

FOR RICHER OR POORER: RECENT TRENDS IN AUSTRALIA'S REGIONAL INCOME DYNAMICS

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ABSTRACT: In this paper we examine trends in Australia's regional income dynamics over the twenty-five year period 1976-2001, with particular emphasis given to the final decade within this period. The measure of income is median weekly individual income, while dispersion is analysed in terms of population weighted and unweighted coefficients of variation, weighted mean absolute deviation, as well as σ - and β -convergence. The regions comprise both states and statistical divisions. Regardless of the level of regional analysis, the results point to a lack of significant cross-sectional convergence or divergence over the entire 25 years, with alternating sub-periods of both mild divergence and mild convergence. At the statistical division level, the β convergence measure is significant suggesting 'catch-up' in terms of rates of economic growth between low and high income regions. Analysis of intrastate patterns of dispersion reveals some interesting contrasts. So, too, does grouping of regions by type (eg. metropolitan, agricultural-based, manufacturing-based, resource development oriented, warm climate coastal; and major provincial town) and analysis of the relative performance of the individual groups.

1. INTRODUCTION

Regional disparities in socio-economic wellbeing and opportunities are widely perceived as undesirable if persistent or increasing over time (see for example Taylor, 2000). While the Australian economy has performed well in international terms, the perceived uneven spread of this prosperity across the regions of Australia has seen a loss of political support for traditional conservative party candidates in a number of state and federal elections during the mid- to late 1990s (O'Hagan, 2001). State and federal governments have, as a result, been forced to pay greater attention to the plight of so-called 'regional' areas of Australia – with this term having become synonymous with 'rural and remote' Australia in the popular media and among government policy makers. With the release of data from the 2001 population census by the Australian Bureau of Statistics it has become possible to analyse patterns of change in regional incomes over a twenty-five year period (1976-2001), and to identify whether on the basis of this data disparities in regional economic wellbeing have become wider, narrower or stayed the same and whether the experience of the most recent decade (1991-2001) differs significantly from the earlier sub-period (1976-1991).

The paper is organised as follows. Section 2 provides an overview of alternative theories relating to regional income dynamics as well as a brief review of international evidence supporting these alternative theories. Section 3 presents a summary of results from previous studies focussing on Australian regional income inequalities. Section 4 provides some background information

on the time period, data and measures of regional income disparities employed in this study. Section 5 reports results from the analysis of inter-state income disparities, while Sections 6 and 7 report results from statistical division based analysis in relation to the national and own-state averages respectively. Finally, section 8 contains a summary of the main conclusions and draws out some policy implications.

2. THEORIES ABOUT REGIONAL INCOME DYNAMICS AND INTERNATIONAL EVIDENCE

Alternative theories of regional growth disagree on whether in the absence of government intervention normal interregional income dynamics should lead to convergence or divergence in regional per capita income levels (see for example, Armstrong and Taylor, 2000).

On the one hand, neoclassical growth theories suggest that where there are no significant barriers to the operation of market forces disparities in regional incomes will not persist over time. Where inequalities are present movements in factors of production (capital, labour and technology) and their corresponding prices will take place in response to these inequalities. As a result convergence of regional incomes is predicted over time. Impediments to factor mobility between regions as well as government interventions (eg. in the areas of wages and income support, monetary/taxation policy and fiscal equalisation schemes) that act to minimise spatial differences in factor prices have been cited as reasons acting to reduce the observed rate of convergence in the Australian case (Industry Commission, 1993).

On the other hand, cumulative causation and endogenous growth theories suggest that divergent growth can be expected even over the long term because of the differential ability of regions to benefit from agglomeration economies and the existence of self-reinforcing growth processes that give low income regions little hope in their quest to catch up with high income regions. Taylor (2000) identifies three factors central to this divergent tendency: new firm formation and adoption of new technology being concentrated in high income regions and the selective nature of the migration process such that high skilled workers are those most likely to move from low to high income regions and by so doing acting to further exacerbate the interregional skills gap. As King and Taylor (1993: 8) note:

“The debate between those who support the convergence view and those who favour the divergence view has not been resolved by theoretical arguments. Attention has therefore switched to the empirical evidence.”

Early empirical work by Williamson (1965) suggested convergence and divergence occur in an inverted U-shaped pattern over the development spectrum. That is, countries in the early stages of development display a higher level of regional inequality than those at later stages of development. Amos (1988, 1989) argues that by focussing on interstate comparisons rather than intrastate comparisons Williamson’s findings glossed over a potentially important dimension of regional inequality in economies at the later stages of economic development – namely urban-rural differences. Contrary to naïve

expectations that regional income inequality reaches a minimum value after the inverted-U pattern is complete and then remains stable, Amos (1988) found a pattern of increase-decrease-increase for the counties of the United States over the period 1969-1983. This finding of a return to divergence in the 1980s was confirmed by other researchers such as Coughlin and Mandelbaum (1988). Nevertheless, McGillivray and Peter (1991) question Amos' interpretation of his results as supporting an 'augmented inverted U' cycle, instead arguing that such a cycle could represent no more than short-run oscillations around a longer term trend of stability.

Subsequent papers by Barro and Sala-i-Martin (1991, 1995) and Sala-i-Martin (1996a) have analysed convergence properties of regions within various countries and the results led Sala-i-Martin (1996b: 1325) to make the following conclusion in relation to the leading industrialised economies:

"The empirical evidence on regional growth and convergence across the United States, Japan and five European nations ... confirm that the estimated speeds of convergence are surprisingly similar across data sets: regions tend to converge at a speed of approximately two percent per year. We also show that the interregional distribution in all countries has shrunk over time".

More recent studies have suggested that this convergence rate has slowed down, especially for European regions, over the last two decades (Taylor, 2000).

3. REVIEW OF PREVIOUS AUSTRALIAN REGIONAL INCOME STUDIES

Williamson (1965) identified Australia as having the lowest level of regional income inequality from his sample of twenty-four countries. His data covered the period 1949-50 to 1959-60, while personal income per capita and the states and territories were used as the basis of analysis. Harris and Harris (1991,1992) examined differences in rates of economic growth and levels of real gross state product per head over the period 1953-54 to 1990-91. They found convergence in per capita incomes in the early 1960s to early 1970s followed by a period of divergence in the 1980s. Evidence of 'catch-up' whereby states with below average GDP per capita experienced higher rates of growth was reported. Maxwell and Hite (1991,1992) analysed regional income dispersion over a similar time period to Harris and Harris using data on both household income and GDP per capita. They argued that interstate dispersion followed an N-shaped pattern with divergence from the early to mid- 1960s, convergence from the mid- 1960s to mid 1970s and divergence again from mid 1970s through the 1980s. Cashin (1995) examined trends in GDP per capita over a much longer time period, namely 1861 to 1991 with New Zealand added to the set of regions as a former Australasian colony. He found evidence of convergence in both income levels and 'catch-up' in terms of rates of economic growth. However, most of the decline in cross-sectional dispersion occurred in the 19th century with dispersion in the subsequent 90 year period displaying no clear downward (or upward) trend. Neri's (1998) study essentially re-examined Cashin's time period with a slightly different data set and regions (New Zealand was dropped and Northern Territory and Australian Capital Territory added). He examined more

closely differences across the sub-periods and emphasised that while both types of convergence identified by Cashin were present prior to 1976, there was neither convergence or divergence in the 'catch-up' sense from the mid 1970s to the early 1990s and clear evidence of a rise in cross-sectional dispersion of per capita income levels in the latter period. Cashin and Strappazon (1997) analysed data on real per capita income derived from population censuses conducted between 1976-91. They concluded that the distribution of per capita income between states rose between 1976 and 1981, fell slightly between 1981 and 1986 and rose again between 1986 and 1991. Harris (1998) analysed the period between 1977-8 and 1994-5 and confirmed the lack of a consistent trend in interstate dispersion of GDP per capita. Nguyen, Smith and Meyer-Boehm (2003) extended the analysis of Cashin and Neri to cover the period 1984-5 to 1996-7. Once again, they confirmed absence of support for 'catch-up' type convergence in the most recent period as well as evidence of a continuation of the rise in cross-sectional dispersion in income levels during the early to mid 1990s. In summary then, when regions are defined as states (or states and territories) previous authors have confirmed Williamson's (1965) findings of low levels of interregional income inequality by international standards with a long-term trend towards convergence. However, the 1980s and early to mid 1990s featured both a lack of convergence in the 'catch-up' sense and divergence in levels of per capita income.

