INCOME CONVERGENCE--A DELUSION

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Several recent publications concerning regional economic growth have stated that regional differences in per capita incomes are diminishing over time; that is, inter-regional per capita incomes are supposedly converging. (4, p. 7;14, p. 59). However, the mere presence of chronically depressed regions during the recent period of sustained national growth belies this hypothesis.[1] It is the contention of this study that the supposed convergence of incomes is a delusion fostered by the usage of relative measurements. Although area per capita incomes in relative terms may appear to be converging, in absolute dollar terms they are in fact diverging.

Review of Studies

Several notable studies of the regional distribution of per capita incomes within the United States have been completed. Borts and Stein (4) Perloff (13), and Easterline (6) concluded that regional per capita incomes were converging over time within the United States. These studies relied primarily upon relative measures of regional incomes for their conclusions. Such convergence also implied that, on balance, regions with below average incomes possessed growth rates greater than the more affluent areas. The seminal work in this field was Easterlin's study. Primarily he used relative measures of state per capita incomes. Easterlin expressed each state's per capita income as a percentage of the nation's per capita income. Then, he calculated mean deviations and coefficients of variation for these percentages over time (6, pp. 145-55). Perloff's work also noted that absolute income differentials were increasing; nevertheless, income convergence based upon relative differentials was emphasized (13, pp. 502-607). Borts and Stein coupled their empirical analysis with the theoretical neo-classical growth model to arrive at a similar conclusion of income convergence (4, pp. 3-47).

The neo-classical growth model is frequently encountered in regional development literature. In a comparative static analysis and with other stringent assumption, this model yields a theory of factor mobility in which capital moves from high to low income regions while labor migrates from low to high income areas. These equilibrating factor flows cause higher rates of capital growth and larger wage increased in low income regions than in high income areas. This simplified version of the neo-classical model, consequently, predicts interregional per capita income convergence. After reviewing the above studies, Richardson has suggested utilization of this model to explain regional growth within the United States (14, pp. 56-65). In this model, labor must be highly mobile. Borts and Stein (4, p. 214) and Perloff (13, p. 606) have emphasized a governmental role subsidizing migration and vocational training.

In contrast to the above views, Myrdal (8) and Hughes (7) have emphasized factors which negate the practical application of the simple neo-classical growth model and its consequent convergence of incomes. Dynamic considerations, differing production functions, and agglomeration economics

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are some of the forces which could negate this theoretical convergence of incomes. Myrdal has argued that regional inequalities will be perpetuated and increased by dynamic, free market forces and non-economic variables. Hughes has argued that initial income differentials cause differential in savings, investments, and human capabilities which in turn reinforce the initial income divergence among regions. Booth has empirically analyzed long term trends in absolute income differences among regions (3). His conclusion of increasing per capita income divergence among regions substantiates the theoretical arguments proposed by Myrdal and Hughes. The present article re-emphasized Booth's earlier work, incorporates recent data, and proposes new arguments.

Delusion of Relativity

In relative terms, at least, it is conceded that per capita income among areas in the United States are converging. However, the word "relative" is highly important in that statement and should never be omitted. Relative numbers are essentially dimensionless and practically meaningless without thorough familiarity with the concealed data. Relative numbers are but one side of the data coin.[2] We do not spend and earn relative percentages, but rather actual dollars.

Three relative numbers are the chief contributors to this delusion about income convergence. First, expression of each state's per capita income as a percentage of the nation's overall per capita income is misleading. For example, even if a state maintained a per capita income equivalent to 90% of the national level from 1880 to 1950, its divergence from that level would have increased from $30 to $90 in constant real terms (6, p. 185). Secondly, growth rates can be especially misleading. Percentage rates of growth are biased against high income areas and favor low income areas because of differences in base sizes (13, pp. 32-39). Thirdly, the often used coefficient of variation is another dimensionless number. Its value depends upon both the standard deviation and the mean of a statistical distribution. Any reliance upon it as a measure of dispersion requires thorough knowledge of its individual components (16, pp. 62-64).

Area Income Dispersion

The following empirical study of per capita income dispersion among areas utilized the Office of Business Economics' per capita personal income series for the continental forty-eight states.[3] The series was somewhat broken between 1947 and 1948 because of definitional revisions in the overall income and product accounts (11). However, effects of these revisions were considered minimal. For each year from 1929 to 1968, the frequency distribution of states' per capita personal income was analyzed in both current and constant dollars. The Consumer Price Index for all items with a base of 1957-59 equaling 100 was used to compute constant dollar incomes (10, 18, 19).

