INCOME DISPERSION BETWEEN STATES OF DIFFERENT REGIONS IN THE UNITED STATES, INCLUDING COMPARISONS WITH AUSTRALIA

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ABSTRACT This paper examines income dispersion among the states within the regions in the United States. A profile from 1929 to 1997 is provided. A simple equitable distributional criterion is used whereby each state receives a share of the total population comparable to its share of income. The dispersion measure employed is the coefficient of variation for each region on a yearly basis. The results provide evidence that for most regions, a substantial declining trend in income dispersion among component states is observed up to the early to mid-1970s, followed by a slight rise in the 1980s with slightly diminishing trends in most recent years. A comparison is also provided for regional income inequality in the United States with regional income inequality in Australia.

1. INTRODUCTION

The purpose of this paper is to describe trends in the variation of income distribution among states within regions of the United States. This research uses the eight regions (see Appendix) classified by the Bureau of Economic Analysis (BEA) as the basis of geographic disaggregation and uses BEA (1998) data for a period of sixty-eight years, 1929-1997. Therefore, a clear look at the behaviour of the states' incomes in the regions makes it possible to observe within-region heterogeneity as explained by Borooah (2000). Borooah indicated that within group inequality is the contribution to inequality as a result of differences between component individuals in the group.

For a contrast, findings of published research dealing with trends in income inequality in Australia at the regional level are examined for comparisons with the reported findings of trends in the United States. Both countries are industrially advanced with similar democratic standards, culture, heritage, and socio-economic institutions.

Economic similarity prompted the use in this study of the BEA classification of states into regions. Perlman (1982) emphasizes that the BEA classification is organized according to economic homogeneity, industrial output similarities, as well as physical proximities and historical development. It is recognized that regional definitions create boundaries that have some individuals earning an income in one region and spending the income in another region of residence.

According to BEA (1998, /regional/articles/spi2997/maintext.htm), though BEA estimates of per capita income are derived from place-of-work data, because of proper adjustments, and to the extent that commuting flows net out, conclusions based on place-of-work approximate conclusions made on place-of-residence.

Similarly, starting in 1976, the Australian Bureau of Economic Statistics (ABS) divided Australia into 57 statistical divisions (SD) grouped into six major states (New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania) and two territories (Australian Capital and Northern). There is an obvious parallel in the geographical division of Australia with the United States by treating the six Australian states as BEA regions and the statistical divisions within the Australian states as the United States states within the BEA regions.

2. MEASUREMENT OF INCOME DISPERSION

Many studies investigated income inequalities at the state, regional, or national levels, exemplified by the works of Amos (1991); Coughlin and Mendelbaum (1988); Garnick (1990); Levernier, Rickman, and Partridge (1995); Maxwell and Hite (1992); Maxwell and Peter (1988); Ram (1992); and Rowley, Redman, and Angle (1991). The schemes for measuring income inequalities also abound. Some widely used measures are surveyed by Kakwani (1980) and Levy and Murnane (1992).

The economic literature relates trends toward income equality to a concept known as convergence, popularised a great deal by Barro and Sala-i-Martin (1992). According to Bernat, Jr (2001), even though theoretically there is only one type of convergence, a distinction is made empirically between two concepts of convergence – mobility and dispersion. Mobility (named β-convergence) focuses on the change in the position of economies. It answers a question of whether or not poorer economies are catching up to richer economies. A common way to measure β-convergence is to regress the growth in per capita income on initial per capita income. If the estimated regression coefficient is negative and statistically significant, the indication is that economies with low initial incomes grew faster than economies with high initial incomes.

The second convergence concept, dispersion, focuses on the spread of income (distance between incomes) and answers a question of whether or not the distribution of income among economies is becoming narrower over time. Furthermore, Bernat explains that the coefficient of variation (defined as the standard deviation divided by the mean), which is chosen in this research, is a typical measuring device for dispersion called σ-convergence. An increase in the coefficient of variation, as O'Hagan (1999) observed, indicates an increase in income inequality as well as regional income divergence.

