Convergence in State Per Capita Personal Income, 1950–99

By G. Andrew Bernat, Jr.

THE question of whether State per capita personal incomes are converging—that is, whether the differences in per capita incomes are getting smaller over time—is important for many reasons. Convergence is of great interest to economists and policymakers who believe that large differences in income levels among States are undesirable.

State income convergence is also important for theoretical reasons. During the past 10 to 15 years, there has been, in the words of Robert Solow, a "wildfire revival" of interest in economic growth theory.[1] Much of this resurgence has focused on the inconsistency between the standard growth theory's prediction that national economies tend to converge and the absence of convergence among nations. The resulting controversy surrounding growth theory has rekindled interest in the question of whether State per capita incomes are converging because States—more so than nations—are likely to meet some of the important conditions under which the most widely accepted growth model is applicable. A finding of convergence among States has been interpreted as supporting the neoclassical explanation of economic growth.

This article provides new evidence on convergence in State per capita incomes. It uses data from BEA's regional accounts to analyze the convergence of State per capita incomes from 1950, the first year for which data for Alaska and Hawaii are available, to 1999, the most recent year for which consistent data are available.[2] This article, like Garnick and Friedenberg's earlier analysis of convergence among BEA regions, is one of the few studies to analyze convergence in the major components of State per capita personal income.[3] By extending the period of analysis to include all the 1990s, this article shows that the apparent break in convergence identified by earlier studies continued for 20 years.[4]

Among the key findings are the following:

- The convergence in State per capita income in 1950–99 occurred almost entirely during the first 29 years. Since 1979, there has been essentially no convergence.
- Because earnings accounts for such a large share of personal income, the convergence of per capita income in 1950–79 and the absence of convergence since 1979 are largely attributable to per capita earnings.

An overview of the theoretical issues is presented in the first section of the article. Trends in State per capita personal income and its components are discussed in the second section. The third section discusses some implications of the findings.

Theories of Economic Growth and Convergence

Economic convergence is about how economies change over relatively long periods of time, so it is useful to look at economic growth theory for insights into whether economies are expected to converge over time. A comprehensive review of the vast and complex literature on economic growth and convergence is beyond the scope of this article, but the following discussion provides a brief overview of the concepts that are the most relevant to the question of economic convergence.

The neoclassical growth model is the most widely used theoretical framework for analyzing economic growth. In its simplest form, this model

1. Robert Solow, "Perspectives on Growth Theory," *Journal of Economic Perspectives* 8 (Winter 1994): 45.

2. U.S. Bureau of Economic Analysis, *State Personal Income 1929–99,* CD–ROM RCN–0268 (November 2000).

NOTE.—This article condenses a more technical paper the author presented at the annual meeting of the Southern Regional Science Association in Austin, Texas, on April 5–7, 2001.

3. Daniel H. Garnick and Howard L. Freidenburg, "Accounting for Regional Differences in Per Capita Income Growth, 1929–79," SURVEY OF CURRENT BUSINESS 62 (September 1982): 24–34. See also Daniel H. Garnick, "Accounting for Regional Differences in Per Capita Personal Income Growth: An Update and Extension," SURVEY 70 (January 1990): 29–40.

4. For example, see Sergio J. Rey and Brett D. Montouri, "U.S. Regional Income Convergence: A Spatial Econometric Perspective," *Regional Studies* 33 (1999): 146.

assumes an economy's output is determined by three inputs: Capital, labor, and technology. The way in which these inputs are combined to produce output—referred to as the economy's production function—largely determines whether convergence will occur. In studies of convergence, this production function is often expressed on a per worker—or, strictly speaking, a per unit of labor—basis. Thus, the neoclassical production function asserts that output per worker is a function of capital per worker and technology.