Table 1 presents three measures of the yearly frequency distribution of states' per capita personal incomes.[4] For each year's frequency distribution, each state's per capita income was one of forty-eight observations. The means of the distributions were not identical to the overall national per capita income. Tests for skewness and kurtosis did not indicate rejection of the hypothesis that frequency distributions of current dollar per capita personal incomes were normal in every year.[5]

The range and the standard deviation of each year's distribution were indicative of the dispersion of income over time. Divergence of area per

TABLE 1. FREQUENCY DISTRIBUTION MEASURES OF PER CAPITA PERSONAL INCOME FOR THE 48 CONTIGUOUS STATES[a]

	Current Dollars				Constant Dollars[b]		
Year	Mean	Range	Stan.Dev.	Coeff. of Var.	Mean	Range	Stan.Dev.
1929	617	889	223	.361	1033	1489	374
1930	545	840	208	.380	937	1443	357
1931	457	712	183	.401	862	1343	346
1932	349	555	145	.414	734	1166	305
1933	329	505	133	.405	730	1120	296
1934	374	519	141	.377	802	1114	303
1935	427	548	145	.340	893	1146	304
1936	481	628	175	.364	996	1300	363
1937	513	709	177	.344	1027	1418	354
1938	477	592	161	.338	972	1206	329
1939	505	711	178	.351	1044	1469	367
1940	540	786	191	.352	1107	1611	391
1941	664	829	215	.323	1295	1616	419
1942	868	1107	256	.295	1528	1949	451
1943	1035	1062	277	.267	1717	1761	460
1944	1108	974	262	.236	1808	1589	428
1945	1146	1017	253	.220	1827	1622	403
1946	1162	1112	268	.230	1709	1635	393
1947	1240	1070	282	.227	1594	1375	362
1948	1351	1026	282	.209	1613	1224	337
1949	1294	1163	283	.218	1559	1401	341
1950	1401	1376	325	.231	1672	1642	387
1951	1554	1420	349	.224	1717	1569	386
1952	1625	1545	365	.224	1757	1670	395
1953	1673	1539	376	.225	1795	1651	404
1954	1654	1529	364	.219	1768	1634	389
1955	1733	1529	379	.218	1857	1639	406
1956	1820	1729	396	.217	1922	1826	419
1957	1889	1672	396	.209	1927	1706	404
1958	1933	1523	377	.194	1920	1512	374
1959	2002	1564	399	.199	1972	1541	393
1960	2058	1651	408	.198	1997	1601	396
1961	2102	1660	417	.198	2017	1593	400
1962	2222	1932	431	.194	2108	1833	409
1963	2288	1808	435	.190	2144	1694	408
1964	2394	1760	448	.187	2215	1628	415
1965	2575	1838	458	.177	2343	1672	417
1966	2776	1945	474	.170	2455	1720	419
1967	2938	2116	496	.168	2526	1819	427
1968	3175	2175	530	.166	2620	1795	437

[a]Calculated from data for 48 states; 1929-1947 source: Charles F. Schwartz and Robert E. Graham, Jr., Personal Income by States Since 1929 (Washington: GPO, 1956), pp. 142-43; 1948-1968 source: Office of Business Economics, Survey of Current Business, (August, 1969), p. 15.

[b]Consumer Price Index, 1957-59 = 100.

capita personal incomes would be indicated by increasing standard deviations; convergence would be noted by decreasing standard deviations. In current dollars, as the mean of the income distribution increased, so also did the range and standard deviation. The range increased from $889 to $2,175 between 1929 and 1968; the standard deviation increased from $223 to $530. In both cases, there were occasional declines, especially during the early thirties. Nevertheless, the overall trend indicated that the distribution of states'

per capita income was becoming more dispresed. Relationships for per capita income distributions in constant dollars were not as spectacular. Over time and as constant dollar incomes increased, both the range and the standard deviation exhibited much fluctuation. Nevertheless, it can be stated that the distribution of constant dollar incomes did not converge over time.

