# INCOME DISPARITIES AND POPULATION MOVEMENTS IN VICTORIA

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ABSTRACT Are disparities in per capita incomes between Statistical Divisions in Victoria increasing? Is there evidence of concomitant changes in population in these areas? In this study, Australian Bureau of Statistics (ABS) Census data for Victoria from 1981 to 1996 was fitted to boundaries for the 1996 Statistical Divisions (SDs) and analysed to assess changes in income distribution between and within SDs. The dispersion of per capita income between Victorian SDs has increased over this period. The distributions of income within SDs, assessed using the Gini coefficient as a measure of income distribution, have improved.

#### 1. INTRODUCTION

Annual growth in the Gross State Product (GSP) of the Victorian economy has fluctuated between -2.5 and five per cent between 1981 and 1986 (ABS, 1997a). These changes have been in line with the Australian national figures of Gross Domestic Product (GDP). At the same time as these fluctuations in GSP have occurred the structure of the Victorian economy has changed. There has been a reallocation of resources from the public to the private sector; growth in the services sector of the economy and a relative decline of the contribution of the agricultural sector to GSP. In the rural areas of Victoria, structural change in the economy is manifest in such phenomena as shifts in population from small to large regional centres, rationalisation of government services and changes in the agricultural and non-agricultural labour force (ABS, 1998a).

The question then arises, how have the fluctuations in aggregate economic growth in Victoria affected the well-being of people living in the different Statistical Divisions (SDs) in Victoria? Are adjustments to these changing economic circumstances occurring at a rate and manner which is resulting in the convergence or divergence of per capita incomes in these SDs? Australian SDs have been designed to be relatively homogeneous regions characterised by recognisable social and economic links with the unifying influence of one or more major towns or cities (ABS, 1996). The geographical boundaries of the SDs in Victoria are shown in Figure 1 (ABS, 1998a). The next section of this paper is a discussion of a theoretical framework for the determinants of regional per capita income.

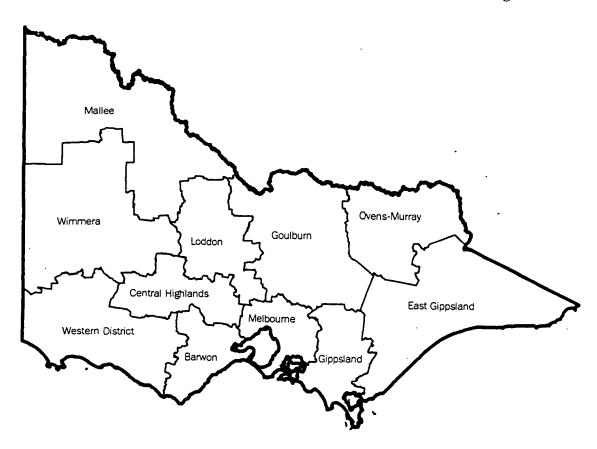


Figure 1: The Statistical Divisions in Victoria (1996 boundaries)

#### 2. A THEORETICAL FRAMEWORK

There has been considerable research on causes and effects of changes in the economic status of people over time and space (see Barro and Sala-I-Martin, 1991; Blanchard and Katz, 1992; Chisholm, 1990). The pre-eminent theory on these questions holds that convergence of the economic status of people in different regions will occur. This is based on a mixture of neoclassical theories of economic growth and the process of regional adjustment, drawing on the theory of trade, investment and migration. From neoclassical economic theory it is hypothesised that, when there are no barriers to factor mobility, labour is attracted to regions where the ratio of capital to labour is high and therefore wages and incomes are higher, rather than to areas where labour is less expensive and capital to labour rates are low. Conversely, capital is attracted to regions where the ratio of capital to labour is low and the returns to capital are higher. Income changes and population movements, therefore, occur as people and capital leave, or move to, a region in search of better returns to their labour and their investments and in this

way, the incomes of people in regions adjust and converge over time.

Levels of per capita income are determined by a large number of factors, including wage levels, employment and participation rates, demographics, levels of imputed income from dwellings, levels of unincorporated income from farm and non-farm sources, and other forms of income such as interest (Ferry 1991). Quality of life and the level of development are influenced by other factors than mean income. These include the cost of living and the availability of services and amenities, which vary between the Victorian SDs. However, the World Bank (1995) argues that per capita income is a useful indicator of general economic welfare because of its high positive correlation with other human development variables.