The key assumption underlying the neoclassical production function is that capital is subject to diminishing returns, which means that the increase in output associated with an additional unit of capital is less than the increase associated with the addition of the previous unit (holding everything else constant). Diminishing returns to capital contributes to convergence in two ways. First, because each additional unit of capital raises output less in

Table 1.—Per Capita Personal Income and Components, 1950–99

	Per capita personal income			Per capita earnings			Per capita dividends, interest, and rent			Per capita transfers		
	1950	1999	Average annual growth (percent)	1950	1999	Average annual growth (percent)	1950	1999	Average annual growth (percent)	1950	1999	Average annual growth (percent)
United States	**1,510**	**28,542**	**6.2**	**1,236**	**19,402**	**5.8**	**182**	**5,414**	**7.2**	**92**	**3,727**	**7.9**
Alabama	909	22,987	6.8	753	15,109	6.3	76	4,098	8.5	80	3,780	8.2
Alaska	2,400	28,577	5.2	2,257	19,127	4.5	81	5,141	8.8	62	4,309	9.0
Arizona	1,367	25,189	6.1	1,104	16,841	5.7	168	4,992	7.2	95	3,356	7.5
Arkansas	847	22,244	6.9	690	14,163	6.4	71	4,212	8.7	86	3,868	8.1
California	1,877	29,910	5.8	1,498	20,924	5.5	258	5,545	6.5	120	3,441	7.1
Colorado	1,521	31,546	6.4	1,183	22,919	6.2	219	5,860	6.9	119	2,767	6.6
Connecticut	1,891	39,300	6.4	1,498	27,723	6.1	309	7,174	6.6	84	4,403	8.4
Delaware	2,075	30,778	5.7	1,504	21,045	5.5	498	6,161	5.3	73	3,573	8.3
Florida	1,304	27,780	6.4	1,025	16,252	5.8	185	7,310	7.8	94	4,218	8.1
Georgia	1,065	27,340	6.8	887	19,743	6.5	101	4,572	8.1	77	3,025	7.8
Hawaii	1,429	27,544	6.2	1,202	18,866	5.8	166	5,361	7.3	61	3,317	8.5
Idaho	1,329	22,835	6.0	1,108	15,513	5.5	139	4,388	7.3	82	2,933	7.6
Illinois	1,831	31,145	6.0	1,526	21,459	5.5	223	6,219	7.0	82	3,467	7.9
Indiana	1,524	26,143	6.0	1,299	17,911	5.5	157	4,867	7.3	68	3,366	8.3
Iowa	1,532	25,615	5.9	1,268	16,682	5.4	193	5,467	7.1	71	3,466	8.3
Kansas	1,463	26,824	6.1	1,208	18,188	5.7	181	5,358	7.2	74	3,278	8.0
Kentucky	990	23,237	6.7	821	14,985	6.1	91	4,328	8.2	77	3,924	8.3
Louisiana	1,117	22,847	6.4	884	14,843	5.9	120	4,020	7.4	113	3,984	7.5
Maine	1,195	24,603	6.4	944	15,818	5.9	168	4,672	7.0	82	4,113	8.3
Maryland	1,642	32,465	6.3	1,355	23,073	6.0	212	6,112	7.1	75	3,279	8.0
Massachusetts	1,656	35,551	6.5	1,321	24,695	6.2	225	6,431	7.1	109	4,425	7.9
Michigan	1,718	28,113	5.9	1,439	19,195	5.4	202	5,149	6.8	77	3,768	8.2
Minnesota	1,437	30,793	6.5	1,171	20,954	6.1	172	6,498	7.7	94	3,340	7.6
Mississippi	770	20,688	6.9	626	13,413	6.5	64	3,436	8.5	79	3,839	8.2
Missouri	1,427	26,376	6.1	1,164	17,137	5.6	171	5,406	7.3	93	3,834	7.9
Montana	1,654	22,019	5.4	1,393	13,368	4.7	171	5,229	7.2	90	3,422	7.7
Nebraska	1,560	27,049	6.0	1,273	18,095	5.6	217	5,546	6.8	69	3,408	8.3
Nevada	1,991	31,022	5.8	1,657	20,945	5.3	238	6,979	7.1	95	3,098	7.4
New Hampshire	1,348	31,114	6.6	1,061	21,886	6.4	198	5,917	7.2	90	3,311	7.6
New Jersey	1,802	35,551	6.3	1,518	25,310	5.9	202	6,329	7.3	82	3,911	8.2
New Mexico	1,204	21,853	6.1	998	14,224	5.6	121	4,242	7.5	85	3,387	7.8
New York	1,858	33,890	6.1	1,500	22,446	5.7	259	6,121	6.7	99	5,323	8.5
North Carolina	1,077	26,003	6.7	914	17,830	6.3	93	4,617	8.3	70	3,555	8.4
North Dakota	1,360	23,313	6.0	1,096	14,512	5.4	187	5,120	7.0	76	3,681	8.2
Ohio	1,608	27,152	5.9	1,332	17,999	5.5	189	5,352	7.1	87	3,801	8.0
Oklahoma	1,144	22,953	6.3	915	15,246	5.9	126	4,141	7.4	103	3,566	7.5
Oregon	1,657	27,023	5.9	1,373	17,314	5.3	185	6,079	7.4	99	3,630	7.6
Pennsylvania	1,552	28,605	6.1	1,253	18,645	5.7	173	5,367	7.3	126	4,593	7.6
Rhode Island	1,553	29,377	6.2	1,238	18,677	5.7	191	5,842	7.2	123	4,857	7.8
South Carolina	925	23,545	6.8	774	15,684	6.3	77	4,315	8.6	73	3,546	8.2
South Dakota	1,283	25,045	6.3	1,062	15,959	5.7	147	5,707	7.8	74	3,379	8.1
Tennessee	1,028	25,574	6.8	844	17,520	6.4	97	4,131	7.9	86	3,923	8.1
Texas	1,363	26,858	6.3	1,128	19,638	6.0	152	4,157	7.0	83	3,063	7.6
Utah	1,348	23,288	6.0	1,109	16,832	5.7	150	4,090	7.0	89	2,366	6.9
Vermont	1,169	25,889	6.5	947	16,905	6.1	147	5,287	7.6	75	3,698	8.3
Virginia	1,257	29,789	6.7	1,070	21,402	6.3	120	5,525	8.1	67	2,862	8.0
Washington	1,721	30,392	6.0	1,388	21,193	5.7	190	5,649	7.2	144	3,550	6.8
West Virginia	1,056	20,966	6.3	879	12,400	5.5	98	3,815	7.8	79	4,750	8.7
Wisconsin	1,506	27,390	6.1	1,258	18,447	5.6	181	5,582	7.2	67	3,361	8.3
Wyoming	1,719	26,396	5.7	1,398	16,342	5.1	233	6,891	7.2	88	3,163	7.6

