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Sub-National Income Differentials, 1986 - 1996

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INTRODUCTION

This paper deals with regional personal and family incomes, and particularly inter-regional income inequality. It is primarily a descriptive work. The explanatory framework of why incomes of regions are unequal and changing in the ways observed is not the focus. Regional economic development will be briefly referred to as an explanatory setting, but a discussion of the connections between income patterns and trends, and economic development, is a topic which requires research and data somewhat beyond the scope of this initial, exploratory paper.

New Zealand had little regional income inequality by international standards a few decades ago (Williamson, 1965; Jensen, 1969). Somewhat paradoxically, there was a relatively high level of concern in the 1960s and 1970s about unequal development in the regions. In the 1980s, this concern became displaced by attention to developments in the national economy. There seems to have been an underlying assumption at that time, either that there were no regional issues, or that regional problems would be rectified by attending to national problems such as unemployment (Lowe, 1991).

Nationally, it has been found that the degree of income inequality in New Zealand among both individuals and families has been steadily increasing at least since the 1986 census, and in fact can be traced back to the 1970s (Martin, 1997a; 1997b; 1999). The general increase in income inequality stems from changes in the economic and policy environment which have affected all of the OECD countries since the 1970s. This increase in inequality extends to regional personal and household incomes in Australia, the United Kingdom and the United States (Cashin and Strappazon, 1998; Jenkins, 1995; Grubb and Wilson, 1992).

We find here that this increase in income inequality extends to income inequality between regions. Moreover, there is a clear difference between the principal cities and the northern half of the North Island on the one hand, and the rest of the country on the other hand. In the course of the increase in regional income inequality, there has been some reordering of regions with respect to income level. The gap between Auckland and Wellington cities and the rest of the country has grown, while the relative position of some regions, most notably Northland has slipped, while the relative position of some others has improved.

Data and Methodology

Regional incomes, both family and individual, can be obtained from the public record via the published census, and Supermap 3, Statistics New Zealand's computerised version of the Census. However, only personal incomes are available at a regional level from censuses prior to the 1996 census. Furthermore, while Supermap 3 does offer a choice of both personal, family and household incomes from the 1996 census, it has the disadvantage that cross-tabulations are pre-selected and limited in choice. For example, incomes by both region and ethnicity are not available. For this paper, individuals by sex, age and region, and families by number of adults and number of adults in the labour force

by region were chosen as potentially the most useful datasets for 1996. Historical data for individuals for 1986 and 1991 were also used. The geographical divisions used were Regional Council areas. The five largest cities (Auckland, Hamilton, Wellington, Christchurch and Dunedin) were also taken from the Territorial Local Authority series and included here. Their respective populations were deducted from their surrounding regions. For example, 'Auckland region' refers to the region excluding the four Territorial Local Authorities which make up 'Auckland city'.

When discussing regional variations, it is important to bear in mind the concentration of population. New Zealand has been divided here into 15 regions and 5 cities, but 60 per cent of individuals aged 15 years or more are found in the 5 cities alone, and 47 per cent are found in the northern half of the North Island.[1] Thus national statistics (for example, unemployment rates or average incomes) are influenced by these geographical distributions of population. This has the effect of minimising the differences between say, Auckland and Wellington cities, and the rest of the country.

Also included is a discussion of regional variations in labour force participation. It would have been desirable to have incomes of individuals by region cross-tabulated with labour force status and other employment-related variables such as occupation, but this was not available. Also, labour force participation data are not available by Territorial Local Authority. Thus while the five principal cities are a distinct grouping with respect to incomes, their labour force participation patterns and trends could not be distinguished in the data. The regions in which the three principal cities of Auckland, Wellington and Christchurch are situated were used as a proxy for cities.

It is necessary to outline the measurement of income inequality within regions. Measuring income inequality between regions is relatively unproblematic; it has been done in this paper by comparing average (mean) incomes of regions. Measuring income inequality within regions is definitely problematic. Usually, income inequality is measured with a summary index number. However, no index is perfect, and there is frequently disagreement among indices, because of their individual properties, and the way they respond to the data (Martin, 1999: 62, 160, 230). In order to minimise error measuring inequality within regions, three indices frequently used in incomes analysis were employed. These are the Gini coefficient, the Theil coefficient and the ratio of the 90th and 10th percentiles. To a large extent, there was agreement. However, there was not enough agreement to ascertain an exact rank order of regions with respect to degree of income inequality. In order to clarify the reasons why the three indices did not agree, cumulative distributions of income were computed.

The Lorenz curve is the graphical form of the cumulative distribution of income; it is a popular graphical device for this purpose. The cumulative percentages of the population are on the horizontal axis, and on the vertical axis are cumulative percentages of income (such as are contained in Tables A4 and A5 in the Appendix). A population will have a more unequal distribution of income if its Lorenz curve lies completely outside the other population's curve. In situations where indices disagree as to rank order of regions, it will be found that Lorenz curves of populations being compared cross at some point, and thus

there is some ambiguity as to which population has the more unequal distribution of income. This situation may be illustrated as follows: in population A, the top 20 per cent has 52.5 per cent of total income, and the bottom 40 per cent has 9.6 per cent of total income. In population B, the analogous figures are 53.1 per cent and 10.8 per cent. Which has the more unequal distribution of income?

When looking at the bottom 40 per cent, population A is the more unequal because their bottom 40 per cent has a lesser income share. But when looking at the top 20 per cent population B is more unequal, because this quintile has a greater share of total income. In order to determine which population has the more unequal distribution of income, it is necessary to first decide which is more important, the bottom 40 per cent's share, or the top 20 per cent's share. This sort of decision requires personal or social judgement as to what constitutes inequitability.[2] Although cumulative distributions of income did not help determine the rank order of regions, they did clarify the reasons for the ambiguity of the evidence. This ambiguity is discussed in the text.