Another measurement of income inequality favoured by some researchers is the Theil's (1967) entropy because total entropy can be decomposed into between-region equality and within-region equality. However, this paper has opted for a different approach, outlined below, for two reasons. The first reason is that the focus of this research is on within-region equality. The between-region equality, using a similar approach followed in this paper, was addressed by

Nissan and Carter (1993). Therefore, no decomposition is intended here. The second reason is that the use of logarithms in computing the Theil's index was criticized by Sen (1973) and Fields (1980) because the results lack intuition.

3. THE THEORETICAL MODEL

The scheme employed in this research takes into account the shares of population and income of each state from the U.S. totals. For this purpose, let the eight BEA regions of the United States be denoted by R_j, $j = 1, 2, \ldots, 8$. Further, let p_i and y_i be, respectively, the shares of national population and national income of state i, where $\Sigma_i p_i = \Sigma_i y_i = 1.00$, $i = 1 \ldots, n$ is the number of states.

Define an average measure for region R_j in each year by

$$\bar{z}_j = \left(\frac{1}{n_j}\right)\sum_{i\varepsilon R_j} z_i, \quad j = 1, \ldots, 8 \tag{1}$$

where $z_i = (p_i/p_j)/(y_i/y_j)$. p_j and y_j are, respectively, the national population and national income shares of region R_j obtained as $p_j = \Sigma_i p_i$, and $y_j = \Sigma_i y_i$, $i \in R_j$, n_j is the number of states in region R_j. Note, when $z_i = 1$, a state has the same proportional shares of population and income as its region. If $z_i > 1$, the implication is that the state's share of population in the region is larger than its income share. The reverse is true if $z_i < 1$. In this case, a state has a larger share of income than its share of population.

The coefficient of variation is obtained for region R_j by

$$CV_j = \frac{S_j}{\bar{z}_j} \tag{2}$$

where $\bar{z}_j$ is given by equation (1) and

$$S_j = \Big[\frac{1}{n_j - 1}\sum_{i\varepsilon R_j}(z_i - \bar{z}_j)^2\Big]^{1/2}, \quad j = 1, \ldots, 8$$

It can be shown that CV_j in (2) may be expressed as

$$CV_j = \left\{\frac{1}{n_j - 1}\sum_{i\varepsilon R_j}\left[\left(\frac{z_i}{\bar{z}_j}\right)^2 - 1\right]\right\}^{1/2}, \quad j = 1, \ldots, 8$$

from which a deduction is obtained that $\left(z_i/\bar{z}_j\right)^2 - 1$, the normalized difference between the ratio of population to income (z_i) of the ith state to that of the average of the whole region ($\bar{z}_j$), measures the observed from the egalitarian distribution. That is, as the proportional share of the ith state z_i approaches that of the average of the region in which it is a member, the ratio $\left(z_i / \bar{z}_j\right)$ approaches 1.00. It follows that $\left(z_i / \bar{z}_j\right)^2$ also approaches 1.00. Thus, $\left(z_i / \bar{z}_j\right)^2 - 1$, and therefore CV_j, becomes smallest when all states in a region approach the average of the region. In fact, CV_j becomes zero when every state has exactly the same proportion as the average of its region.

Note that it is also possible to decompose the coefficient of variation into between-sets and within-sets. Foster, Greer and Thorbecke (1984) show that their proposed inequality measure, in essence is the squared coefficient of variation, can also be decomposed. However, as explained earlier for Theil's entropy, the concern is within state inequality and therefore no disaggregation is contemplated.

4. EMPIRICAL RESULTS

4.1 Preliminary Results

Table 1 shows the mean, $\bar{z}_j$ of equation (1), and Table 2 shows the coefficient of variation, CV_j, of equation (2), in five-year intervals during 1930-1995 for the eight regions. Table 1 provides a picture of the interplay between states within regions for the differences in regional means. Note that complete equality for a state is z_i = 1.00; that is, there is equality of population share to income share.