capital-abundant economies than in capital-scarce economies, a given increase in the capital-to-labor ratio will raise output per worker more in capital-scarce economies than in capital-abundant economies (all other things being equal). Second, the rate of investment will tend to be higher in capital-scarce economies than in capital-abundant economies because the rate of return is higher in the capital-scarce economies. In addition, if both capital and labor are mobile, the model predicts that convergence will occur relatively rapidly.

By assuming that capital is subject to diminishing returns, the neoclassical growth model predicts that output per worker will converge over time to a fixed value, given a particular level of technology. If all economies have the same production function and have access to the same technology, convergence will be a natural result of economic growth. However, it is now widely recognized that the neoclassical prediction of convergence has not been fulfilled, as the gap between the richest and poorest nations is not much smaller than it was more than 30 years ago. For example, the ratio of output per worker in the richest 5 percent of nations was 35 times that of the poorest 5 percent in 1950, and it was 34 times that of the poorest 5 percent in 1989.[5] The absence of convergence is seen by many economists as an indication that the neoclassical growth model is seriously flawed.

Like all models, the neoclassical growth model is a highly simplified description of how an economy grows. The inability of the model to reasonably describe the actual growth experience of nations over the past 30 years could therefore be more the result of over-simplification than the result of fundamental flaws in its description of the growth process. This is the view taken by proponents of "conditional convergence." In the conditional convergence view, growth in output per worker is the result not just of growth in capital per worker and technology, as in the basic neoclassical growth model, but is also conditioned on a host of characteristics of an economy, such as the political system, culture, and the educational system. According to this view, once all of this "social infrastructure" is taken into account, the neoclassical prediction of convergence becomes evident.[6]

In contrast, a group of models loosely referred to as the "new growth theories" takes the view that the neoclassical growth model's failure to accurately describe the pattern of economic growth is the result of a basic flaw in the model. These growth models vary considerably in their details and are therefore difficult to characterize, but one feature they share is the abandonment of the neoclassical assumption of diminishing returns to capital.[7]