While the states of Australia are regarded by many as relatively homogeneous in terms of their respective economic structures, culture, and responsiveness to external shocks a large number of authors (for example King and Armstrong, 1993 and Lloyd et al., 2000) have suggested that interregional variation in development and socio-economic wellbeing should be expected to be stronger at the sub-state (statistical division/local government area) level. A small but growing number of authors have focussed explicitly on an examination of the extent of income disparities across Australia's statistical divisions. Maxwell and Peter (1988) and McGillivray and Peter (1991) used population census data on mean family incomes and concluded that at the statistical division level increased regional development is associated with minor and frequent oscillations around a longer term growth path. Maxwell and Hite (1992) also analysed population census data for mean household incomes. The 1976-81 period was identified as one in which the majority of statistical divisions were converging towards the national mean, while the 1981-86 period saw the opposite phenomenon with the majority of the statistical divisions having per capita incomes diverging from the national mean. Over the entire 1976-86 period these two opposite movements tended to cancel each other out, with a large number of regions recording no significant change but nevertheless overall divergence was observed. Categorisation of regions into different economic types suggested downward convergence of per capita incomes in predominately agricultural regions and upward divergence by capital city and remote resource-based regions. Maxwell, Hale and Peter (1991) analysed the same data for local government areas (LGAs) and found evidence of considerably greater disparities in incomes than had been observed in statistical division based analysis. Cashin

and Strappazon (1998) extended the contribution of previous authors by including 1991 census data. Measures of income dispersion at the statistical division were found to be about three times that of comparable measures at the state level. For most states the results showed no strong upward or downward trend in intra-state dispersion of incomes over the 1976-91 time period. The notable exception in this respect was NSW which experienced a steady rise in income dispersion. Lloyd et al (2000) focussed on LGA based data between 1991 and 1996 and pointed to a large and growing gap between the incomes of those living in the capital cities and those living in the rest of Australia. Their study did not, however, utilise measures of regional income inequality comparable to previous studies so no conclusions can be drawn about how experience in this latter period differs from the earlier one focussed upon by Cashin and Strappazon. O'Hagan (1999 and 2001) and Cashin and Strappazon (1998) conducted a more detailed analysis of the regional growth and convergence-divergence experience of the sub-state regions of Victoria. Cashin and Strappazon (1998) reported the period 1976-91 as one involving slight convergence in regional per capita incomes at the statistical division level. O'Hagan (1999) found an increase in disparities in regional per capita incomes between 1991 and 1996 and that the long standing inequalities reported by Cashin and Strappazon between the agriculturally based regions in the west and the rest of the state continued to persist. O'Hagan (2001: 325) using annual data on individual taxable income suggests that:

“convergence of income growth rates and income levels is occurring, but there may also be countervailing divergent forces helping to maintain the persistent differences in income levels between regions”.

4. DATA AND MEASURES OF REGIONAL INCOME DISPARITIES

This study utilises data on weekly individual income derived from the 1976, 1981, 1986, 1991, 1996 and 2001 population censuses conducted by the Australian Bureau of Statistics (ABS). This represents a twenty five year time period and includes data from the 2001 population census not covered by previous studies.

States and statistical divisions are the regions chosen for analysis. However a number of changes in statistical division boundaries during this time period meant that data at the LGA and census collection district level had to be employed to make data from all years conform to the 2001 census boundaries. In addition, since data relating to the 'offshore and migratory' statistical division was not available over the entire time period for each state and territory these statistical divisions were dropped from the analysis as was the 'other territories' category at the state level for similar reasons.

Income data from ABS population censuses involves respondents self reporting their income before tax in one of several income brackets – one of which is 'unstated' and the highest income bracket comprises an open interval. This makes estimation of mean weekly individual income problematic. It is normally assumed that 'unstated' income is distributed identically to 'stated' income, and this is what is done in this study. For the closed interval income

brackets, it is normally assumed that all respondents in this income bracket have incomes at the mid-point of this income bracket; while for the open interval income bracket a number of approaches have been employed to estimate the mid-point and/or upper limit of the bracket. For example, Cashin and Strappazon (1998) and O'Hagan (1999) assume that the mid-point of this bracket is 1.5 times the lower limit of this bracket. This is a somewhat arbitrary assumption that may result in unnecessary truncation of the distribution in high income regions and so impact significantly on the various measures of income dispersion. Karadgediki, *et al.* (2000) address this problem by fitting Pareto distributions to the upper quartile of the frequency distributions.

In this study, we avoid the need to assign all individuals to the mid-point of closed interval income brackets as well as the need to estimate the mid-point and/or upper limit of the highest income bracket by using median weekly individual income. This data is available directly from the ABS for the 1996 and 2001 population censuses, however needed to be estimated by simple interpolation techniques for the earlier censuses. Use of the median rather than the mean as a measure of central tendency of the income distribution has intuitive appeal since it means that 50 percent of residents aged 15 and over in the region have incomes below this point and 50 percent have incomes above this point. It also overcomes a well known problem associated with the mean, namely that it may be adversely affected by extreme values at either end of the distribution.

To facilitate comparison of income levels over time the data was converted from current to constant dollars using national consumer price index data with 1989/90 as the base year. The absence of comparable regional (and even state) deflators necessitated this approach to deriving real income data, which as noted by Barro and Sala-i-Martin (1991) and Cashin and Strappazon (1998) could act to bias the results towards a finding of regional income convergence.

Consistent with previous Australian studies of regional income dispersion, this study initially makes use of several simple statistical measures of the extent to which median regional incomes vary about the corresponding national and/or state median incomes: namely the unweighted coefficient of variation (V_{uw}), the population-weighted coefficient of variation (V_w) and the weighted mean absolute deviation (M_w). An increase (decrease) in any of these measures indicates that regional incomes are diverging (converging) and income inequality is increasing (decreasing). Being standardised in terms of a 'mean' each of these coefficients can be used for inter-temporal comparisons of a single variable or for comparisons of inequality of different variables over the same time period.

The unweighted coefficient of variation is derived as the standard deviation of the income series divided by the corresponding 'average' income for all regions. That is:

$$V_{uw} = \left(\sum_{i=1}^N (Y_i - \bar{Y})^2 N^{-1} \right)^{1/2} (\bar{Y})^{-1} \quad (1)$$

where Y_i = median weekly individual income in region i , \bar{Y} = median weekly individual income for the aggregate of all regions i , and N = the number of regions.

The weighted coefficient of variation allocates weights to each region according to the proportion of the aggregate population which the region contains. That is:

$$V_w = \left(\sum_{i=1}^N (Y_i - \bar{Y})^2 f_i n^{-1} \right)^{1/2} (\bar{Y})^{-1} \quad (2)$$

where f_i = population in region i , and n = population of the aggregate of all regions i . This weighting has been argued to reduce the degree to which smaller regions can skew the measure of inequality (Williamson, 1965).

The weighted mean absolute deviation measure focuses on absolute deviations rather than squared deviations from the aggregate 'average' and its property of additive decomposability allows for identification of each region's relative contribution to the overall measure of inequality. It is calculated as:

$$M_w = \left(\sum_{i=1}^N |Y_i - \bar{Y}| f_i n^{-1} \right) 100 (\bar{Y})^{-1} \quad (3)$$

where all terms are as defined above.

In the more recent comparative economic growth literature two additional measures of convergence are commonly calculated. Using the terminology of Barro and Sala-i-Martin (1991), β convergence is said to exist when among a cross-section of regional economies there is a negative relationship between the initial level of income and the rate of growth of income in the ensuing period. If β convergence is observed then 'catch-up' has occurred in the sense that the poorer regional economies have on average grown more rapidly than the richer economies comprising the cross-section. By contrast, σ convergence is said to hold when the cross-sectional dispersion of income declines over time. These two concepts of convergence are related, but not identical. In particular, β convergence is a necessary but not sufficient condition for σ convergence (Sala-i-Martin, 1996b).

In this study σ is calculated as the unweighted standard deviation of the natural logarithm of median weekly individual income, while β is found by regressing the trend growth rate of this median income on the corresponding initial level of income (expressed in natural logs) and a constant term.

5. STATE-BASED MEASURES OF INCOME CONVERGENCE/DIVERGENCE

Table 1 (Part A) shows real median individual weekly income for each state in 1989-90 dollars, and gives the trend growth rate of this income measure over the period 1976-2001. The territories of ACT and NT had the highest median incomes over the entire sample period, while the state of TAS consistently recorded the lowest. QLD and NSW experienced the highest trend growth rates in median income over the entire time period, while TAS recorded the lowest growth rate.