Evidence, presented by Cashin (1995) for Australasia, Barro and Sala-i-Martin (1991) for Europe and the United States and by Ray and Rittenoure (1987) for the United States revealed that levels of regional per capita personal incomes have converged in the areas in question over most of the last century. However, in the latter study, empirical evidence from the mid-1970s to the late 1980s reveals that divergence of per capita incomes is now occurring. In Australian studies, a similar pattern of regional income divergence over this later period at both state and substate levels was found to exist (Maxwell and Peter, 1988; Maxwell and Hite, 1992). Cashin and Strappazon (1998) reported a divergence in regional incomes between Australian states but not at the sub-state SD level between 1976-91. Focusing on SDs in Victoria, Cashin and Strappazon (1998) found that there was an overall tendency for convergence of per capita incomes between SDs over this period. At the same time, they reported that there were long-standing disparities between SDs in per capita incomes, with SDs in the west of Victoria having persistently low per capita incomes.

This study extends the work of Cashin and Strappazon (1998) to include data from the 1996 Census. Per capita income was analysed to compare income disparities among SDs between 1981 and 1996. Gini coefficients were calculated to compare the distribution of income within SDs. Population changes at the SD level were also analysed. The data and methods of analysis are discussed in the following section.

# 3. DATA AND METHODS OF ANALYSIS

Standard statistical measures of the extent to which regional incomes vary about the state mean income include the population-weighted coefficient of variation (Vw), the unweighted coefficient of variation (Vw) and the weighted mean absolute deviation (Mw) (Williamson, 1965; Maxwell and Hite, 1992). An increase in any of these measures indicates that income inequality is increasing and regional incomes are diverging.

The unweighted coefficient of variation is the standard deviation of the income series divided by its mean and is a measure of the dispersion of income with each region weighted equally. This can be expressed as:

$$V_{uw} = [\sum_{i} (y_{i} - \overline{y})^{2} N^{1}]^{\frac{1}{2}} (\overline{y})^{-1}$$
 (1)

where  $y_i$  is income per capita of the *i*th region;

y is income per capita for the aggregate of the regions; and

N is the number of regions.

The weighted coefficient of variation weights each region's income by the proportion of the aggregate population which the region contains, and is specified as:

$$V_{w} = \left[\sum_{i} (y_{i} - \overline{y})^{2} f_{i} n^{-1}\right]^{1/2} (\overline{y})^{-1}$$
 (2)

where n is the aggregate population;

 $f_i$  is the population in the *i*th region and all other variables are as specified above.

Whereas Vw considers squared deviations of income relative to the mean,

Mw considers absolute deviations, and is specified as:

$$M_{w} = (\sum_{i} |y_{i} - \overline{y}| f_{i} n^{-1}) 100 (\overline{y}_{i})^{-1}$$
(3)

where all terms are as defined above.

The Victorian mean income was calculated by summing across all SDs and dividing by the total Victorian population. The nominal gross income of each SD was calculated by multiplying the midpoint of each income bracket by the number of respondents in each interval and summing across all income brackets. The highest income bracket is an open interval so the midpoint was taken as 1.5 times the lower limit of the interval. The mean income of each SD was calculated by dividing the gross income by the number of persons in the SD.

The Gini coefficient is a summary measure of inequality of income distribution. It can vary between a value of 0 (income is distributed evenly) to 1 (one income unit has all of the income). Here the distribution of income within a region was assessed using Needleman's (1978) Gini coefficient. Gini coefficients and other measures of income inequality are discussed at length in Maxwell *et al* (1991).

The annual rate of population growth, r, can be derived for an intercensal period of n years by the formula;

$$r = (P_n / P_1)^{1/n} - 1 (4)$$

where  $P_n$  is the population in the *n*th year from the base year; and

 $P_1$  is the base year and in Australia, the intercensal period n is 5 years (Maher and Burke, 1991).

Analysis of trends in income inequality in Australia have been impeded by the scarcity of income data up until 1969 (McLean and Richardson, 1986). In 1969, the ABS began surveys of income distribution that were repeated in 1974, 1979 and 1982. In addition, since 1976, an income question has been included in the five-yearly Census of Population and Housing (ABS, 1997c). Census respondents

were asked to nominate the range into which their individual weekly gross income falls.

