995/96 –

- *average real household disposable income was by 1995/96 approximately the same as in 1981/82, but the income of the median household had fallen significantly,*
- *mean household disposable incomes in most parts of the income range fell, but those of the top 10 percent rose considerably,*
- *the mean income of some household types (e.g. sole parent households) appears to have fallen, and that of others (e.g. mature 'couple with children' households) improved,*
- *the 'spreading out' of the income distribution saw Europeans tending to move upwards from the middle-income range, and Mäori downwards, particularly in the 1985/86 to 1990/91 period.*

Individuals' incomes are to a considerable extent determined by age and gender. Average income for males increases with age to a peak in middle age, and then declines. Average female incomes are lower than corresponding male averages, and after peaking in the 25-29 age-group, are lower on average in the 30s age-groups, before rising to another peak in the 45-49 age-group.

The level of educational qualification also shapes the income profile over time. The higher the qualification, the higher the average income profile. Females' average incomes for a given age and qualification level are well below those of males.

Changes over time in the overall income distribution occur in part because of changes in the age composition of the population, in the gender composition of the work-force, and in the proportions of the population with different educational qualifications.

B.2   Income Dynamics

22.   Cross-sectional, or 'static', tabulations, of the kind illustrated in the previous section, have been for many years the standard way of analysing income distributions. That this approach tells only part of the story, and that the underlying dynamics should be investigated, has also been realised. Barker (1996) for example strongly advocated a new 'dynamics' approach to incomes analysis. Survey developments in recent years, in the form of longitudinal panel studies, are gradually making analyses of income dynamics more feasible.

23.   A 'dynamics' approach tries to follow individual incomes over time. The information obtained helps to answer questions such as whether people, or households, tend to remain over time at a relatively fixed point in the income

distribution, or whether instead they show considerable mobility?[3] Such knowledge is particularly useful when developing policies to help those in the bottom income group. It would be invaluable to know to what extent those in this group tend to remain there, or whether instead they can be expected to move up the income distribution in succeeding periods. Or if there are representatives of both groups, as is the case, it is again valuable for policy purposes to know how to distinguish those in the two categories.

24. The material below surveys briefly the currently available information on income dynamics for New Zealand. First, we see what might be deduced from following sub-population cohorts over time. Next, results from the two available 'longitudinal' datasets – Inland Revenue tax records for individuals, and the Christchurch Health and Development Study (CHDS) – are appraised. The tax data has been used for general studies of income mobility, and also to study the effects of welfare dependence. The CHDS data provides evidence on 'poverty persistence', which can be set against results from overseas panel studies.

Chart 17: Cohort Age Income Profiles
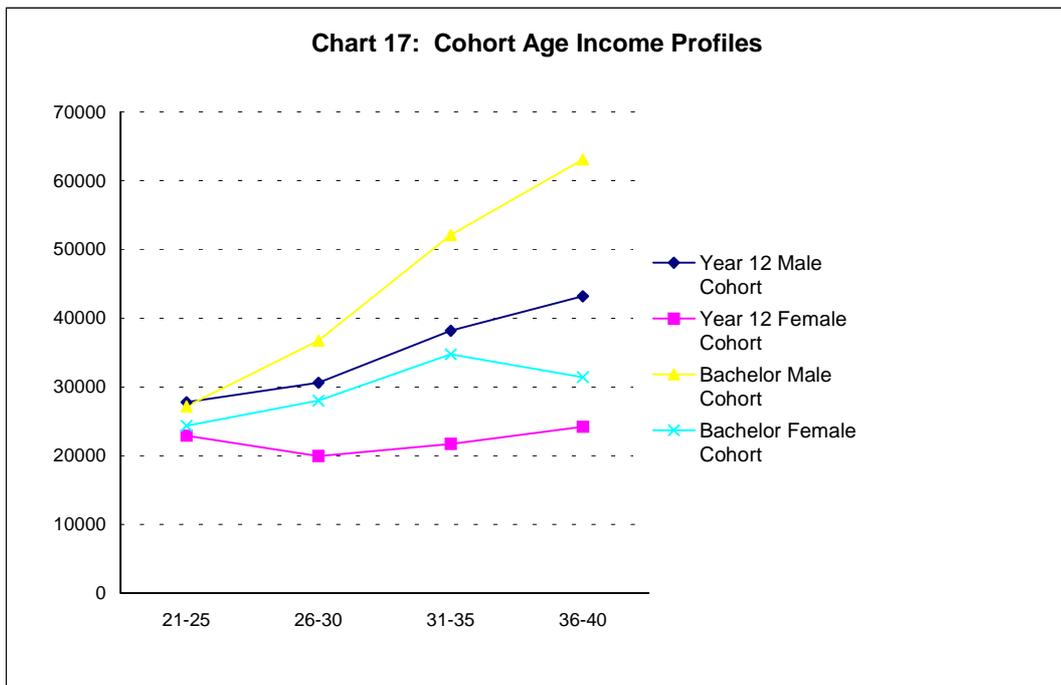
Income paths of cohorts

25. Cohort paths over time can be constructed from a series of cross-sectional profiles, of the kind shown earlier from papers by Coleman and Maani. Thus an age-group cohort aged 20-24 in 1981 is assumed to receive the average for age-group 25-29 in 1986, age-group 30-34 in 1991 and so on. Maani (1999; Appendix D) tracks in this way average income over the period 1981 to 1996

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[3] Conceptually one might distinguish between 'income mobility', having the sense of significant changes up or down, and 'income volatility', meaning essentially random changes. Empirically the two are not so easily differentiated.

for selected age-groups and educational qualifications. The averages are for employed males and females. Chart 17 is a specimen for the cohort aged 21-25 in 1981 and having either "year 12" qualifications (UE or Sixth-form certificate) or a bachelor's degree. (The price deflator for these series has been changed to that excluding GST.) Real income rises strongly for the male 'bachelors' cohort over the 15 year period, and also reasonably strongly for males with 'year 12' qualifications. These cohort paths reflect the average experience for those employed throughout. The paths followed by the female cohorts are much lower and flatter, reflecting the cross-sectional profile shown earlier.

26. If incomes across the age-range all increase over time at the same real rate, each successive cohort should trace out a profile lying above the previous cohort. Andrew Coleman, checked on this using census data. Some results are shown in Chart 18. It should be noted that this chart gives median incomes rather than average incomes, whereas the chart from Maani is for average incomes, as also is the earlier chart from Coleman's work. The chart has been simplified from that in his paper to make the results clearer.

Chart 18: Earnings Profile by Age : Successive Cohorts
Male Median Income (excluding income reported as zero)
Aged 20 in year 19xx
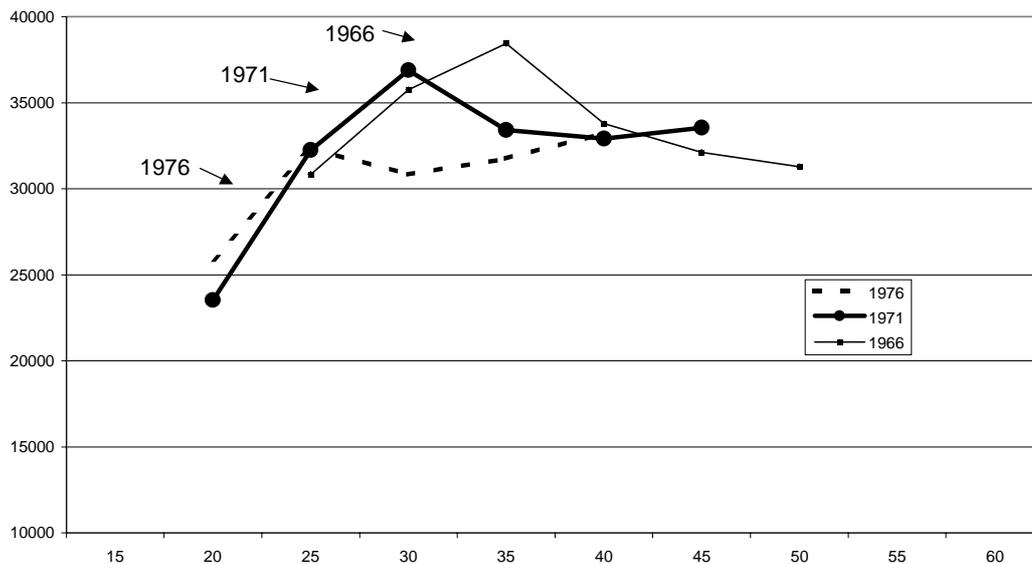
27. Up until the 1981 census (age 35 for those aged 20 in 1966, age 30 for those aged 20 in 1971 and so on) this pattern is followed. In 1986 there is a sharp break. The income for each cohort falls well below that of the cohort 5 years older, instead of continuing above it.

28. This reversal follows from the downturn in male average incomes in the 1980s, shown in the earlier chart from Coleman's paper. It is important to note that these cohort income paths are for all males, except those reporting 'nil' income. They include in fact, as well as those in employment, most of those not in employment also, as these will not in general have 'nil' income because the

census definition of income includes income from benefits and other sources as well as from earnings. Maani's cohort income paths, on the other hand, are for 'employed' persons, and do not show a dip in the 1980s. In other words the sharp break in incomes is not caused by a fall in the income of those employed throughout. It is because the number of 'not employed' increased, and this dragged down average incomes.

Summary of points in preceding section

A first approach to investigating income dynamics is to track average or median income paths for sub-population cohorts, for example tracking the average income of persons born in a given five-year period over successive censuses. With continuing economic growth, the path of each successive cohort by age would be expected to lie above that of the preceding cohort, measured in real dollars. This did not happen in the 1980s. Instead average real incomes of males in most cohorts fell below those of preceding cohorts. This was due to the fall in male labour force participation (female participation also fell, but by less, and recovered fairly quickly), and increase in unemployment, rather than because of any general fall in incomes of those who were employed throughout.

Longitudinal analyses using the IRD data-set

29.   There is one substantial longitudinal income data-set available in New Zealand, that being the IRD database of individual income tax returns. This consists of a stratified random sample of all tax returns, the sample design being such that the same individuals remain in the sample from year to year. The data-set also draws on Tax Deduction Certificates which are filed by payers who withhold PAYE tax from individuals' earnings. These payers are primarily employers and the Department of Social Welfare. This provides information on the income of individuals who do not file IR returns.

30.   The data-set is not, however, ideal.

- (i) Tax-declared income can deviate from other concepts of income;
- (ii) Only minimal personal details are available – gender and age, and gender is in fact imputed from the person's title;
- (iii) There are sometimes difficulties in linking income returns when a PAYE taxpayer's income drops below the level at which a personal tax return is required; and this probably biases the data-set towards higher-income earners (see Hyslop for details);
- (iv) There are ongoing 'births' and 'deaths' to the data-set – new labour-force entrants, or those re-entering, retirements and deaths, persons migrating overseas, or immigrants. This does have the advantage, compared with a longitudinal sample, of maintaining the cross-sectional representativeness of the sample.

31. Analyses from the data-set need, therefore, to be done with some care. Both Creedy (1997b) and, in particular, Hyslop (Feb. 1999) discuss these problems and ways of overcoming them.

32. Smith and Templeton (1990) were the first to examine income mobility for 1980s data using IRD data-sets. They constructed 'transition matrices' showing the proportions of taxpayers moving between different income quintiles (fifths) over differing lengths of time (examples of such matrices are shown below from Hyslop's most recent work). These showed what appeared, subjectively at least, quite high degrees of mobility over time, with those in one quintile at the starting date gradually spreading more and more over other quintiles in subsequent years. Although there still typically remained some concentration in the original quintile, it appeared that the degree of mobility up and down the income distribution was relatively high.

33. There are, however, some 'traps for beginners' in this form of analysis (see discussion in Gardiner and Hills, 1999). First, there may be 'regression to the mean' effects. Random variation would lead, for example, to a number of those in the top quintile in the base period being there as a result of chance variation from their 'usual' income in a lower quintile, and therefore more likely to drop to a lower quintile in subsequent periods. A similar effect would apply for the bottom quintile. That is, some of the apparent volatility can be thought of more as a 'return to normal' from a variant starting position. That is, 'regression to the mean' effects can exaggerate the true degree of mobility. They can also exaggerate the true amount of inequality.

34. Second, some of the income mobility from quintile to quintile is undoubtedly a result of 'ageing' effects. The 'inverted U' distribution of income with age, at least for males, means that young people entering the workforce will typically be increasing their income from year to year, some of them rapidly. At the other end of the working life, income tends to fall away from its peak in the 40s or early 50s, and of course usually falls sharply on retirement.

35. Thus any estimates of income mobility need to be controlled for age effects, as is done by Stroombergen et. al. (1995, using 1991 to 1993 data), Creedy (1997, for the same three years), and Hyslop (1999). Hyslop achieves this by estimating income quintiles separately for each year of age, over the main working-life span from 20 to 65, and examining inter-quintile movements over the four-year period 1994 to 1998 in terms of these age-specific quintiles. (Hyslop found that age-associated differences in income account for only about 10 percent of overall inequality.)

36. Hyslop's latest analyses covered the four year period 1994 to 1998. He examined

    (a) Transition matrices
    (b) Income correlation over time (till 1997 only)

37. <u>Transition Matrices</u>. Some typical transitional matrices for movements between income quintiles are exhibited in tables 4 and 5, drawing on Hyslop's work.

38. Tables 4 and 5 are one-year and four-year transition matrices respectively, taken from Hyslop's updated work including the 1998 tax year. For presentational purposes they are simplified here to include transitions between only the five positive income quintiles – excluding the details of 'Missing data', 'Negative income' and 'zero income' states. These last three amount to between 20 and 25 percent of all observations, mostly in the 'Missing data' and 'Zero income' categories. The full matrices are given as Tables 4A and 4D in the Statistical Appendix.

39. To illustrate their working, Table 4 shows that males in market income quintile 1 (the lowest positive income bracket) have an estimated 48.2 percent chance of being in that quintile in the following year, and a 19.2 percent chance of moving up to the second quintile, and so on. Males in the top income quintile for their age have a 74.8 percent chance of being still in the top quintile the following year, a 13.3 percent chance of having dropped to the fourth quintile, and so on. The percentages are similar for females. It should be noted that quite large percentages also move in and out of the 'Missing' or 'zero income' or 'negative income' categories, particularly in the lowest quintile. Some of this is shown in the final column in Tables 4 and 5.

40. Table 5 shows that over a four-year period, male taxpayers in the bottom quintile in Year 1 have a 30.6 percent chance of being still in the bottom quintile in the fifth year, a 20 percent chance of having moved up one quintile, etc. For the top quintile, the estimated probability of still being in that quintile after four years is 55.9 percent. The distribution among quintiles, for each starting quintile, is flatter after 4 years than after 1 year.

41. As Hyslop points out, analyses in terms of these matrices are not sensitive to 'outliers' in the way that the correlation coefficients are (as discussed below), but on the other hand show only the larger 'inter-quintile' movements, and are insensitive to 'intra-quartile' movements.

42. An important question is whether income variation from one year to the next has any connection to income variation in earlier or later years. A simple test is that if changes in any one year are completely independent of other years, the four-year transition matrix should equal the one-year matrix raised to the fourth power.

43. An arithmetical check for each of the male and female matrices shows this not to be the case. Raising the one-year matrices to the fourth power gives much flatter distributions, or in different words much lower coefficients on the principal diagonal, than do the four-year matrices. For instance 21.9 per cent and 39.8 percent likelihoods for Q1 to Q1 and Q5 to Q5 transitions respectively for males; compared with the actual four-year transition probabilities of 30.6 and 55.9 percent given above. Similar results hold for the female matrices.

44. This has important implications for micro-simulation modelling of income change over time. It is not sufficient to apply a constant one-year transition matrix to model the change from one year to the next, independently of changes

in earlier years. Actual transition probabilities require a more complex statistical generating model. Stroombergen et. al. (1995) use two-year transition probabilities, but this also is probably too much of a simplification.

Table 4: One-Year Market Income Transition Probabilities, 1994-98						
First-Year State	**Second-Year State** **Positive Market Income Quintile**					**'Missing' or zero or -ve income**
	1	**2**	**3**	**4**	**5**	
Males						
1st Quintile	**0.482**	0.192	0.062	0.027	0.012	0.226
2nd Quintile	0.160	**0.488**	0.196	0.058	0.028	0.071
3rd Quintile	0.054	0.159	**0.539**	0.173	0.045	0.030
4th Quintile	0.027	0.054	0.139	**0.596**	0.163	0.022
Top Quintile	0.021	0.031	0.043	0.133	**0.748**	0.024
Females						
1st Quintile	**0.442**	0.203	0.062	0.025	0.012	0.257
2nd Quintile	0.150	**0.443**	0.216	0.060	0.024	0.107
3rd Quintile	0.056	0.161	**0.489**	0.195	0.047	0.055
4th Quintile	0.024	0.052	0.144	**0.572**	0.177	0.032
Top Quintile	0.015	0.029	0.048	0.135	**0.749**	0.023

Notes: Entries are relative frequencies of being in the Second-year state, conditional on being in the First-year state, averaged over the 1994-95, 1995-96, 1996-97 and 1997-98 transitions. Income quintiles are age-specific quintiles, based on all positive sample incomes. Sample sizes = 23,197 males; 22,887 females.

Source: Hyslop 1999

Table 5: Four-Year Market Income Transition Probabilities, 1994-98

First-Year State	Fifth-Year State Positive Market Income Quintile					'Missing' or zero or -ve income
	1	2	3	4	5	
Males						
1st Quintile	**0.306**	0.200	0.115	0.069	0.041	0.270
2nd Quintile	0.157	**0.292**	0.217	0.111	0.070	0.154
3rd Quintile	0.087	0.179	**0.343**	0.207	0.091	0.093
4th Quintile	0.062	0.094	0.164	**0.386**	0.211	0.083
Top Quintile	0.053	0.056	0.076	0.172	**0.559**	0.084
Females						
1st Quintile	**0.251**	0.197	0.121	0.071	0.044	0.316
2nd Quintile	0.145	**0.240**	0.219	0.134	0.076	0.185
3rd Quintile	0.086	0.160	**0.261**	0.230	0.101	0.163
4th Quintile	0.056	0.086	0.150	**0.341**	0.246	0.121
Top Quintile	0.043	0.073	0.091	0.157	**0.538**	0.099

Notes: Entries are relative frequencies of being in the Fourth-year state, conditional on being in the First-year state, over the 1994-98 transitions. Income quintiles are age-specific quintiles, based on all positive sample incomes. Sample sizes = 23,197 males; 22,887 females.