There are many reasons why returns to capital might not be diminishing, especially if capital is defined broadly to include information, knowledge, and human capital. For example, suppose that research and development, which produces new ideas and new technology, is an ordinary input into a firm's production function, just like labor and capital. If ideas and information can be shared by all firms, research and development activity by each firm raises not only its own output but also the productivity of firms throughout the economy, resulting in nondecreasing returns to capital for the economy as a whole. Because returns are nondecreasing, investment will not automatically shift from economies with high capital per worker to economies with low capital per worker, as in the neoclassical growth model. The absence of this automatic mechanism for shifting investment from capital-abundant to capital-scarce economies will be magnified if information and knowledge flow more easily between nearby firms than between firms that are far apart. In this case, capital-per-worker, and therefore output-per-worker, can grow faster in capital-rich economies than in capital-poor economies, leading to income divergence rather than convergence.[8]

5. Ellen R. McGrattan and James A. Schmitz, Jr., "Explaining Cross-Country Income Differences," Federal Reserve Bank of Minneapolis, Research Department Staff Report 250 (August 1998).

6. See Robert E. Hall and Charles I. Jones, "Why Do Some Countries Produce So Much More Output per Worker than Others?" *The Quarterly Journal of Economics* (February 1999): 83–116; and N. Gregory Mankiw, David Romer, and David N. Weil, "A Contribution to the Empirics of Economic Growth," *The Quarterly Journal of Economics* (1992): 408–437.

7. The absence of convergence is not the only, and possibly not the primary, reason for interest in these models. The neoclassical growth model is also criticized because technological change, the ultimate source of long-run growth, is entirely exogenous. The new growth models, and endogenous growth models in particular, attempt to rectify this shortcoming. For example, see Gene M. Grossman and Elhanan Helpman, "Endogenous Innovation in the Theory of Growth," *Journal of Economic Perspectives* 8 (1994): 23–44; Peter Howitt, "Endogenous Growth and Cross-Country Income Differences," *American Economic Review* (September 2000): 829–846; and Paul M. Romer, "The Origins of Endogenous Growth Theory," *Journal of Economic Perspectives* 8 (1994): 3–32.

8. Many of the ideas in these models have been around for some time, in other disciplines as well as economics, but they have only recently been incorporated into formal models of economic growth. For example, two of the earliest skeptics of convergence were Gunnar Myrdal and Nicholas Kaldor, both of whom argued that there are strong forces contributing to what Myrdal called "cumulative causation." More recently, models of economic geography and of endogenous growth have shown how geographic externalities or nondiminishing returns to knowledge can also lead to divergence. For example, see Martin and Sunley, "Slow Convergence? The New Endogenous Growth Theory and Regional Development," *Economic Geography* 74 (1998): 201–227, and Paul Krugman, "The Role of Geography in Development," *International Regional Science Review* 22 (1999): 142–161.

Trends in Per Capita Personal Income and Its Components

In this section, trends in the spread and in the relative growth rates of State per capita personal income and its components are examined for evidence of convergence (see the box "Measuring Convergence").[9] In addition, changes in geographic patterns are discussed.

Total per capita personal income

Dispersion.—Whether measured by changes in the range of per capita incomes or by changes in the coefficient of variation (CV), there was substantial convergence in total per capita personal income from 1950 to 1999. In 1950, per capita income in Alaska, the State with the highest per capita income, was 2.99 times per capita income in Mississippi, the State with the lowest per capita income. In 1999, the per capita income in Connecticut, the State with the highest per capita income, was only

9. State personal income is defined as the income received by, or on behalf of, all the residents of the State. It consists of the income received by persons from participation in production, from both government and business transfer payments, and from government interest (which is treated like a transfer payment). Personal income is the sum of wage and salary disbursements, other labor income, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend income, personal interest income, and transfer payments to persons, less personal contributions for social insurance, plus a residence adjustment (for more information, see *State Personal Income, 1929–99*). No adjustment is made for inflation, because State-level deflators do not exist.