Regional Economic Development and Income Distribution

Theoretical work in the 1950s and 1960s posited (under an assumption of economic growth) that income inequalities between regions should follow the same path as the Kuznets model of national income inequalities. That is, after a phase (in the nineteenth century) in which inequalities increase, inequalities should be decreasing (Kuznets, 1958; Myrdal, 1957; Williamson, 1965; Cashin and Strappazon, 1998). According to Williamson (1965), any initial disadvantage of regions should in the later stages of economic development be ameliorated by national development in infrastructure, including distributional networks for goods and services, from improved flow of labour and capital, and by proactive government policies to equalise development. This is not, however, to say that regional inequalities are predicted to ultimately disappear completely, only that inequalities will be reduced.

Regional economic and social conditions are now back on the agenda of national concerns (Morrison, 1997). Government is identified as the key reason why regions have been performing poorly, either for impeding the process of regional adjustment by propping up regional economies for social reasons (Cashin and Strappazon, 1998), or for being insufficiently interested and providing insufficient funding (Morrison, 1997). These points of view draw upon both regional income and labour market data. The latter (the labour market) essentially determines the former (regional income levels and degree of income inequality). But, as Morrison points out, not a lot is known about the actual behaviour of regional labour markets. He has emphasised the necessity of taking a broad view of regional labour market functioning, looking at not just differences between regions in full time salaries/wages levels and in unemployment rates, but also differences in labour force participation rates and in proportion of part time and/or occasional workers (Morrison, 1997). Thus some regions may have low unemployment rates (suggesting a strong labour market), but also have low labour force participation rates (Morrison, 1997: 84). Regional variation in female labour force participation may be part of the explanation of differences in the latter (Morrison, 1997:87; Hyman, 1979).

Regional Patterns in Labour Force Participation

Regional differences in incomes will be essentially explained by regional differences in the industrial and occupational composition of their economies, and by differences in the strength or degree of activity in those economies. One aspect of economic activity is labour force participation. The national pattern with respect to male labour force participation rates is of 80 to 90 per cent participation,[3] declining slowly in recent time, while female participation rates have been over 60 per cent since the 1980s, and steadily increasing.

There are two axes of differences between regions in labour force participation. One is between the cities and the non-metropolitan regions, the other is the difference between the North and South Islands. With respect to full time employment rates of males, the difference between cities and the regions is greater than the difference between the North and South Islands. The cities have had higher rates of male full-time employment than the non-metropolitan regions, and the disparity between cities and regions has grown over time. This is shown in Table 1. The city-regions disparity is larger among females than among males (Panel B of Table 1). The disparity among females has also widened over time, but not as rapidly as among males.

Table 1: Full Time Employment Rates, Males and Females, Cities and Regions, 1986-1996

A Males	**1986**	**1991**	**1996**
Cities	68.8	58.8	60.5
Regions	67.4	57.0	58.7
Disparity	1.4	1.8	1.7
B Females			
Cities	35.1	33.0	35.9
Regions	30.9	28.6	31.3
Disparity	4.3	4.4	4.6

Note: 'Cities' defined as Auckland, Wellington and Canterbury Regions.

The decline in male labour force participation rates has been strongest in non-metropolitan regions in the North Island - Northland, Bay of Plenty, Gisborne, Taranaki and Manawatu-Wanganui.- and also on the West Coast of the South Island. Participation rates in Auckland and Wellington regions, while not declining so strongly, have nevertheless declined at a rate faster than the national average. The decline has been least evident in the South Island., excluding Otago region.

Female labour force participation rates manifest clear regional differences, both between the cities and the regions, and between the North and South Islands. Nationally, the full time participation rate has increased, but only slightly (by 4.6 percentage points between

1986 and 1996). In the North Island, the average participation rate has increased by 3.7 percentage points. In the South Island, the average participation rate has increased by 7.2 percentage points.

While the growth in female full time labour force participation rates has been slow, the growth of female part time employment has been relatively rapid. Again, rates are higher in the metropolitan regions and in the North Island generally than in the rest of the country, and have also increased more rapidly in these places. The greater disparity of the two types of regional groupings is between the North and South Islands. The part time participation rate increased by 3.7 percentage points between 1986 and 1996 in the North Island, but by 5.4 percentage points in the South Island. The least increase has been manifested in Auckland region.

Nationally, unemployment increased strongly in the late 1980s up to 1992; it then declined. The 1996 census showed an unemployment rate much reduced over the 1991 census rate, but still higher than was evident in the 1986 census.[4] Unemployment has struck the North Island more severely than the South Island, and of the North Island regions, Northland, Bay of Plenty and Gisborne are the most severely affected. The South Island has maintained employment fairly well over the ten years 1986-96. The South Island's male unemployment rate is only 0.5 percentage points higher in 1996 than it was in 1996, whereas in the North Island, the male unemployment rate is 1.7 percentage points higher. In Northland, Bay of Plenty, and Gisborne, the unemployment rate is 2.5, 3.4 and 3.1 percentage points higher respectively.

Regional Change in Incomes, 1986 - 1996

Some introductory comments are necessary before discussing the detail of regional incomes. Firstly, in terms of all the dimensions of income inequality, regional inequalities are relatively insignificant. Other attributes such as age, sex and labour force status account for a larger part of the variance of incomes.[5] Table 2 shows national income inequality from 1986 to 1996, divided into inequality within regions and inequality between regions. The Theil index used here, is one of four indices frequently used for this purpose (Martin, 1999:63-64). On the basis of apportioning inequality within and between regions, inequality between regions accounts for less than 2 per cent of the total. This is true whether one measures inequality among men and women (panel A), or (controlling for the large income gap between the sexes), among men by themselves (panel B).[6]

While region may be insignificant as a determinant of income of the individual person, family or household relative to age, sex or labour force status, the regional dimension is nevertheless important in public policy. Some inequalities - by age or labour force status for example - are tacitly accepted as equitable. Others - such as ethnic or regional inequalities - are treated in public policy as inequitable. Thus regional income inequality is worth researching as a policy issue.