Source: Hyslop 1999

45. Income correlation. If all incomes changed by exactly the same amount from period to period then they would be perfectly correlated over time, and the correlation coefficient measuring this would have a value of unity. If income is highly volatile from period to period, with a large 'transitory' component during any given period, we would expect a low correlation of individuals' incomes between any two specified periods, and that the correlation coefficient would continue to decline over longer time-spans. This is what Hyslop's results seem to show. Table 6 gives averages of correlation coefficients over 1, 2, and 3 year periods. (Hyslop's Tables 5A and 5B; the correlations being in terms of logarithms of income)

Table 6.   **Correlation Coefficients of Taxpayer incomes over time: Using IRD 1994-97 data, individuals aged 20-65**

	Market Income			Disposable Income		
	1 yr	2 yrs	3 yrs	1 yr	2 yrs	3 yrs
Males	0.70	0.57	0.47	0.69	0.57	0.48
Females	0.73	0.60	0.50	0.69	0.55	0.45

Source: Hyslop, Feb. 1999

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46. The coefficients are for those taxpayers who have positive income in each of the years 1994 to 1997.

47. Over a three-year period the correlation coefficients are typically below 0.5. Although this is a low value and, on the face of it, implies that a large fraction of the observed differences in incomes is transitory, Hyslop notes that these results are susceptible to the presence of outliers. He defines 'outliers' as any individual with market income in any year less than 10 percent of their four-year sample average income. Such individuals numbered about 5 percent of males and 7 percent of females. Table 7 (derived from Hyslop's tables 6A and 6B) gives results corresponding to those in Table 6, but excluding these outliers.

Table 7.	Correlation Coefficients of Taxpayer incomes over time: Using IRD 1994-97 data, individuals aged 20-65 Excluding 'outliers'					
	Market Income			**Disposable Income**		
	1 yr	2 yrs	3 yrs	1 yr	2 yrs	3 yrs
Males	0.80	0.72	0.66	0.78	0.69	0.62
Females	0.82	0.74	0.68	0.78	0.68	0.60

Source: Hyslop, Feb. 1999

48. Correlation is significantly stronger when the 'outliers' are excluded, being now in excess of 0.60 over a three-year period, and more in line with results typically found in US and other overseas analyses using panel survey data.

49. Hyslop's results above are of considerable interest. Unfortunately they cannot tell us, because we do not have corresponding results for earlier periods, whether income mobility has been increasing or not.

50. Creedy earlier made use of the same data-set (1997a, 1997b), for the three years 1990/91 to 1992/93. His estimated equations show some regression towards the mean over time, so that "there is no systematic tendency for success to breed success or for failure to lead to further failure" (1997b, page 101), and a degree of negative serial correlation so that individuals do not move systematically up or down the distribution (page 117). His model undoubtedly over-simplifies reality, however. The IRD data-set provides information on age and gender, but not on any other individual characteristics. Creedy's estimates are constrained by this data limitation, and cannot take account of the different potential income profiles for, say, different levels of educational qualification. His estimated 'regression to the mean' parameter assumed that incomes for all individuals of a given age and gender regress towards the same mean, a clearly implausible assumption. A tendency to regress to different means, determined for example by educational qualification, is far more probable, and would result in the persistence of permanent income differences over time.

51. The lack of detailed information on individual characteristics beyond age and gender is a major obstacle to using the IRD data-set for detailed longitudinal analyses.

The Christchurch Health and Development Study (CHDS)

52. There are very few other longitudinal income data-sets available in New Zealand. One, however, is the data available from the CHDS. This study, initiated by Dr Fergusson, has tracked the development of 1,263 children born in Christchurch area hospitals between April and August of 1977. Interviews were held annually until the children reached age 18. Relatively consistent

information on family income was collected during interviews when the children were between the ages of 1 and 14.

53. This information, anonymised, was made available to the Law and Economics Consulting Group, for analyses commissioned by Treasury. (Maloney and Barker, August 1999). The objective was to examine both spells and movements into and out of poverty by these families. The results given here are for those 453 families who reported their incomes for each year from 1978 to 1991. This is out of 962 families who reported their income in the final year 1991.

54. Chart 19 shows median family pre-tax income over the period 1978 to 1991. (Deflator changed from that used in Maloney and Barker, to the Reserve Bank index excluding GST and interest costs.) Real median income increases steadily over the period. This should not, however, be interpreted as saying that median family incomes for New Zealand families in general were rising over this period. What is happening is that, as these families change from being 'young' to 'middle-aged' families, their income is increasing relative to that of the population in general. The income of the principal income earner tends to increase as he/she follows his/her career path, and also more of the families become 'double income' households. Chart 16 earlier shows the increase in average family income for more 'mature' households. It is that pattern that is being reproduced in Chart 19.

Chart 19: Median Real Gross Family Income in the CHDS
1996:2 dollars - index excluding GST and interest costs (Reserve Bank)
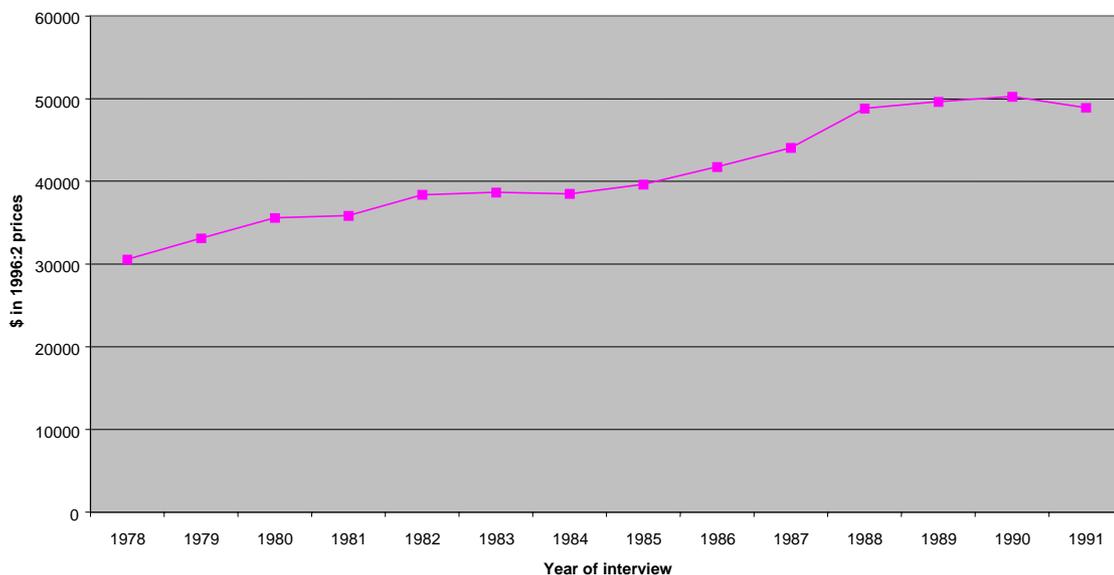
55. The next chart shows the changes in percentile boundaries for the same families. The dispersion of these boundaries appears initially fairly constant, but then seems to increase quite rapidly from 1985 to 1988, and after that more slowly. Too much should not be read into results from a relatively small sample, and it is conceivable that family incomes do in any case start to disperse more widely at a period some ten years on average after the birth of a child. Nevertheless, the

widening gap between top and bottom has a resemblance to that in the earlier Chart 7 for New Zealand households in general, although that chart showed decile means rather than boundaries.

56. Analyses of income mobility over all income levels have not yet been carried out for the data from this survey, though it is planned now to do this. Analyses of transitions in and out of 'low income' are discussed later.

Chart 20: Percentile Boundaries for Real Equivalised Incomes in the CHDS
(Using price index excluding GST)
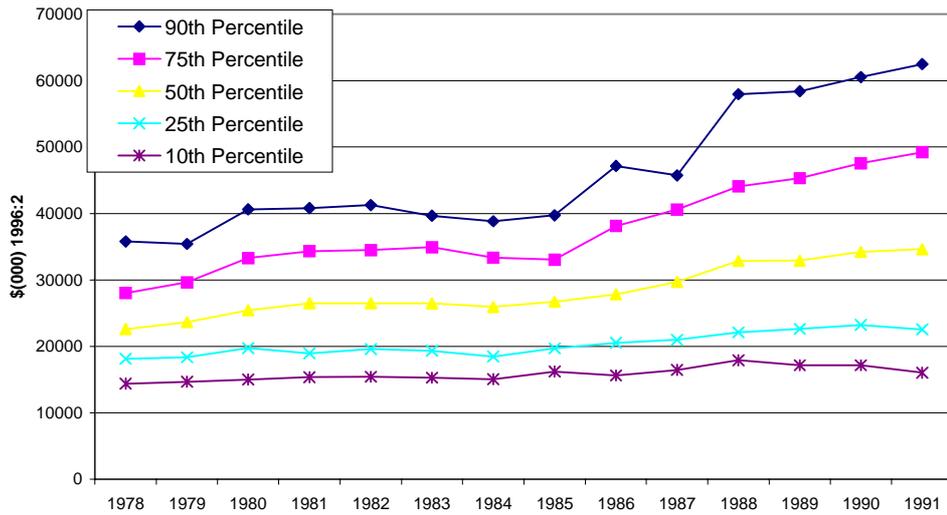
Summary: **Section B.2. Income Dynamics**
                 (see also mid-section summary in para 30).

Results from analyses of New Zealand tax data reported in Hyslop (February/March 1999) are broadly in line with overseas evidence on the dynamics of individual incomes. One conclusion is that there is a lot of period-to-period fluctuation in individual incomes. For example Hyslop's transition matrices summarised above show that only 31 percent of males in the bottom income quintile in Year 1 might expect to be in that same quintile four years later. An estimated 42.5 percent of the original cohort will have moved into higher income quintiles (the remaining 27 percent are 'missing' from the data-set, or reporting negative or zero income). Of those males in the top quintile in Year 1, an expected 56 percent will still be in the top income group 5 years later, but 36 percent will be found in one of quintiles 1 to 4 (leaving 8 percent 'missing', etc.). The results for females are similar, with somewhat greater mobility out of the bottom and top quintiles.

There is also, however, a significant degree of persistence in income differences over time. Hyslop's results suggest that between 40 and 60 percent of point-in-time income differences persist after 4 years, depending on whether outliers are included or excluded. These results are therefore quite sensitive to the treatment of potential outliers in the database.

These are two important conclusions – that there exists substantial period-to-period volatility, but also that income differences show significant persistence over time. To some extent we can say more about the causes of this 'persistence' effect. Material elsewhere in this report shows that observable demographic and skill characteristics (e.g. age, education levels, gender) account for quite large differences in average income. These characteristics are to all intents and purposes "persistent", and in general an individual's income is in part determined by them (though always with some individuals found well above or well below the general average).

The policy message to take from this is familiar, but well worth the restating. That is the need to ensure that everyone, but especially those in disadvantaged groups, is given access to opportunities to enhance their skill levels – both access to education and training, and opportunities to gain experience.

Tax data analyses are constrained by there being available information only on age and gender, but not on other important income determinants, such as educational qualification, and skill levels and experience.

It is difficult to make any comparison of tax-based estimates of income mobility with those cited for overseas countries. Those results are mostly based on household longitudinal survey data, and the data from such surveys, often using income concepts tailored more closely to policy interests, differs in many ways from tax return information.

The Christchurch Health and Development Study (CHDS) is a valuable longitudinal data-set, collecting income data annually, for families with a child born in 1977, over a 14-year period. The results show the expected increase in median real income as families 'mature' and also a widening of their income distribution in the late 1980s, which could be a life cycle effect or could be connected to the general increase in income inequality at about that time.

B.3   Income dynamics of those 'at the bottom'.

Analyses from the CHDS

57.   'Static' implications have been discussed earlier. In brief, the poor on the whole appear to have got poorer in real income terms in the last 15 years, by perhaps 5 percent on average; a significant reduction in living standards. Certain household types – particularly sole parent families - appear to make up a larger proportion of the 'lowest income' group than formerly; whereas the elderly have on the whole improved their position.

58.   A previously untapped source for studying the dynamics of poverty in New Zealand is the CHDS– described above. Indeed there is no other source currently providing like data. The Maloney and Barker report on the CHDS data defined a 'poverty threshold' in terms of 50 or 60 percent of median equivalised incomes; and then ascertained how many families and children had fallen below this line, and whether transiently, or more frequently, or permanently.

59.   Their preferred results are given below. The low-income threshold is defined there as 60 percent of median (from the CHDS itself) equivalised income in any year. (The results are broadly similar for other 'poverty threshold' definitions).

Table 8: (Table 7 from Maloney and Barker)

**Temporal Patterns in Low-Income Spells for CHDS Children
CHDS Median Income Threshold**

	Children	Proportion of – Children currently Poor	Children ever Poor
No Poverty	0.545	-	-
Transient (once)	0.128	0.068	0.282
Occasional (not > 1yr)	0.033	0.046	0.073
Recurrent (some > 1yr)	0.183	0.569	0.403
Persistent (once, for 2-13 yrs)	0.091	0.188	0.199
Chronic (repeat spells, never separated by more than one year)	0.015	0.097	0.034
Permanent - continuous	0.004	0.033	0.010
All	100%	100%	100%

Source: Maloney and Barker

56

60. It can be seen from this table that 55 percent of children did not experience 'poverty' during this 14-year period; and another 15 percent experienced poverty for just one year or only occasionally (with no occasion of duration longer than a year). At the other extreme, 0.4 percent experienced poverty continuously throughout the 14 years, and 1.5 percent experienced 'chronic' poverty, consisting of spells never separated by more than one year. Maloney and Barker state that at most one out of ten families was poor in ten or more years, and conclude that the evidence suggests that poverty is a transitory state for many of those families which experience it.

61. On a cross-sectional basis, larger percentages of those in poverty at a given point in time are there on a recurrent, persistent, chronic or permanent basis.

62. To some extent, but a relatively limited extent, a move into poverty was associated with a move from a two-parent to one-parent household, and moves out of poverty with the converse. Other relevant demographic and social factors are also analysed in the report.

63. The results are consistent with those reported in US studies cited by the authors of the report (though there is substantial sampling variability in the NZ results).

64. To sum up, most experience 'poverty' never or but briefly. But that small minority who do experience it more frequently, or even permanently, account for most of those in 'poverty' at any given point in time.

Analyses from IRD data

65. In addition to his analyses of general income mobility, discussed above, Hyslop was also able to use the IRD data-set containing longitudinal information on individual incomes to carry out an econometric analysis of the 'persistence effects' of welfare benefit receipt on individuals' income. (Hyslop, Aug. 1999) This was to test two competing hypotheses for the observed persistence 'on welfare' of those receiving welfare benefits – the 'welfare trap' hypothesis in which the receipt of welfare in itself increases the recipients' propensity to receive welfare benefits in succeeding periods – or the 'heterogeneity' hypothesis according to which some members of the population have a greater propensity than others to require welfare, and soon come to dominate the population of welfare recipients.

66. Results for his initial specification supported the 'welfare trap' hypothesis. However, more elaborate specifications found "no systematic evidence of a positive or negative effect of benefit receipt on incomes."

67. This is an important result for policy purposes. It implies that the optimal policy for helping those on welfare is not necessarily to try to move people off benefit as quickly as possible by whatever means are most effective. Hyslop, however, expressed some econometric caveats about these results. It is clearly desirable that further analyses be carried out.

Overseas analyses of 'poverty dynamics'

68.   In addition to the work cited by Maloney and Barker (Rebecca Blank, 1997, and Walker, 1994); the papers cited earlier on income mobility also in many cases focus specifically on the 'lowest income' group. The recent Economic Journal article by Gardiner and Hills discusses the issue in some detail for UK panel data sources. They argue persuasively against the belief that because of income mobility poverty is in general a fairly temporary phenomenon.

69.   To quote (much based on data from the British Household Panel Survey) –

" while there is considerable income mobility, most of it is short-range."
(p. F96)
" … the escape rates of those who stay at the bottom for more than one period seem to decline. Either people get stuck and find it increasingly hard to escape, or there are two different populations: 'bouncers' and 'stickers'…" (p. F96)
"Low income is *not* a random phenomenon." (p. F96)

70.   More generally those who escape upwards from the lower income bracket have a greater propensity to fall back into it later than do those originally in the upper bracket (trajectories depicted on page F101 of op. cit.).

71.   The paper's concluding section is worth quoting at some length.

"It is important to distinguish between at least three groups: the persistently poor, the recurrently poor and the temporarily poor. ….. Much current government policy …. is aimed at getting people who are currently out of work into work. The extent of recurrent poverty … suggests that policy needs to pay attention not just to the first transition, off benefit and into work. It also needs to focus on subsequent transitions, stopping the same people simply cycling between benefits and work, much of it low paid. Finally, 40% of low income observations are accounted for by people who are not only poor, but whose position in the income distribution does not change significantly over a four year period. For many of these – disproportionately low income pensioners and lone parents and their children – it is the level of social security benefits which will have the greatest effect on their standard of living." (p. F110)

Summary: Income dynamics of those 'at the bottom'

Longitudinal studies are essential for examining the duration of 'poverty'. Maloney and Barker's results from the Christchurch Health and Development Study, which are consistent with overseas work, show that a minority of families with children, though quite a substantial minority, do experience occasional 'relative poverty'. For most of these, however, the experience is short-lived and once-off. A small minority do experience poverty for longer periods or recurrently. These account for most of those families 'in poverty' at any given point in time.