Table 1. State Incomes Relative to the Nation 1976-2001

Part A: Real Median Weekly Income (1989-90 = 100)

	1976	1981	1986	1991	1996	2001	Trend Growth Rate % 1976-2001
<i>NSW</i>	26	64	136	291	354	510	2.96
<i>VIC</i>	27	64	144	287	344	502	2.91
<i>QLD</i>	24	56	124	264	339	475	3.00
<i>SA</i>	25	55	124	257	317	456	2.89
<i>WA</i>	27	62	136	279	364	494	2.92
<i>TAS</i>	23	54	121	250	305	415	2.88
<i>NT</i>	34	83	187	339	425	584	2.84
<i>ACT</i>	38	91	218	419	510	718	2.94
TOTAL	26	62	136	282	347	496	2.94

Part B: State Real Individual Income Relative to the Nation

	1976	1981	1986	1991	1996	2001
<i>NSW</i>	1.00	1.03	1.00	1.03	1.02	1.03
<i>VIC</i>	1.04	1.04	1.06	1.02	0.99	1.01
<i>QLD</i>	0.90	0.91	0.91	0.94	0.98	0.96
<i>SA</i>	0.96	0.89	0.91	0.91	0.91	0.92
<i>WA</i>	1.01	1.01	1.00	0.99	1.05	1.00
<i>TAS</i>	0.88	0.87	0.89	0.88	0.88	0.84
<i>NT</i>	1.31	1.34	1.38	1.20	1.23	1.18
<i>ACT</i>	1.44	1.47	1.61	1.49	1.47	1.45

Part C: Patterns of Convergence/Divergence Relative to the Nation

	1976-81	1981-86	1986-91	1991-96	1996-2001	1976-2001	1991-2001
<i>NSW</i>	<i>UD</i>	<i>DC</i>	<i>UD</i>	<i>DC</i>	<i>UD</i>	<i>NSC</i>	<i>NSC</i>
<i>VIC</i>	<i>NSC</i>	<i>UD</i>	<i>DC</i>	<i>DC</i>	<i>UC</i>	<i>NSC</i>	<i>NSC</i>
<i>QLD</i>	<i>NSC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>	<i>DC</i>	<i>UC</i>	<i>UC</i>
<i>SA</i>	<i>DD</i>	<i>UC</i>	<i>NSC</i>	<i>NSC</i>	<i>UC</i>	<i>NSC</i>	<i>NSC</i>
<i>WA</i>	<i>NSC</i>	<i>DC</i>	<i>DD</i>	<i>UC</i>	<i>DC</i>	<i>NSC</i>	<i>NSC</i>
<i>TAS</i>	<i>DD</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>
<i>NT</i>	<i>UD</i>	<i>UD</i>	<i>DC</i>	<i>DC</i>	<i>UC</i>	<i>DC</i>	<i>DC</i>
<i>ACT</i>	<i>UD</i>	<i>UD</i>	<i>DC</i>	<i>DC</i>	<i>DC</i>	<i>NSC</i>	<i>DC</i>

Notes. UD = upward diverging, UC= upward converging, DD = downward diverging,
DC = downward converging, NSC = no significant change.

Table 1 (Part B) shows each state's median income as a proportion of the corresponding national figure. Median incomes in ACT, NT and NSW are equal to or above the national median income for all years, while those for WA and VICT are also above the nation for each year except 1991 and 1996 respectively. Median incomes in QLD, SA and TAS are consistently below the national median income, with QLD rising over the period to become closer to the national average while SA and TAS both saw their median incomes fall further below the national average over the period.

Table 2 shows the various cross-state measures of dispersion (V_w , V_{uw} , M_w and σ) over the various time periods covered by the data. This data is also plotted in Figure 1 for V_w , V_{uw} and σ .

Table 2. Measures of Inequality of State Income Relative to the Nation

Measure	1976	1981	1986	1991	1996	2001
V_{uw}	0.20	0.22	0.26	0.19	0.19	0.18
V_w	0.08	0.09	0.10	0.08	0.07	0.07
M_w	4.32	6.04	5.42	4.78	3.77	4.10
Sigma	0.17	0.19	0.21	0.17	0.17	0.16

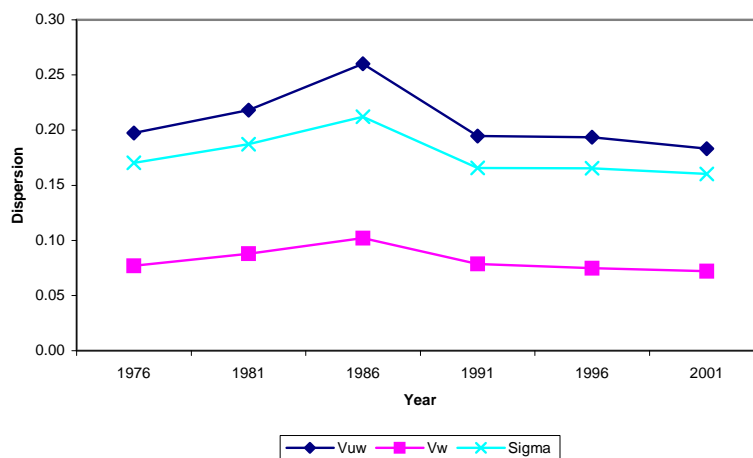


Figure 1. Measures of Income Inequality for Australian States

Regardless of which measure of dispersion (V_w , V_{uw} , or σ) is used income convergence is observed over the entire sample period – however the extent of movement is not statistically significant. Between 1976 and 1986 income divergence is present, however this is followed by a period of income convergence between 1986 and 1991, and a period of neither convergence or divergence between 1991 and 2001. Results for M_w follow the same pattern of

mild convergence over the entire period but a slightly different pattern over the various sub-periods – with divergence evident between 1976 and 1981 followed by convergence thereafter.

Since M_w is additively decomposable, it is possible to analyse each state's contribution to the overall results. See Table 3. In the early part of the period (1976-1986) the largest contributions to M_w came from QLD, VICT and ACT with each of these states having median individual weekly incomes relatively far (below, above and above respectively) from the corresponding national figure. In the latter part of the period (1991-2001) NSW replaced VICT as a major contributor to M_w . This switching occurred as a result of the (downward) movement of VICT's median income closer to the national average as well as the concomitant (upward) movement of NSW's median income further away from the national average.

Table 3. Decomposition of M_w Results by State

	1976	1981	1986	1991	1996	2001
<i>NSW</i>	0.12	1.08	0.07	1.02	0.69	0.99
<i>VIC</i>	1.07	1.05	1.52	0.47	0.17	0.33
<i>QLD</i>	1.49	1.45	1.43	1.12	0.39	0.82
<i>SA</i>	0.35	0.99	0.74	0.74	0.68	0.62
<i>WA</i>	0.10	0.09	0.01	0.11	0.50	0.03
<i>TAS</i>	0.34	0.36	0.30	0.31	0.31	0.39
<i>NT</i>	0.22	0.29	0.37	0.21	0.25	0.20
<i>ACT</i>	0.64	0.72	0.97	0.80	0.79	0.74
TOTAL	4.32	6.04	5.42	4.78	3.77	4.10

Part C of Table 1 classifies the convergence/divergence behaviour of states relative to the nation according to the Coughlin and Mandelbaum (1988) system where: upward convergence (UC) represents movement to the national average from below, downward convergence (DC) represents movement to the national average from above, upward divergence (UD) represents movement away from the national average from above, downward divergence (DD) represents movement away from the national average from below, and no significant change (NSC) is deemed to have taken place if movement in any direction is less than or equal to one percent over a five year period, less than or equal to 2 percent over a ten year period and less than 6 percent over the entire 25 year period. All states except QLD and NT experienced no significant change over the 1976-2001 period. QLD was classified as upwardly converging, while NT was classified as downwardly converging. Over the latter part of the period (1991-2001) more states experienced significant change, however TAS was the only state for which this change was in a divergent direction.

Looking at β convergence Figure 2 plots the relationship between initial income (in logs) and trend growth rates for the states and territories. Once again, merely looking at the graph the negative relationship between these variables

suggests convergence in the catch-up sense – with high growth by QLD that initially had low median income and low growth by NT that initially had high median income, for example. However standard testing procedures suggest that this relationship is not statistically significant and so the data supports neither β convergence nor β divergence.

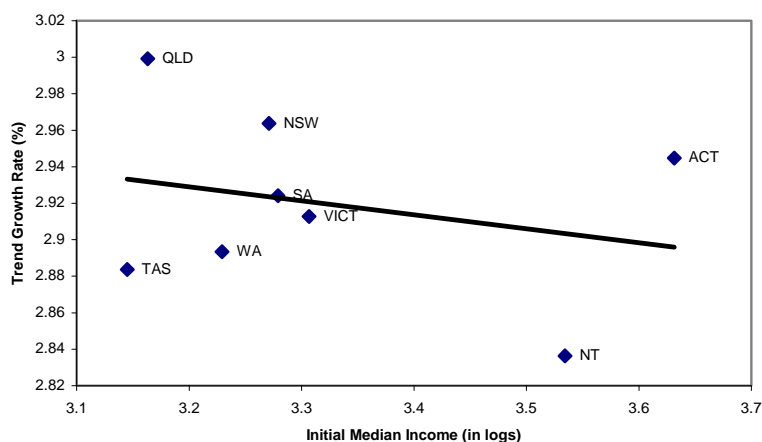


Figure 2. Beta-Convergence of Median Income for States of Australia

6. STATISTICAL DIVISION BASED MEASURES OF CONVERGENCE/DIVERGENCE COMPARED WITH THE NATIONAL AVERAGE

Previous research and current public policy attention to the plight of 'regional' Australia suggests that a further examination of income inequality at the level of sub-state regions might generate contrasting results.