As an explanation (though calculations are not shown for economy of space) in New England (see Appendix), the states of Vermont, Maine, New Hampshire, and Rhode Island had z_i values larger than 1.00 while Massachusetts and Connecticut had z_i values less than 1.00 in almost all years. Both z_i greater than 1.00 and z_i less than 1.00 contributed, in general, to New England having the highest values of $\bar{z}_j$ in Table 1.

Table 2 concretely shows that the dispersion within states fluctuates considerably between the regions. For instance, in recent years, the least dispersion among states within individual regions (thus, the greatest regional income parities) occurred in the regions of Great Lakes, Southwest, Plains, and Far West. The opposite was true for Mideast, Southeast, Rocky Mountain, and New England.

4.2 Interplay Between Equality and Dispersion

The main feature of the model for regional equality, $\bar{z}$, may be summarized by stating that relative decline in dispersion over a period of time for a region is reached when $\bar{z}$ approaches one from above or from below. The converse is true when $\bar{z}$ moves away from one from above or below. In either case, moves of a

Table 1. Mean ($\bar{z}$) for Ratio of Population Share to Income Share: 1930-1995

Year	United States	New England	Mideast	Great Lakes	Plains	Southeast	Southwest	Rocky Mountain	Far West
1930	1.06894	1.14440	1.01998	1.07231	1.13296	1.04529	1.00932	1.01273	1.11374
1935	1.05214	1.15847	0.97522	1.04618	1.10434	1.03950	0.98039	1.00037	1.09856
1940	1.05296	1.16985	0.94014	1.05626	1.10259	1.04885	1.01009	1.00328	1.07320
1945	1.02958	1.10465	1.00815	1.02881	1.00810	1.03292	1.01669	0.99600	1.03247
1950	1.02929	1.13211	0.95651	1.02697	1.01683	1.03631	1.04006	0.99767	1.02083
1955	1.04156	1.11774	0.97354	1.02957	1.05835	1.03829	1.02623	1.00882	1.06786
1960	1.03885	1.11534	0.98742	1.02560	1.03143	1.04599	1.00589	1.02150	1.05564
1965	1.03703	1.10802	0.98662	1.02408	1.03601	1.04121	1.02276	1.01485	1.04810
1970	1.03931	1.10837	0.99496	1.02226	1.05009	1.04986	1.02955	1.02765	1.01132
1975	1.02240	1.09982	0.97703	1.02048	1.00106	1.04061	1.04050	1.01553	0.97407
1980	1.03870	1.09608	0.98274	1.01605	1.05477	1.04849	1.05265	1.03183	1.01422
1985	1.05236	1.10919	0.99316	1.01897	1.04324	1.06618	1.05610	1.06760	1.05034
1990	1.05232	1.11716	0.98664	1.01915	1.04414	1.07570	1.05578	1.05751	1.03699
1995	1.04769	1.12452	0.98244	1.01698	1.05027	1.06250	1.06105	1.06938	1.00208

Note: Table 1 is computed from equation (1). See Appendix for listing of states in each region.
Source: BEA (1998)

Table 2. Dispersion (*CV*) for Ratio of Population Share to Income Share: 1930 - 1995