Overseas panel studies suggest strongly that being in the state of 'poverty' at a given point in time is positively linked with having been in poverty in previous periods. For New Zealand, Hyslop's recent study of 'welfare dependence' suggests on the whole, although confirmation by further work would be desirable, that the persistence of some people 'on welfare' is a consequence not of their initial receipt of welfare, but of particular obstacles they face, such as lack of qualifications.

B.4 Income Volatility

The 'Increased Mobility' hypothesis

72. New Zealand is not the only country which has seen increases in cross-sectional income inequality in recent years. (Statistics NZ, 1999, Chapter 7; and also Chart 4 earlier in this report.) A question which has been debated is whether this cross-sectional inequality increase is the result of an increase in income volatility or mobility, rather than a genuine increase in inequality.

73. The argument runs as follows. Suppose each individual (or household) has an expected 'permanent' income. This permanent income would be determined by such factors as age, work experience, qualifications, and other factors. In addition suppose there is a variable or 'transitory' component of income which varies randomly from period to period.

74. Suppose now that the transitory component increases relative to the size of the permanent component, for all persons or households. Income mobility, or volatility, would increase. People would move from period to period up and down over a wider income range than before.

75. The effect would be to 'flatten out' the income distribution, and to increase cross-sectional income inequality. In other words precisely the changes that have been seen in New Zealand and some other countries.

76. The point is that the apparent increase in inequality would not be a genuine increase, at least in the longer term. If incomes were to be added over a number of years, the random inter-period ups and downs would tend to cancel out, and the relatively unchanged 'underlying' distribution would reappear.

77. Of course this is a very simple model of the way in which inter-period changes in income are generated. The true picture is undoubtedly more complicated. Nevertheless the same general conclusion could be expected – a general increase in income mobility, for whatever reason, will lead to an apparent increase in income inequality, but the increase will be a 'statistical artefact' which gradually vanishes as incomes are aggregated over longer periods.[4]

78. The question is whether income mobility can be shown to have increased, or not to have increased. Unfortunately the material available on period-to-period mobility, derived by Creedy (1997a&b) and by Hyslop (1999) from tax data and discussed above, does not allow consistent comparisons over a sufficiently long

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[4] Note, however, that Creedy (1997b, Chapter 6) rejects this argument. He attacks a version of it in an OECD report (1996), pointing out that the precise effects of an increase in relative mobility on cross-sectional and life-time inequality depend on the age distribution and also the age-earnings profiles. He is able to construct counter-examples, in which increased mobility increases lifetime inequality more than it does cross-sectional inequality, though these seem to require rather unusual age distributions. In another counter-example, this time with 'regression towards the mean', an increase in mobility will decrease life-time inequality. At the least, Creedy's comments illustrate the care needed in specifying generating models for income distributions.

period to answer this question. There is some 'indirect' New Zealand evidence, which is discussed below, followed by a brief review of the international literature.

79. A point worth making here is that an increase in income mobility in itself has costs and benefits. The more risk-averse will see increased mobility as meaning increased insecurity and stress; ambitious risk-seekers will see it as potential gain.

'Indirect' New Zealand evidence on changes in mobility

80. A possible clue to whether or not income mobility has increased is to examine whether the rate of transition into and out of 'Earning' (employment and self-employment) has been increasing. Chart 21 uses data from the Household Labour Force Survey (HLFS) on quarterly transition rates, supplied by the Labour Market Policy group. Exit rates are a proportion of those in earnings, and entry rates a proportion of those unemployed or not in employment. The rates are for males and females combined, of all ages. The starting date is December 1985.

Chart 21.

HLFS Quarterly Exit and entry rates from employment
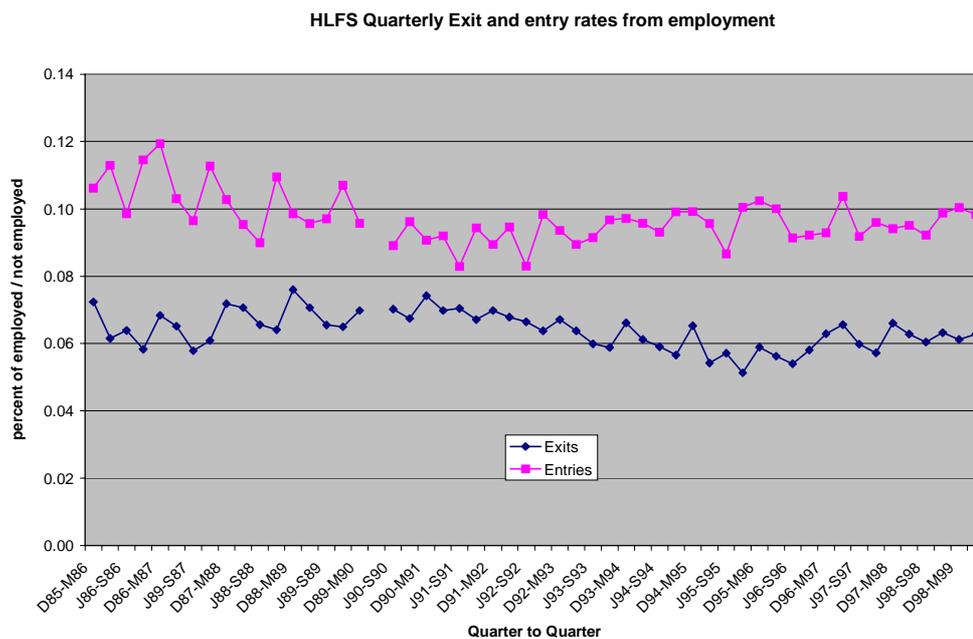
81. There is no visually apparent increase in 'turnover', including the period most of interest, from 1986 to 1990.

82. This suggests that there has been no significant increase in employment mobility, which might be expected to account for at least part of any increase in income mobility. It does not, of course, necessarily follow that income mobility did not increase. An increase in income mobility could still occur independently of changes in employment mobility.

83.	It has been argued that consumption is based on 'permanent' income, excluding 'transitory' income, and that it follows that an increase in income volatility will not lead to an equivalent increase in consumption volatility. If correct, and income volatility has increased, this would imply that consumption inequality should not have increased in the way that income inequality has.

84.	Gini coefficients have been calculated for household expenditure by John Scott of Statistics NZ. The chart below compares the income and expenditure Gini coefficients. The increase in the expenditure coefficients is less than that of the income coefficients (0.040 as against 0.059), but still appears to be a significant increase.

Chart 22: Expenditure and income Gini coefficients. 1985/86 to 1995/96.
Equivalised Household Disposable Income and Expenditure
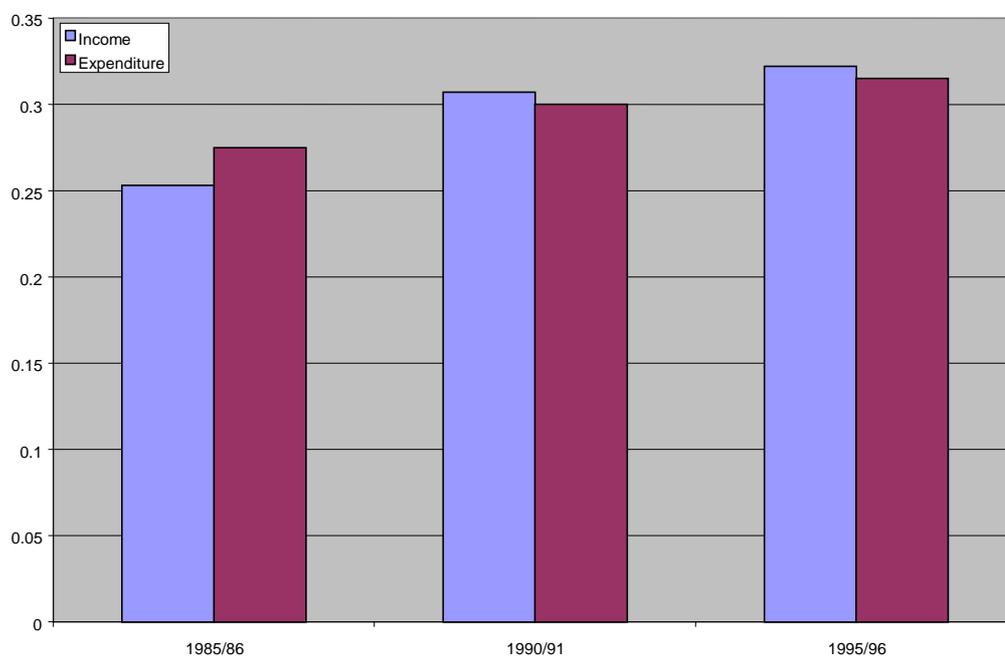
Overseas research on income mobility

85.	There is a burgeoning literature on 'income mobility', using data from the panel surveys which are becoming increasingly common. A number of these have investigated in detail whether changes in income inequality can be associated with changes in income mobility.

86.	Useful papers, in general highly technical, include Atkinson et. al. (1988), Jarvis and Jenkins (1998), Baker and Solon (1999), Gottschalk and Danziger (1997), Burkhauser and Poupore (1997). Gittleman and Joyce (1995), and Gardiner and Hills (1999) will be easier going for most readers. Most of the papers have been written in an environment in which income or earnings inequality has been increasing (USA, UK, Canada).

87.   The general conclusion, at least of those papers written in the last few years, is that income mobility has not been increasing, or where it has, it is not the sole explanation for increased inequality.

Section Summary and Conclusions.   Income Volatility.

If income volatility has increased, this could help explain the increase in cross-sectional income inequality in New Zealand. Unfortunately it is not possible with currently available incomes data to say whether or not New Zealand's income mobility has increased. Some 'indirect' evidence is, however, available. 'Employment mobility', in the sense of 'entry' and 'exit' rates to and from employment, which might be expected to have some association with income mobility, does not appear (visually) to have changed significantly. Inequality of expenditure has also increased quite substantially, which is an argument that 'permanent income' inequality has increased, rather than just income mobility, on the assumption that households try to relate expenditure to 'permanent' income. On the other hand, expenditure inequality did not increase quite as much as income inequality, which could be an argument for some of the apparent increase in cross-sectional income inequality being a result of increased mobility.

Overseas analyses, for countries which have also experienced increased income or earnings inequality, on the whole conclude that increased mobility is not the cause.

These findings do show the potential importance of dynamics for understanding change in income inequality. Our current understanding is limited by the data. This emphasises the importance of developing longitudinal panel surveys to monitor income change in New Zealand. For instance, we want to know more about how people are adjusting to job losses and other shocks, for instance by retraining. There is a real paucity of information with which to answer these questions, because of the lack of large scale surveys that follow people through life. Yet these issues are central to analysing the effect of policy change on welfare outcomes in New Zealand.

Part C: Contributors To The Change In Cross-Sectional Income Inequality

C.1 Classifying The Contributors To Change

1. Having earlier confirmed the increase in inequality we now wish to explain it. A first level of analysis can be labelled as 'decomposition' analysis. This explains as much of the total change in inequality as possible by, first, identifying how much of the change is caused by changes in the relative size of different population sub-groups, and, second, how much is caused by changes in the relative average incomes of each of those different population size-groups. These sub-populations are defined in terms of their 'attributes'; for example, age, level of educational qualification, labour force participation, household type. So we are talking about explaining as much as is possible of the change in inequality first in terms of changes in population attributes, and secondly in terms of changes in returns to those attributes.

2. At a later stage one might wish to go beyond 'decomposition analysis', trying to explain the changes in the sizes and average incomes of the different population sub-groups as outcomes of changes in the economic and social environment, either policy-caused or exogenous.

3. Concentrating initially on 'decomposition' analysis, the usual approach is to try to source as much of possible of the overall change in inequality, for a given type of income, to the following components –

    -   <u>Changes in observable population attributes</u>. For example changes in age structure for individuals, in the proportion of different household types for families or households, in levels of educational qualification, in skills, and in extent of participation in the paid workforce. For convenience attributes might be further sub-divided into –

        -   'Demographic' attributes; e.g. age and sex for individuals, size and type of household for households. These are not much influenced by changes in the economic environment.
        -   'Economic' attributes; e.g. skills and qualifications, degree of workforce participation. These are more strongly influenced by changes in the economic environment.

    -   <u>Changes in returns to observable attributes.</u> For example to levels of educational qualification.

4. This then leaves (usually) the

    -   Unexplained 'residual'. This could be a result of not specifying all the relevant attributes. A part of the residual, however, is likely to be because even for individuals or households with identical attributes, observed and unobserved, the income distribution has changed, becoming either more dispersed or less dispersed.

5. This approach has been quite widely used (see Borland, 1999 for discussion; and Borland, 1998, and Dixon, 1998 for examples of application of the approach). It is sometimes known as the JMP method, after Juhn, Murphy and Pierce (1993).

6. The chart below illustrates first the build-up of the distribution of individuals' wage and salary incomes in this framework, then the combination of wages and salaries with other types of income, and finally the combination of individual incomes to household incomes and the combination of different household types. This gives the distribution at a given point in time. Changes over time are the net outcome of changes in all the separate components.

Chart 23. The Determinants of Income

Part A
Wage & Salary income of individuals

Demographic Attributes
• age
• gender
• family responsibilities

Economic Attributes
• skills & qualifications
• extent of workforce participation

Returns to Attributes
• 'hours worked' component
• 'hourly rates' component

Variable component
due to random
or 'unobservable' causes.

Individual's wages or salary
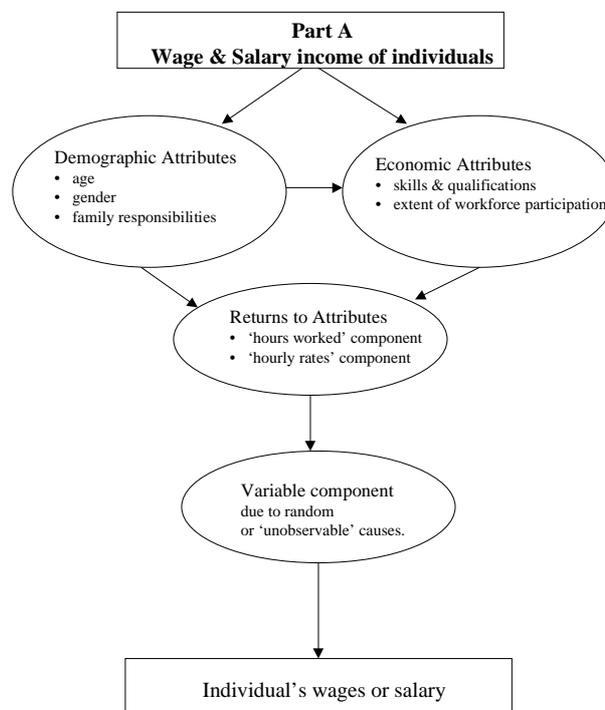
Part B – Merging different sources of income

Wages/salary	Self-employment	Investment income

Relative proportions

Individual's Market Income

+ Government transfers determined by
   individual attributes
    = Individual's Gross Income

- Tax payments determined by
   individual attributes
    = Individual's Disposable Income

**Part C
Individuals to Households**

Person alone	Sole Parent	Multi-adult households

Proportions of different sizes and composition

Correlation of incomes of individual members

**Distribution
of
Household Incomes**
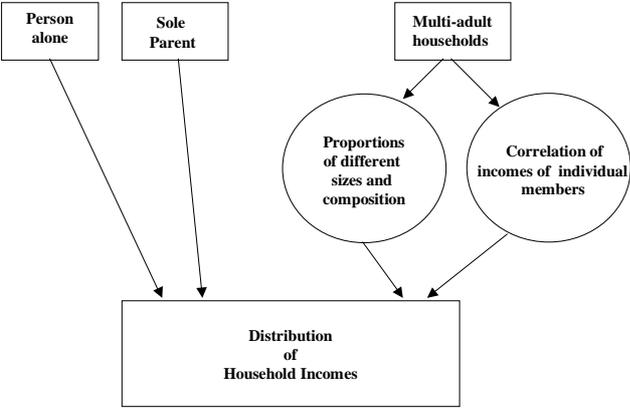
7.   There is more than one way of carrying out a 'decomposition analysis' in practice. One approach is to calculate the effect of holding some attribute constant. This was done for example by Statistics NZ (1999) to analyse the effect of changes in the proportions of different household types. (See 'Demographic Adjustment' row in earlier Table 2.) Also, on a more extensive basis, by Hyslop and Maré (1999), calculating the effect of holding constant various combinations of both attributes and returns to attributes (discussed further below).

8.   Another approach is, having classified the population into sub-groups, by some attribute or attributes (gender, labour force status, age, etc.), to then calculate the effect on inequality over time of "between-group" changes - that is the effect of changes in relative numbers and mean incomes of the groups. The remaining unexplained change in inequality can then be labelled as "within-group" inequality change.

9.   This second approach is particularly appropriate where we do not have data on individual persons and households. This is the case for census incomes data where we have numbers with specific attributes in a given income range. The separation of change into "between-group" and "within-group" requires a measure of inequality mathematically suitable for this kind of decomposition. The Gini coefficient is not amenable to this approach. For this reason in his work on census income inequality Martin (1998a) used the 'mean logarithmic deviation' (MLD), which is amenable. Technical discussions of the MLD are to be found in Martin (1998a, pages 60-68) and Mookherjee and Shorrocks (1992). For other technical discussions of 'decomposition' see for example Shorrocks (1980) and Jenkins (1995).

10. The sections that follow report first on 'decomposition analyses' for individuals; then the combining of individual incomes to give family and household incomes; and then the results of 'decomposition analyses' for households. A final section discusses the possible economic forces driving these changes.

Section summary.

'Decomposition analysis' seeks to explain the overall change in inequality in terms of changes in population attributes, for individuals and households, and changes in the average income return to those attributes. This still leaves, usually, an 'unexplained' component of the total change in inequality. This can be caused by measurement error, failure to specify all relevant attributes, or a broadening or narrowing of the income distribution for those whose attributes are otherwise identical.