Table 2: Within-Region and Between-Region Elements of the Theil National Income Inequality Index, 1986-1996

Index Element	**1986**	**1991**	**1996**
A Males and Females			
Within Regions	0.3382	0.3404	0.4581
Between Regions	0.0039	0.0058	0..0064
Between Regions as % of total	1.2	1.7	1.4
Total	0.3421	0.3462	0.4646
B Males Only			
Within Regions	0.2656	0.3040	0.4144
Between Regions	0.0039	0.0062	0.0051
Between Regions as % of total	1.5	2.0	1.2
Total	0.2695	0.3102	0.4195

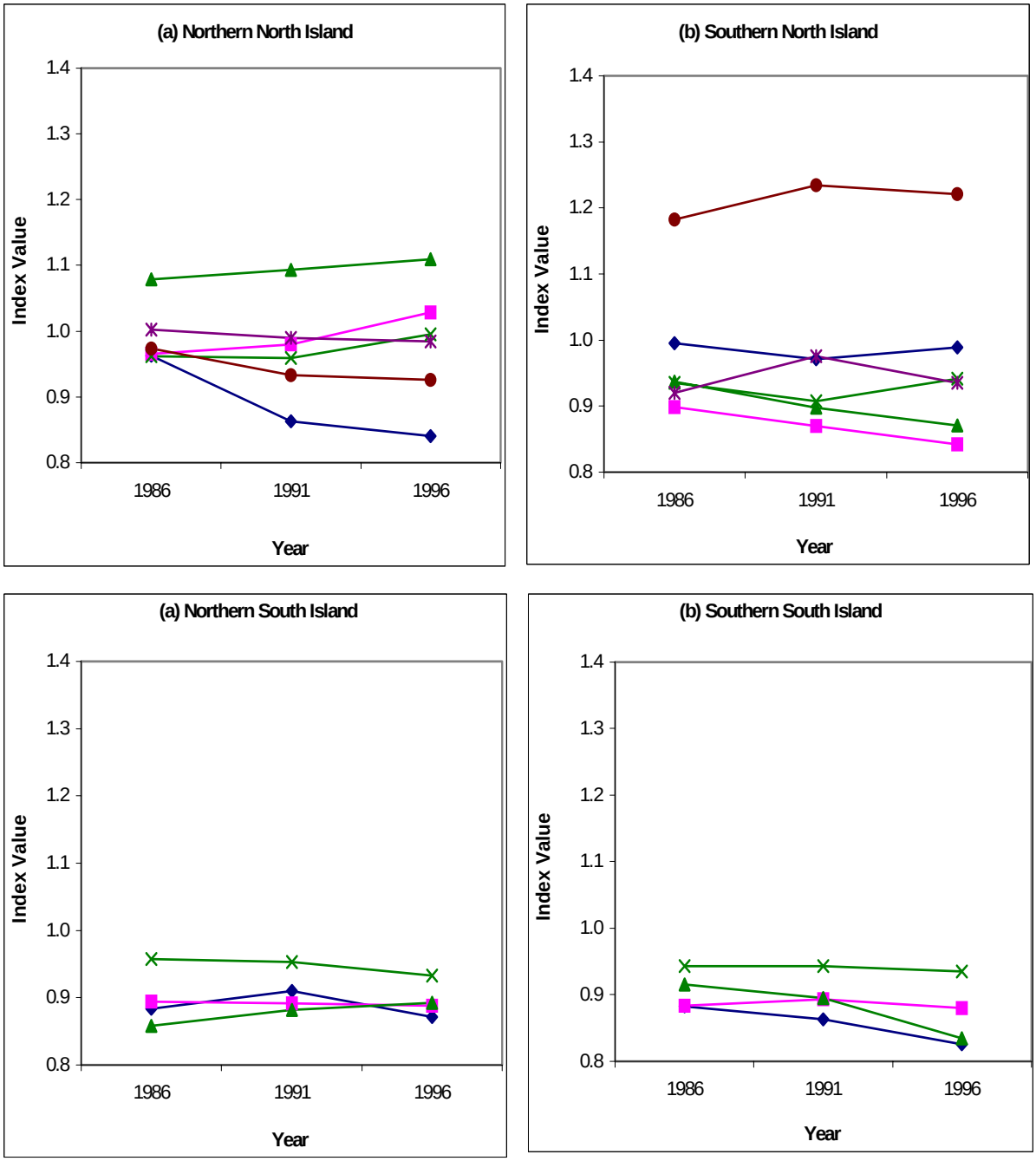
Refers to population aged 15 Years +.

Figure 1 (overleaf) shows how income relativities between the 20 regions/cities have changed between 1986 and 1996. The incomes data are also shown in Table A1 in the Appendix. In 1986, incomes in the northern half of the North Island and in Wellington and Christchurch cities were above the average; everywhere else was below the average. In most cases, the income differences were small. The lowest income regions in the South Island had incomes only 10 to 12 per cent below average. Wellington and Auckland cities however, stood apart as having average incomes 18 and 8 per cent respectively above the average.

Over the ten years between 1986 and 1996, a clearer differentiation between these two cities and the rest of the country has taken shape. By 1996, incomes were 22 and 11 per cent respectively above the average in Wellington and Auckland. This rise in relative position did not befall the other three principal cities. Two of the three - Hamilton and Christchurch - roughly retained their relative positions (at 2 per cent and 7 per cent respectively below, the average respectively). Changes affecting the fifth city, Dunedin, will be referred to shortly.