Table 4 shows each statistical division's median income as a proportion of the corresponding national figure over the period 1976-2001. There emerges a pattern of broad consistency in terms of the relative positions of the various statistical divisions at either end of the distribution represented within this table. Pilbara (WA), Darwin, Canberra, North West (QLD), Sydney and Melbourne were always present among the 10 highest earning statistical divisions, while South Eastern (WA), Mackay and Balance ACT formed part of this elite group in at least four of the six time periods. At the other end of the spectrum Richmond-Tweed (NSW), Mid-North Coast (NSW), Far West (NSW) and Wide Bay-Burnett (QLD) were always present among the 10 lowest earning statistical divisions, while Murray Lands (SA) and Southern (TAS) formed part of this unfortunate group in at least four of the six time periods.

Table 4. Statistical Division Real Median Individual Incomes Relative to the Nation (Ratio)

	1976	1981	1986	1991	1996	2001
<i>Sydney</i>	1.12	1.15	1.15	1.17	1.17	1.18
<i>Hunter</i>	0.79	0.87	0.84	0.85	0.85	0.82
<i>Illawarra</i>	0.93	0.91	0.85	0.88	0.85	0.85
<i>Richmond-Tweed</i>	0.62	0.68	0.71	0.77	0.78	0.76
<i>Mid-North Coast</i>	0.65	0.68	0.69	0.76	0.73	0.74
<i>Northern</i>	0.74	0.83	0.78	0.84	0.83	0.84
<i>North Western</i>	0.77	0.85	0.76	0.83	0.85	0.87
<i>Central West</i>	0.81	0.86	0.81	0.85	0.89	0.87
<i>South Eastern</i>	0.89	0.87	0.92	1.00	0.98	0.95
<i>Murrumbidgee</i>	0.88	0.96	0.84	0.87	0.96	0.96
<i>Murray</i>	0.80	0.95	0.85	0.87	0.90	0.93
<i>Far West</i>	0.70	0.80	0.73	0.79	0.70	0.73
Melbourne	1.14	1.11	1.14	1.09	1.07	1.08
Barwon	0.83	0.86	0.90	0.88	0.87	0.89
Western District	0.66	0.84	0.86	0.84	0.87	0.90
Central Highlands	0.77	0.76	0.83	0.82	0.83	0.86
Wimmera	0.73	0.89	0.82	0.79	0.86	0.87
Mallee	0.78	0.88	0.80	0.81	0.86	0.89
Loddon	0.73	0.82	0.85	0.84	0.84	0.86
Goulburn	0.71	0.91	0.88	0.87	0.90	0.93
Ovens-Murray	0.85	0.94	0.94	1.01	1.00	0.98
East Gippsland	0.77	0.85	0.87	0.84	0.79	0.79
Gippsland	0.77	1.00	0.95	0.88	0.82	0.81
<i>Brisbane</i>	1.00	0.98	1.01	1.00	1.06	1.03
<i>Moreton</i>	0.69	0.78	0.80	0.87	0.90	0.90
<i>Wide Bay-Burnett</i>	0.69	0.72	0.69	0.74	0.73	0.73
<i>Darling Downs</i>	0.71	0.81	0.79	0.82	0.87	0.88
<i>South West</i>	0.81	0.88	0.91	0.99	0.97	1.07
<i>Fitzroy</i>	0.85	0.97	0.94	0.93	0.95	0.93
<i>Central West</i>	0.92	0.99	0.96	0.96	0.97	1.09
<i>Mackay</i>	1.15	1.12	1.01	1.02	1.09	0.98
<i>Northern</i>	1.06	1.01	0.97	0.98	1.03	1.00
<i>Far North</i>	0.87	0.89	0.87	1.00	1.09	0.98
<i>North West</i>	1.21	1.23	1.21	1.15	1.24	1.19

Table 4 (Continued)

	1976	1981	1986	1991	1996	2001
Adelaide	1.02	0.89	0.96	0.96	0.93	0.94
Outer Adelaide	0.70	0.80	0.82	0.85	0.90	0.92
Yorke & Lower North	0.75	0.78	0.70	0.71	0.74	0.75
Murray Lands	0.79	0.82	0.75	0.74	0.83	0.85
South East	0.85	0.98	0.90	0.89	0.99	1.00
Eyre	0.93	0.91	0.75	0.74	0.84	0.87
Northern	0.99	0.95	0.86	0.87	0.83	0.79
Perth	1.01	1.00	1.02	0.99	1.05	1.01
South West	0.75	0.85	0.80	0.87	0.91	0.88
Lower Great Southern	0.88	0.95	0.82	0.84	0.90	0.85
Upper Great Southern	1.09	1.12	0.92	0.89	1.10	0.84
Midlands	1.12	1.04	0.87	0.88	1.02	0.89
South Eastern	0.98	1.05	1.11	1.24	1.45	1.27
Central	1.07	0.96	0.94	0.98	1.04	0.94
Pilbara	1.66	1.77	1.76	1.62	1.76	1.56
Kimberley	0.91	1.00	1.06	0.98	1.02	0.99
Greater Hobart	0.98	0.93	0.99	0.97	0.97	0.92
Southern	0.89	0.73	0.76	0.78	0.76	0.75
Northern	0.83	0.84	0.85	0.85	0.84	0.81
Mersey-Lyell	0.86	0.86	0.84	0.84	0.81	0.77
Darwin	1.50	1.56	1.60	1.36	1.45	1.40
Balance NT	1.03	1.03	1.13	1.03	0.91	0.79
Canberra	1.44	1.48	1.61	1.49	1.47	1.45
Balance ACT	0.97	1.13	1.29	1.21	1.03	1.07

Table 5 shows cross-statistical divisions measures of dispersion (V_w , V_{uw} , M_w and σ) over the various time periods covered by the data. This data is also plotted in Figure 3 for V_w , V_{uw} and σ . Regardless of which measure of dispersion (V_w , V_{uw} , or σ) is used income convergence is observed over the entire sample period – however the extent of movement is once again not statistically significant particularly for measures that employ population weights. Between 1976 and 1981 income convergence is present, however this is followed by a period of income divergence between 1981 and 1986, a period of convergence between 1986 and 1991, and a period best described as neither convergence nor divergence between 1991 and 2001.

Comparison of the results in Table 5 for statistical divisions with those derived for states in Table 2 confirms a priori expectations of greater inequality or dispersion as the focus of analysis shifts to a more disaggregated level of regional analysis – with this being most pronounced when the measures of inequality are weighted by population size. To illustrate this point more clearly,

the V_w figures for states and territories and statistical divisions are plotted on the same scale in Figure 4. This also serves to highlight the fact that the convergence trend over the entire period 1976-2001 appears slightly more pronounced the regions (as represented by statistical divisions) than for states, and that the experience of the regions and the states are broadly consistent over each five-year sub-period with the exception of 1976-81 (which was a period of divergence at the state level but convergence at the regional level).

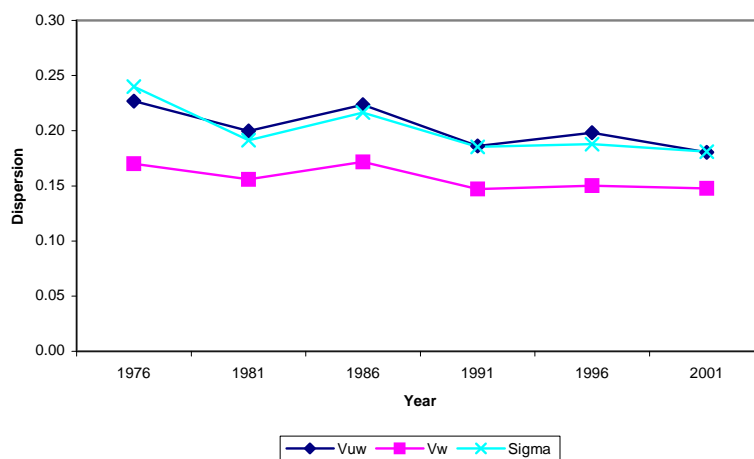


Figure 3. Measures of Inequality for Australian Statistical Divisions 1976-2001

Table 5. Measures of Inequality of Regional Incomes Relative to the Nation

Measure	1976	1981	1986	1991	1996	2001
V_{uw}	0.23	0.20	0.22	0.19	0.20	0.18
V_w	0.17	0.16	0.17	0.15	0.15	0.15
M_w	13.66	12.62	13.68	11.69	12.17	11.97
Sigma	0.24	0.19	0.22	0.19	0.19	0.18

Table 6 classifies the convergence/divergence behaviour of statistical divisions relative to the nation according to the Coughlin and Mandlebaum (1988) system. A summary of these results is recorded in Table 7. In the periods 1976-1981 and 1986-91 the median incomes of the majority of regions (38 and 34 out of 58 respectively) were converging towards the national median. In direct contrast, the period 1981-1986 saw the majority of the regions diverging (33 out of 58) away from the national median. During the period 1991-2001 a greater number of regions experienced no significant change relative to the

nation and the number of diverging and converging regions became more equal, with their experiences acting to cancel each other out to generate relative stability in the overall measures of dispersion. Over the entire period 1976-2001, only 6 of the 58 regions were classified as diverging relative to the nation: Sydney which was upwardly diverging, and Illawarra (NSW), Eyre (SA), Northern (SA), Southern (TAS) and Mersey-Lyell (TAS) which were downwardly diverging. The patterns are consistent with the results reported above using the V_w , V_{uw} , M_w and σ cross-statistical divisions measures of dispersion.