C.2   Contributors to the increase in Individuals' Income Inequality

11.   The two charts in the Statistical Appendix of the distribution of males' and females' market incomes show the same change between 1986 and 1991 as found by Hyslop and Maré for household incomes from 1983-86 to 1995-98 (earlier Chart 3). Namely a flattening of the distribution and increased dispersion.

Contributions measured using census incomes data

12.   Martin (1998a) found that, for those employed, shifts in the structure or composition of the labour force accounted for a little under 40 percent of the increase in income inequality from 1986 to 1996. Another 20 percent approximately was due to a widening in income differentials by occupation, education, industry and age. This left about 40 percent of the total increase in income inequality unexplained.

Change in individual income inequality, using HES data

13.   The table below from the Statistics NZ 1999 report (Figure 3.18) gives Gini coefficients for all persons 15 and over. Results are given for the three main income measures. The same pattern is seen as for household income inequality – a decline to 1986, a steep increase between 1986 and 1991, and a further though smaller increase to 1996 (although for market income there is no further increase). A further table in the Statistics NZ report (Figure 2.20), not given here, shows that if the calculation for Market Income is restricted to those actually receiving some market income the Gini coefficient continued to increase in the latest period also.

Table 9:   Distribution of Personal Income: Gini Coefficients, 1982-1996

(*Figure 3.18 in Statistics NZ, 1999)*
Distribution of Personal Income: Gini Coefficients, 1982-1996

Type of income	1982	1986	1991	1996
	Gini coefficient			
Market income	0.566	0.542	0.611	0.609
Gross income	0.472	0.437	0.474	0.495
Disposable income	0.414	0.386	0.437	0.456

Source: Statistics New Zealand, Household Economic Surveys

Chart 24: Changes in Individuals' Income Inequality 1982-96.
Gini Coefficients. Persons aged 15 and over.
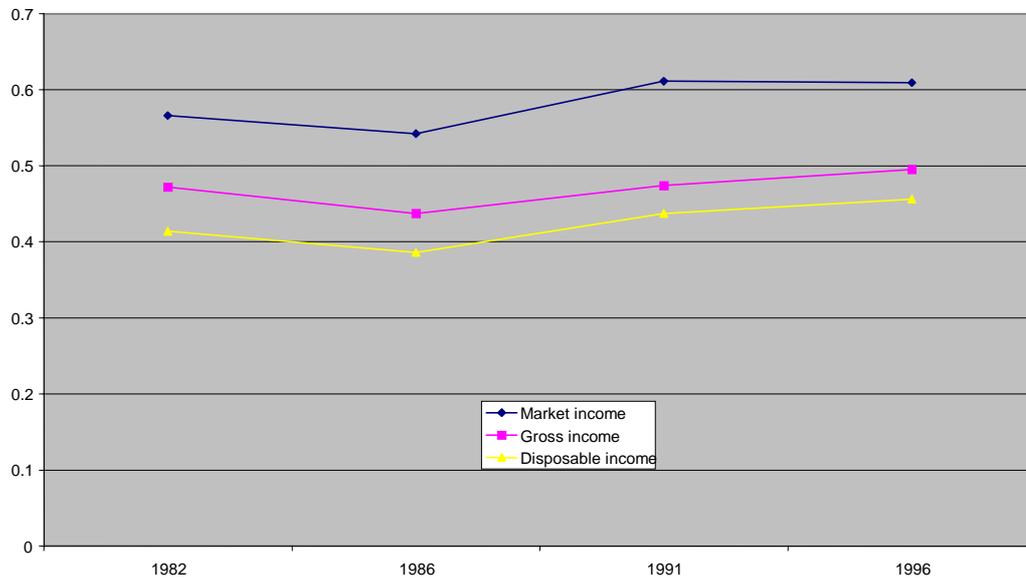
14. The next table examines the wages and salaries component of market income, for those actually receiving some wage and salary income during the year. The same pattern over time is apparent. There are gender differences, however. The increase in inequality since 1986 has been much smaller for females than for males (although female inequality is higher than male inequality, because of the greater proportion of females working part-time.)

Table 10: Gini Coefficients: Wages and Salaries by sex

Wage and salary earners 15-64

	1982	1986	1991	1996
	Gini coefficient			
Males	0.340	0.339	0.408	0.434
Females	0.479	0.459	0.481	0.486
All	0.427	0.421	0.466	0.479

Source: Statistics NZ (1999) Figures 2.10 and 2.11

15. These changes are associated with marked shifts in labour force participation. The chart below gives participation rates by sex for the adult population since 1987. Up to that date, participation rates had been relatively stable for males, falling from 79.3 percent at the 1981 census to 77.5 percent at the 1986 census; and rising for females, from 47.2 percent in 1981 to 53.3 percent in 1986.

16. From 1987, however, male participation fell precipitously, not beginning to increase again until 1993. Participation in 1987 was 78.6 percent; in 1993 just

73 percent. (Unemployed are counted as labour force participants – if excluded, the 'employment participation' trend would fall even more starkly.) Female participation also fell, reversing the long established upwards trend, although falling by less than male participation, and bottoming out in 1990. Participation in 1988 was 54.6 percent; in 1990 53 percent.

Chart 25: Labour Force participation by sex. 1987 to 1997.
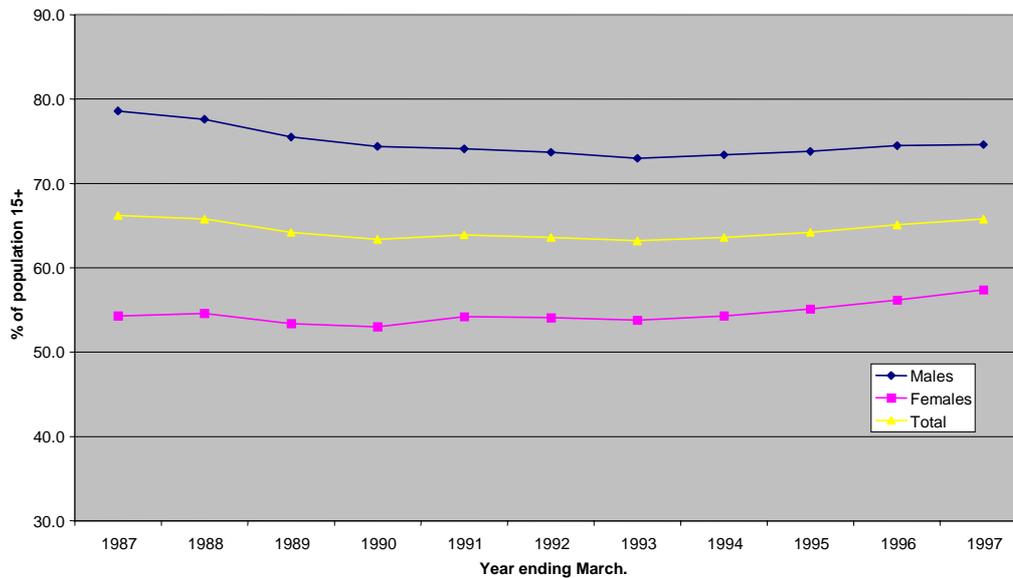
17.   Some of this fall in participation reflects a rise in attendance at post-compulsory educational institutions (itself partly a response to job-finding becoming more difficult). Labour force participation fell between 1987 and 1997, however, for males in every age-group except those aged 60-64. For females participation fell only for the two youngest age-groups 15-19, and 20-24, and the 40-44 age-group. Across a wide range of male age-groups, from 20 to 45, there was little or no indication of an upturn in participation even by 1997. Although for male age-groups from 25 to 54 participation in 1997 still exceeds 90 percent, there is some support in these global numbers for the 'Marginal Men' hypothesis, the existence of a growing underclass of men "whose lack of economic resources is sentencing them to life as outsiders." (Quoted in Callister, 1999. See also Dixon (1999), who examines these trends in detail using 1997 HLFS data. Age, qualifications, ethnicity, having no partner, and being a sole parent all have a statistically significant association with non-participation.)

Contributors to changes in wages and salaries income inequality

18.   Wages and salaries make up approximately 80 percent of all personal market income, with self-employment income accounting for another 10 to 12 percent; most of the remainder being investment income (Statistics NZ, 1999. Figure 2.12). Changes in inequality of wages and salaries can be expected therefore to be the dominant factor in changes in market income inequality.

19. Sylvia Dixon has published a series of papers on the distribution of earnings in the New Zealand labour market (Dixon, 1995, 1996, and 1998). The 1995 paper looks at changes in the dispersion of industry average wages; and the later two at the distribution of earnings and the growth in the dispersion of earnings. These last two papers, making use of HES data, differ from other studies in that they analyse weekly and hourly earnings rather than annual earnings. This means that one possible source of the growth in inequality – an increased variation in the number of weeks worked per year – can be put aside. The focus is more on the causes of earnings variation than on changes in employment stability.

20. She found in her 1998 paper that, over the period 1984 to 1997, median hourly earnings grew only slightly in real terms. Median weekly earnings of full-time employees increased by around 10 percent however. Mean weekly hours worked by full-time males increased across the income spectrum, but more so for high-earners (Dixon reviews possible causes of measurement error in the data on hours worked).

21. Using a number of measures of inequality she found that the increases in weekly earnings dispersion over the period were substantially larger than the increases in hourly earnings dispersion (more especially in the 1990 to 1997 period). The increases in inequality were most rapid between 1986 and 1990, and from 1995 to 1997.

22. At least part of the increased inequality of weekly earnings could be attributed therefore to changes in the distribution of hours worked.

23. Examining earnings differentials associated with skill-related characteristics, Dixon found that only a few were moving consistently in a direction likely to cause increased inequality. " .. education and age differentials did not widen much over the 13-year period of the study, and gender differences narrowed." (Dixon, 1998, page 94).

Using the JMP decomposition analysis referred to earlier, the results in the following table were obtained –

Table 11:

	Decomposition of change in full-time weekly earnings				
	(sd of log earnings)		**1984 to 1997**		
		Change in -			Contribution
	Total	Observed	Returns to	Unobserved	of unobserved
	change	charact-	Observed	fac tors	factors
		-eristics	charact-		
			-eristics		
Males	0.129	0.012	0.025	0.091	70.8%
Females	0.099	0.027	0.000	0.073	73.3%
Source:	Dixon (1998), Table 7, page 96				

24. That is, on this measure about 25 to 30 percent of increased weekly earnings inequality was explainable in terms of changes in observable characteristics and returns to those characteristics. The remainder was 'unexplained'. (For alternative percentile ratio measures a higher proportion was explained, up to about 50 percent, more particularly for males.) Her analyses did not include occupation or industry, which might partly explain why the proportion 'unexplained' was higher than the 40 percent 'unexplained' found by Martin in his analyses of census data on incomes of employed persons. There are other differences in their data, for example Dixon's data being full-time weekly earnings, versus Martin's being annual incomes.

25. Dixon reached the following conclusions (op. cit. page 101)–

"Changes in earnings differentials associated with measured skill-related characteristics, such as formal qualifications, age and potential years of work experience, made a positive net contribution to the total rise in earnings inequality, particularly during the 1980s. Overall however, that contribution was relatively small."

"The largest share of the growth in earnings inequality between 1984 and 1997 occurred within the main demographic and skill groups. This raises some interesting questions about the underlying drivers of the growth in inequality.

The evidence that earnings inequality was rising before 1991, and did not noticeably pick up in pace after 1991, does not provide immediate support for the notion that the Employment Contracts Act 1991 made a fundamental difference to the growth of earnings inequality in New Zealand."

26. Her conclusions, for individuals' earnings, are similar to the provisional conclusions reached by Hyslop and Maré, for gross household incomes, in their work (discussed further below).

Differences in source of personal market income

27. Sources of income other than wages and salaries are more unequally distributed, at least among households, than wages and salaries. The 'concentration coefficient' (for an income component the equivalent of the Gini coefficient) for wages and salaries in 1995/96 was 0.409, having risen from 0.335 in 1985/86. (Statistical Appendix Table 5, but note these measures are for households rather than individuals.) That for self-employment income in 1995/96 was 0.703 (0.489 in 1985/86) and for investment income in 1995/96 was 0.510 (0.556 in 1985/86).

28. The chart below, from census data analyses in Bururu et. al., illustrates how self-employment income is more widely dispersed across the income range than wages and salaries. Both the self-employed and wage and salary earners have their highest concentrations in the $30,000-40,000 income range; but the self-employed distribution is much flatter, with higher proportions in the top income brackets, but also amongst those making losses.

**Chart 26: Distribution of Wage & Salary earners, and self-employed
across income range. 1996 census (Bururu et. al.)**
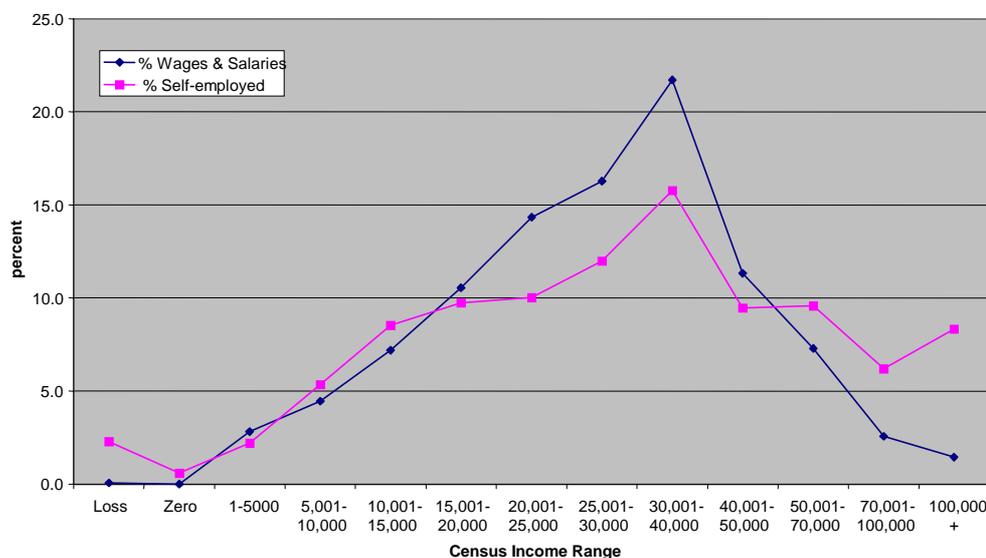
Returns to Educational Qualifications

29. In a recent major project, Maani (1997; 1999) has been analysing income
returns to educational qualifications, using census data. She found (1997) that
returns to education in New Zealand are comparable to those in other high
income countries. Also that there were significant increases in returns to tertiary
education over the 1981-1991 decade. Tertiary participation rates increased
significantly during this period and have continued to increase.

30. For the latest period, 1991 to 1996, the significant change is that the private
returns to a Bachelor's degree have stabilised for males, and fallen slightly for
females. The fall in the returns from tertiary qualifications to females became
more apparent after adjustment for the greater significance of immigrant
numbers with higher education since 1991. To quote –

"Of course, the income gains to tertiary education may not be expected to
increase indefinitely, especially with supply adjustments, and the 1996 evidence
indicates that a stabilisation of the market for graduates has been in effect in the
1991-1996 period." (Maani, 1999, page 34)

31. Maani's overall results, however, confirm that returns to all educational levels
were significantly higher in 1996 than in 1981. It would be expected that this
would be associated with an increase in income inequality. Dixon did find that
the penalty for 'no qualifications' had grown larger (Dixon, 1998, page 91) but
that the premia for higher qualifications had tended to decline in the 1990s. She
considered that this could be a cohort-specific effect, due to the large increase in
the supply of those with university qualifications. In general neither Dixon's
results, nor Hyslop and Maré's for household income, show changes in

educational qualifications and in returns to those qualifications making a major contribution to increased inequality, relative to other contributors.

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Section summary: Contributors to changes in Individuals' income inequality

The trends in individual income inequality are similar to those already seen in household or family income inequality. Inequality rose significantly in the late 1980s, and has generally continued to do so in the 1990s, at a slower rate. The rise in the 1980s was associated with a general fall in labour force participation, particularly for males; but the increase in participation since the early 1990s has not been accompanied by a fall in inequality. Male participation is still significantly lower than in the early 1980s, which supports the argument that the number of so-called 'Marginal Men' has increased.

Some 60 percent of the increase in census income inequality, for employed persons, between 1986 and 1996 can be explained by shifts in the composition of the labour force, and by a widening of income differentials for observable characteristics. (Martin, 1998a)

Wages and salaries are by far the largest component of personal market income. Dixon has examined growth in wages and salaries inequality in detail. Weekly wages and salaries inequality has increased more than hourly wages and salaries inequality, because average hours worked, which have increased generally for full-time workers, have increased more for those on higher incomes. Changes in observed workforce characteristics, and in returns to those characteristics, were found to explain some of the increase in weekly earnings inequality, but at least a half and perhaps around two thirds, of the increase in inequality, as measured in the Household Economic Survey, remains unexplained.

Returns to educational qualifications over the last two decades have increased, as shown by Maani, except that in the latest inter-censal period returns to males for a Bachelor's degree have stabilised, and for females fallen. From the work of both Dixon for individual wage and salary earners, and Hyslop and Maré for households, changes in educational qualifications and in the returns to qualifications , do not seem to have made much contribution to increased inequality.

</div>

C.3   From individuals to households

32.   Increases in individuals' income inequality and increases in household income inequality are of course linked. The charts below from Martin (1998a) show this clearly, although the charts are for 'families' rather than households. The first chart is for all labour force statuses; the second for 'Employed' men and 'Employed' families.