Year	United States	New England	Mideast	Great Lakes	Plains	Southeast	Southwest	Rocky Mountain	Far West
1930	0.19974	0.19793	0.20811	0.16428	0.24482	0.24997	0.18123	0.07978	0.18035
1935	0.19114	0.22993	0.21590	0.12375	0.19871	0.22479	0.15167	0.10517	0.18999
1940	0.19360	0.23088	0.21645	0.13799	0.16683	0.24252	0.13759	0.11189	0.18454
1945	0.10976	0.15275	0.11469	0.07966	0.04357	0.15122	0.08102	0.04699	0.08211
1950	0.13538	0.18616	0.13390	0.08048	0.06824	0.15254	0.09004	0.11752	0.17051
1955	0.11836	0.17549	0.10444	0.08630	0.11349	0.12851	0.07034	0.08747	0.11784
1960	0.10863	0.15657	0.09944	0.07607	0.07319	0.13390	0.03844	0.08993	0.10642
1965	0.09569	0.14895	0.09332	0.07635	0.07988	0.11459	0.04039	0.05560	0.06508
1970	0.10108	0.14274	0.07797	0.07085	0.09893	0.11222	0.08113	0.07813	0.10982
1975	0.10120	0.13352	0.08956	0.07049	0.04662	0.09462	0.05943	0.10600	0.15893
1980	0.10561	0.14187	0.07500	0.06096	0.10937	0.10411	0.08144	0.15001	0.10876
1985	0.11159	0.15877	0.08868	0.06691	0.08746	0.12216	0.08049	0.13536	0.12428
1990	0.10986	0.15960	0.10317	0.06638	0.08410	0.12792	0.07805	0.11791	0.08285
1995	0.10863	0.17235	0.11319	0.06366	0.08935	0.11049	0.07520	0.11495	0.05149

Note: Table 2 is computed from equation (2). See Appendix for listing of states in each region.
Source: BEA (1998)

region's mean, $\bar{z}$, over time toward one from above or below contribute to decreases in the coefficient of variation. Moves of $\bar{z}$ away from one from above or below contribute to increases in the coefficient of variation.

Table 1 and Table 2 bear witness to the interplay between regional mean, $\bar{z}$, and regional coefficient of variation, *CV*. Take, for instance, the New England region where all $\bar{z}$ >1.00 in Table 1. Increases in $\bar{z}$ over a period coincide with increases in *CV* and vice versa in Table 2. On the other hand, the Mideast region had values $\bar{z}$ <1.00 (except 1930 and 1945). Note that a decrease in $\bar{z}$ over a period coincides with an increase in *CV* and *vice versa*. Such patterns prevail for most entries in Tables 1 and 2 with some exceptions.

Over time, therefore, there are four possibilities for combining $\bar{z}_j$ and CV_j (respectively, the mean in Table 1 and the dispersion in Table 2) as follows:

(a) $\bar{z}_j$ falls - CV_j falls,

(b) $\bar{z}_j$ falls - CV_j rises,

(c) $\bar{z}_j$ rises - CV_j falls, and,

(d) $\bar{z}_j$ rises - CV_j rises.

When looking at two consecutive periods in Tables 1 and 2, the perception is that over the years 1930 to 1995 no one-way trend prevails.

Table 3 is composed of entries of the letters a, b, c, and d, reflecting the four alternative movements depicted above. As observed in Table 3, some patterns prevail more than others when counting the inventory of letters a, b, c, and d. The letter "a," signifying a fall for both $\bar{z}$ and *CV*, dominates for a total of 37 followed by the letter "d," signifying a rise for both $\bar{z}$ and *CV*, occurring a total of 32, followed by the letter "c," signifying "rise-fall," with a total of 20.

The breakdown by regions displayed at the bottom of Table 3 provides an interesting story regarding patterns of movement of $\bar{z}$ and *CV*. The occurrence of 'a' and 'c', which signify approaches to $\bar{z}$ = 1.00 from above or below accompanied with falling *CV*, indicate prevalence of trends toward less regional dispersion (57 of 104). In other words, states in a region tended to receive more equalized proportional shares.

4.3 Non-linear Trends in Income Dispersion

Also from Table 2, a conclusion may be made that, for some regions, patterns of variability are evident, more so in some cases than others. For this purpose, quadratic and cubic trends were made for the whole period, 1929-1997. The quadratic version is employed to detect patterns of decreasing then increasing trends if any, and the cubic version is employed to detect decreases in trends in recent years, if any. Due to smallness of the numbers, *T* (the year trend code for time) is a transform

$$T = (\text{Year-1929})/10$$

so that $T_{1929} = 0$, $T_{1930} = 0.1$, and so on up to 1997 with $T_{1997} = 7.5$. The quadratic equation is