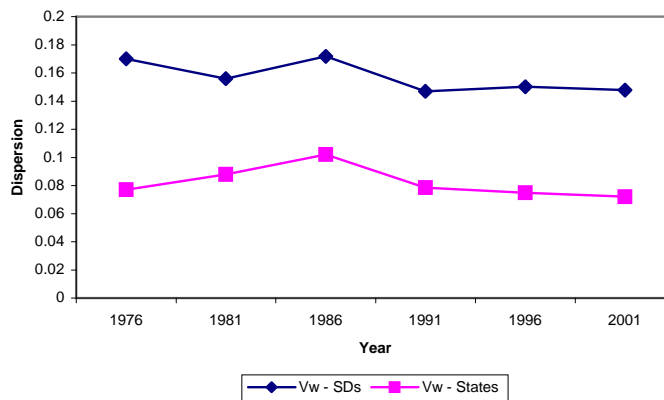


Figure 4. Estimates of V_w for Australian States and Regions

Following Cashin and Strappazon (1998) it is useful to also explore whether examination of results classified by economic structure provides additional insights into the convergence/divergence patterns. Carter's (1983) typology of regions has been adapted for use and statistical divisions classified into the following 8 categories based on 1996 population census results:

- capital city
- predominantly agricultural (15% or more of workforce employed in the agricultural, forestry and fishing sector with no other non-service sector employing more than 10%)
- predominantly manufacturing (15% or more of workforce employed in the manufacturing sector with no other non-service sector employing more than 10%)
- agricultural/manufacturing (8.5 percent or more of workforce employed in both the agriculture, forestry and fishing and manufacturing sectors)
- resource development oriented (10 percent or more of workforce employed in mining and electricity and gas sectors)

Table 6. Patterns of Convergence Relative to the Nation

	1976- 1981	1981 -1986	1986 1991	1991 1996	1996 -2001	1976 -2001	1991 -2001
<i>Sydney</i>	<i>UD</i>	<i>NSC</i>	<i>UD</i>	<i>NSC</i>	<i>NSC</i>	<i>UD</i>	<i>NSC</i>
<i>Hunter</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>NSC</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>
<i>Illawarra</i>	<i>DD</i>	<i>DD</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>	<i>DD</i>
<i>Richmond-Tweed</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>NSC</i>	<i>NSC</i>	<i>UC</i>	<i>NSC</i>
<i>Mid-North Coast</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>	<i>NSC</i>
<i>Northern</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>	<i>NSC</i>
<i>North Western</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
<i>Central West</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>
<i>South Eastern</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>UC</i>	<i>DD</i>
<i>Murrumbidgee</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>
<i>Murray</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
<i>Far West</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>NSC</i>	<i>DD</i>
Melbourne	<i>DC</i>	<i>UD</i>	<i>DC</i>	<i>DC</i>	<i>UD</i>	<i>DC</i>	<i>NSC</i>
Barwon	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>UC</i>	<i>NSC</i>	<i>NSC</i>
Western District	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
Central Highlands	<i>DD</i>	<i>UC</i>	<i>NSC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
Wimmera	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>
Mallee	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>
Loddon	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
Goulburn	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
Ovens-Murray	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>UC</i>	<i>DD</i>
East Gippsland	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>NSC</i>	<i>NSC</i>	<i>DD</i>
Gippsland	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>
<i>Brisbane</i>	<i>DC</i>	<i>UC</i>	<i>NSC</i>	<i>UD</i>	<i>DC</i>	<i>NSC</i>	<i>UD</i>
<i>Moreton</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>
<i>Wide Bay-Burnett</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>NSC</i>	<i>NSC</i>	<i>NSC</i>
<i>Darling Downs</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>
<i>South West</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
<i>Fitzroy</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>NSC</i>
<i>Central West</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
<i>Mackay</i>	<i>DC</i>	<i>DC</i>	<i>UD</i>	<i>UD</i>	<i>DC</i>	<i>DC</i>	<i>DC</i>
<i>Northern</i>	<i>DC</i>	<i>DC</i>	<i>NSC</i>	<i>UC</i>	<i>DC</i>	<i>NSC</i>	<i>DC</i>
<i>Far North</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UD</i>	<i>DC</i>	<i>UC</i>	<i>NSC</i>
<i>North West</i>	<i>UC</i>	<i>NSC</i>	<i>DC</i>	<i>UD</i>	<i>DC</i>	<i>NSC</i>	<i>UD</i>

Table 6 (Continued)

Adelaide	<i>DC</i>	<i>UC</i>	<i>NSC</i>	<i>DD</i>	<i>NSC</i>	<i>NSC</i>	<i>DC</i>
Outer Adelaide	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
Yorke & Lower North	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>NSC</i>	<i>NSC</i>	<i>UC</i>
Murray Lands	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
South East	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
Eyre	<i>DD</i>	<i>DD</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>
Northern	<i>DD</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>
Perth	<i>DC</i>	<i>UD</i>	<i>DC</i>	<i>UD</i>	<i>DC</i>	<i>NSC</i>	<i>NSC</i>
South West	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>NSC</i>
Lower Great Southern	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>NSC</i>
Upper Great Southern	<i>UD</i>	<i>DC</i>	<i>DC</i>	<i>UC</i>	<i>DD</i>	<i>DC</i>	<i>DD</i>
Midlands	<i>DC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>DC</i>	<i>NSC</i>
South Eastern	<i>UC</i>	<i>UD</i>	<i>UD</i>	<i>UD</i>	<i>DC</i>	<i>UC</i>	<i>UD</i>
Central	<i>DC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>DC</i>	<i>DC</i>	<i>DD</i>
Pilbara	<i>UD</i>	<i>NSC</i>	<i>DC</i>	<i>UD</i>	<i>DC</i>	<i>DC</i>	<i>DC</i>
Kimberley	<i>UC</i>	<i>UC</i>	<i>DC</i>	<i>UD</i>	<i>DC</i>	<i>UC</i>	<i>NSC</i>
Greater Hobart	<i>DD</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>
Southern	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>
Northern	<i>UC</i>	<i>NSC</i>	<i>NSC</i>	<i>NSC</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>
Mersey-Lyell	<i>NSC</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>
Darwin	<i>UD</i>	<i>UD</i>	<i>DC</i>	<i>UD</i>	<i>DC</i>	<i>DC</i>	<i>UD</i>
Balance NT	<i>NSC</i>	<i>UD</i>	<i>DC</i>	<i>DC</i>	<i>DD</i>	<i>DC</i>	<i>DD</i>
Canberra	<i>UD</i>	<i>UD</i>	<i>DC</i>	<i>DC</i>	<i>DC</i>	<i>NSC</i>	<i>DC</i>
Balance ACT	<i>UC</i>	<i>UD</i>	<i>DC</i>	<i>DC</i>	<i>UD</i>	<i>UC</i>	<i>DC</i>

Notes. UD = upward diverging, UC= upward converging, DD = downward diverging, DC = downward converging, NSC = no significant change.

- region which is based around at least one major provincial town (>240,000 population) and has no dominant employment sector as defined above
- warm climate coastal (region which borders the coast and has the majority of land area less than 32 degrees south of equator with no dominant employment sector as defined above)
- other (including regions with large defence and public administration sectors).