**Chart 27: Census Income Inequality trends 1976-96 - Comparison of Families and Men
All Labour Force Statuses. Gini Coefficients - (Barry Martin thesis Table 11.4)**
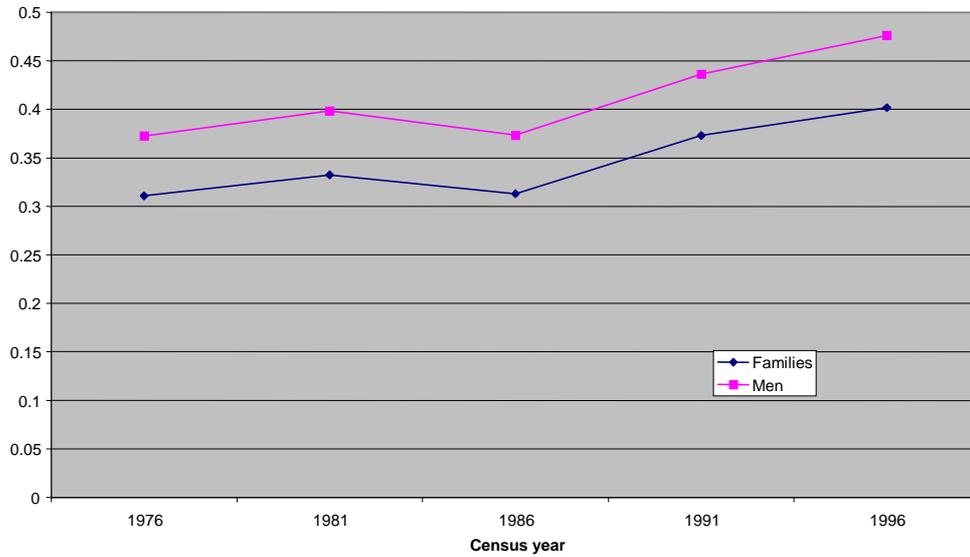
**Chart 28: Changes in Census Income Inequality 1976-96. Comparing 'Employed' families and 'Employed'
men. Gini Coefficients   (Barry Martin thesis, Table 11.4)**
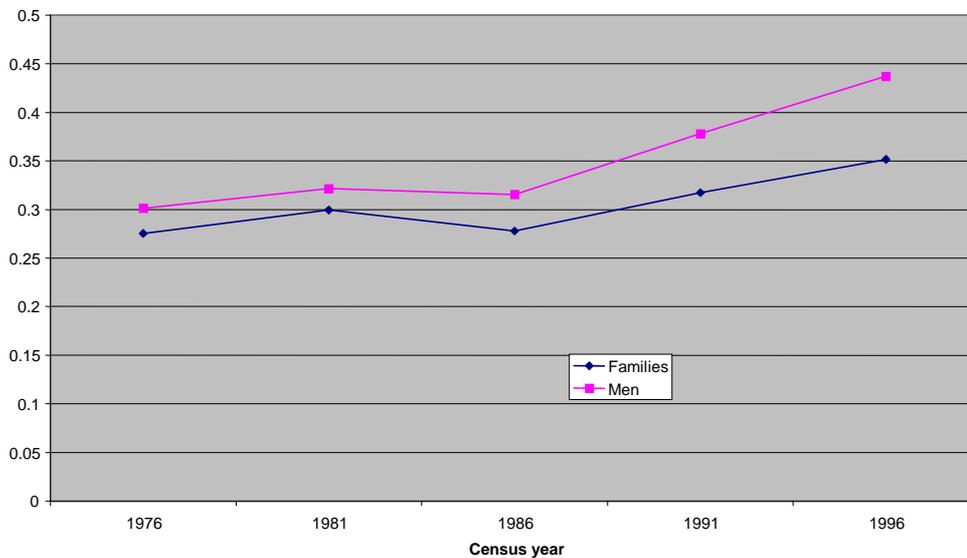
33. The question is whether the process of aggregation of individual incomes to the family or household level has added to, or reduced, the upwards trend in income inequality. Of particular interest is the effect of an increasing proportion over time of 'double income' households.

34. The proportion of couple households which are 'double income' has increased steadily over the years, except for the 1986 to 1991 period. There have been several overseas studies looking at whether this general trend has increased

household income inequality or the reverse. The conventional wisdom has been that on the whole it has reduced income inequality, with wives' income contributions counting more in the lower and middle parts of the income distribution. Some of the most recent overseas studies (Burtless,1999; Jantti, 1997), however, do find that increased proportions of double income households have increased inequality. But another (Harkness, et. al., 1996) finds the reverse for the UK.

35.   In general couple formation is highly assortative – people seek partners with similar educational qualifications (see Callister on the "Meet market"; 1998b).

36.   Chart 29 draws on unpublished analyses using Statistics NZ HES data-sets. The 'couple' data-set used included only two-adult households of opposite sex, with or without children. These numbered about half of all households. The chart shows the contribution of the double-income households to the overall income (equivalent disposable) of these couple households; by income decile.

**Chart 29: Contribution of "two-income" couple households to total 'couple' household income.
Equivalent Disposable Income - 1985/86 to 1995/96**
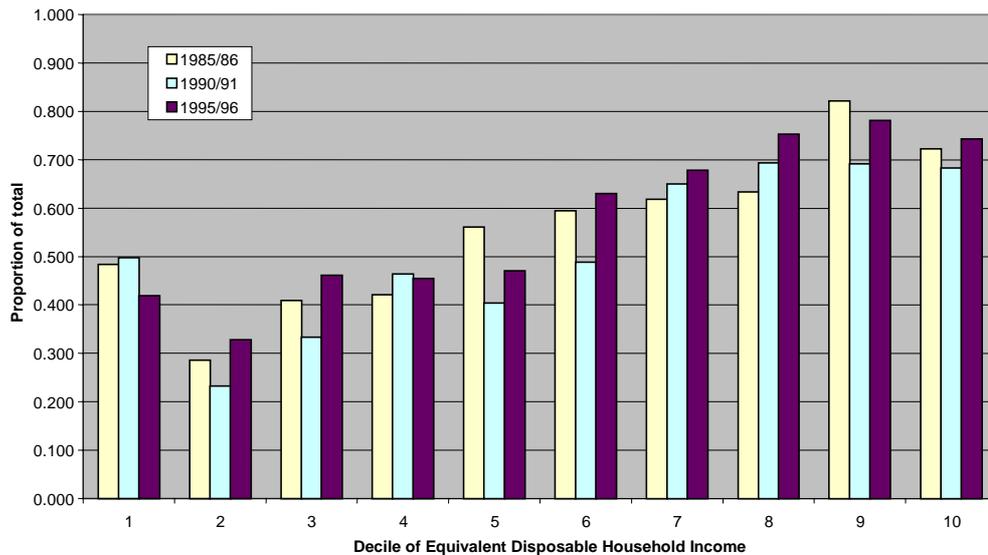
37.   The 'double-income' contribution increases steadily with household income. It is impossible to determine visually, however, whether the charted changes over the 1985/96 to 1995/96 period are such as to increase inequality.

38.   The causes can be analysed arithmetically, however, in the same manner as in the Hyslop and Maré's work. The coefficient of variation of the couple income distribution (using the decile data) was 0.6 in 1986 (and also earlier in 1982). It increased to around 0.8 in 1991 and 1996.

39.   If the proportions in each decile of 'neither with income', 'one with income' and 'double income', are fixed at the 1996 proportions, the coefficient of variation in 1986 becomes 0.66. That is about one quarter to one third of the

increase in inequality (0.06 as a proportion of 0.20) is explainable by changes in the relative proportions. Fixing the relative 'returns' at their 1996 ratios, however, does not explain any of the increased inequality.

40.   In summary, changes in 'double income' proportions, together with changes in other proportions, including 'neither with income', do explain a part of the increase in income inequality; perhaps about 30 percent for that approximate half of all households which are 'couple' households.

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Section Summary: From Individuals to Households

The process of aggregating individual incomes to family or household level could either increase or decrease trends in inequality over time. Both outcomes have been reported in the international literature.

An initial analysis of New Zealand 'couple' households suggests that changes in the proportions of different kinds of 'couple' households ('neither with income', 'one income', 'double income') have made a contribution to the increase in household income inequality, perhaps of the order of 15 percent. Changes in 'returns' to these different household types do not appear, however, have contributed to the increase in inequality.

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C.4   Contributors To The Increase In Household Income Inequality

Analyses in terms of household attributes, and returns to attributes

41.   The four major recent New Zealand studies of household or family income distribution (Hyslop and Maré, 1999; Statistics NZ, 1999; Podder and Chatterjee, 1998; and Martin, 1998) all in one way or another attempted a 'decomposition' analysis, though with differences in approach, and sometimes focussing on different explanatory variables.

42.   Detailed results from Hyslop and Maré are given first. The results of other studies are then given, checking how well they corroborate the Hyslop and Maré analyses. Hyslop and Maré endeavour to explain the increase in inequality of Gross Household income from 1983-86 to 1995-98 in terms of the following causes –

-       changes in the proportion of different household types and in the income distribution for each separate household type
-       changes in such attributes as age, educational qualification
-       changes in one particularly important attribute, employment status
-       changes in the 'returns' to each of these attributes

43.   Six different household types are defined by Hyslop and Maré. Charts 30 and 31 (figures 2.2a and 2.2b from their work) show visually their respective contributions to the overall distribution in 1983-86 and 1995-98.

Chart 30: Distribution of Household Gross Incomes, 1983-86: Contributions by Household Type

(Figure 2.2a): Distribution of Household Gross Incomes, 1983-86: Contributions by Household Type
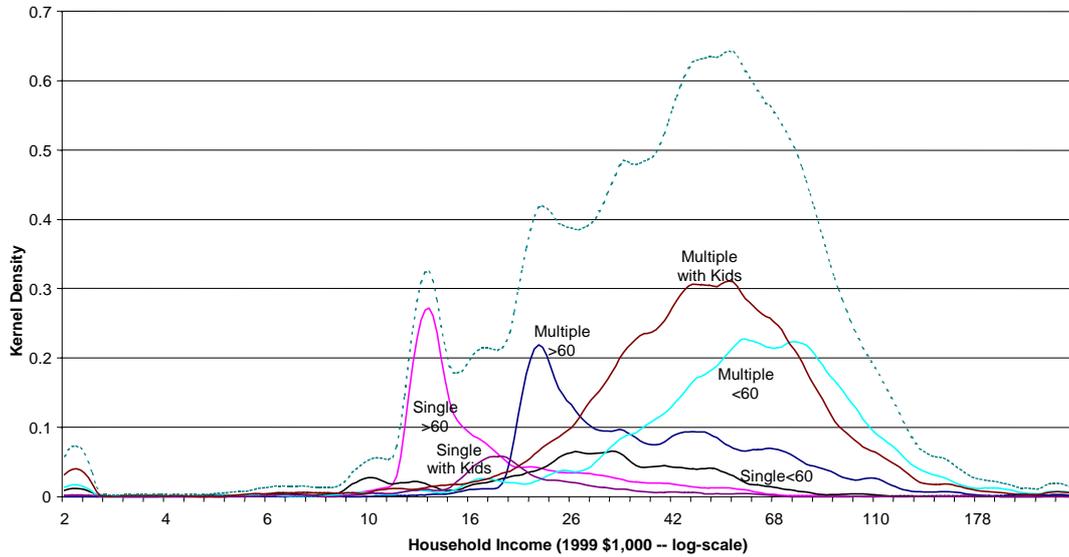
Chart 31: Distribution of Household Gross Incomes, 1995-98: Contributions by Household Type

(Figure 2.2b): Distribution of Household Gross Incomes, 1995-98: Contributions by Household Type
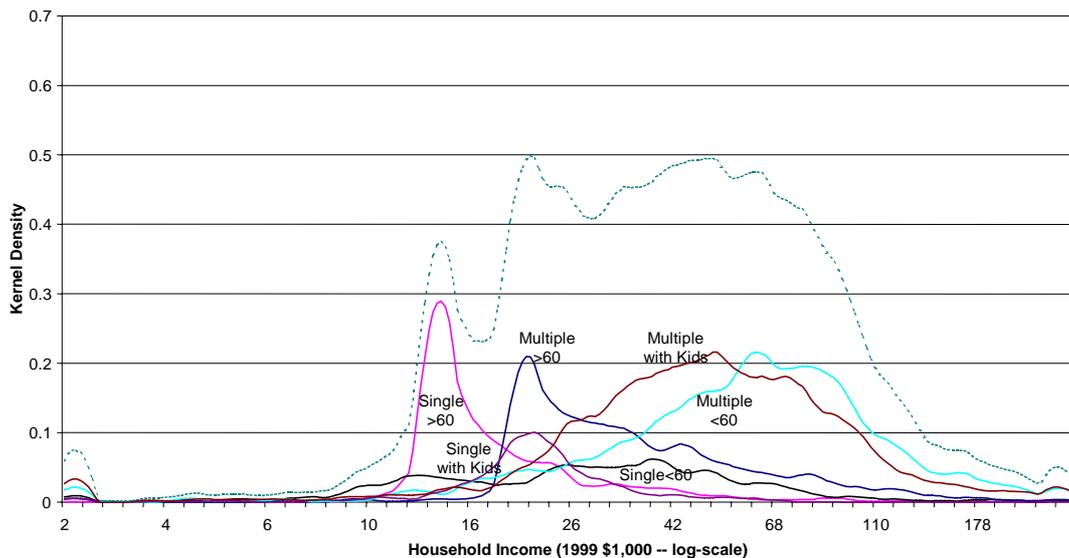

44.   It is immediately apparent that part of the change between 1983-86 and 1995-98 is associated with changes in the distribution for 'Multiple with kids' households. Their overall share fell. This in itself made the overall distribution

flatter because of the concentration of incomes for this household type at the 'modal' income range of the overall income distribution. In addition, the distribution for this household type has become more spread out, again contributing to the flattening in the distribution for all households.

45. The effect for other household types is less clear-cut – though the "Multiple <60" households also appear to have become more dispersed. Other effects include increased contributions at the lower end of the income distribution from "Single over 60" and "Single with children" households.

46. Hyslop and Maré examined the effect of changing household proportions and the other potential causes sequentially, at each step constraining the earlier 1983-86 distribution to the 1995-98 values of the chosen variable, and seeing whether this helped explain the difference between the two distributions. Thus first, the 1983-85 household type proportions were adjusted to 1995-98 proportions. Then, in addition, income functions for given attributes estimated from the later years' data were applied to 1983-86, and so on. Table 12 decomposes the overall changes in the earlier table 1. It shows the amount by which each step, in the given sequence, brought the 1983-86 measure closer (usually) to the 1995-98 measure. The final part of the table expresses these as percentages.

Table 12   Sources of Change in Inequality – 1983-86 to 1995-98
Gross Household Income

Table		Sources of change in inequality - 1983-86 to 1995-98 Gross Household Income					
Hyslop & Mare, 1999							
		Sources of change					
Measure	Hh Types	Attributes	Employmen	Returns	Unexplained		Total
Gini coefficient	0.0048	0.0136	0.0042	-0.0043	0.0331		0.0515
SD (log income)	0.0045	0.0395	-0.0010	-0.0136	0.0347		0.0640
Inter-Quartile Range	0.0321	0.0660	0.0017	-0.0178	0.0595		0.1415

		%age contribution to overall change					
	Hh Types	Attributes	Employmen	Returns	Unexplained		Total
Gini coefficient	9.4%	26.4%	8.3%	-8.3%	64.2%		100.0%
SD (log income)	7.0%	61.7%	-1.6%	-21.3%	54.2%		100.0%
Inter-Quartile Range	22.7%	46.6%	1.2%	-12.6%	42.1%		100.0%

Source: Hyslop and Mare Table 4b.

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47.   The results vary rather with measure chosen. It can be said that –

- changes in household types do explain some of the increase in inequality, from about 10 to nearly 25 percent, depending on the chosen measure of inequality
- changes in attributes do explain an appreciable part of the increase, 25 percent for the Gini coefficient, and substantially more for the other tabulated measures
- the contributions of employment changes, and of changes in 'returns to attributes' appear to be either insignificant or negative
- a good part of the increase in inequality is "unexplained". It can be said, however, that over a third of the increase in the Gini coefficient has been explained, and nearly half that in the SD of log incomes. An appreciable amount of the increased inequality has therefore been 'explained' by observable changes in the determinants.

48.   Surprisingly, job losses during the 1980s had little effect on most overall measures of income inequality. Employment losses were experienced across the whole of the distribution. They had the effect of compressing the bottom half of the distribution and, by dragging down the median, increasing inequality in the top half of the distribution. These two effects largely offset each other, thus having little effect on the overall measure of inequality.

49.   To label much of the change as "unexplained" means that it is unexplained by the factors so far investigated, in the form in which they have been investigated. For example it could be because of complex interactions between different factors, which are not identified by this approach. It could also be related to other yet untested factors, or else be because the increase in income dispersion was general, across all household types, demographic attributes, etc.

50.   Chart 32 shows how much of the overall difference between the 1983-86 and 1995-98 distributions is 'explainable' in terms of the sources of change listed in table 12. The overall distributions for 1983-86 and 1995-98 are shown. The additional 'Adjusted 1983-6' distribution then shows the effect of adjusting the initial distribution for the known changes which occurred in the intervening period; in household type proportions, attributes, employment, and returns to attributes and employment. Over much of the distribution the effect is to close the gap between the two distributions by a quite significant amount. This is particularly the case over much of the range of household incomes from $18,000 to $70,000 household income in which most households are found. Although a substantial amount of the change in the distribution of household income during the 1980s and 1990s is still "unexplained", Hyslop and Maré's analysis suggests that the changing nature of families, and demographic attributes played an appreciable role in the observed changes.