The relative income positions of New Zealand's regions and cities as at 1996 may be grouped into three blocs. These are shown in Table 3. The general profile of regional income inequalities is the same as in 1986, that is, the principal difference being between the northern half of the North Island plus Wellington and the rest of the country. Between 1986 and 1996, that difference had become more accentuated. However, the foregoing generalisation has to be treated with some caution.

Figure 1: Mean Incomes of Individuals in Regions and Cities Indexed to the National Average



Key: (a) Northern North Island: ◆ Northland; ■ Auckland region; ▲ Auckland city; ✕ Waikato; ❋ Hamilton city; ● Bay of Plenty; (b) Southern North Island: ◆ Taranaki; ■ Gisborne; ▲ Hawkes Bay; ✕ Manawatu-Wanganui; ❋ Wellington region; ● Wellington city.
(c) Northern South Island: ◆ Marlborough; ■ Nelson; ▲ Canterbury; ✕ Christchurch city;
(d) Southern South Island ❋ West Coast; ● Otago; ▲ Dunedin city; ✕ Southland.

Table 3: Income Rank Order of Cities and Regions, 1996, with Change 1986-1996 Relative to National Average

High	Medium	Low
Wellington City (+3.9)	Manawatu-Wanganui (+0.7)	Nelson (-0.6)
Auckland City (+3.1)	Wellington Region (+1.5)	Otago (-0.3)
Auckland Region (+6.2)	Southland (-0.8)	Marlborough (-1.2)
Rural Waikato (+3.3)	Christchurch City (-2.6)	Hawkes Bay (-6.7)
Taranaki (-0.6)	Bay of Plenty (-4.7)	Gisborne (-5.7)
Hamilton City (-1.8)	Canterbury (+3.5)	Northland (-12.2)
		Dunedin City (-8.1)
		West Coast (-5.7)

Regions/cities are divided into three groups, as at 1996, defined as follows: *High*: 5 per cent or more above the average. *Medium*: less than +5 per cent and more than -5 per cent of the average. *Low*: 5 per cent or more below the average. Regions/cities are in rank order within each group. Figures in brackets are amount of percentage point change relative to the national mean income since 1986.
Source: Table A1.

Much of the South Island - Southland, Otago, Nelson and Marlborough - underwent a modest income rise in relative terms between 1991 and 1996. The Wellington, Manawatu-Wanganui and Taranaki regions of the mid- to southern North Island also experienced a modest income rise in relative terms. The relative rise did not however extend to Hamilton city. Christchurch city's average income, which was 4.2 per cent below the national average in 1986, fell in relative terms to 6.8 per cent below the national average in 1996, a very slight change but enough to cause it to be disassociated in rank order from Auckland, Wellington and Hamilton. Hawkes Bay and Gisborne regions, being 6.3 and 10.1 per cent respectively below the national average in 1986, fell to 13 and 15.8 per cent respectively below the national average in 1996. The position of Dunedin also belies the generalisation that the cities are relatively favoured in economic/income terms. Having had a mean income 8.5 per cent below the national average in 1986, it experienced a strong deterioration in its relative position, to 16.6 per cent below the national average income in 1996, the most precipitate decline of the 20 regions and cities presented here. The second most precipitate decline was that undergone by Northland. In 1986, it had an average income level slightly below average, but by 1996 it had an income level 15.9 per cent below the national average, a fall relative to the national average income of 12.2 percentage points.

Inequality within Regions, 1996

In addition to differences in average income level between regions and cities, there is some variation in the degree of within-region/city income inequality. Indices of the degree of income inequality in each region/city are shown in Tables A2 to A5 in the Appendix. Tables A2 and A3 show income inequality as measured with three indices. As discussed above, the indices show that there is agreement to a large extent, but not entire agreement,

because of the 'Lorenz curve problem'.[7] In order to clarify the reasons for the disagreement, Lorenz curve distributions were computed, and the derived data are shown in Tables A4 and A5.[8]

Table 4 and 5 hereunder present the regions and cities with the highest and lowest degrees of income inequality as can best be determined from the evidence. Clearly, families data present a quite different picture from data on individuals. The cities tend to have the most equality of incomes with respect to families, while a relatively low degree of income inequality among individuals tends to be found in medium- to low-income regions such as Marlborough. Yet the converse does not hold. There is no correlation between regions with the most equality among individuals and those with the least equality among families.

Table 4: The Five Regions/Cities with the Highest Degree of Income Inequality, 1996; (a) Individuals; (b) Families

Individuals	**Families**
Auckland City	Auckland Region
Waikato	Bay of Plenty
Wellington City	Canterbury
Dunedin City	Hawkes Bay
Auckland Region	Northland

Note: Cities and regions are in rank order of degree of inequality with respect to families. With respect to individuals, the rank order could not be determined, except for Auckland Region, which clearly ranked fifth in terms of degree of income inequality. Refer text, endnotes and appendix tables for discussion of the measurement issues.

The evidence appears to show that the regions/cities with high individual incomes (Auckland region, Auckland city, Waikato, Taranaki, Wellington) generally also have the greatest degree of dispersion of incomes, while the regions which are middle-ranking in terms of income level (eg. Nelson, Marlborough) generally have the most homogeneity of incomes. Low income regions (Northland, Gisborne, West Coast) have middle-ranking degrees of income inequality. According to the Gini index and the 90/10 percentile ratio, the highest degree of income inequality is found in Auckland city, yet the Theil index suggests that it the highest degree of income inequality among individuals is to be found in the Waikato region.

Reference to cumulative percentile distributions of income throws some light on why indices vary in their rank ordering of regions. In the Waikato, the top 20 per cent of individuals have a higher share of total income (53.1 per cent, as opposed to 52.5 per cent in Auckland city). But the bottom 40 per cent of individuals in the Waikato also have a higher share of total regional/city income (10.8 per cent), than they do in Auckland city (9.6 per cent). It is not therefore possible to decide which of the two has a more unequal distribution of income. Similarly, the top 20 per cent of individuals in Wellington city

have the same share of their city's income as their counterparts in Auckland city do, but the bottom 40 per cent of Wellington individuals have a slightly higher share (9.7 per cent) than in Auckland.