Tables 8 reports the contribution to total population and Mw of each category of region, while Table 9 provides details of which statistical division is included in each category. The following observations deserve mention. The majority of the nation's population (63-64 percent) resides in the 8 metropolitan regions, and these regions account for an increasing proportion (47-57 percent) of Mw over

Table 8. Contribution to National M_w by Regions Classified by Economic Structure

Regional Typology	Number	Proportion of National Population					
		<i>1976</i>	<i>1981</i>	<i>1986</i>	<i>1991</i>	<i>1996</i>	<i>2001</i>
Capital City	8	<i>0.64</i>	<i>0.64</i>	<i>0.63</i>	<i>0.63</i>	<i>0.63</i>	<i>0.63</i>
Major Provincial Town	3	<i>0.07</i>	<i>0.07</i>	<i>0.08</i>	<i>0.08</i>	<i>0.09</i>	<i>0.09</i>
Agricultural	13	<i>0.05</i>	<i>0.05</i>	<i>0.05</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>
Manufacturing	3	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>
Agricultural/Manufacturing	16	<i>0.12</i>	<i>0.11</i>	<i>0.11</i>	<i>0.11</i>	<i>0.11</i>	<i>0.11</i>
Resource Development	5	<i>0.01</i>	<i>0.01</i>	<i>0.01</i>	<i>0.01</i>	<i>0.01</i>	<i>0.01</i>
Warm Climate Coastal	3	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>
Other	7	<i>0.05</i>	<i>0.05</i>	<i>0.05</i>	<i>0.05</i>	<i>0.05</i>	<i>0.05</i>
TOTAL	58	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>

Regional Typology	Contributions to M _w - National					
	<i>1976</i>	<i>1981</i>	<i>1986</i>	<i>1991</i>	<i>1996</i>	<i>2001</i>
Capital City	<i>6.46</i>	<i>7.38</i>	<i>7.55</i>	<i>6.55</i>	<i>7.09</i>	<i>7.03</i>
Major Provincial Town	<i>1.31</i>	<i>1.09</i>	<i>1.33</i>	<i>1.09</i>	<i>1.09</i>	<i>1.23</i>
Agricultural	<i>1.04</i>	<i>0.62</i>	<i>0.89</i>	<i>0.74</i>	<i>0.60</i>	<i>0.58</i>
Manufacturing	<i>0.67</i>	<i>0.73</i>	<i>0.71</i>	<i>0.67</i>	<i>0.73</i>	<i>0.67</i>
Agricultural/Manufacturing	<i>2.49</i>	<i>1.40</i>	<i>1.89</i>	<i>1.71</i>	<i>1.43</i>	<i>1.42</i>
Resource Development	<i>0.35</i>	<i>0.39</i>	<i>0.39</i>	<i>0.33</i>	<i>0.44</i>	<i>0.30</i>
Warm Climate Coastal	<i>0.79</i>	<i>0.81</i>	<i>0.84</i>	<i>0.59</i>	<i>0.76</i>	<i>0.66</i>
Other	<i>0.55</i>	<i>0.38</i>	<i>0.35</i>	<i>0.22</i>	<i>0.30</i>	<i>0.38</i>
TOTAL	<i>13.66</i>	<i>12.79</i>	<i>13.94</i>	<i>11.91</i>	<i>12.44</i>	<i>12.28</i>

Regional Typology	Relative Contributions to M _w - National					
	<i>1976</i>	<i>1981</i>	<i>1986</i>	<i>1991</i>	<i>1996</i>	<i>2001</i>
Capital City	<i>0.47</i>	<i>0.58</i>	<i>0.54</i>	<i>0.55</i>	<i>0.57</i>	<i>0.57</i>
Major Provincial Town	<i>0.10</i>	<i>0.08</i>	<i>0.10</i>	<i>0.09</i>	<i>0.09</i>	<i>0.10</i>
Agricultural	<i>0.08</i>	<i>0.05</i>	<i>0.06</i>	<i>0.06</i>	<i>0.05</i>	<i>0.05</i>
Manufacturing	<i>0.05</i>	<i>0.06</i>	<i>0.05</i>	<i>0.06</i>	<i>0.06</i>	<i>0.05</i>
Agricultural/Manufacturing	<i>0.18</i>	<i>0.11</i>	<i>0.14</i>	<i>0.14</i>	<i>0.11</i>	<i>0.12</i>
Resource Development	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.04</i>	<i>0.02</i>
Warm Climate Coastal	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>	<i>0.05</i>	<i>0.06</i>	<i>0.05</i>
Other	<i>0.04</i>	<i>0.03</i>	<i>0.02</i>	<i>0.02</i>	<i>0.02</i>	<i>0.03</i>
TOTAL	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>

the sample period. The only other significant changes are the decline (from 18-12 percent) in the contribution to M_w over the sample period of the

agricultural/manufacturing regions despite a static proportion of the state's population in these regions.

Finally while the results reported in Table 4 point to a fairly stable picture in terms of regions claiming membership of both the top and bottom ends of the regional income distribution, a number of statistical divisions have experienced change over the 1976-2001 period that have seen them 'cross-over' from being low income regions to become high income regions through superior growth performance relative to the nation. By contrast other statistical divisions have lagged in their comparative growth performance and 'crossed-over' from being a high income region to become a low income region relative to the nation. The β convergence concept enables us to test whether on net 'catch-up' has prevailed within the system as a whole. Figure 5 plots the relationship between initial income (in logs) and trend growth rates for the 58 statistical divisions over the entire sample period 1976-2001. The downward slope on the regression line depicted within this Figure points to β convergence which was found to be statistically significant. This result is consistent with previous results reported in Section 3. The finding of significant β convergence yet the absence of significant σ convergence suggests that while catch-up is occurring between the regions of Australia, the speed and magnitude of this catch-up is insufficiently large to generate a decline in interregional inequalities.

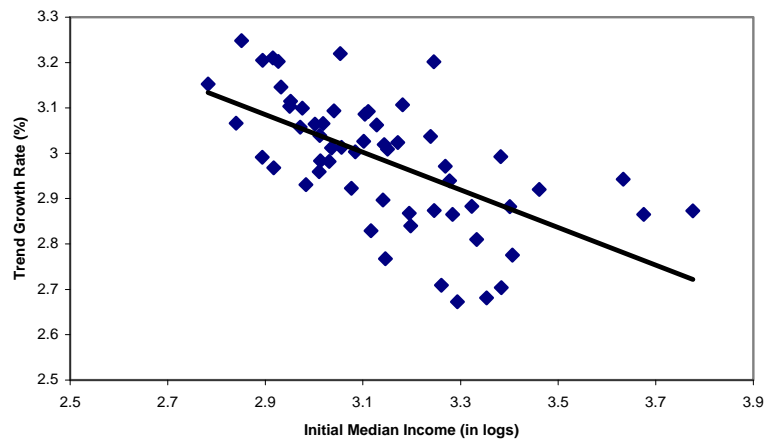


Figure 5. Beta Convergence of Median Income for Regions of Australia

Table 9. Applying an Adaption of the Carter Typology to Queensland Regions

Statistical Division	Regional Typology	Statistical Division	Regional Typology
<i>New South Wales</i>		<i>South Australia</i>	
Sydney	Capital City	Adelaide	Capital City
Hunter	Major Provincial Town	Outer Adelaide	Agric/Manuf
Illawarra	Major Provincial Town	Yorke & Lower North	Agricultural
Richmond-Tweed	Warm Climate Coastal	Murray Lands	Agric/Manuf
Mid-North Coast	Warm Climate Coastal	South East	Agric/Manuf
Northern	Agricultural	Eyre	Agricultural
North Western	Agricultural	Northern	Agric/Manuf
Central West	Agric/Manuf	<i>Western Australia</i>	
South Eastern	Other	Perth	Capital City
Murrumbidgee	Agric/Manuf	South West	Agric/Manuf
Murray	Agric/Manuf	Lower Great Southern	Agricultural
Far West	Resource Development	Upper Great Southern	Agricultural
<i>Victoria</i>		Midlands	Agricultural
Melbourne	Capital City	South Eastern	Resource Development
Barwon	Manufacturing	Central	Resource Development
Western District	Agric/Manuf	Pilbara	Resource Development
Central Highlands	Manufacturing	Kimberley	Other
Wimmera	Agricultural	<i>Tasmania</i>	
Mallee	Agricultural	Greater Hobart	Capital City
Loddon	Manufacturing	Southern	Agric/Manuf
Goulburn	Agric/Manuf	Northern	Other
Ovens-Murray	Agric/Manuf	Mersey-Lyell	Agric/Manuf
East Gippsland	Agricultural	<i>Northern Territory</i>	
Gippsland	Agric/Manuf	Darwin	Capital City
<i>Queensland</i>		Balance NT	Other
Brisbane	Capital City	<i>Aust. Cap. Territory</i>	
Moreton	Major Provincial Town	Canberra	Capital City
Wide Bay-Burnett	Agric/Manuf	Balance ACT	Agricultural
Darling Downs	Agric/Manuf		
South West	Agricultural		
Fitzroy	Other		
Central West	Agricultural		
Mackay	Other		
Northern	Other		
Far North	Warm Climate Coastal		
North West	Resource Development		

7. STATISTICAL DIVISION BASED MEASURES OF CONVERGENCE/ DIVERGENCE COMPARED WITH THE STATE AVERAGE

Since responsibility for regional policy in Australia is not the sole province of the national government, another useful disaggregation of results is by state. State governments are often more concerned about regional performance relative to the state average rather than the national average – that is with intra-state measures of income dispersion. Table 10 reports results for the standard measures of dispersion (Vw, Vuw, Mw) for each state calculated with respect to differences between each statistical division's median income and the corresponding own-state median income. This data is also plotted for Vw in Figure 6. Regional incomes relative to the corresponding own-state incomes are recorded in Tables 11 and 12, while Table 13 highlights the contribution to own-state Mw of regions of regions classified by economic type.