Chart 32: Distribution of Household Incomes.
'Explained' contribution to shift from 1983-86 to 1995-98
(Derived from Hyslop & Mare Figure 2.4):
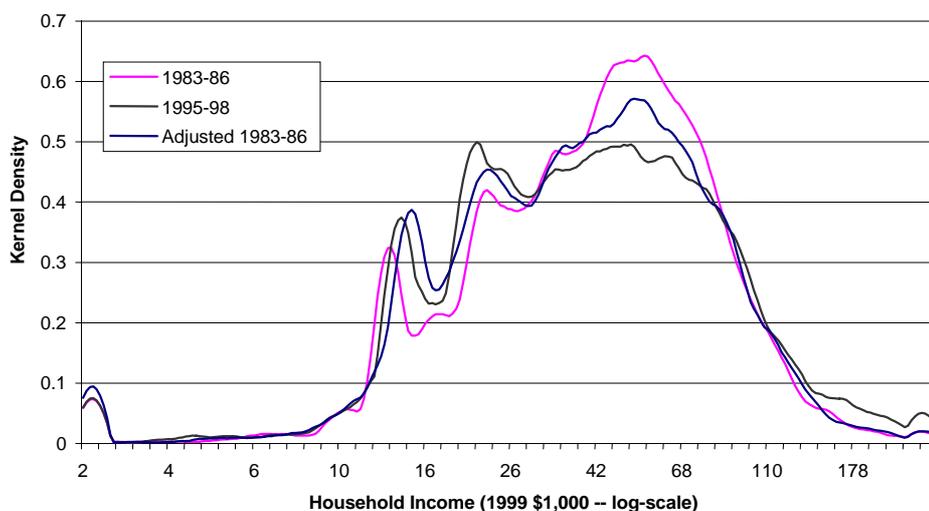
Analyses in terms of Income sources

51. Another approach to analysing the causes of the increase in income inequality is to look at the different sources of income. This line of research is not followed in the Hyslop and Maré analyses. However, Podder and Chatterjee developed an analytical approach in their 1998 paper for attributing the overall change in Gini coefficient to the different income sources. The contribution of each income source depends, first, on its overall 'share' in the income total, and how much this share changes; and secondly on the inequality of the distribution of that particular type of income, and how much that has changed over time. These are labelled the "share" and "concentration" components respectively.

52. Podder and Chatterjee's analysis was for Gross income, equivalised on their own equivalence scale (0.8 for each additional adult, 0.4 for each additional child). Statistics NZ extended the Podder and Chatterjee analysis to Household Disposable income (equivalised using the Revised Jensen Scale). Results of both analyses are given in Table 13.

53. Some of the statistical calculations underlying the Statistics NZ analysis are given in Statistical Appendix Table 5 (reproducing a table from the Statistics NZ web-site). The table gives the share and concentration coefficients for each income source – these are referred to at various points in the next few paragraphs – and the share and concentration components of the overall increase in income inequality.

Table 13:   Contribution of Different Income Sources to changes in Income Inequality

Contribution of different income sources to changes in income inequality		
Podder and Chatterjee, 1998 -		
Income source:	**83/84 to 91/92**	**91/92 to 95/96**
Earned income	0.028	0.032
Unearned income	0.015	-0.013
Govt Cash Benefits	-0.015	0.004
Total increase in Gini Coeff.	0.029	0.022
Statistics NZ, 1999 Appendix A.4		
Income source:	**85/86 to 90/91**	**90/91 to 95/96**
Wages and salaries	0.023	0.030
Self-employment	0.014	0.017
Investment	-0.004	-0.014
Benefits	-0.006	0.001
NZ Superannuation	0.001	-0.003
Other gross income	-0.001	0.002
Direct taxes	0.028	-0.017
Total increase in Gini Coeff.	0.054	0.015

54.   There are differences in detail between the two analyses – in part no doubt due to differing time-periods and different income concepts (for example tax credits were included in Government Cash Benefits by Podder and Chatterjee, but as a negative direct tax in the Statistics NZ analysis). Both show, however, a significant contribution to the increase in inequality in both periods by 'earned income' – wages and salaries, plus self-employment. Benefits tended to reduce income inequality in the late 1980s, as is to be expected in a period ending with the 1989-91 recession. They made only a small positive contribution to increased inequality in the 1991-96 period. The share of benefits in overall income fell in this later period, because of the economic recovery, and also because of the benefit cuts for some beneficiary categories in 1991. These tended to increase inequality, but by only slightly more than the decrease caused by benefits becoming more concentrated at lower income levels, for example because of the abolition of the universal Family Benefit.

55. Direct taxes, in the Statistics NZ analysis, made a large contribution to the increase in disposable income inequality in the late 1980s. The reasons are quite complex. They trace certainly in part to the simplification and reduction in personal tax rates made in October 1986 (with the introduction of 10 percent GST), and in October 1988. The consequence of those changes was that direct tax payments, imputed by applying schedule tax rates to the information on household incomes, fell as a share of income by more than a fifth. Because personal income taxes are progressive, the fall in their share increased after-tax inequality. Offsetting this, however, actual tax payments became more unequally distributed, despite the apparent flattening of tax scales, and this tended to reduce inequality. One reason for the increased inequality of tax payments could have been the increase in income inequality, making higher-income gainers liable for a larger share of tax than would otherwise have been the case. Other possible reasons include the removal, as part of the late-80s tax package, of the rebate on contributions to superannuation funds. The Fringe Benefits Tax, also introduced in the late 80s, probably led to some fringe benefits being converted to cash income, increasing cash income inequality and also tax payable more particularly on higher incomes.

56. Quite significant increases in company taxes also occurred as a result of the 1980s tax reforms. This report deals with income received by households, which includes self-employment income, and company dividends, but does not include undistributed company profits. These last would have been reduced by the increase in company taxation. This would be expected to flow through to lower dividend payments (offset by dividends paid from tax-paid profit being made exempt from tax in the hand of shareholders), and to share prices being presumably lower than they otherwise would have been. Lower dividends would be reflected in household incomes as measured in the analyses in this report, but not the effect of lower share prices.

57. In the latest period, 1990/91 to 1995/96, direct taxes made a contribution to reducing income inequality, reversing in fact over half the contributed increase in the earlier period. An increase in the share of direct taxation, and a further increase in the 'progressivity' of tax payments, both contributed to this reduction in inequality.

58. It should be noted that the period covered in the table, up to March 1996, does not include subsequent reductions in tax rates, plus changes to the independent family tax credit and family support, nor the increase in the 'top bracket' tax rate this year.

59. Returning to employment income, and drawing on the information in Statistical Appendix table 5, the overall share of both wages and salaries and self-employment fell between 1985/86 and 1990/91. The inequality of distribution of both increased quite markedly, however, particularly that of self-employment income, as shown by the "concentration coefficients", which are similar to Gini coefficients, but for specific income sources. The coefficient for wages and salaries increased from 0.34 in 1985/86 to 0.39 in 1990/91 (and 0.41 in 1995/96). That for self-employment income increased from 0.49 to 0.70 (and

remained at that value in 1995/96). It was this increased 'concentration' which dominated the increase in inequality in the 1985/86 to 1990/91 period.

60.   That self-employment income is widely dispersed across the income range is shown in Bururu et al (1998). Both the self-employed and wage and salary earners at the time of the 1996 census had their highest concentrations in the $30,000-40,000 income range; but the self-employed distribution was much flatter, with higher proportions in the top income brackets, but also amongst those making losses.

Census analyses

61.   Martin's (1998a) overall results were given earlier (Table 3). He examined three of six posited causes of the overall increase in family census income inequality; these being –

-       changing distribution of families by family type
-       changing distribution of families by labour force participation
-       unemployment

(The other three posited causes were change in earnings inequality, change in the composition of family income, and change in the correlation between spouses' labour force participation.)

62.   In brief, Martin disaggregated his families into 1,872 sub-groups, defined by age, sex (for sole-parent families), ethnicity, family type and size, and labour force status. He found that changes in 'between-group' inequality accounted for most of the overall change in all family income inequality for the period 1981 to 1991 (op. cit. page 254); though only about half the overall increase in the subsequent period 1991 to 1996.

63.   Restricting his analyses to 'Employed Families' – at least one employed parent or spouse – the contribution of 'between-group' inequality changes became less important; less than 40 percent of overall change for the whole period 1981 –96. This suggests changes in employment status of families made a definite contribution to overall changes in inequality; as indeed is confirmed by Martin's more detailed results.

64.   Martin concludes that the change in income inequality (from 1976 to 1996) has essentially been due to shifts in the relative size of categories of families (cross-categorised by employment status). This effect was powerful in the 1980s, but not from 1991 to 1996 with increasing employment. In this last period other determinants became more important. (Note that the Statistics NZ analyses summarised in Table 2 also found no 'demographic adjustment' effect for this last period).

C.5   The changes in the economic environment potentially causing the changes in income inequality.

65.   This paper has focussed on the changes in the income distribution. It has attempted to identify changes in the characteristics of either individuals or households, for example level of educational attainment, together with changes in the returns to these characteristics. These changes in both characteristics and returns are then used to explain some of the observed change in the distribution of income. At best these factors help us explain about 60 percent of the increase in income inequality; much remains unexplained however.

66.   What underlies the changes in the characteristics of individuals or households? What has shaped the returns from education? And what factors might help in reducing the substantial part of the change in the distribution of income which is still "unexplained?"

67.　Over the fifteen-year period covered by this study, there were major changes in the economic and institutional environment external to the household. The earnings of households from labour and capital, the accumulation of wealth, labour force participation and the returns to investment in human capital will all be influenced by these broader changes in the economy. Furthermore, these same forces can shape the very size and composition of the household itself.

68.　Since the early 1980's the New Zealand economy has become more open, there have been changes in the structure of taxes and benefits, there has been rapid technological change in some areas and the nature of employment contracting has evolved. Each of these factors can influence the distribution of income through a number of channels. In many cases the mechanisms are complex and not well understood.

69.　Changes in the dispersion of earnings are clearly an important source of changes in the distribution of individual incomes. The external forces outlined above may alter the demand for labour, the supply of labour or change the institutional setting within which labour contracting takes place. (Borland, 1999.)

70.　Consider, for example, the greater globalisation of the economy. New Zealand is now more integrated into global markets for both goods and services and for financial flows. Lower tariffs have been a key element of the opening up of the economy. What impact might that have had on the distribution of income?

71.　Access to cheaper foreign goods such as clothing, footwear and automobiles confers a gain in real income on households. The impact on the distribution of income depends on the particular goods which now face lower tariffs, and the consumption patterns of different households. At the same time lower tariffs may reduce the costs of importable inputs to farms and businesses, making them more internationally competitive and allowing them to expand their output.

72.　Changes in the mix and level of output will change the demand for labour, and most probably for different skill levels. Will the new demand be largely for higher skilled workers or will the removal of tariffs perhaps eliminate impediments to expanding industries, using relatively large amounts of unskilled labour?

73.　But the effects of a tariff reduction on income distribution do not stop there. Accompanying the removal of tariffs it is possible that the real exchange rate will alter, again sending signals to some industries to expand and others to contract. Different expansion paths may imply differences in the amount of part time employment available and lead to changes in labour force participation rates especially amongst women.

74.　In short, this one example shows how a simple change in the external economic environment of the household (in this case a reduction of import tariffs), can set in train a series of reactions which operate through a wide variety of channels to eventually shape the distribution of income.

75.   These types of changes will not only influence the current demand for labour, but will send signals about the returns to investment in human capital. If demand for skilled labour increases, for example, this will encourage higher participation rates in tertiary education and training, eventually increasing the supply of skills. The initial shortage of skilled labour would be expected to increase returns to skills, and income inequality; but in the longer term as more persons with the required skills become available, a reversal of this outcome is possible.

76.   Changes in the distribution of income have in the past moved in long historical cycles. Income inequality increased during at least the earlier stages of the industrialisation of the economies of Europe and North America during the 18th and19[th] centuries. Growing participation in schooling and tertiary education and training then led to greater equality. A similar cycle driven by another wave of technological change may have been operating in recent years (Aghion, et. al., 1999).

In summary, the distribution of income is subject to a wide set of forces external to the household which influence employment, the demand and supply of particular skills and the institutional structure in which employment contracts are formed and executed. Teasing out their separate effects on the distribution of income by household or individuals will never prove an easy task.

Appendix A: Definitions and technical issues:

Some common acronyms and abbreviations

HES   Household Economic Survey. Statistics NZ. Annual until 1997/98.
HLFS   Household Labour Force Survey. Statistics NZ

SD or sd. Standard deviation. Square root of sum of squared deviations from the mean.
CV or cv. Coefficient of variation. Ratio of sd to mean.

MLD   Mean Logarithmic Deviation. Mean of deviations of log incomes from the logarithm of mean income.

Equivalence scales
RJS   Revised Jensen Scale, that most used in New Zealand.
LIS   Luxembourg Income Study scales, particularly the 0.5 scale, which simply divides household income by the square root of the number of persons in the household.

Definitions and Concepts

- Is income the best concept for measuring 'inequality'?

  There are many aspects to personal and social wellbeing apart from income. Physical and mental health is clearly a very important component. But it is income that enables us as individuals and family members to obtain the necessities of life, and allows us also to seek personal and social fulfilment in a multitude of ways. It is possible to achieve some of these things with no, or low, income, but it is more difficult. It has been shown that differences in other dimensions of wellbeing are often correlated with income differences. In particular, those with lower socio-economic status and (in general) lower incomes can expect on average more ill-health, and expect also to die younger on average.

  This does not mean that wellbeing is perfectly correlated with income. We all differ in our needs, desires and motivations. Some prefer a simple non-materialistic life, and are content with relatively low income. Others are not. In general, there is a fair degree of correlation between income level and wellbeing.

  It has been quite often argued that 'consumption' or, as another alternative, 'wealth', are better concepts for use in discussing inequality than is 'income'. There are quite good arguments for both. A practical reason for using income, however, is the general availability of better information on income.

  In practice, the large majority of empirical analyses are in terms of income, and this report is restricted to such analyses. (For discussions of the distribution of wealth in New Zealand, see for example Easton – 1983 and NZ Planning Council 1990, with associated technical papers.)

- Individuals, families, or households?

  Income is received by individuals, but the benefits from it are shared within the family. (How equally the benefits are in fact shared is another issue. Too little is as yet known, despite recent research efforts, for example as reported by Fleming, 1997). In terms of reporting on 'wellbeing', therefore, and for policy formulation, probably the most natural unit is the family. 'Family' here can be defined to include persons living alone, as well as couples, couples with children, and sole parent households. The only household types falling outside this definition are then 'extended family' households, and 'non-family' households, for example people flatting together. These two categories make up between them around 15 to 17 percent of all private residential households.

  There are practical difficulties with the available data-sets, however, in excluding these last two household types in a consistent way from the analyses. Also there are advantages, for making comparisons between populations at different times or in different places, in working consistently with all of the population living in private households, rather than with the family sub-set. For these reasons, the 'household' unit is used in preference to the 'family' in the studies reported in this paper.

  Although the focus of most results discussed in this report is the household, income is in the first instance generated by the activity of individuals, and so there is necessarily also discussion of the distribution of individuals' incomes.

- The different income concepts – Market, Gross, and Disposable

  Empirical analyses in New Zealand commonly draw on either five-yearly Census of Population data, or on survey data from the ongoing Household Economic Survey (HES) which covers about 3,000 households, or around 7,500 individuals, each year. Usually only regular or recurrent cash receipts are regarded as income. That is, 'in kind' transactions are excluded, and also gifts, bequests, and other transactions of a 'capital' nature.

  Market Income is that received from market transactions – wages and salaries (including regular accident compensation payments), self-employment income, investment income, and private superannuation. Wages and salaries have accounted typically for 78 to 80 percent of all market income, and self-employment income for a further 10 to 12 percent. Changes in the distribution of earnings can be expected, therefore, to be the dominant influence on market income distribution.

  Gross (or Total, or pre-tax) Income includes, in addition to Market income, transfer income received by the individual or household. This includes social welfare income-tested benefits (domestic purposes, unemployment, invalids, sickness, etc), NZ Superannuation, and educational bursaries. All these transfers are supposed to be measured including tax.

Disposable Income is income after tax (and tax credits).

Each of these concepts has its uses. Only Gross Incomes data are available from the census. HES provides fine detail on both Market and Gross income, though for a sample of the population only. Information on Disposable Income is not collected as such. Instead personal income taxes are imputed, in models such as Treasury's TAXMOD, from the data on gross income.

- Wider income concepts

The income concepts above exclude 'non-cash' transactions such as fringe benefits, capital gains, and the imputed rental income from owning one's own home. 'Black economy' transactions are also omitted, if not reported by respondents. For further discussion see the 1990 NZ Planning Council report.

Also excluded are goods and services provided free or subsidised by the government. Among the more important of these are education and health services. The Statistics NZ report of 1990, using data for 1987/88, is the most recent attempt at a full 'fiscal incidence' study, following the earlier SEBIRD (study of the effect of the government budget on income redistribution) reports.

- Adjusting for household size and composition. Equivalence scales.

A household's wellbeing depends not just on its income, but also on the number of persons in the household, and to some extent also on the different needs of different household members; for instance whether they are children, adolescents or adults, and in paid work or not. A household of two adults will need a higher income than an adult living alone to have an equivalent standard of living. The two-adult household will not, however, need twice the income of the adult living alone. This is because there are 'economies of scale' in many items of household expenditure, such as housing costs, household operation, transport, etc.

The standard way of allowing for this is to 'equivalise' household incomes. An equivalence scale is applied to actual household income to calculate the household's 'equivalent income' allowing for household size and composition. (A point on the scale is set at unity, commonly for a two-adult household.) The larger the household the more the household's actual income is scaled down.

A number of different scales have been developed. That most commonly used in New Zealand is the Revised Jensen scale (RJS). It allows for household size, distinguishes between children and adults, and has an adjustment for the age of the children, so that adolescents are 'costed' more heavily.

The Revised Jensen scale has been criticised, however, as not allowing sufficiently for the expenses of some households, particularly sole-person and sole-parent households (see for arithmetical illustration Statistics NZ, 1999; Appendix A1).

Undoubtedly there is a degree of arbitrariness in the choice of equivalence scale, and this is one argument against their use. Also the 'equivalised dollars' in which incomes are measured no longer correspond to actual dollars. On the other hand it is clear some account needs to be taken of household size and composition in examining the welfare implications of income distribution changes.

The two non-Treasury analyses mentioned in this report (Podder and Chatterjee; and Statistics NZ) both used equivalised household income data. The Treasury analysis, however, (Hyslop and Maré) used actual household income data. As an alternative to 'equivalising', their work includes a look at changes in the income distribution of specific household types.

- Comparing incomes over time – the appropriate price index.