$$CV_t = b_0 + b_1T + b_2T^2 + u_t \tag{3}$$

and the cubic equation is

$$CV_t = b_0 + b_1T + b_2T^2 + b_3T^3 + u_{t,} \tag{4}$$

Table 3. Qualitative Display of Regional Directions of Means and Dispersion

Period	New England	Mideast	Great Lakes	Plains	Southeast	Southwest	Rocky Mountain	Far West
1930-1935	d	b	a	a	a	a	b	b
1935-1940	d	b	d	a	d	c	d	a
1940-1945	a	c	a	a	a	c	a	a
1945-1950	d	b	b	d	d	d	d	b
1950-1955	a	c	d	d	c	a	c	c
1955-1960	a	c	a	a	d	a	d	a
1960-1965	a	a	b	d	a	d	a	a
1965-1970	c	c	a	d	c	d	d	b
1970-1975	a	b	a	a	a	c	b	b
1975-1980	b	c	a	d	d	d	d	c
1980-1985	d	d	d	a	d	c	c	d
1985-1990	d	b	c	c	d	a	a	a
1990-1995	d	b	a	d	a	c	c	a
Sum a	5	1	7	6	5	4	3	6
Sum b	1	6	2	0	0	0	2	4
Sum c	1	5	1	1	2	5	3	2
Sum d	6	1	3	6	6	4	5	1

Note: a, b, c, and d refer to simultaneous direction of change in Table 1 of mean $\bar{z}$ and in Table 2 of *CV* between the time periods. The letters denote, respectively: fall-fall; fall-rise; rise-fall; and rise-rise. See text for explanations. See Appendix for listing of states in each region.

Source: Tables 1 and 2.

Table 4. Quadratic and Cubic Regressions of Coefficients of Variation, 1929-1997

Region	Regression	b_0 (t-Value)	b_1 (t-Value)	b_2 (t-Value)	b_3 (t-Value)	F-Values	$\overline{R}^2$
United States	Quadratic	0.228	-0.059	0.007	--	153.95	0.818
		(36.5)	(-14.0)	(10.8)	--		
	Cubic	0.244	-0.088	0.017	-0.001	120.21	0.840
		(32.0)	(-9.0)	(5.1)	(-3.2)		
New England	Quadratic	0.242	-0.043	0.005	--	88.41	0.720
		(41.6)	(-10.8)	(8.4)	--		
	Cubic	0.233	-0.026	-0.001	0.001	62.49	0.731
		(31.4)	(-2.7)	(-0.4)	(1.9)		
Mideast	Quadratic	0.245	-0.076	0.008	--	221.47	0.866
		(38.3)	(-17.3)	(13.7)	--		
	Cubic	0.253	-0.090	0.014	-0.001	151.47	0.869
		(30.7)	(-8.5)	(3.9)	(-1.5)		
Great Lakes	Quadratic	0.156	-0.038	0.004	--	297.42	0.897
		(47.4)	(-16.8)	(11.8)	--		
	Cubic	0.170	-0.063	0.013	-0.001	335.15	0.936
		(50.5)	(-14.7)	(8.9)	(-6.5)		
Plains	Quadratic	0.280	-0.102	0.012	--	51.87	0.599
		(15.9)	(-8.6)	(6.9)	--		
	Cubic	0.337	-0.207	0.050	-0.004	50.59	0.686
		(16.6)	(-7.9)	(5.6)	(-4.4)		

Table 4 *(contd).* Quadratic and Cubic Regressions of Coefficients of Variation, 1929-1997