Table 5: The Five Regions/Cities with the Lowest Degree of Income Inequality, 1996; (a) Individuals; (b) Families

Individuals	Families
Marlborough	Hamilton City
Nelson	Waikato
Hawkes Bay	Auckland City
Manawatu-Wanganui	Dunedin City
Otago	Manawatu-Wanganui

Note: Cities and regions are in rank order of degree of income inequality with respect to families. With respect to individuals, only Marlborough and Nelson had a clear rank order; the remaining three regions are not in rank order. Refer text, endnotes and appendix tables for discussion of the measurement issues.

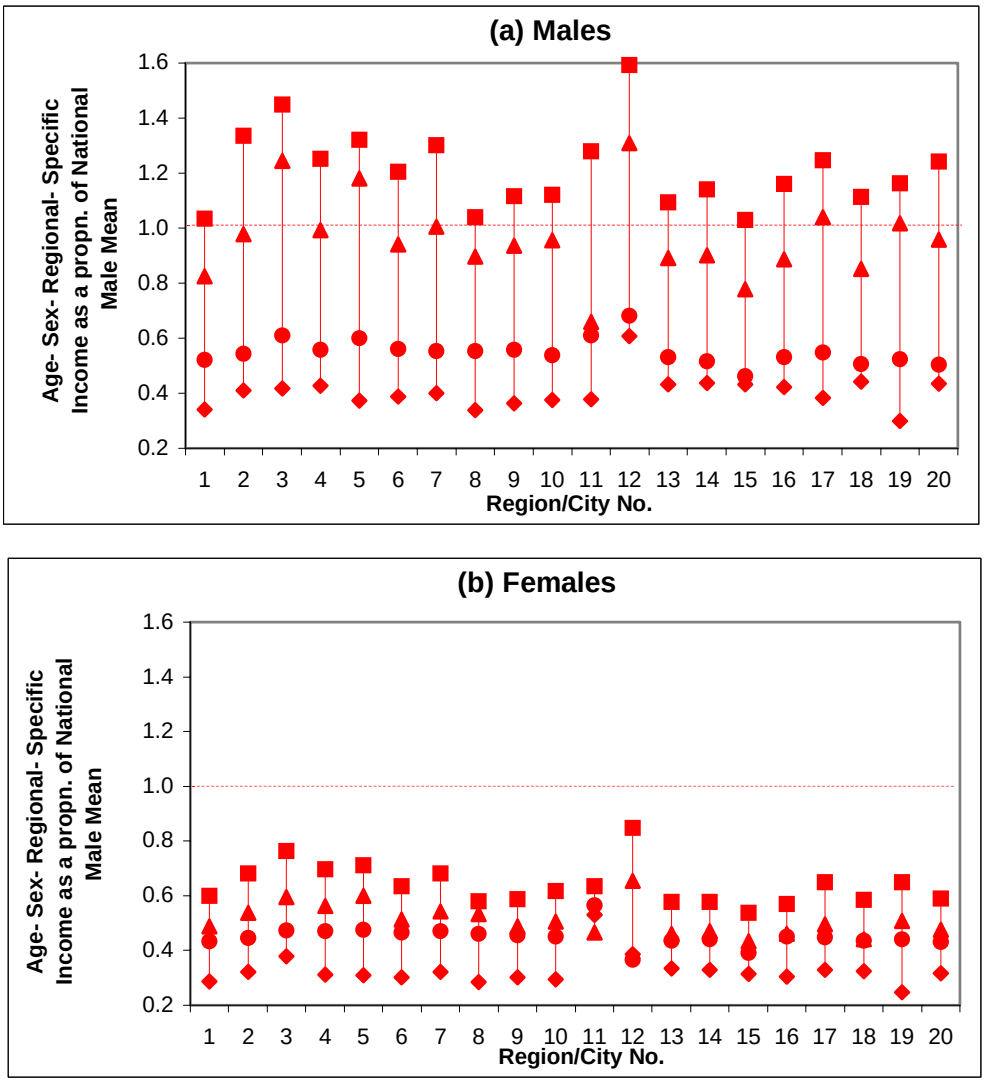
The distribution of income among families is most equal in Hamilton city. There, the top 10 per cent of families have 20.5 per cent of the city's total family income. In Auckland and Wellington cities, where there is also a relatively low degree of family income inequality, the top 10 per cent have 29.6 per cent and 28.3 per cent respectively of their city's total family income. Overall, the highest degrees of family income inequality tend to be found in non-metropolitan regions (e.g. Northland, Hawkes Bay), and the lowest degrees of family income inequality found in the major cities.

Incomes of Individuals by Age and Sex

Disaggregation of incomes by age and sex allows a more complete picture of regional incomes. Regional incomes by sex and age are available from the 1996 census.[9] In Figure 2, mean incomes of age-sex groups by region are indexed to the national male mean income. This shows three distinctive features: (a) considerable variation in incomes of prime age males; (b) a low position of female incomes relative to male incomes; (c) the much lower position of younger males relative to prime working age males.

Males of prime working age (25 to 54 years) can be divided into three groups: (a) those with an annual income 25 per cent or more above the national all-ages average (Wellington city, Auckland city, Auckland region, Hamilton city and Taranaki, with incomes 59, 45, 33, 32 and 30 per cent respectively above this income level). (b) Those with an income between 15 and 25 per cent above the male average (Bay of Plenty, Canterbury and Dunedin city). (c) Those with an income less than 15 per cent above the male average (Northland, Gisborne, Hawkes Bay, Manawatu-Wanganui, Marlborough, Nelson, the West Coast and Otago). Incomes of males at prime working age in Northland, Gisborne and the West Coast are only 3, 4 and 3 per cent respectively above the all-ages average.