  Normally incomes are compared over time by deflating by the Consumers Price Index (CPI) to 'real' dollars of some specified date. The assumption is that price changes affect equally household spending at all income levels.

  In the late 1980s, however, there was a major switch in the tax-base. Goods and Services Tax (GST) was introduced at 10 percent on almost all goods and services on 1 October 1986, and increased to 12.5 percent on 1 July 1989. (There was some offset from the abolition of a number of earlier indirect taxes.) Direct tax rates were reduced substantially, and also compensatory increases were made to benefits.

  This makes it wrong to use the CPI – which includes the GST increases – to deflate pre-tax income (Market or Gross) time-series across this 1986 to 1989 period. Incomes can appear to have fallen dramatically in terms of purchasing power, whereas in fact there were compensatory offsets in the form of lower direct taxes. The Treasury project, and also others such as Dixon (1998), uses therefore the CPI index excluding GST calculated by the Reserve Bank (Roger, 1995).

  On the other hand it is appropriate to use the CPI to deflate Disposable income.

  Some of the material from other sources cited in this paper has been recalculated using a more appropriate deflator, where it appears an incorrect deflator was used. The alteration is indicated in all cases.

- The choice of time-period

  Most of the results reported in this paper are 'cross-sectional', showing the distribution of income for a given year, and then comparing the distribution for that year with other years.

  Income distributions can, at least conceptually, be analysed for shorter or longer periods. The distribution of weekly or monthly incomes can be of importance, for example, in the case of those at the lower end of the income scale who have not much scope for averaging incomes over time (Atkinson). In general, weekly

incomes can be expected to be more volatile, and in general therefore more unequally distributed than annual incomes.

In the other direction, income might be calculated for periods longer than a year. In particular, if concerned with long-term equity, the concept of 'lifetime income' and its distribution has a lot of appeal. Lifetime incomes would in general be expected to be less unequally distributed than current incomes (for societies in which most individuals live to a good age).

Data on lifetime incomes are not easily obtained. Ideally a cohort of individuals is followed from birth to the grave. That is for individual incomes. It is difficult to see, however, how lifetime analyses could be applied to household incomes, except in the sense of each individual having attached to them the (equivalised) income of the household to which they belong at a given time.

Even if cohorts cannot be followed over a whole lifetime, it can be possible to follow them as population groups for shorter periods, for example tracking average incomes of individuals aged 30 to 34 in the 1986 census, 35 to 39 in the 1991 census, and so on. And then comparing their income trajectory with that of older or younger groups, where the data are available.

- Summary measures of income inequality

  A wide variety of summary measures have been developed. Some referred to in this paper are –

  - the standard deviation of income (or alternatively of the logarithm of incomes). Often divided by the mean to give the 'coefficient of variation';
  - the Gini coefficient, perhaps the most commonly used of all measures of income inequality. There are a number of ways of defining it. Mathematically it is derived from taking the mean of all possible differences between any two individuals (or households) in the population. It has an easy to understand graphical representation. Because the Gini coefficient is so widely used this is illustrated in the chart below, using actual 1986 and 1991 data for Household Equivalent Disposable Income.
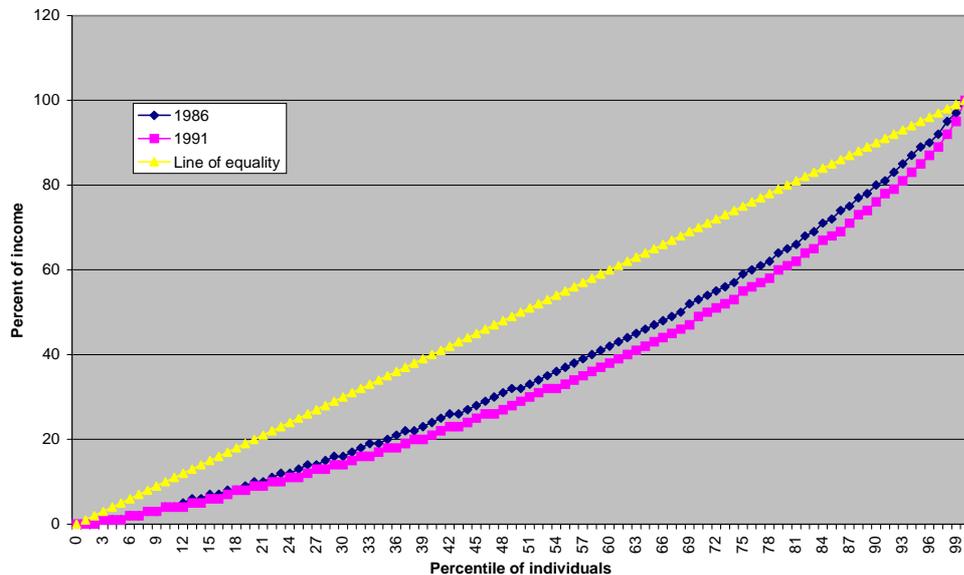
- The x-axis ranks individuals in the population from poorest to richest according to the ranking of the household to which they belong. The vertical axis plots their cumulated income. The result is the Lorenz curve, shown here for both 1986 and 1991, gradually curving upwards as richer households are added to the income total. If all incomes were equal, the result would be the "line of equality". As they are not, the Lorenz curve sags below the line of equality. The extent of the 'sag' gives an indication of inequality – and the Gini coefficient can be shown to measure this, being the area between the Lorenz curve and the line of equality, taken as a proportion of the triangle below the line of equality. The greater sag in 1991 corresponds to an increase in the Gini Coefficient, or increase in inequality.
- Thus it takes values between zero – for perfect equality - and unity – for perfect inequality, increasing as inequality increases. Typical values for the distribution of household income are in the range 0.25 to 0.40; and for individual incomes somewhat higher.
- The inter-quartile difference. That is, the 75th percentile income less the 25th percentile income. Division by the median gives the Inter-quartile ratio.
- Mean Logarithmic Deviation. (MLD). Mean of the deviations of log income from the log of mean income.
- Percentile ratios (or decile ratios). For example, if the population is ranked in percentile order from the 1st to the 100th percentile, measures often used are the ratio of the 90th to 50th percentiles, 50th to 10th, 90th to 10th, and so on. As a measure applied to survey data it is vulnerable to increased sampling error at the bottom and top ends of the income distribution.

These summary measures are generally for the whole distribution, though percentile ratios are an exception. Different measures will not always show the same trends. The Gini coefficient for example is more sensitive to changes in the mid-range of the income distribution, whereas others are more sensitive to changes at either extreme. In general, however, the different measures will give the same inequality ranking to different income distributions, provided the Lorenz curves do not cross (Atkinson, 1983). Also the measures given here should be thought of as measures of 'statistical inequality', and not as measuring welfare rankings for different income distributions. It is perfectly possible for incomes to become more unequal - as measured say by the Gini coefficient – at the same time as the relative position of the poorest improves. Or vice versa. If one is particularly concerned with the position of the poor, say those in the bottom decile (the bottom 10 percent, when ranked from poorest to richest), it is necessary to use statistical measures focussed specifically on them.

Also the measures listed here are only a sub-set, and a relatively small and unsophisticated sub-set at that, of the full range of different measures used. For further discussion see Sen (1973), Atkinson (1983), Creedy (1997), and many others.

- Statistical significance

Most incomes analyses are based on sample survey data. Changes over time, or differences between population sub-groups can therefore be a result of random sampling error. Researchers have found it difficult at times to be certain whether or not a given change or difference is sufficiently large to be genuinely statistically significant, particularly as there are no standard formulae for the standard errors of measures such as the Gini coefficient.

Dixon (1998), however, used 'bootstrap' methods to estimate 95% confidence intervals, for measures related to individuals' earnings in HES, and found these typically should be set at around 6-8 percent either side of the measure being estimated. So any change to be demonstrably statistically significant has to be in excess of this range. Statistics NZ (1999, Appendix A2) used replicated sub-sampling techniques to estimate 95% confidence intervals for the Gini coefficient of household incomes in HES, and came up with a percentage value of seven percent, in good agreement with Dixon. In other words a change or difference will in general need to be of this order or larger before one can have much confidence that it is statistically significant. The precise amount will depend on the measure being used, and the size of sample or sample sub-group being considered.

Statistical Appendix

Contents

Charts and Tables from 'quincentile' distributions provided by Stats NZ

> Note that all values are converted to March quarter 1996 dollars.
>
> Note also that for the 'household' analyses in Charts 3 to 9, and Tables 2 and 3, each individual is assigned the income of the household to which they belong. The charts, and calculations of means, medians, and Gini coefficients, are then in terms of these 'individually assigned' household incomes. This approach appears to be becoming the international standard. Chart 6 earlier in this report, however, calculates means and medians in terms of households rather than household incomes assigned to individuals.

Charts 1 to 2 of changes in distribution of Individuals' incomes (smoothed) –

- Male market incomes
- Female market incomes

Charts 3 to 8 of changes in distribution of Households' incomes (smoothed) –
- Actual Market Income
- Equivalent Market Income
- Actual Gross Income
- Equivalent Gross Income
- Actual Disposable Income
- Equivalent disposable Income

Transition Matrices from Dean Hyslop's work

Additional detail from Statistics NZ report on Income Distribution.

Appendix Chart 1:
Changes in the Distribution of Males' Market income - 1981/82 to 1995/96

Appendix Chart 2:
Changes in the Distribution of individual Market Income - Females. 1981/82 to 1995/96
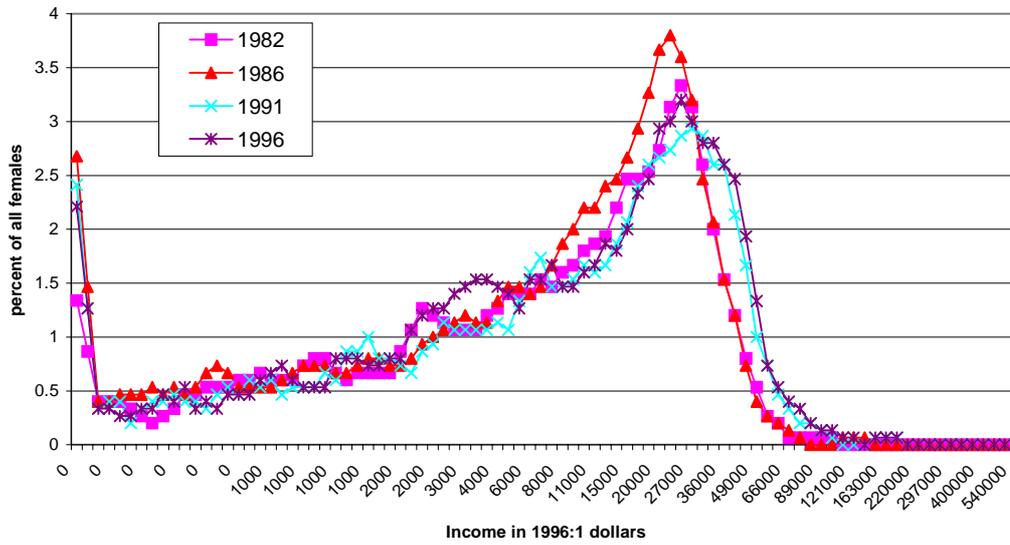
Appendix Chart 3: Actual Household Market Income.
Changes in its distribution. 1981/82 to 1995/96. Smoothed.

Actual Market income in 1996:1 dollars (log scale)
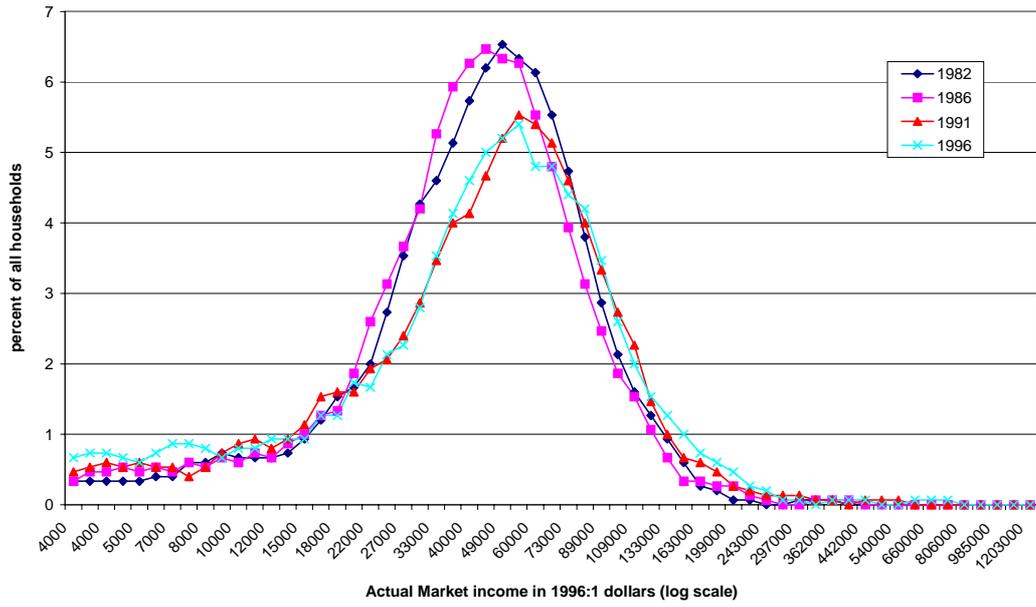
Appendix Chart 4: Equivalent Household Market Income.
Changes in its distribution - 1981/82 to 1995/96. Smoothed.

Equivalent Market income in 1996:1 dollars
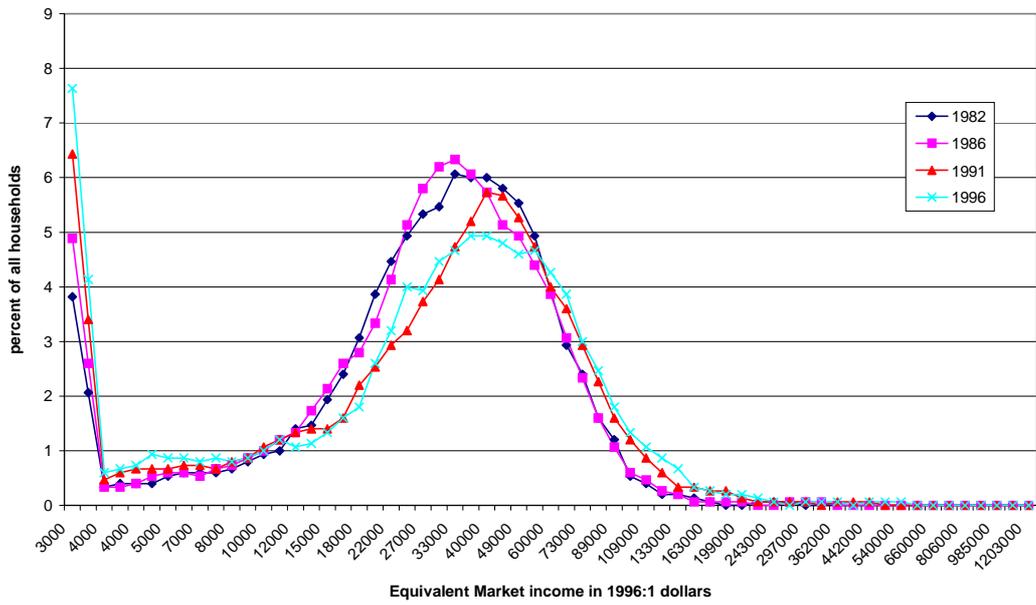
Appendix Chart 5: Household Gross Income.
Changes in its distribution - 1981/82 to 1995/96. Smoothed.

Gross Income in 1996:1 dollars (log scale)
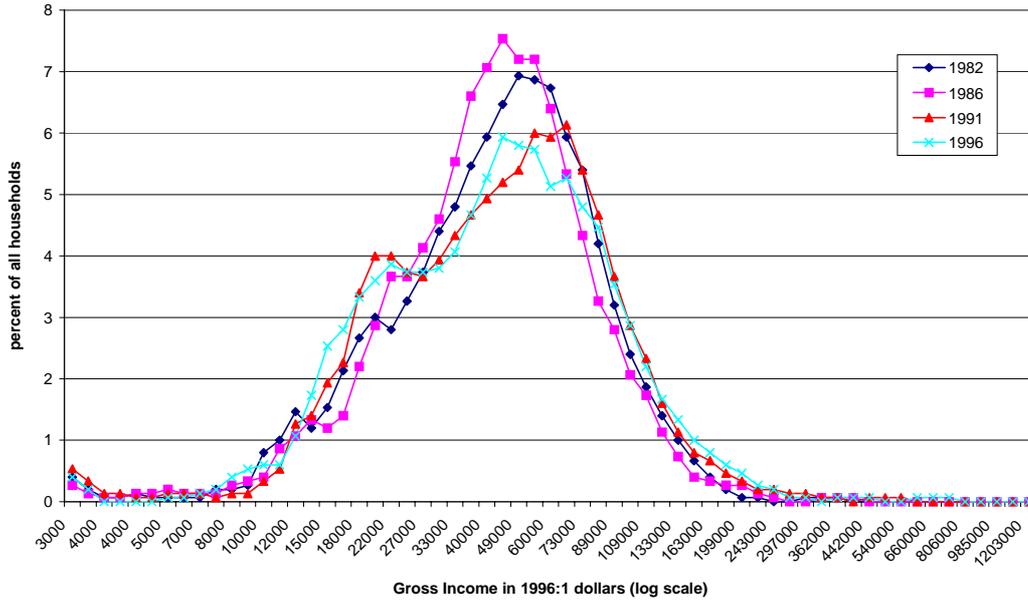
Appendix Chart 6: Equivalent Gross Household Income.
Changes in its distribution - 1981/82 to 1995/96. Smoothed.