Measuring Convergence

The neoclassical model of economic growth is a model of aggregate production in an economy. Consequently, its predictions regarding convergence apply to output per worker and not, strictly speaking, to per capita income. Nevertheless, studies of income convergence frequently analyze per capita income because data on per capita income are available for much longer time periods than data on output per worker. For nations, using per capita income rather than output per worker may not be a serious problem because the relationship between personal income and output is likely to be close. However, for States, a large portion of some of the components of State personal income may come from outside the State, so the correspondence between per capita income and output per worker in any given State may be less direct.

Two concepts of convergence

Although there is only one type of convergence in theoretical models, the empirical literature distinguishes two distinct, though related, concepts of convergence.[1] The first concept focuses on the dispersion, or spread of incomes, and is used to answer the question of whether the distribution of per capita income among States is becoming narrower over time. The simplest way to answer this question is to look at the range of per capita incomes, or the difference between the States with the highest and the lowest per capita income. If the range is shrinking over time, convergence is taking place.

A more comprehensive measure of dispersion is the variance, which includes the values for all States rather than just the two extreme values. Two statistics that are based on the variance, the coefficient of variation (CV) and the standard deviation of the log of incomes, are the most frequently used measures.[2] The CV is used in this article because it accounts for changes in the overall level of income, a particularly important attribute because the data used here have not been adjusted for price changes. If the CV of incomes for a group of economies is smaller at the end of a period than at the beginning, the economies have converged. This type of convergence is called σ convergence because the Greek letter σ (sigma) is the common symbol for the standard deviation.

The second concept focuses on the mobility, or the change in position, of individual economies within the distribution and is used to answer the question of whether poorer economies are catching up to richer economies. Many economists believe mobility is more important than dispersion; that is, the size of differences in incomes at any particular time is less important than the ability of poor economies to catch up to rich economies. Low mobility means it will take a long time to reduce the gap between the poorest and the richest economies, whereas high mobility means that individual economies quickly move up (and down) within the income distribution.

One way of looking at the mobility of economies is to compare the growth rates of the lowest income economies and the growth rates of the highest income economies; convergence is occurring if the economies with below-average initial income are growing relatively faster.[3] For this article, the States were grouped into quintiles according to per capita personal income at the beginning of the period, and averages of the State annual growth rates were calculated for each quintile. Because the CV suggests that convergence halted in 1979, these calculations were conducted separately for 1950–79 and 1979–99.

1. A third type of convergence, called stochastic convergence, focuses on the time-series properties of the distribution of per capita income. See, for example, Gerald Carlino and Leonard Mills, "Convergence and the U.S. States: A Time Series Analysis," *Journal of Regional Science* 36 (1996): 597–616. For a critical view of the usefulness of stochastic convergence, see Jonathan Temple, "The New Growth Evidence," *Journal of Economic Literature* 37 (1999): 112–156.

2. The CV is defined as the standard deviation divided by the mean. For a comparison of these two measures, see Carl-Johan Dalgaard and Jacob Vastrup, "On the Measurement of σ Convergence," *Economic Letters* 70 (2001): 283–287.

3. A related method used in a large number of studies is to regress growth in per capita income on initial income. See, for example, Robert J. Barro and Xavier Sala-i-Martin, "Convergence," *Journal of Political Economy* 100 (1992): 223–251 and Caudio Michelacci and Paolo Zaffaroni, "(Fractional) Beta Convergence," *Journal of Monetary Economics* 45 (2000): 129–153.

1.89 times the per capita income in Mississippi, the State with the lowest per capita income.

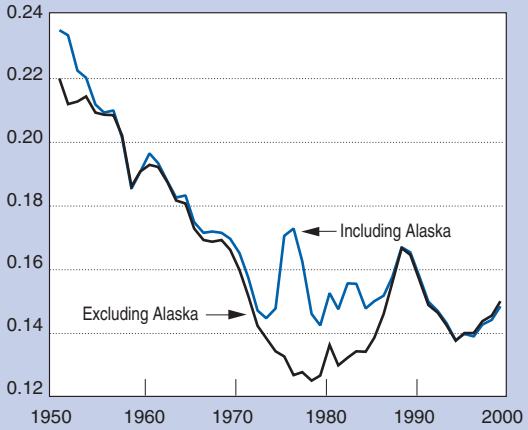
Similarly, the CV for total per capita personal income declined substantially in 1950–99; virtually all of this decline occurred in the first half of the period (chart 1). From 1973 to 1987, the pattern of the CV was noticeably affected by a surge in per capita income in Alaska that was almost entirely due to the construction of the Alaska pipeline. Construction's share of total personal income in Alsaka increased from about 9 percent in 1973 to over 36 percent in 1976, and then fell back to 9 percent by 1986. When Alaska is included, the CV declines steadily until 1973, after which it fluctuates with little or no trend. When Alaska is excluded, the CV declines steadily until 1978, after which it fluctuates around a slight uptrend.