Figure 2 Regional Incomes by Age and Sex



Key: ◆ 15 to 24 years ■ 25 to 54 years ▲ 55 to 64 years ● 65 years plus

Region	Region No.	Region	Region No.
Northland	1	Wellington region	11
Auckland region	2	Wellington City	12
Auckland City	3	Marlborough	13
Waikato	4	Nelson	14
Hamilton City	5	West Coast	15
Bay of Plenty	6	Canterbury	16
Taranaki	7	Christchurch City	17
Gisborne	8	Otago	18
Hawkes Bay	9	Dunedin City	19
Manawatu - Wanganui	10	Southland	20

By age 55 to 64 years, incomes are not only lower than at the prime working ages, but the regional variability of incomes has also been reduced. In most regions/cities, men at this age have incomes between 85 and 100 per cent of the national male mean income ($29,000). However, to an extent the metropolitan-provincial disparity is still evident at this age, with men in Auckland city, Hamilton city, and Wellington city having incomes 25, 18, and 31 per cent respectively above the national all-ages average. In Northland, Wellington region and on the West Coast on the other hand, the mean income is 17, 34 and 22 per cent below the national average.

By retirement age (65 years plus), male incomes by region fall within a narrow band of 68 to 46 per cent of the national average. The regional variation is by these ages minimal.

The relative position of young males (15 to 24 years) stands out. With incomes in the range $10,000 to $13,000 a year, their incomes are only about 40 per cent of the national male mean and exhibit even less regional variation than incomes of the retired. Those in Wellington city are the only young males of metropolitan areas to have a relatively high income. Otherwise, there is no distinction between young males in the cities and elsewhere. The lowest income regions at this age are Northland, Gisborne Hawkes Bay and Dunedin city.

The incomes of women at this age (15 to 24 years) are at a slightly lower level ($8,000 to $9,700 per annum) than that of their male counterparts, in the range of 33 to 28 per cent of the national mean of men of all ages, and again show little regional variability. Those living in Auckland city, Wellington city, and Wellington region have the highest income (38, 39 and 53 per cent of the national male mean) while those living in Northland, Gisborne, Manawatu-Wanganui and Dunedin city have the lowest incomes (29, 28, 29 and 25 per cent of the average).

Women in the 25 to 54 years age group generally have an income about two-thirds (64 percent) of the national male average. Women at these ages in Auckland city, Hamilton city, Waikato and Wellington city have incomes 76, 71, 70 and 85 per cent respectively of the male average. The lowest incomes for women at this age are found in Gisborne, Marlborough, Nelson and the West Coast (58, 58, 58 and 54 per cent of the male mean respectively); Northland women also rank as relatively low, but not as among the lowest earners, at 60 per cent of the male mean.

By age 55 to 64 years, women's incomes have fallen to 51 per cent of the male average, although women in Auckland city, Hamilton city, Waikato and Wellington city have incomes between 56 and 65 per cent of the male average. Women in Marlborough, Tasman and the West Coast have the lowest incomes.

The oldest age group of women (65 years plus) have incomes slightly lower than men of the same age. Women of this group living in Auckland, Waikato, Bay of Plenty, Taranaki and Wellington have the highest incomes on average; the lowest income regions are

Northland, Wellington region, Nelson, Marlborough, the West Coast and Canterbury. However, excluding Wellington city, the difference between the highest and lowest regional mean incomes is very slight at only $2,500.

Discussion and Conclusion

Regional differences in income level have increased between 1986 and 1996. Incomes relative to the rest of the country are now higher in Wellington and Auckland cities than they were ten years ago. The greatest contrasts are seen in the North Island, as the widest gaps are between Auckland and Wellington on the one hand, and Northland, and Gisborne regions on the other. The South Island has generally occupied a middle ranking with respect to relative income level, although West Coast has historically been a low income region, and its relative position has continued to decline in the last ten years. The income level of Dunedin city stands out as having declined markedly.

Regional variation in unemployment offers one reason for the increased differentiation between income levels of regions. It is well known that Northland, Gisborne and the West Coast of the South Island have experienced chronically high unemployment levels relative to the rest of the country. Their unemployment levels are clearly reflected in their average income levels. However some regions/cities have experienced declines in full time employment of males greater than other places, and yet continue to have a higher average income level. This is the case when we compare Wellington with the South Island.

The cities and regions with high average incomes, in particular with high average incomes of prime age males, are likely to also be those cities and regions with the highest degree of individual income inequality. This probably indicates that regional income inequalities behave in the same manner as age inequalities. Nationally, it has been found that a higher average income at older ages is associated with a wider degree of income dispersion (Martin, 1999, 169-177). Furthermore, this association leads to any increase in income or earnings inequality (as has occurred in the late 1980s - early 1990s) being concentrated at older ages (Dixon, 1996). Thus males in Wellington and Auckland cities have relatively high earnings and the degree of income inequality is also higher than in the regions. Also, where the average prime age male income is high, the disparity between male and female income levels is also relatively large. The ratio of prime age male to prime age female income is 1.90 and 1.88 respectively in Wellington and Auckland, compared to a ratio of 1.79 in Gisborne for example.

It was observed that family income inequality does not follow the same pattern as income inequality among individuals. The labour force participation data presented suggest that regional variation in family income level and degree of income inequality is due to patterns of labour force participation, specifically the correlation between the participation of spouses. Where there is a relatively low degree of family income

inequality, full time participation rates of males and females are higher, and part time participation rates are lower. Conversely, where there is relatively high family income inequality, full time participation rates are lower, and part time participation rates are higher.