Region	Regression	b_0 (*t*-Value)	b_1 (*t*-Value)	b_2 (*t*-Value)	b_3 (*t*-Value)	*F*-Values	$\overline{R}^2$
Southeast	Quadratic	0.253	-0.061	0.006	--	198.26	0.853
		(40.3)	(-14.3)	(10.4)	--		
	Cubic	0.257	-0.067	0.009	-0.0002	131.08	0.852
		(31.2)	(-6.4)	(2.4)	(-0.6)		
Southwest	Quadratic	0.186	-0.061	0.007	--	109.55	0.761
		(26.8)	(-13.0)	(10.8)	--		
	Cubic	0.203	-0.093	0.019	-0.001	86.76	0.791
		(24.1)	(-8.6)	(5.1)	(-3.2)		
Rocky Mountain	Quadratic	0.119	-0.021	0.004	--	11.35	0.233
		(13.6)	(-3.5)	(4.2)	--		
	Cubic	0.137	-0.054	0.016	-0.001	10.42	0.293
		(12.5)	(-3.9)	(3.3)	(-2.6)		
Far-West	Quadratic	0.176	-0.029	0.002	--	17.89	0.332
		(13.5)	(-3.3)	(1.9)	--		
	Cubic	0.221	-0.111	0.033	-0.003	23.39	0.497
		(15.0)	(-5.9)	(5.1)	(-4.8)		

Note: Based on Table 2 and equations (3) and (4). See Appendix for listing of states in each region.
Source: BEA (1998)

where CV_t is the estimate for the coefficient of variation, T is the transform of time, and u_t is the disturbance term. The results are shown in Table 4, where columns (1)-(4) contain the values of the coefficients "b_i" and their *t*-values in parentheses for testing their significance. Column (6) displays $\overline{R}^2$ which gives the goodness of fits for trends of equations (3) and (4).

The coefficients of the quadratic equations displayed the proper signs for decreasing trends in income dispersion in early years followed by a rising trend in more recent years (negative for the linear term b_1 and positive for the quadratic term b_2). All the coefficients were significant at the five percent level, with the exception of the quadratic term for the Far West region.

The cubic equations, on the other hand, with the exception of the New England region, displayed the proper signs for decreasing, increasing and then decreasing trends in income dispersion (negative for the linear term b_1, positive for the quadratic term b_2, and negative for the cubic term b_3). However, the cubic terms were not statistically significant for the Mideast and Southeast regions. Overall, both versions attest to a decrease then increase in dispersion. But, as a consequence of the findings of the cubic version, it may be concluded that the divergence of the 1980s is diminishing in the 1990s.

The largest values of b_0, signifying the largest beginning values of dispersion in both regression versions of equations (3) and (4) are (in order with the largest first) the Plains, the Southeast, the Mideast, and the New England regions. The sharpest decrease then increase in dispersion in the quadratic version are (in order, with largest first) the Plains, Mideast, Southwest, Southeast, and New England. This pattern is somewhat maintained in the cubic regression where the order now decrease-increase-decrease is observed for the Plains, the Southwest, the Far West, and the Great Lakes regions.

The regression coefficients in Table 4 for the United States and the regions where $b_1 < 0$ and $b_2 > 0$ in the quadratic as well as the cubic versions, give credence to the perceived widening in income dispersion. However, the decline in dispersion for most regions, as observed in the signs of the cubic coefficients, dispel somewhat the notion that the trends in the increase in dispersion observed in the 1980s will continue into the future.

5. IMPLICATIONS

The relative income divergence during the 1980s within most regions of the United States may be explained, in part, in terms of international trade dynamics. Due to internationalisation of commerce, new countries with strong economies have appeared. Among the remedies suggested to overcome the challenge is emphasizing the production of new products that require high technology expertise for job creation. This suggestion was received, especially in the United States, with enthusiasm for federal, state, and local government programs of education and retraining, grants, and tax concessions designed to encourage innovation and new jobs to replace the lost traditional industrial jobs.

In some regions with successful programs, new spirals of employment and economic growth have been in evidence in recent years. These are consistent with advocates of "pole theory" as explained for instance by Hanson (1967) and Lausen (1969) and as empirically tested by the so-called "augmented inverted U" for the United States by Amos (1986) and for Australia by Maxwell and Peter (1988). Within the United States, some states performed a bit better than others and this, perhaps, may explain in part the reason for trends in United States regional divergence in the 1980s and the new trends toward convergence in Table 4.