Table 10. Measures of Regional Income Dispersion Relative to Own-State

Measure	1976	1981	1986	1991	1996	2001
<i>New South Wales</i>						
Vuw	0.23	0.20	0.21	0.18	0.18	0.19
Vw	0.16	0.15	0.17	0.15	0.16	0.17
Mw	14.90	14.11	16.42	14.91	15.66	16.20
<i>Victoria</i>						
Vuw	0.26	0.16	0.18	0.16	0.14	0.14
Vw	0.17	0.11	0.11	0.11	0.10	0.09
Mw	14.52	9.41	10.48	9.58	8.92	8.44
<i>Queensland</i>						
Vuw	0.19	0.16	0.15	0.11	0.13	0.12
Vw	0.16	0.12	0.12	0.09	0.11	0.09
Mw	14.76	10.50	11.04	8.14	9.34	7.92
<i>South Australia</i>						
Vuw	0.16	0.08	0.14	0.14	0.10	0.10
Vw	0.10	0.05	0.08	0.08	0.05	0.06
Mw	7.69	2.75	6.71	6.37	3.80	4.07
<i>Western Australia</i>						
Vuw	0.24	0.26	0.28	0.24	0.27	0.23
Vw	0.14	0.15	0.16	0.13	0.14	0.11
Mw	5.73	5.59	7.62	5.03	4.91	5.39
<i>Tasmania</i>						
Vuw	0.06	0.09	0.10	0.08	0.10	0.08
Vw	0.08	0.06	0.09	0.08	0.09	0.08
Mw	6.80	4.77	8.45	7.26	8.20	7.39

Table 11. Regional Median Individual Income Relative to Own-State (Ratio)

	<i>1976</i>	<i>1981</i>	<i>1986</i>	<i>1991</i>	<i>1996</i>	<i>2001</i>
<i>New South Wales</i>						
Sydney	1.12	1.12	1.15	1.13	1.15	1.15
Hunter	0.79	0.84	0.83	0.83	0.84	0.80
Illawarra	0.93	0.88	0.85	0.86	0.84	0.82
Richmond-Tweed	0.61	0.66	0.71	0.75	0.76	0.74
Mid-North Coast	0.65	0.66	0.69	0.74	0.72	0.72
Northern	0.74	0.81	0.77	0.82	0.82	0.81
North Western	0.76	0.83	0.76	0.80	0.83	0.84
Central West	0.81	0.83	0.81	0.82	0.87	0.85
South Eastern	0.89	0.84	0.92	0.97	0.96	0.93
Murrumbidgee	0.88	0.93	0.84	0.85	0.94	0.93
Murray	0.79	0.92	0.85	0.84	0.89	0.90
Far West	0.70	0.78	0.73	0.77	0.69	0.70
<i>Victoria</i>						
Melbourne	1.10	1.07	1.08	1.07	1.07	1.07
Barwon	0.80	0.82	0.85	0.87	0.87	0.88
Western District	0.63	0.81	0.81	0.83	0.88	0.89
Central Highlands	0.74	0.73	0.78	0.81	0.83	0.84
Wimmera	0.70	0.85	0.78	0.78	0.87	0.86
Mallee	0.75	0.85	0.75	0.79	0.87	0.87
Loddon	0.70	0.79	0.80	0.82	0.84	0.85
Goulburn	0.68	0.88	0.83	0.86	0.90	0.91
Ovens-Murray	0.82	0.90	0.89	0.99	1.00	0.97
East Gippsland	0.74	0.82	0.82	0.83	0.80	0.78
Gippsland	0.75	0.96	0.90	0.86	0.83	0.80
<i>Queensland</i>						
Brisbane	1.11	1.08	1.11	1.07	1.08	1.08
Moreton	0.76	0.86	0.88	0.92	0.92	0.94
Wide Bay-Burnett	0.76	0.79	0.76	0.79	0.75	0.76
Darling Downs	0.79	0.89	0.87	0.87	0.89	0.92
South West	0.90	0.97	1.00	1.06	0.99	1.12
Fitzroy	0.94	1.07	1.03	1.00	0.97	0.97
Central West	1.02	1.09	1.05	1.03	0.99	1.13
Mackay	1.28	1.24	1.11	1.09	1.11	1.02
Northern	1.17	1.11	1.07	1.04	1.06	1.04
Far North	0.97	0.98	0.95	1.07	1.11	1.03
North West	1.35	1.35	1.32	1.23	1.27	1.25

Table 11 (Continued)

	<i>1976</i>	<i>1981</i>	<i>1986</i>	<i>1991</i>	<i>1996</i>	<i>2001</i>
<i>South Australia</i>						
Adelaide	1.06	1.01	1.05	1.05	1.02	1.03
Outer Adelaide	0.73	0.90	0.90	0.93	0.98	1.00
Yorke & Lower North	0.78	0.88	0.76	0.77	0.81	0.81
Murray Lands	0.82	0.93	0.83	0.82	0.91	0.93
South East	0.89	1.10	0.98	0.98	1.08	1.08
Eyre	0.97	1.03	0.82	0.81	0.91	0.94
Northern	1.03	1.07	0.94	0.95	0.91	0.86
<i>Western Australia</i>						
Perth	1.00	0.99	1.02	1.00	1.00	1.01
South West	0.74	0.85	0.81	0.88	0.86	0.88
Lower Great Southern	0.87	0.94	0.82	0.85	0.86	0.85
Upper Great Southern	1.08	1.11	0.92	0.90	1.05	0.84
Midlands	1.11	1.03	0.87	0.89	0.97	0.89
South Eastern	0.97	1.04	1.11	1.25	1.38	1.28
Central	1.05	0.95	0.94	0.99	0.99	0.94
Pilbara	1.64	1.75	1.76	1.64	1.67	1.56
Kimberley	0.90	0.99	1.06	0.99	0.97	0.99
<i>Tasmania</i>						
Greater Hobart	1.11	1.06	1.11	1.10	1.10	1.10
Southern	1.00	0.83	0.85	0.89	0.86	0.89
Northern	0.93	0.97	0.95	0.96	0.96	0.97
Mersey-Lyell	0.97	0.99	0.94	0.95	0.92	0.92

Regardless of measure VIC, QLD, SA and WA experienced intra-state income convergence over the 1976-2001 period – with this convergence tendency being most pronounced in VIC and QLD. By contrast on two out of the three measures TAS and NSW experienced intra-state income divergence.

Analysing the data from each sub-period also reveals some interesting contrasts. During the period 1976-81 all states except WA experienced income convergence. Recall from Table 5 that this was also a period of inter-state income convergence. The 1981-86 period saw all states except QLD experience income divergence. This was, not surprisingly, a period of inter-state income divergence also. The 1986-91 period saw both inter-state and intra-state convergence. The final two sub-periods, which were ones of neither convergence nor divergence at the inter-state level, each produced significant differences at the intra-state level. 1991-96 saw income convergence being experienced within SA and VIC and income divergence being experienced in all other states. By contrast, 1996-2001 saw income divergence being experienced within NSW and SA with income convergence being experienced in all other states. Taking these

last two sub-periods together, a strong convergent movement can be observed for the regions of VIC while a consistent divergent movement can be observed for the regions of NSW. As these states are the most populous states these contrasting movements deserve further research to determine the underlying causes.