Gross Equivalent income in 1996:1 dollars (log scale)
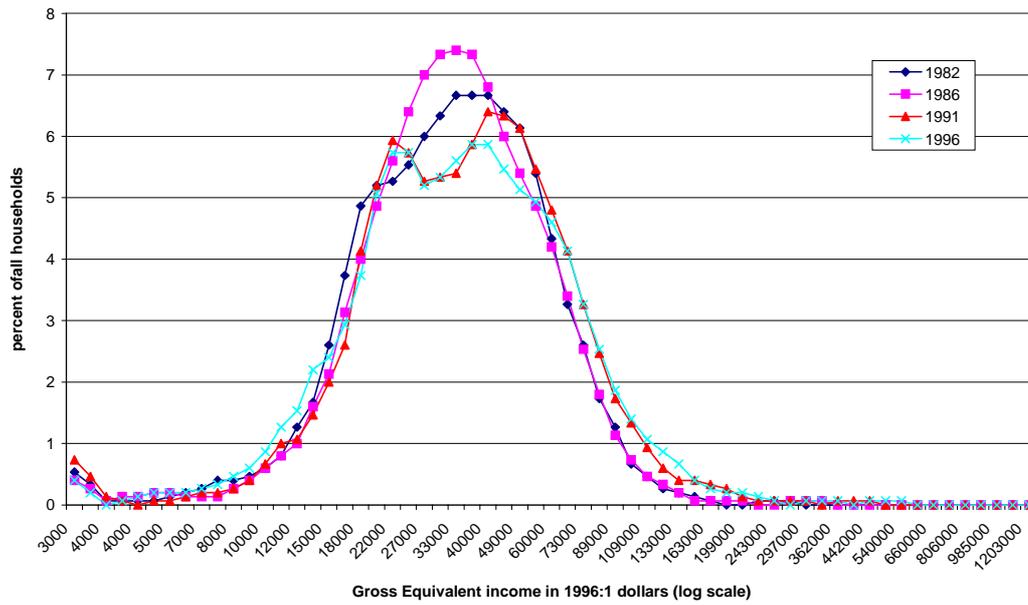
**Appendix Chart 7:   Household Disposable Income.
Changes in its distribution - 1981/82 to 1995/96. Smoothed.**

Disposable Income in 1996:1 dollars (log scale)
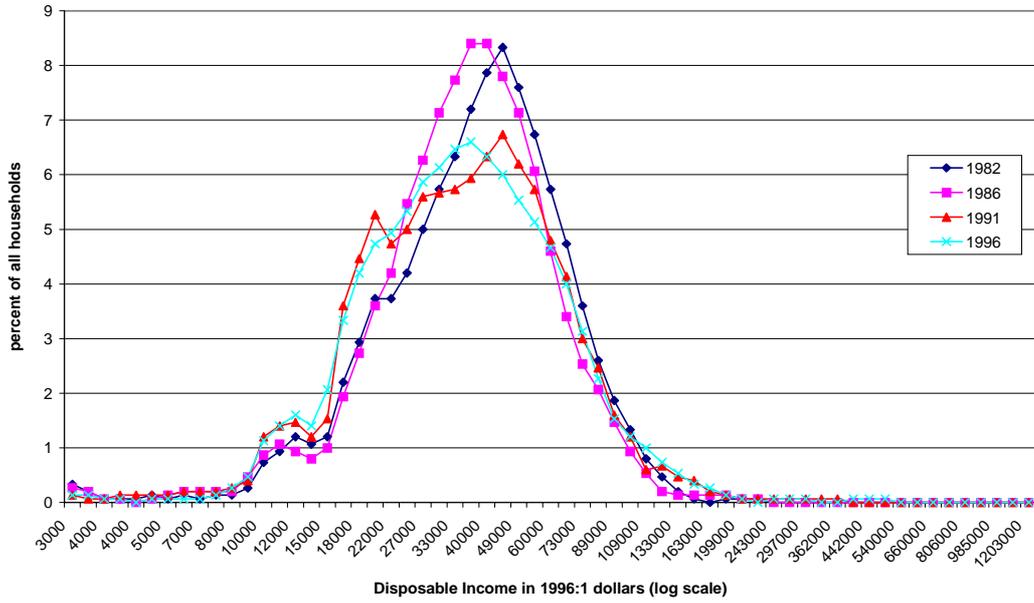
**Appendix Chart 8:   Equivalent Household Disposable Income.
Changes in its distribution - 1981/82 to 1995/6. Smoothed**

Equivalent Disposable income in 1996:1 dollars (log scale)

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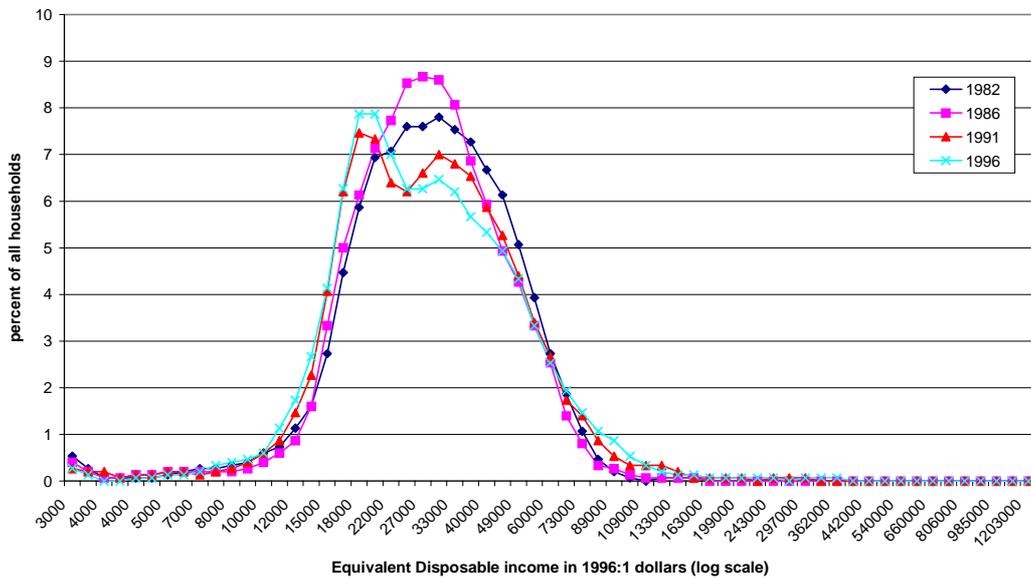
Notes: Average and median incomes are given in the following tables to the nearest dollar. This is for convenience. It should not be taken to imply that they are accurate to that level. In fact 95% confidence intervals will be of the order of several hundred dollars either side of the given estimates.

Means and medians are given in terms of March quarter 1996 dollars. The CPI was used to convert Disposable Income measures to this basis. For Market Income and Gross Income, the price index used was a Reserve Bank index, excluding GST and interest rate effects.

Appendix Table 1:
Mean and Median Individual Market Incomes

		1981/82	1985/86	1990/91	1995/96
Males					
	Mean	26,133	25,254	26,742	27,897
	Median	24,747	23,714	23,277	22,069
	Ratio	1.06	1.06	1.15	1.26
Females					
	Mean	9,285	10,123	11,528	12,580
	Median	3,651	5,400	4,680	5,489
	Ratio	2.54	1.87	2.46	2.29
	Source:	HES			

Appendix table 2:

    Means and Medians - Household Income

Mean Household Incomes

	1981/82	1985/86	1990/91	1995/96
Market income:				
Actual	43,300	41,780	44,533	46,175
Equivalent	31,681	31,488	34,319	35,841
Gross income:				
Actual	47,797	46,778	51,321	51,651
Equivalent	35,459	35,811	40,372	40,715
Disposable income:				
Actual	40,422	38,076	39,305	39,641
Equivalent	30,017	29,047	30,884	31,196

Median Household Incomes

	1981/82	1985/86	1990/91	1995/96
Market income:				
Actual	40,007	37,487	39,040	38,791
Equivalent	28,798	27,987	29,901	29,581
Gross income:				
Actual	42,822	40,830	42,999	41,868
Equivalent	31,348	30,971	33,843	32,725
Disposable income:				
Actual	37,562	34,397	33,500	32,785
Equivalent	27,197	26,282	26,349	25,399

Ratio Mean/Median

	1981/82	1985/86	1990/91	1995/96
Market income:				
Actual	1.08	1.11	1.14	1.19
Equivalent	1.10	1.13	1.15	1.21
Gross income:				
Actual	1.12	1.15	1.19	1.23
Equivalent	1.13	1.16	1.19	1.24
Disposable income:				
Actual	1.08	1.11	1.17	1.21
Equivalent	1.10	1.11	1.17	1.23

Source: HES

Appendix Table 3:
Gini Coefficients: Household Incomes - All Persons

	1981/82	1985/86	1990/91	1995/96
Market income:				
Actual	0.390	0.400	0.474	0.481
Equivalent	0.386	0.396	0.470	0.479
Gross income:				
Actual	0.325	0.320	0.368	0.384
Equivalent	0.306	0.303	0.346	0.369
Disposable income:				
Actual	0.283	0.278	0.334	0.341
Equivalent	0.259	0.253	0.307	0.322

**Appendix Chart 9: Gini Coefficients for Various measures of Household Income.
1981/82 to 1995/96**

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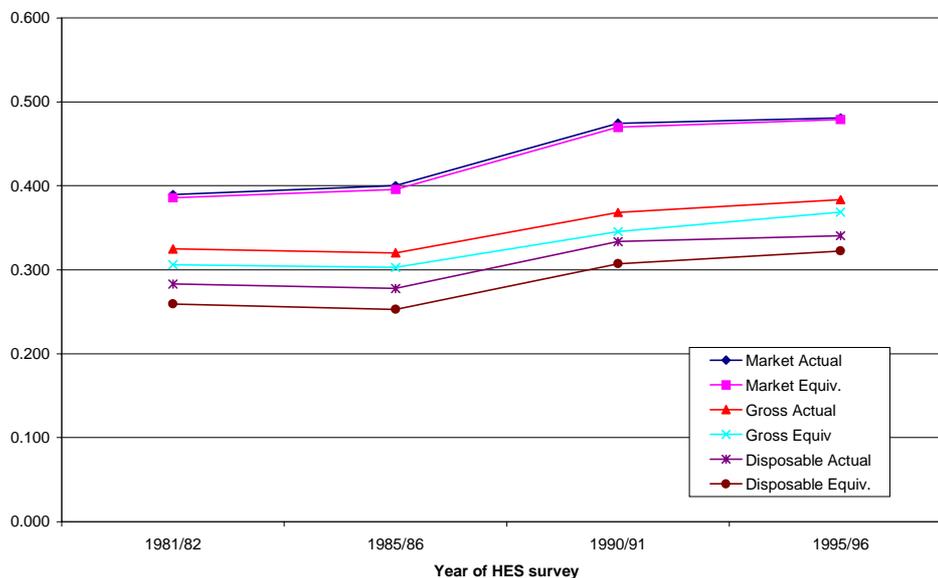
Table 4A: One-Year Market Income Transition Probabilities, 1994-98

| First-Year State | Second-Year State | | | | | | | | Sample Fraction |
| | Missing Data | Negative Income | Zero Income | Positive Market Income Quintile | | | | | |
				1	2	3	4	5	
Males									
Missing Data	**0.603**	0.001	0.061	0.202	0.070	0.026	0.020	0.016	0.113
Income<0	0.012	**0.445**	0.190	0.215	0.081	0.032	0.020	0.004	0.005
Income=0	0.052	0.011	**0.667**	0.193	0.051	0.014	0.007	0.005	0.097
1st Quintile	0.098	0.008	0.120	**0.482**	0.192	0.062	0.027	0.012	0.156
2nd Quintile	0.038	0.002	0.031	0.160	**0.488**	0.196	0.058	0.028	0.158
3rd Quintile	0.018	0.001	0.011	0.054	0.159	**0.539**	0.173	0.045	0.158
4th Quintile	0.013	0.001	0.008	0.027	0.054	0.139	**0.596**	0.163	0.157
Top Quintile	0.016	0.001	0.007	0.021	0.031	0.043	0.133	**0.748**	0.156
Sample Fraction	0.102	0.006	0.100	0.159	0.159	0.159	0.158	0.158	
Females									
Missing Data	**0.591**	0.002	0.086	0.171	0.077	0.036	0.023	0.015	0.121
Income<0	0.020	**0.368**	0.251	0.216	0.082	0.041	0.016	0.008	0.006
Income=0	0.039	0.011	**0.708**	0.154	0.055	0.021	0.008	0.003	0.151
1st Quintile	0.091	0.006	0.160	**0.442**	0.203	0.062	0.025	0.012	0.146
2nd Quintile	0.046	0.004	0.057	0.150	**0.443**	0.216	0.060	0.024	0.145
3rd Quintile	0.029	0.001	0.025	0.056	0.161	**0.489**	0.195	0.047	0.145
4th Quintile	0.021	0.001	0.010	0.024	0.052	0.144	**0.572**	0.177	0.144
Top Quintile	0.016	0.0004	0.007	0.015	0.029	0.048	0.135	**0.749**	0.143
Sample Fraction	0.107	0.006	0.156	0.145	0.147	0.146	0.147	0.147	

Notes: Entries are relative frequencies of being in the Second-year state, conditional on being in the First-year state, averaged over the 1994-95, 1995-96, 1996-97 and 1997-98 transitions. Income quintiles are age-specific quintiles, based on all positive sample incomes. Sample sizes = 23,197 males; 22,887 females.

Table 4D: Four-Year Market Income Transition Probabilities, 1994-98

First-Year State	Fifth-Year State								Sample Fraction
	Missing Data	Negative Income	Zero Income	Positive Market Income Quintile					
				1	2	3	4	5	
Males									
Missing Data	**0.288**	0.003	0.105	0.267	0.130	0.074	0.065	0.068	0.145
Income<0	0.082	**0.180**	0.197	0.221	0.115	0.098	0.066	0.041	0.005
Income=0	0.084	0.015	**0.469**	0.211	0.112	0.056	0.032	0.021	0.098
1st Quintile	0.094	0.010	0.166	**0.306**	0.200	0.115	0.069	0.041	0.148
2nd Quintile	0.083	0.005	0.066	0.157	**0.292**	0.217	0.111	0.070	0.150
3rd Quintile	0.053	0.002	0.038	0.087	0.179	**0.343**	0.207	0.091	0.150
4th Quintile	0.049	0.002	0.032	0.062	0.094	0.164	**0.386**	0.211	0.152
Top Quintile	0.060	0.002	0.022	0.053	0.056	0.076	0.172	**0.559**	0.151
Sample Fraction	0.101	0.006	0.111	0.160	0.154	0.154	0.156	0.159	
Females									
Missing Data	**0.251**	0.006	0.148	0.199	0.146	0.102	0.073	0.073	0.157
Income<0	0.058	**0.133**	0.292	0.225	0.092	0.117	0.058	0.025	0.005
Income=0	0.059	0.013	**0.518**	0.163	0.118	0.070	0.039	0.021	0.147
1st Quintile	0.090	0.008	0.218	**0.251**	0.197	0.121	0.071	0.044	0.142
2nd Quintile	0.069	0.007	0.109	0.145	**0.240**	0.219	0.134	0.076	0.137
3rd Quintile	0.081	0.003	0.079	0.086	0.160	**0.261**	0.230	0.101	0.139
4th Quintile	0.072	0.002	0.047	0.056	0.086	0.150	**0.341**	0.246	0.137
Top Quintile	0.069	0.001	0.029	0.043	0.073	0.091	0.157	**0.538**	0.137
Sample Fraction	0.101	0.006	0.168	0.137	0.146	0.143	0.146	0.153	

Notes: Entries are relative frequencies of being in the Fourth-year state, conditional on being in the First-year state, over the 1994-98 transitions. Income quintiles are age-specific quintiles, based on all positive sample incomes. Sample sizes = 23,197 males; 22,887 females.

Table 5. Share and Concentration Coefficients, and contributions to increase in inequality of Household Equivalent Disposable Income.

(from unpublished table on Statistics NZ web-site)

Figure A4.2   (Note: this figure does not appear in the Statistics NZ publication)
Share Coefficients and Concentration Coefficients

		Wages and salaries	Self employment	Investment	Social Welfare benefits	NZ Superannuation	Direct Taxes	Market income residual	Total income residual
Share coefficients	1981/82	0.990	0.158	0.059	0.061	0.085	-0.373	0.019	0.000
	1985/86	0.953	0.148	0.089	0.069	0.093	-0.378	0.021	0.004
	1990/91	0.880	0.123	0.073	0.085	0.103	-0.291	0.021	0.005
	1995/96	0.909	0.147	0.062	0.071	0.081	-0.305	0.030	0.004
Concentration coefficients	1981/82	0.333	0.516	0.495	-0.245	-0.154	0.429	0.370	0.000
	1985/86	0.335	0.489	0.556	-0.292	-0.172	0.436	0.576	0.144
	1990/91	0.388	0.702	0.630	-0.303	-0.143	0.473	0.533	0.013
	1995/96	0.409	0.703	0.510	-0.348	-0.215	0.508	0.446	-0.171
Contribution to changes in Gini Coefficient									
a) Share effect	81/82 to 85/86	-0.012	-0.005	0.016	-0.002	-0.001	-0.002	0.001	0.000
	85/86 to 90/91	-0.026	-0.015	-0.010	-0.005	-0.002	0.040	0.000	0.000
	90/91 to 95/96	0.012	0.017	-0.006	0.005	0.004	-0.007	0.005	0.000
b) Concentration effect	81/82 to 85/86	0.002	-0.004	0.005	-0.003	-0.002	-0.003	0.004	0.000
	85/86 to 90/91	0.049	0.029	0.006	-0.001	0.003	-0.012	-0.001	-0.001
	90/91 to 95/96	0.018	0.000	-0.008	-0.003	-0.007	-0.010	-0.002	-0.001
Combined	81/82 to 85/86	-0.010	-0.009	0.021	-0.005	-0.003	-0.005	0.005	0.001
	85/86 to 90/91	0.023	0.014	-0.004	-0.006	0.001	0.028	-0.001	0.000
	90/91 to 95/96	0.030	0.017	-0.014	0.001	-0.003	-0.017	0.002	-0.001

Source: Calculations as per Prodder and Chatterjee (1998); but extended to bring in Direct Income taxes.

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