Coefficients of variation over time for actual income distributions decreased from .361 in 1929 to .166 in 1968; occasional changes in this trend were evident. The coefficient of variation is the ratio of the standard deviation to the mean. On balance, both the means and the standard deviations were increasing over time. In absolute terms, incomes were becoming more dispersed over time; in relative terms, incomes were converging as noted by the declining coefficient of variation. The basic explanation for this decline in the coefficient was the fact that the increases in the means were proportionately greater dollar amounts than the increases in the standard deviations. A simple linear regression equation was computed for the current dollar series in which standard deviations were regressed on the means.[6] The resulting equation was:

$$\sigma = 107.5395 + .1401\ \mu$$

In current dollars, each one dollar increased in the mean was associated with a fourteen cents increase in the standard deviation. Therefore, the distribution of per capita personal incomes by states definitely became more dispersed over time as income rose.

If no change in this linear trend is assumed, then the above equation can be reformulated to predict the asymptote of the coefficients of variation.

$$\sigma/\mu = \frac{107.5395}{\mu} + .1401$$

$$\text{Lim}\ (\sigma/\mu) = .1401$$
$$\mu \to \infty$$

The coefficient of variation approaches a limit of 14 percent as incomes increase.[7] For this to be possible, the standard deviation must alway be increasing as incomes increase. Consequently, projection of this linear trend - a hazardous assumption - predicts that absolute income differentials will continue to increase and that relative income differentials will stabilize.

Quite definitely, state incomes did not converge within the United States. Moreover, relative locations of individual states within the income distributions remained fairly constant. Inspection of an intercorrelation matrix of state per capital income between 1929 and 1968 indicated little change over time for states' relative positions within the United States. Simple correlation coefficients were above 0.75 and generally greater than 0.90. The poorer states remained poorer, and vice-versa.

Differing Growth Rates

Borts and Stein (4, p. 7) and Easterline (6, p. 145) noted that low income areas exhibited larger growth rates than high income areas. Theoretically, this differential in growth rates, if maintained, should produce interregional income convergence in the long run. As a preliminary investigation of this argument, differentials in growth rates and per capita incomes were investitaged for the Mideast and Southeast regions of the United States for the period 1933 to 1968. The Mideast has consistently been a high income region; the Southeast a low income region (12, p. 15; 15, pp. 142-43). A five year mov-

ing average was used to depict the trend in growth rates and per capita income differences as indicated in Table 2. Incomes were expressed in current dollars.

TABLE 2. DIFFERENCES IN GROWTH RATES AND PER CAPITA INCOMES FOR THE MIDEAST AND SOUTHEAST REGIONS[a]

	Five Year Moving Average of				
Centered Year	Mideast Growth Rate %	Southeast Growth Rate %	Difference in Growth Rates %	Difference in Income P/C $	Change in Income Difference $
1936	5.5	8.1	2.6	395	---
1937	4.5	5.9	1.4	408	13
1938	4.6	5.4	0.8	423	15
1939	5.1	7.9	2.8	435	12
1940	8.1	13.3	5.2	452	17
1941	13.3	19.4	6.1	490	38
1942	14.2	20.9	6.7	530	40
1943	13.6	20.4	6.8	568	38
1944	10.6	14.9	4.3	603	35
1945	7.3	8.9	1.6	634	31
1946	4.7	6.5	1.8	649	15
1947	2.4	3.3	0.9	659	10
1948	3.3	3.7	0.4	678	19
1949	4.9	6.2	1.3	701	23
1950	5.0	6.6	1.6	721	20
1951	4.6	5.2	0.6	749	28
1952	4.9	5.7	0.8	775	26
1953	4.1	5.6	1.5	790	15
1954	3.6	4.5	0.9	808	18
1955	3.6	3.8	0.2	836	28
1956	2.9	3.5	0.6	852	16
1957	3.9	4.7	0.8	874	22
1958	3.5	3.6	0.1	903	29
1959	2.6	3.1	0.5	921	18
1960	2.7	3.5	0.8	934	13
1961	3.2	3.9	0.7	952	18
1962	3.4	4.2	0.8	971	19
1963	4.0	5.4	1.4	989	18
1964	5.0	6.5	1.5	1012	23
1965	5.5	7.0	1.5	1039	27
1966	6.6	7.8	1.2	1084	45

[a]Source: same as Table 1.