Table 12. Patterns of Convergence/Divergence Relative to Own-State

	<i>1976-1981</i>	<i>1981-1986</i>	<i>1986-1991</i>	<i>1991-1996</i>	<i>1996-2001</i>	<i>1976-2001</i>	<i>1991-2001</i>
<i>New South Wales</i>							
Sydney	<i>UD</i>	<i>DC</i>	<i>NSC</i>	<i>UD</i>	<i>NSC</i>	<i>NSC</i>	<i>UD</i>
Hunter	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>NSC</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>
Illawarra	<i>DD</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>
Richmond-Tweed	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>NSC</i>
Mid-North Coast	<i>NSC</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>	<i>NSC</i>
Northern	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>NSC</i>	<i>NSC</i>	<i>UC</i>	<i>NSC</i>
North Western	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
Central West	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>
South Eastern	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>
Murrumbidgee	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>	<i>NSC</i>	<i>UC</i>
Murray	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
Far West	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>NSC</i>	<i>DD</i>
<i>Victoria</i>							
Melbourne	<i>DC</i>	<i>UD</i>	<i>NSC</i>	<i>NSC</i>	<i>NSC</i>	<i>NSC</i>	<i>NSC</i>
Barwon	<i>UC</i>	<i>UC</i>	<i>NSC</i>	<i>NSC</i>	<i>NSC</i>	<i>NSC</i>	<i>NSC</i>
Western District	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>
Central Highlands	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>
Wimmera	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>
Mallee	<i>UC</i>	<i>DD</i>	<i>NSC</i>	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>
Loddon	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>
Goulburn	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>UC</i>
Ovens-Murray	<i>UC</i>	<i>DD</i>	<i>UC</i>	<i>UC</i>	<i>DC</i>	<i>UC</i>	<i>DD</i>
East Gippsland	<i>UC</i>	<i>NSC</i>	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>
Gippsland	<i>UC</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>	<i>DD</i>	<i>NSC</i>	<i>DD</i>

Table 12 (Continued)

	1976- 1981	1981- 1986	1986- 1991	1991- 1996	1996- 2001	1976- 2001	1991- 2001
<i>Queensland</i>							
Brisbane	DC	DC	NSC	NSC	NSC	NSC	NSC
Moreton	UC	UC	UC	NSC	UC	UC	NSC
Wide Bay-Burnett	UC	DD	UC	DD	UC	NSC	DD
Darling Downs	UC	DD	NSC	UC	UC	UC	UC
South West	UC	UC	UC	DC	UC	UC	UD
Fitzroy	UC	DC	DD	DD	NSC	NSC	DD
Central West	UD	DC	DC	DC	UC	UD	UD
Mavkay	DC	DC	DC	UD	UD	DC	DC
Northern	DC	DC	DC	UD	DC	DC	NSC
Far North	UC	DD	UC	UD	DC	UC	DC
North West	NSC	DC	DC	UD	DC	DC	NSC
<i>South Australia</i>							
Adelaide	DC	UD	NSC	DC	NSC	NSC	DC
Outer Adelaide	UC	NSC	UC	UC	UC	UC	UC
Yorke & Lower North	UC	DD	UC	UC	NSC	NSC	UC
Murray Lands	UC	DD	NSC	UC	UC	UC	UC
South East	UC	DC	NSC	UC	NSC	UC	UC
Eyre	UC	DC	NSC	UC	UC	NSC	UC
Northern	UD	DC	UC	DD	DD	DC	DD
<i>Western Australia</i>							
Perth	NSC	UC	DC	DC	UD	NSC	NSC
South West	UC	DD	UC	UC	UC	UC	NSC
Lower Great Southern	UC	DD	UC	NSC	NSC	NSC	NSC
Upper Great Southern	UD	DC	DD	UC	DC	DC	DD
Midlands	DC	DC	UC	UC	DD	DC	NSC
South Eastern	UC	UD	UD	UD	DC	UD	UD
Central	DC	NSC	UC	NSC	DD	DC	DD
Pilbara	UD	UD	UD	UD	DC	DC	DC
Kimberley	UC	UC	DC	DD	UC	UC	NSC
<i>Tasmania</i>							
Greater Hobart	DC	UD	DC	NSC	NSC	NSC	NSC
Southern	DC	UC	UC	DD	UC	DC	NSC
Northern	UC	DD	UC	NSC	UC	UC	NSC
Mersey-Lyell	UC	DD	NSC	DD	NSC	DD	DD

Notes. UD = upward diverging, UC= upward converging, DD = downward diverging,
DC = downward converging, NSC = no significant change.

Table 13. Relative Contribution to State MW By Regions Classified by Economic Structure

	1976	1981	1986	1991	1996	2001
<i>New South Wales</i>						
Capital City	0.50	0.53	0.56	0.55	0.60	0.58
Major Provincial Town	0.15	0.15	0.14	0.16	0.16	0.18
Agricultural	0.09	0.07	0.08	0.06	0.06	0.05
Agricultural/Manufacturing	0.09	0.06	0.08	0.08	0.05	0.05
Resource Development	0.01	0.01	0.01	0.01	0.01	0.01
Warm Climate Coastal	0.13	0.15	0.12	0.13	0.13	0.13
Other	0.02	0.03	0.01	0.01	0.01	0.01
<i>Victoria</i>						
Capital City	0.49	0.52	0.54	0.54	0.58	0.57
Agricultural	0.09	0.08	0.10	0.11	0.09	0.09
Manufacturing	0.20	0.26	0.21	0.20	0.19	0.19
Agricultural/Manufacturing	0.23	0.13	0.16	0.15	0.14	0.15
<i>Queensland</i>						
Capital City	0.36	0.32	0.43	0.39	0.38	0.45
Major Provincial Town	0.18	0.19	0.18	0.16	0.16	0.16
Agricultural	0.01	0.01	0.00	0.01	0.00	0.02
Agricultural/Manufacturing	0.22	0.20	0.22	0.26	0.25	0.25
Resource Development	0.05	0.06	0.04	0.04	0.03	0.03
Warm Climate Coastal	0.01	0.01	0.03	0.06	0.08	0.02
Other	0.18	0.20	0.09	0.08	0.10	0.06
<i>South Australia</i>						
Capital City	0.52	0.17	0.54	0.56	0.43	0.47
Agricultural	0.10	0.16	0.18	0.17	0.20	0.17
Agricultural/Manufacturing	0.37	0.67	0.28	0.26	0.37	0.36
<i>Western Australia</i>						
Capital City	0.02	0.13	0.21	0.05	0.00	0.18
Agricultural	0.19	0.09	0.15	0.18	0.11	0.16
Agricultural/Manufacturing	0.33	0.21	0.21	0.21	0.26	0.22
Resource Development	0.44	0.56	0.43	0.56	0.62	0.43
Other	0.02	0.00	0.01	0.00	0.01	0.00
<i>Tasmania</i>						
Capital City	0.63	0.49	0.53	0.55	0.51	0.54
Agricultural/Manufacturing	0.11	0.31	0.30	0.29	0.34	0.35
Other	0.26	0.19	0.17	0.16	0.15	0.11

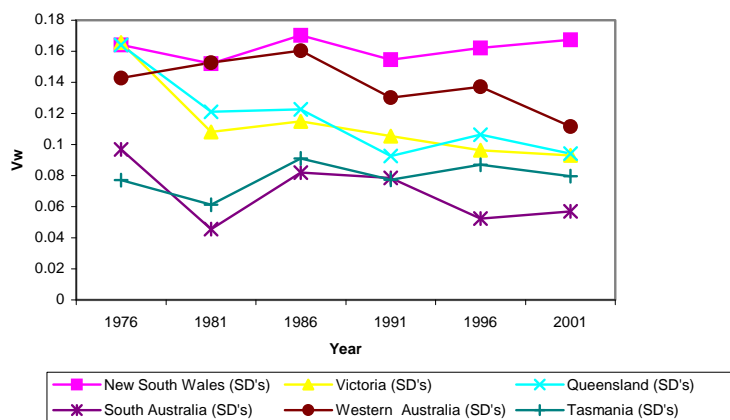


Figure 6. Weighted Coefficient of Variation: Statistical Divisions Relative to Own-State

7. CONCLUSION

Our examination of trends in Australia's regional income dynamics over a twenty-five year period gives strong support to the suggestion by McGillivray and Peter (1991) that for economies in the later stages of economic development regional inequality can be expected to follow a pattern of short-run oscillations around a longer term trend of relative stability.

This begs the question, however of what implications we might draw for government policy from our empirical findings. On the one hand, one could argue that twenty-five years has elapsed and regional inequality has not been impacted on significantly by existing federal and state regional policies and that greater priority needs to be given to this area by all levels of government – since to ignore persistent inequality can give rise entrenched economic, social and political problems. On the other hand, one could attempt to use the findings of this paper to argue that devoting extra resources to regional policy would represent a waste of scarce resources since history suggests that progress made towards the goal of reducing inequality in a given time period is likely to be reversed in the next phase of development. It could be however that political cycles in terms of the degree of emphasis given to regional policy by successive governments provide part of the explanation behind the oscillations in regional inequality that have been observed. If further research suggests that this is indeed the case, then putting regional policy higher among the policy priorities of government over the longer term may yield significant returns in accelerating the currently painfully slow crawl towards convergence.

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