Income and population data for this study were obtained directly from the ABS. Major changes occurred to the boundaries of Victorian SDs between 1986 and 1991. This data set was derived from the 1981, 1986, 1991 and 1996 Australian Census of Population and Housing by aggregating data from Collection Districts in census years on a best-fit basis to the boundaries pertaining to the 1996 census. Data for the 1976 census was not included because of the difficulty in fitting this data to the 1996 boundaries. It is possible that census respondents understate their income but there is no evidence to suggest that the extent of this has changed relatively over the last four census. A comparison of census income data with Income Distribution Surveys and the National Accounts by Hunter and Gregory (1996) shows that census data is suitable as a measure of gross income. All monetary values are in 1996 dollars, calculated by using the national Implicit Price Deflator Indexes for Gross Domestic Product (1996 base) supplied by the ABS. The data on population exclude overseas visitors and the small off-shore and migratory category. The results of the per capita income and population analyses are presented in the following section.

#### 4. RESULTS

## 4.1 Income Changes

Summary statistics of the income data analysis are shown in Table 1. In real terms, the Victorian mean per capita income increased by 20 per cent between 1981 and 1996. The unweighted standard deviation, the population-weighted coefficient of variation Vw, the unweighted coefficient of variation Vuw and the weighted mean absolute deviation Mw all rose between 1981-86, were stable between 1986-91 and rose again between 1991-96. The results are consistent with Cashin and Strappazon (1998) for 1981, 1986 and 1991 but extending the analysis to include 1996 data shows increasing dispersion in the mean per capita incomes of Victorian SDs.

The Gini coefficients for Victorian SDs, indicating the distribution of income within each SD are reported in Table 2. A decrease in the Gini coefficient is an indication that income distribution within the SD has become more equal. Only in the case of the East Gippsland SD did the Gini coefficient increase between 1981 and 1996, mainly as a result of an increase between 1981 and 1986.

The proportion of SD per capita income relative to the Victorian mean per capita income and the percentage change in this variable over time are shown in Table 3. A percentage change in SD per capita income relative to the mean per capita income of greater than two per cent is considered significant. This figure is arbitrary but is consistent with other studies (Maxwell and Hite, 1992). Overall, during the period 1981 to 1996, five SDs exhibited downward divergence (movement away from the Victorian average from below), one SD

Table 1. Summary Statistics for Statistical Divisions

	1981	1986	1991	1996
Victorian mean per capita income (\$1996)	12 624	13 285	13 801	15 197
Standard deviation across SDs (\$1996)	741	934	948	1 121
Vw	0.07	0.09	0.09	0.10
Vuw	0.11	0.14	0.14	0.15
Mw	6.38	7.81	7.85	8.53

Source: ABS (1981, 1986, 1991 and 1996 Census of Population and Housing)

Table 2. Gini Coefficients for Statistical Divisions

Statistical Division	1981	1986	1991	1996
Melbourne	0.476	0.465	0.450	0.473
Barwon	0.498	0.475	0.448	0.466
Western District	0.496	0.473	0.442	0.459
Central Highlands	0.497	0.474	0.443	0.458
Wimmera	0.482	0.468	0.437	0.442
Mallee	0.483	0.469	0.429	0.431
Loddon	0.487	0.471	0.444	0.458
Goulburn	0.484	0.467	0.435	0.452
Ovens-Murray	0.476	0.461	0.439	0.452
East Gippsland	0.430	0.492	0.455	0.469
Gippsland	0.488	0.477	0.448	0.468

(Ovens-Murray) exhibited upward convergence (movement towards the Victorian average from below) and the remaining five SDs showed no significant change. The Gippsland SD has the most significant downward divergence. The Wimmera SD had large fluctuations in per capita income but exhibited downward divergence overall. The Mallee and East Gippsland SDs both had the lowest per capita income at eighty per cent of the Victorian mean in 1996. In accordance with these findings, and the population-weighted coefficient of variation, Vw for Victoria as a whole, the standard deviation of mean SD per capita income increased between 1981 and 1996.

# 4.2 Population Changes

The per capita income of a SD is by definition a function of its population. In addition to this, population changes are of interest in monitoring the process of adjustment occurring due to economic change. The population of Victoria rose by 551 301 persons between 1981 and 1996. This consisted of a rise of 186 582 persons between 1981-86, 224 113 persons between 1986-91 and 140 606 persons between 1991-96, indicating that the overall rate of population growth in Victoria is declining. The Wimmera SD lost population in all three intercensal periods, whereas the Western District SD lost population between 1986-91 and 1991-96,