During the period 1936 to 1966, the Southeast's growth rate was always greater than the Mideast's rate. The income position of the Southeast region relative to the Mideast region improved from 42 percent in 1936 to 68 percent in 1966. In 1936 per capita income was $288 in the Southeast and $683 in the Mideast. In 1966 per capita income was $2,299 in the Southeast and $3,383 in the Mideast. In absolute dollar terms, however, the per capita income gap increased from $395 in 1936 to $1,084 in 1966. Per capita incomes were definitely diverging during this period.

The size and change in the income gap depend upon the (1) initial income base in each region, (2) growth rate for each region, and (3) differential in growth rates. Theoretically, the income gap will decrease (1) the greater the differential in growth rates and (2) the lower the growth rate levels at

which any constant growth differential exists. For example, a 2 percent differential when growth rates are 9 and 11 percent is not as effective for reducing income gaps as a 2 percent differential when growth rates are 3 and 5 percent. Consequently, income gaps will decrease the greater the growth differential and the lower the growth rates. At no time in the period 1936-1966 did the income gap decrease.

As noted in Table 2, growth rates and differentials varied considerably. There also occured much fluctuation in the incremental change of the income gap. Theoretically, the gap should at least increase at a decreasing rate. However, this was not always the case either. Generally, the level of growth rates exerted the predominant influence on the income gap during the forties. During the fifties, the differential in growth rates was more influential. During the sixties, mixed effects were observed.

Apparently, the hypothesis that, if low income regions possess growth rates greater than high income regions, income convergence will occur, is not completely accurate. High growth rates for low income regions are necessary, but not sufficient, for reducing interregional income gaps. Much research needs to be conducted concerning the income impacts of dynamic changes in growth rate levels and rate differentials.[8]

Family Income Dispersion

Family incomes, nationwide, exhbited a tendency toward greater dispersion also.[9] Data were obtained from Census Bureau reports on family median incomes and family income distributions by quintiles for 1947 to 1964 (17, p. 3; 20, p. 33). In current dollars, as family median incomes increased, so also did the twenty-eighty percentile range.[10] This range increased from $3,346 to $7,232 between 1947 and 1964 as indicated in table 3. The relationship in constant dollars was similar but not as marked. Over time as incomes have increased, so also has the dispersion of the income distribution. Instead of convergence, family incomes have diverged and become more dispersed.

Implications

Theoretical usage of the neo-classical growth model is not warranted by empircal facts concerning the dispersion of regional per capita incomes. This model in a comparative static framework predicts absolute per capita income convergence among regions. However, the empirical fact is that absolute per capita incomes are diverging. Obviously, dynamic considerations and other economic realities must be incorporated into the model if it is to explain accurately regional growth. This is not to deny that reasons other than per capita income distributions may favor utilization of the neo-classical growth model.

This growth model theoretically emphasizes the necessity for labor and capital to be highly mobile. There have already occurred within the United States massive migrations of people from farms to cities, among states, and in and out of depressed regions. In spite of this tremendous relocation of persons, state per capita incomes and family incomes are diverging. A correlate of fostering migration is national economic growth. Supposedly a high rate of national economic growth will insure sufficient aggregate demand to draw a mobile labor force into the nation's economic mainstream without any specialized poverty programs. However, the empirical fact is that distributions of state per capita incomes and family incomes have become more dispersed as the nation has grown. Migration and national growth in a dyn-

TABLE 3. FREQUENCY DISTRIBUTION MEASURES FOR FAMILY INCOME[a]

	Current Dollars		Constant Dollars[b]	
Year	Median	20-80% Range	Median	20-80% Range
1947	3031	3346	3895	4301
1948	3187	3430	3803	4093
1949	3107	3511	3743	4230
1950	3319	3691	3960	4405
1951	3709	3856	4098	4261
1952	3890	4055	4205	4384
1953	4233	4473	4541	4799
1954	4173	4617	4458	4933
1955	4421	4688	4738	5025
1956	4783	5221	5050	5513
1957	4971	5391	5072	5501
1958	5087	5669	5051	5629
1959	5417	5835	5336	5749
1960	5620	6194	5451	6008
1961	5737	6498	5505	6237
1962	5956	6544	5650	6209
1963	6249	6833	5856	6404
1964	6569	7232	6076	6690

[a]Sources: U. S. Bureau of the Census, Trends in the Income of Families and Persons in the United States: 1947-1964, Technical Paper No. 17 (Washington: GPO, 1967), p. 33; U. S. Bureau of the Census, Current Population Reports, Series P-6Q, No. 51, p. 3.