Previous research on income inequality at the national level indicates that the process of increasing differentiation in individual and family incomes will be driven by change in the nature of employment. The evidence in this study suggests that labour force participation is one factor which partially explains why regional income levels are divergent. However, it is not a complete explanation; further research will have to consider change in the structure of regional economies.

NOTES

1. Defined as Northland, Auckland region, Auckland City, Waikato, Hamilton City and Bay of Plenty.

2. Atkinson has addressed this point by devising the so-called 'Atkinson index', which modifies existing inequality indices by introducing the parameter ε. The value of ε ranges from 0, when society is indifferent about the distribution of income, to ∞, when society is only concerned with the position of the lowest income group (Atkinson, 1983: 54-57).

3. Between ages 15 and 59 years.

4. This is true with respect to unemployment of both sexes combined and of men by themselves. It is not true with respect to women, whose unemployment rate is lower in 1996 than it was in 1996.

5. The low explanatory power of geographical location with respect to the income of the individual has to be seen in the context of the power of identifiable attributes of individuals to explain income variance. Seven attributes (age, sex, ethnicity, employment status, hours of employment, occupation, industry) only account for about 55 per cent of variance among employed individuals. This may be increased to something like 70 per cent by taking education, geographical location and an increased number of occupational and industrial categories into account. Thus however many attributes are added, there will still remain a fairly high degree of income variance among individuals (say 30 per cent) not accounted for by the identified attributes (Martin, 1999, 199, 214-215).

6. Among men and among employed women, income inequality has been increasing since the 1970s. However, among men and women combined, income inequality was diminishing from the 1960s up to 1986 or 1991. Women's incomes have been rising relative to men's, principally because of increasing labour force participation. When measuring income inequality among men and women combined, the decreasing income inequality between the sexes has outweighed increasing inequality in other respects. Since the 1986 or 1991 census, income inequality between the sexes has been increasing again. Evidence as to which date is the turning point is not clear. The Theil and the Gini indices show an increase between 1986 and 1991, but three other indices (the Mean Logarithmic Deviation, the Coefficient of Variation, and the Variance of the Logarithm) show a decrease between these two dates (Martin, 1999). The Lorenz curve reveals that

the bottom 40 per cent had a slightly lesser share of total income in 1991 than in 1986, implying an increase in inequality, but also that the bottom 50 per cent and all higher percentiles had a greater share of total income in 1991 than in 1986, implying that there was a more equal distribution of income in 1991.

7. The Gini Coefficient is most sensitive to differences in the middle of the income scale, while the Theil Coefficient is most sensitive at the top end (Levy and Murnane, 1992; Martin, 1998). The third index, the ratio of income at the ninetieth percentile to income at the tenth percentile, is a cruder measure since it only employs two points on the income scale. It cannot distinguish between the disparity between the tenth and fiftieth percentiles, and disparity between the fiftieth and ninetieth percentiles.

8. The Lorenz curve makes poor graphs when there is more than one curve per graph, for the reason that differences between income distributions are too slight to show up. Thus figures are presented here instead.

9. The data in the 1986 and 1991 censuses were not published.

APPENDIX

Table A1: Mean Incomes of Regions

	A Mean income ($1996)			B Indexed income		
	1986	1991	1996	1986	1991	1996
Northland	$20,631	$20,026	$19,222	0.963	0.863	0.841
Auckland region	$20,698	$22,729	$23,510	0.966	0.980	1.028
Auckland city	$23,119	$25,358	$25,376	1.079	1.093	1.110
Rural Waikato	$20,618	$22,255	$22,751	0.962	0.959	0.995
Hamilton city	$21,473	$22,971	$22,498	1.002	0.990	0.984
Bay of Plenty	$20,863	$21,648	$21,179	0.973	0.933	0.926
Taranaki	$21,325	$22,526	$22,620	0.995	0.971	0.989
Gisborne	$19,264	$20,173	$19,261	0.899	0.870	0.842
Hawkes Bay	$20,089	$20,825	$19,900	0.937	0.898	0.870
Manawatu-Wanganui	$20,037	$21,047	$21,529	0.935	0.907	0.942
Wellington region	$19,709	$22,633	$21,385	0.920	0.976	0.935
Wellington city	$25,340	$28,638	$27,922	1.182	1.235	1.221
Marlborough	$18,931	$21,112	$19,921	0.883	0.910	0.871
Nelson	$19,163	$20,677	$20,296	0.894	0.891	0.888
Canterbury	$18,399	$20,461	$20,410	0.858	0.882	0.893
Christchurch city	$20,524	$22,103	$21,320	0.958	0.953	0.932
West Coast	$18,919	$20,026	$18,884	0.883	0.863	0.826
Otago	$18,927	$20,719	$20,117	0.883	0.893	0.880
Dunedin city	$19,616	$20,763	$19,076	0.915	0.895	0.834
Southland	$20,220	$21,869	$21,370	0.943	0.943	0.935
New Zealand	$21,341	$23,198	$22,863	1.000	1.000	1.000

Note: incomes are of men and women aggregated, ages 15 years +.