Table 3. Real Per Capita Income as a Proportion of the Victorian Average

Statistical Division	·····	•		1996	1981-86	1986-91	1991-96
	1981	1986	1991		(per cent change)		
Melbourne	1.04	1.05	1.06	1.06	1.02	0.04	0.43
Barwon	0.90	0.90	0.89	0.89	-0.06	-1.33	-0.20
Western District	0.86	0.85	0.84	0.85	-0.84	-0.89	0.92
Central Highlands	0.83	0.83	0.83	0.83	0.24	0.22	-0.57
Wimmera*	0.92	0.82	0.91	0.84	-9.36*	8.86+	-6.8*
Mallee*	0.88	0.79	0.80	0.80	-9.18*	0.66	0.51
Loddon*	0.86	0.85	0.86	0.83	-1.15	0.22	-2.65*
Goulburn	0.86	0.84	0.85	0.84	-2.64*	0.96	-0.29
Ovens-Murray <sup>†</sup>	0.89	0.89	0.94	0.92	0.10	4.82 <sup>+</sup>	-1.19
East Gippsland*	0.91	0.88	0.86	0.80	-2.88*	-1.58	-5.81*
Gippsland*	0.96	0.92	0.87	0.83	-4.17*	-4.70*	-3.97*
Standard Deviation	0.059	0.070	0.069	0.074			

<sup>\*</sup> Downward divergence \*Upward convergence

Source: ABS (1981, 1986, 1991 and 1996 Census of Population and Housing)

resulting in a decrease in population in these two SDs over the 15 year observation period. The Mallee and Gippsland SDs had population increases over the entire period 1981-96 but lost population in the 1991-96 period. All other Victorian SDs increased in population during this time at the various annual rates of growth shown in Table 4.

The Loddon and Ovens-Murray SDs both had consistently above average annual population growth rates, resulting in a growth rate over the period 1981-96 which was twelve per cent above the Victorian state average.

The proportion of the Victorian population in each SD and the change in each SD's share of Victoria's population over the period 1981-1996 are shown in Table 5. While these figures show aggregate regional changes, they do not reveal the pattern of population redistribution within the regions.

A summary of the key points from this study is shown in Table 6, which develops a profile of the changes in each SD from 1981 to 1996. These results are discussed in the following section.

## 5. DISCUSSION

The finding of an increase in the dispersion of per capita incomes between the SDs in Victoria between 1981-96 is in line with the general trend found by Maxwell and Hite (1992), who reported divergence of mean incomes in agriculturally-based regions across Australia between 1976-86. Cashin and Strappazon (1998) also reported a clear divergence from the Victorian mean income in the predominantly agricultural SDs of the Wimmera and Northern Mallee (since renamed) over the period 1976-1991, although they found no evidence of increasing dispersion of per capita incomes between Victorian SDs as a whole during this period.

Table 4. Rates of Annual Population Growth in the Statistical Divisions of Victoria (%)

Statistical Division	1981-1986	1986-1991	1991-1996
Melbourne	0.84	1.06	0.82
Barwon	1.24	1.57	0.40
Western District	0.36	-0.18	-0.23
Central Highlands	1.22	1.21	0.35
Wimmera	-0.47	-0.20	-0.59
Mallee	0.47	0.49	-0.08
Loddon	1.85	2.04	0.79
Goulburn	1.30	1.63	0.50
Ovens-Murray	2.00	2.11	0.62
East Gippsland	2.00	1.22	0.14
Gippsland	1.56	0.89	-0.32
Victoria	0.95	1.09	0.66
Rise in population (persons)	186 582	224 113	140 606

Table 5. Proportion of Total Victorian Population in each Statistical Division (%)

Statistical Division	1981	1986	1991	1996	1981-96 (% change)
Melbourne	71.7	71.3	71.2	0.0	0.0
Barwon	5.1	5.2	5.3	5.2	-0.1
Western District	2.5	2.5	2.3	2.2	-0.3
Central Highlands	2.9	3.0	3.0	3.0	0.1
Wimmera	1.4	1.3	1.2	1.1	-0.3
Mallee	2.1	2.1	2.0	1.9	-0.2
Loddon	3.1	3.3	3.4	3.4	0.3
Goulburn	3.9	4.0	4.1	4.1	0.2
Ovens-Murray	1.9	2.0	2.1	2.1	0.2
East Gippsland	1.7	1.8	1.8	1.8	0.1
Gippsland	3.4	3.5	3.5	3.3	-0.1