Mobility.—An examination of average per capita growth rates for 1950–79 by quintile shows a distinct decline from the lowest quintile to the highest quintile, indicating that the low-income states had above-average growth while the high-income States had below-average growth (chart 2). This pattern does not hold for 1979–99.

Geographic patterns.—There were substantial geographic shifts in per capita income among States (see map 1 on page 45). In 1950, 5 of the top 10 States were in the west, and the bottom 10 States were in the Southeast. In 1999, only 2 of the top 10 States were west of the Mississippi, and 4 of the Southeastern States (Georgia, North Carolina, South Carolina, and Tennessee) were replaced in the bottom 10 by Idaho, Montana, New Mexico, and Oklahoma.

CHART 1

Per Capita Personal Income: Coefficient of Variation, 1950–99



U.S. Bureau of Economic Analysis

Trends in per capita earnings

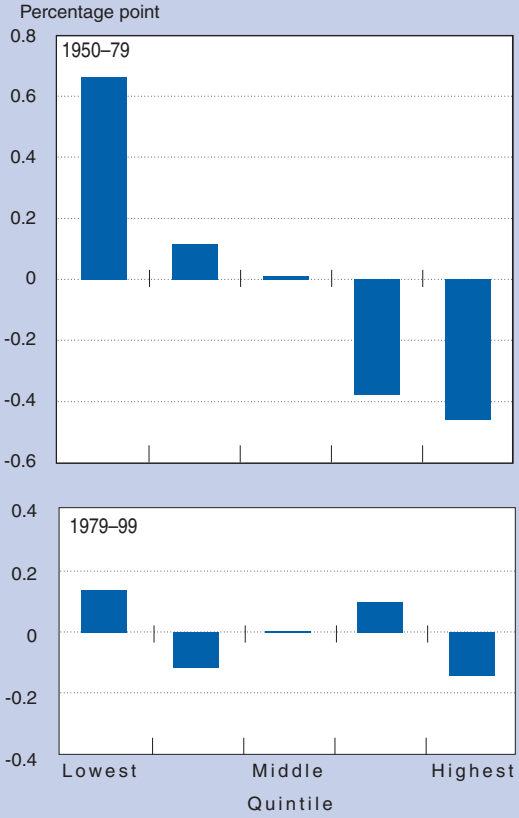
Earnings by place of residence is the sum of wage and salary disbursements, other labor income, and proprietors' income with inventory valuation and capital consumption adjustments. It is often called net earnings by place of residence, but for simplicity, it will henceforth be referred to as earnings.[10] Earnings is the largest component of personal income: It accounted for about 82 percent of total personal income in 1950 and about 68 percent in 1999. For most States, the level of earnings closely reflects economic activity in the State because commuting across State borders is generally low. Because of this close relationship to production, convergence trends in earnings per capita may shed some light on the debate about how to model economic growth.[11]

10. Earnings are estimated by BEA on a place-of-work basis and are adjusted to a place-of-residence basis using commuting data from the Census Bureau. For more information, see U.S. Bureau of Economic Analysis, *State Personal Income 1929–97* (Washington, DC: U.S. Government Printing Office, 1999).

11. Earnings per capita differs from the appropriate growth theory concept both because of commuting and because it is based on population not on labor.

CHART 2

Per Capita Personal Income: Difference From U.S. Average Annual Growth Rate



Note.—For 1950–79, the average annual growth rate of U.S. per capita income was 6.6 percent. For 1979–99, it was 5.8 percent.

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Dispersion.—The range of per capita earnings among States narrowed substantially. In 1950, earnings in Alaska, the State with the highest per capita earnings, was 3.6 times the per capita earnings in Mississippi, the State with the lowest per capita earnings. In 1999, per capita earnings in Connecticut were 2.2 times per capita earnings in West Virginia.