Table A2: Ranking of Income Inequality of Regions, by Three Indices: Individuals

Region	Theil	Region	Gini	Region	90/10
Waikato	0.4893	Auckland City	0.5105	Auckland City	30.0
Auckland City	0.4892	Waikato	0.5052	Auckland Reg.	24.6
Auckland Reg.	0.4687	Wellington City	0.5029	Hamilton City	22.9
Wellington City	0.4683	Auckland Reg.	0.5011	Dunedin City	22.5
Taranaki	0.4647	Dunedin City	0.4992	Wellington City	21.4
Dunedin City	0.4644	Hamilton City	0.4969	Waikato	19.9
Hamilton City	0.4604	Taranaki	0.4954	Southland	18.9
Northland	0.4573	Northland	0.4877	Canterbury	18.8
Gisborne	0.4460	Bay of Plenty	0.4857	Taranaki	17.7
Bay of Plenty	0.4445	Gisborne	0.4815	Christchurch City	17.6
Canterbury	0.4381	Southland	0.4815	Northland	17.6
Southland	0.4377	Canterbury	0.4800	Gisborne	17.3
Wellington Reg.	0.4356	Wellington Reg.	0.4794	Bay of Plenty	17.1
Christchurch City	0.4287	Christchurch City	0.4791	West Coast	16.6
Manawatu-Wang.	0.4178	Manawatu-Wang.	0.4725	Otago	16.4
West Coast	0.4176	West Coast	0.4717	Hawkes Bay	16.0
Otago	0.4171	Hawkes Bay	0.4692	Manawatu-Wang.	15.9
Hawkes Bay	0.4153	Otago	0.4669	Wellington Reg.	15.1
Nelson	0.4070	Nelson	0.4648	Nelson	14.9
Marlborough	0.3989	Marlborough	0.4570	Marlborough	13.6
New Zealand	0.4646	New Zealand	0.4969	New Zealand	20.9

Table A3: Ranking of Income Inequality of Regions, by Three Indices: Families

Region	Theil	Region	Gini	Region	90/10
Canterbury	0.2953	Bay of Plenty	0.4152	Bay of Plenty	8.26
Bay of Plenty	0.2948	Canterbury	0.4106	Christchurch City	8.09
Auckland Region	0.2940	Auckland Region	0.4056	Southland	6.59
Northland	0.2921	Northland	0.4048	Canterbury	6.56
Hawkes Bay	0.2820	Hawkes Bay	0.4004	Hawkes Bay	6.36
Gisborne	0.2761	Gisborne	0.3999	Gisborne	6.32
Wellington Region	0.2748	Wellington Region	0.3958	Northland	6.25
Southland	0.2701	Christchurch City	0.3944	Otago	6.12
Christchurch City	0.2640	Southland	0.3942	Wellington Region	6.06
Taranaki	0.2628	Otago	0.3850	Auckland Region	6.01
Marlborough	0.2574	Taranaki	0.3849	Taranaki	5.86
Dunedin City	0.2571	Marlborough	0.3834	Marlborough	5.84
Otago	0.2526	Dunedin City	0.3787	West Coast	5.58
West Coast	0.2500	West Coast	0.3760	Hamilton City	5.36
Nelson	0.2489	Nelson	0.3734	Nelson	5.28
Manawatu-Wang.	0.2468	Hamilton City	0.3707	Dunedin City	5.12
Wellington City	0.2464	Manawatu-Wang.	0.3706	Manawatu-Wang.	5.06
Hamilton City	0.2445	Wellington City	0.3693	Wellington City	4.91
Auckland City	0.2364	Auckland City	0.3606	Auckland City	4.59
Waikato	0.2319	Waikato	0.3575	Waikato	4.55
New Zealand	0.2846	New Zealand	0.4050	New Zealand	6.49

Table A4: Cumulative Distributions of Income in the Five Regions and Cities with the Highest Degree of Income Inequality, 1996: (a) Individuals; (b) Families

Region	Percentiles									
(a) Individuals	10th	20th	30th	40th	50th	60th	70th	80th	90th	100th
Auckland Region	0.4	2.4	5.5	10.5	16.2	24.1	34.4	47.9	64.7	100.0
Auckland City	0.3	1.9	4.9	9.6	15.6	23.7	34.1	47.5	63.6	100.0
Waikato	0.5	2.6	5.9	10.8	16.3	24.0	34.0	46.9	63.3	100.0
Wellington City	0.4	2.2	5.2	9.7	15.9	24.4	34.9	47.5	64.4	100.0
Dunedin City	0.7	2.0	6.0	9.9	16.5	23.9	34.2	47.7	65.4	100.0
(b) Families										
Northland	2.0	5.7	10.3	16.4	23.8	31.9	42.2	55.4	70.1	100.0
Auckland Region	1.3	4.3	8.5	14.0	20.8	29.6	39.4	51.6	68.8	100.0
Bay of Plenty	1.8	5.0	9.6	15.3	22.0	30.4	41.4	52.6	68.2	100.0
Hawkes Bay	2.0	5.5	10.4	16.4	23.4	32.0	42.8	54.8	69.9	100.0
Canterbury	1.9	5.4	9.8	15.6	22.7	30.7	40.7	53.8	68.9	100.0

Table A5: Cumulative Distributions of Income in the Five Regions and Cities with the Lowest Degree of Income Inequality, 1996: (a) Individuals; (b) Families

Region	Percentile									
(a) Individuals	10th	20th	30th	40th	50th	60th	70th	80th	90th	100th
Hawkes Bay	0.7	3.0	6.8	12.1	18.4	26.5	36.8	50.0	67.1	100.0
Manaw.-Wang.	0.7	3.0	6.5	11.7	17.7	26.1	36.8	50.2	67.0	100.0
Nelson	0.7	3.2	6.8	12.5	18.5	26.9	37.5	50.8	67.7	100.0
Marlborough	0.8	3.3	7.1	12.7	19.0	27.5	38.1	51.2	68.0	100.0
Otago	0.6	3.0	6.7	12.1	18.3	26.7	37.4	50.5	67.4	100.0
(b) Families										
Auckland City	2.2	6.2	11.3	17.6	25.1	33.1	43.4	56.1	70.4	100.0
Waikato	2.4	6.4	11.8	18.1	25.7	33.8	44.0	56.8	70.7	100.0
Hamilton City	1.6	5.7	12.2	20.1	30.0	40.8	52.8	65.7	79.5	100.0
Manaw.-Wang.	2.1	5.8	10.7	16.7	24.0	32.6	42.9	55.5	70.4	100.0
Dunedin City	2.1	6.1	10.7	16.8	24.1	32.6	43.0	55.7	70.1	100.0

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