Although the results for agriculturally-based SDs were not uniform, and most of the Victorian SDs have a mixture of agriculture and manufacturing, Cashin and Strappazon concluded that the dominance of the agriculture sector in the SD, and in particular fluctuations in the broadacre cropping industries between 1976-91, was a major influence on per capita incomes. In this study, within the four predominantly agriculturally-based Victorian SDs, the Wimmera, Mallee and East Gippsland SDs had significant declines (greater than 2 per cent) in their mean per capita income relative to the Victorian mean from 1981-96, while the Western District showed no significant change. The Gippsland and Loddon SDs, which have a mixture of agriculture and manufacturing, also had significant income decline, with the Gippsland SD having the largest decline of all the SDs. Restructuring in the power industry and subsequent high unemployment and low

11

14

-0.020

Gippsland

Victoria

Statistical **Population** Income Gini Coefficient Division (per cent (per cent (persons) (change) change) change) Melbourne 396 130 1.49 -0.003 14 Barwon 17 33 682 -1.20-0.032-252 Western District 0 -0.81-0.03715 26 696 Central Highlands -0.10-0.039-3 274 Wimmera -6 -7.30-0.040Mallee 5 3 675 -8.00-0.052Loddon 26 31 146 -3.58-0.029Goulburn 19 28 555 -1.97-0.03226 Ovens-Murray 19 274 3.73 -0.0240.039 East Gippsland 18 11 954 -10.30

Table 6. Statistical Division Profiles: Summary of Changes from 1981-96

participation rates in the Latrobe Valley in the Gippsland SD has had a major impact on income levels.

14 605

551 301

-12.84

Gini coefficients for the Victorian SDs decreased over 1981-96. That is, the distribution of income within SDs improved by this measure, and the position of the SDs relative to each other in regard to income distribution did not change significantly. The exception to this was the East Gippsland SD which had a rise from the lowest Gini coefficient in 1981 to the highest in 1986 but then went down again to be mid-range of the other SDs by 1996. The demography of the SD and its economic structure have a bearing on the income distribution within it so that regional Gini coefficients need careful interpretation. Regions where incomes received are in a fairly narrow range tend to have a more even distribution of income than regions that also incorporate significant numbers of retirees, professionals or an urban population surrounded by rural areas (Maxwell et al, 1991). The settlement of retirees along the coastal areas of the East Gippsland SD and restructuring in the timber industry may help explain why the Gini coefficient for this SD increased between 1981-96.

The agriculturally-based SDs had average rates of population growth below the Victorian average of fourteen percent during 1981-96. Wimmera SD lost population during 1981-96, while the Western District SD had zero population growth and the Mallee and Gippsland SDs lost population during 1991-96. More detailed figures on regional population growth and decline for Australia are contained in McKenzie (1994), Maher and Stimson (1994) and ABS (1998b). The trends identified in these studies show that small town rural population is declining at the expense of larger centres and towns within commuting distance of either the larger centres or Melbourne. The proximity of some areas within the Barwon, Central Highlands, Loddon, Goulburn and Gippsland SDs to Melbourne allows commuting and social access to the metropolitan area. At the same time, low income families have moved to areas outlying Melbourne and the larger centres in

response to lower housing costs. These demographic changes strongly influence per capita incomes in these SDs.

The ability of people in a region to adjust to economic change depends on the extent to which there is a diverse local economy that can provide stability when one or other industrial sector lags. It is also an advantage to have an urban centre to provide skilled labour and amenities. Natural resources for industrial utilisation, such as coal, timber, gold and off-shore oil and gas reserves in Victoria, and natural amenities for recreation such as coastal and alpine areas that are attractive to tourists and retirees also provide opportunities for diversification. Victorian SDs with areas within commuting distance of Melbourne, or growth centres such as Bendigo (Loddon SD) and Wodonga, are likely to continue to grow in population because they have some or all of the above features. The Ovens-Murray SD, the only SD to have an increase in both population and per capita income relative to the Victorian mean during 1981-96, has the benefit of all these attributes. Economic growth in the Ovens-Murray SD has been enhanced by the diversity of the economy, which includes the wine making industry, food processing, timber and tourism, as well as more traditional agricultural enterprises, with access to interstate transport routes. The largest centre for the Ovens-Murray SD is Wodonga, which when combined with Albury in New South Wales has a population of over ninety thousand people. In contrast, Horsham, the main centre of the Wimmera SD, while growing slowly, has a population of about thirteen thousand people.