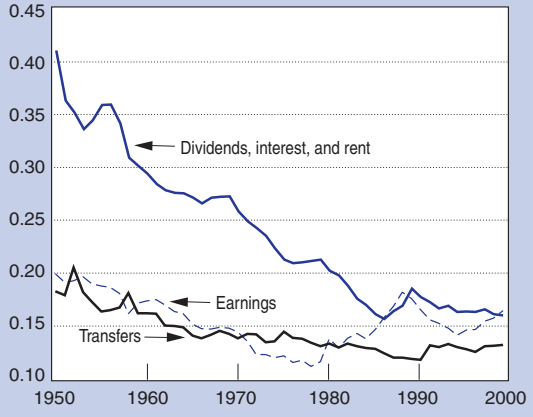
The CV for per capita earnings fell almost 40 percent in 1950–78 (chart 3). It then began to rise and by 1988 was at a level last attained in 1956. The CV then declined until 1994 and rose thereafter.

Mobility.—The pattern of per capita earnings growth rates by quintile is very similar to that of total per capita income: There was a strong pattern of convergence in 1950–79 but no evidence of convergence in 1979–99 (chart 4).

Geographic patterns.—In 1950, the States with the lowest per capita earnings were all in the Southeast region, and the States with the highest per capita earnings were dispersed across the West, Great Lakes, Mideast, and New England regions (see map 2 on page 46). In 1999, four Southeastern States (Georgia, Tennessee, North Carolina, and South Carolina) had moved out of the bottom quintile and were replaced by States west of the Mississippi River (Montana, North Dakota, New Mexico, and Oklahoma). The top quintile was still as dispersed, but there was a slight movement eastward.

CHART 3

Components of Per Capita Personal Income: Coefficient of Variation, 1950–99



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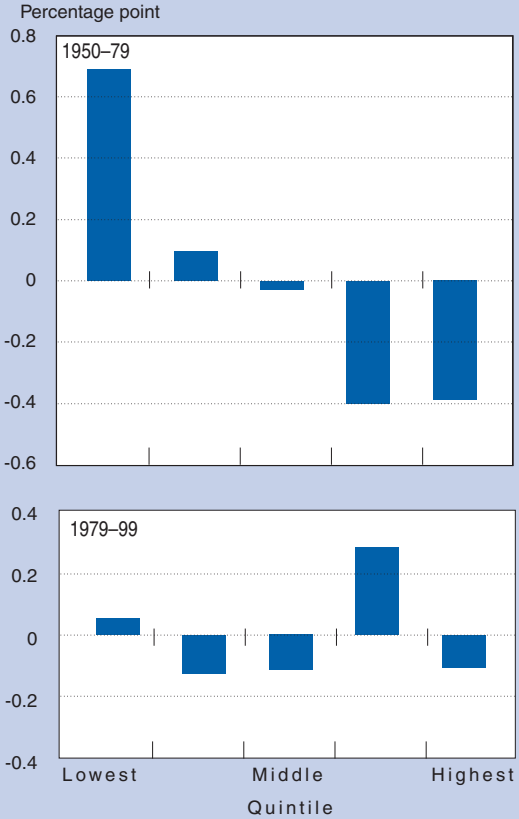
Trends in per capita dividends, interest, and rent

Dividends, interest, and rent—henceforth referred to as DIR—is the second largest component of personal income. DIR's share of total personal income gradually increased from about 11 percent of personal income in 1950 to 19 percent in 1999. Almost all of this increase was due to growth in interest income. Dividends' share of total personal income rose only slightly, from 4 percent to 5 percent, and rental income's share was essentially unchanged at 4 percent.

While DIR is closely related to production activity, per capita DIR in a particular State might not be closely related to economic activity in that State. Because financial markets are national in scope, the financial assets of the residents of a State are very likely related to firms and businesses throughout the nation rather than being related to those within the State. Hence, though convergence in

CHART 4

Per Capita Earnings: Difference From U.S. Average Annual Growth Rate



Note.—For 1950–79, the average annual growth rate of U.S. per capita earnings was 6.2 percent. For 1979–99, it was 5.3 percent.