Along this line of reasoning, Mair (1993) contends that the adoption of new technological and organizational structures were causes of a new driving force in economic growth in some localities. In this regard, local and regional officials decided to promote the best role for the labour in a locality or region to meet the challenge of the global redistribution of labour. This phenomenon introduced a new round of activities in some areas culminating in pole-like spatial economic advantages.

Some economists project a course for the United States economy of lost industrial jobs not adequately replaced by jobs in the service sector, or jobs in the new high-tech innovative industries that tend to favour a special segment of the work force. Adequate numbers of jobs, rising worker incomes, and thus decreasing income dispersions require job creation, and the development of a suitable work force. Those, in turn, depend on worker retraining in the rapid technological change created by a dynamic, increasingly intertwined global economy.

Consequently, whether increasing income dispersion within-regions trends, as evidenced by the results of the quadratic model of equation (3), will continue to grow or go back to their former trends of less dispersion as evidenced by the results of the cubic model of equation (4), in essence following a pattern suggested by Maxwell and Peter (1988, Figure 1, p. 20) for Australia, will depend on how well the United States adjusts to the prevailing economic realities.

6. COMPARISONS WITH AUSTRALIA

In a similar manner as the states in the United States, the Australian sub-state regions (SDs) according to McGillivray and Peter (1991), differ in labour market, demographic, and geographic variables which may contribute to income inequality among families as related to differences in economic development. Using the Gini coefficient as the inequality indicator, they concluded that inequality and development levels exhibit a pattern of minor oscillation around a longer-term trend. A similar observation using the Gini coefficient as a measure of inequality was forwarded earlier by Maxwell and Peter (1988) in that considerable variation exists between the sub-state statistical divisions.

Maxwell and Hite (1992) confirm that an increase in income inequality between the late 1970s and the late 1980s for Australian states and territories followed a similar pattern to the pattern found in this paper of income inequality in the United States. Harris (1998) paid special attention to changes between 1977-78 and 1994-95 in per capita income in each Australian state. He found that there were significant changes in per capita income in individual states. Harris concludes that while the changes at Australia's national scale may not have been very significant, the changes in the redistribution of GDP at the individual states' levels were very large.

An exclusive look at one of the Australian states (Victoria) by O'Hagan (1999) can be viewed as a prototype of the other states. He concludes (p. 97) that "the existence of long-standing disparities 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 convergence of incomes over time." O'Hagan goes on to explain that long-term sectoral changes and other influences beyond freer movement of labour and capital also affect economic growth in Victorian SDs. One may add, in a similar manner, that this applies to the other Australian states as well.

Overall, the findings of the papers cited in this section present a picture of regional income inequality in Australia that coincides with the picture presented in this article for the United States regions. Similar divergence patterns of per capita income between and within regions were witnessed for both Australia and the United States. Similar explanations for the causes of income inequality in the United States, as hypothesized in section 5, may also apply to Australia.

7. CONCLUDING REMARKS

This paper presents a profile of income dispersion among United States states within regions from 1929 to 1997 by using the coefficient of variation. For contrast, income dispersion in Australia is compared with income dispersion in the United States. It was found that dispersion for the United States as a whole, as well as for Australia, was initially reduced then rose again during the late 1970s and late 1980s. The overall conclusions of this analysis support the work of the recent writers who documented and provided possible explanations for the variation in income between states within regions in the United States as well as between statistical divisions within states in Australia. In addition, it was found that the 1980s increase in income dispersion within regions in the United States shows signs of a decrease in recent years.

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APPENDIX

Regions of the United States according to the BEA are: (1) **New England:** Connecticut, New Hampshire, Maine, Massachusetts, Rhode Island, Vermont; (2) **Mideast:** Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania; (3) **Great Lakes:** Illinois, Indiana, Michigan, Ohio, Wisconsin; (4) **Plains:** Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota; (5) **Southeast:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia; (6) **Southwest:** Arizona, Texas, New Mexico, Oklahoma; (7) **Rocky Mountain:** Colorado, Idaho, Montana, Utah, Wyoming; (8) **Far West:** Alaska, California, Hawaii, Nevada, Oregon, Washington.