One interpretation of this finding of increased per capita income dispersion, in contrast to the predictions of the neoclassical theory of regional income convergence, is that trade and financial deregulation which has opened up the Australian economy to world markets in the last two decades has allowed Australia, and thereby the regions within it, to take advantage of specialisation and trade. While in theory these changes should increase the efficiency of resource allocation and therefore growth in the economy as a whole, the corollary is that some regions become vulnerable to industry- or regional-specific shocks. When the rate of adjustment of these regions to negative shocks is impeded, divergence from, rather than convergence with, comparable regions is observed.

The Wimmera SD, and to a lesser extent the Mallee SD, would appear to be good examples of this phenomenon. Population and capital have left the region in response to a negative shock to its dominant broadacre cropping industry, as would be predicted by the theory. This adjustment, however, appears to have been insufficient to increase per capita income in these areas. Given that eighty per cent of broadacre farm capital is in land and fixed improvements (ABARE, 1996), then the scarcity of alternative land uses contributes to capital immobility in this industry sector. Increasing farm size and concomitant population loss can lead to an increase in the capital to operator ratio but not necessarily to an increase in aggregate capital investment in a SD or industry sector. In addition, the long term pressures of technological change and farmers' declining terms of trade on farm incomes have been exacerbated in the short term by a sharp downturn in

commodity prices and persistent poor seasonal conditions. In contrast, the Western District SD had zero population growth with no significant change in per capita incomes between 1981-96. It is possible that the more diverse economic base in this SD has enabled the rate of adjustment to reach a balance over time.

The continued disparities in per capita income in the agriculturally-based SDs of Victoria may also occur because of barriers to labour mobility. The uniformity of national labour awards means the price of labour does not reflect regional differences in productivity (IC, 1993); this both inhibits migration from declining regions and dissuades capital from entering these regions. Whilst broadacre farmers have limited requirements for direct hiring of labour, the increased farm size coupled with decreased on-farm labour has led to increased use of contractors in crop preparation, chemical application, harvesting, transport and other essential farm services. Increasingly, financial and advisory services are obtained from larger business centres or capital cities, and off-farm income is utilised to support farm enterprises (ABARE, 1996). The cost and benefit of this shift in labour resources, and the cost of other farm inputs, is influenced by the price of labour in the national market and does not reflect local returns to factors of production.

The contribution of the interplay of migration, wages and employment to regional adjustment is complex. For comprehensive reviews of these factors see Blanchard and Katz (1992) for the United States and Groenewold (1993) for Australia. Many factors are involved in the relationship between individual income level and distribution and labour market conditions, but work force participation is a major factor in determining per capita income (Maxwell et al., 1991). The uniformity and duration of unemployment benefits are seen as contributing to people migrating to, and remaining in, regions with lower costs of living and lifestyle advantages, but not necessarily better job prospects (IC, 1993). The potential rise in income afforded by moving to a region with better employment opportunities can be offset by the loss of community and family support, differential housing costs and inadequate infrastructure in rapidly growing areas. It is apparent that the choices people make about how and where they wish to live are not based solely on maximising per capita income. Therefore, the concept of labour mobility could be better explored by incorporating measures of economic welfare other than income into the analysis.

### 6. CONCLUSION

The existence of long-standing disparities and increasing dispersion in per capita incomes between Victorian SDs, when viewed through the neoclassical economic framework, indicates that constraints to factor mobility are present and inhibiting the adjustment process which leads to the convergence of regional incomes over time. Hence the argument that freer movement of labour and capital may be required to assist those SDs with persistently low incomes to adjust to economic shocks and long term adjustment pressures, thereby increasing incomes and improving the welfare of people in these SDs. The neoclassical economic framework is based on simplifying assumptions and it is apparent from the above

discussion that long-term sectoral changes and other influences also affect economic growth and welfare in Victorian SDs.

While income levels and population changes are important economic parameters, they are only partial indicators of the economic welfare of the inhabitants of Victorian SDs and further research investigating other indicators at a more disaggregated level is required. The implications of the increasing disparity in per capita incomes between Victorian SDs are that the economic status of people in the SDs exhibiting downward divergence of incomes appear to have worsened and structural change is having a differential impact on SDs. Without better understanding of constraints to adjustment and the development of appropriate public policy, these disparities may become further entrenched. The extent to which the urban inhabitants of Australia are prepared to allocate resources to rural inhabitants is a central element in the current debate about the 'urban-rural divide'. An important part of the renewed focus by State and Federal governments on economic development in regional Australia must be to address this issue.

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