[b]Consumer Price Index, 1957-59 = 100.

amic economic environment have not eradicated poverty nor guaranteed more equitable income distributions.

Depressed areas and impoverished families are still present within a prosperous United States. Poverty continues to exist as a deeply rooted structure in our socio-economic system (5). Richardson (14, pp. 50-65) and Hughes (7) have enumerated several dynamic forces which negate conclusions of the simple neo-classical model and which could foster interregional income divergence despite overall national growth. These include regional differences in technical progress, natural population growth, industrial composition, scale economies, social characteristics, and so forth. A different model which does predict income divergence is the Harrod-Domar model modified for interregional analysis (14, pp. 50-65).

Consequently, there have evolved numerous programs designed to cure or at least alleviate poverty within depressed areas and among families. Reliance upon laissez-faire capitalism and efficiency norms is not sufficient for altering income distributions. To achieve a social welfare optimum determined by legislated political consensus, income transfers of direct and/or indirect types may be necessary (2;9, pp. 226-29). Such a consensus needs to consider, first, what tradeoff shall be made between decreasing interregional income dispersion and increasing national growth and, secondly, what specialized programs can mitigate the terms of tradeoff. Eradication of poverty and attainment of more equitable income distributions probably require specialized programs for low income areas and families in addition to more general national programs.

FOOTNOTES

[1]Several regions exhibiting low incomes and/or high unemployment have been delimited; including Appalachia, New England, Coastal Plains, Upper Great Lakes, Ozarks, and Four Corners Economic Development Regions.

[2]The argument presented herein emphasizes absolute income differences. For a complete presentation of the argument using relative differences, consult Easterlin's work (6). The author acknowledges the importance of relative measurements, but he also insists that absolute measures are equally important.

[3]1929-1947 source (15, pp. 142-43); 1948-1968 source (12, p. 15). State per capita personal income is measured before deduction of income taxes (15, p. 49). Therefore, the impact of progressive income tax schedules upon the regional distribution of income is not analyzed. The Federal income tax may actually be less progressive than the nominal tax rate schedules indicate because of exemptions, deductions, income-splitting, capital gains, and other preferential provisions. If this is so and if most other taxes are not progressive, then the total impact of all taxes may actually increase after-tax income divergence.

[4]Notation is as follows:

I_{ij} = per capita personal income for state i in year j;

i = 1, . . ., 48 states; j = 1929, . . ., 1968 year

$\mu_j = \Sigma_i I_{ij}/48$;

$\text{Range}_j = \text{Max}_i (I_{ij}) - \text{Min}_i (I_{ij})$;

$\sigma_j = (\Sigma_i (I_{ij} - \mu_j)^2/47\frac{1}{2}$;

Coefficient of Variation $_j = \sigma_j/\mu_j$.

[5]For explanation of test procedures, see (16, pp. 86088); Notation is as follows:

Coefficient of skewness = $s_j = \mu 3_j / (\mu 2_j)^{3/2}$;

Coefficient of kurtosis = $k_j = (\mu 4_j / (\mu 2_j)^2) - 3$;

μ_{rj} = r^{th} moment about the mean for year j;

s_j ranged from -0.21460 to +0.57443;

k_j ranged from -0.95823 to -0.23228.

[6]This equation resulted from applying a first-order autoregressive scheme with a transformation coefficient of +.7785 to the original data in order to correct for positive autocorrelation. For the resultant equation, the following parameters were estimated: R = .9394; $F_{(1, 37)}$ = 278.2402; Standard Error = 11.4657; Durbin-Watson = 1.4762.

[7]An analogous argument using the constant dollar series should yield

the same result after incorporating the relationship between the Consumer Price Index and per capita income growth-granted extrapolation of historical linear trends.

[8]Additional research needs to determine the relationship between relative and absolute income gaps. Specifically, how rapid must be the decrease in the relative income gap to induce a decrease in the absolute income divergence.

[9]For a similar and more detailed study, see (1). Family income is measured before deduction of income taxes (20, p. 37). Therefore, the impact of progressive income tax schedules upon the distribution of family income is not analyzed. See footnote 3 also.

[10]Range = Income at 80^{th} percentile - Income at 20^{th} percentile.

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