U.S. Bureau of Economic Analysis

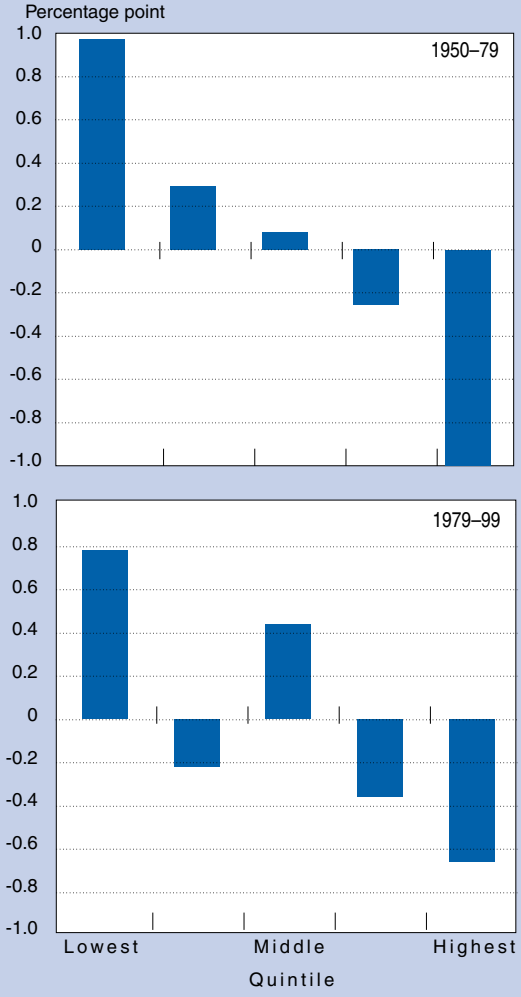
per capita DIR is an important element of convergence of per capita personal income, it is less relevant than convergence in per capita earnings to the predictions of economic growth theory.

Dispersion.—The range for per capita DIR narrowed substantially from 1950 to 1999. In 1950, per capita DIR in Delaware, the State with the highest per capita DIR, was 7.78 times per capita DIR in Alaska, the State with the lowest per capita DIR. In 1999, per capita DIR in Florida was only 2.13 times that in Mississippi.

The CV for per capita DIR declined through 1986 and increased modestly thereafter (chart 3).

CHART 5

Per Capita Dividends, Interest, and Rent: Difference From U.S. Average Annual Growth Rate



Note.—For 1950–79, the average annual growth rate of U.S. per capita dividends, interest, and rent was 7.5 percent. For 1979–99, it was 7.2 percent.

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The initial period of decline was longer and sharper than that for per capita earnings, and the subsequent increase was shorter and milder. Beginning in 1990, the CV for per capita DIR resumed its downtrend.

Mobility.—In 1950–79, the per capita DIR growth rates by quintile show a strong pattern of convergence. In 1979–99, the pattern of growth rates indicates convergence continued to some extent (chart 5).

Geographic patterns.—In 1950, the geographic pattern of per capita DIR was very similar to that of per capita earnings; States with low per capita DIR were clustered in the Southeast, while States with high per capita DIR were more dispersed (see map 3 on page 47). In 1999, low per capita DIR States were still clustered, but the cluster had shifted to the west, as New Mexico, Texas, and Oklahoma replaced North Carolina, South Carolina, and Georgia. The high-per capita DIR States were again dispersed.

Trends in per capita transfers

Transfers (including both business and government transfers) is the smallest of the three components, but it exhibited the largest growth. Transfers' share of personal income more than doubled from about 6 percent in 1950 to 13 percent in 1999. Most of this increase was attributable to growth in old-age, survivors, disability, and health insurance payments. Because of its growing importance in personal income, per capita transfers are clearly relevant to the question of convergence in per capita personal income. However, the geographic distribution of transfers is determined more by where retired workers live than by the level of production in a particular state, thus, convergence in per capita transfers provides little or no insights on the accuracy of the predictions of economic growth theory.

Dispersion.—The range of per capita transfers changed the least among the three components. In 1950, Washington had the highest level of per capita transfers, 2.36 times that of Hawaii, which had the lowest level of per capita transfers. In 1999, the range was only slightly smaller; transfers per capita in New York was 2.25 times that of Utah.

The CV for per capita transfers was the lowest of the three components throughout most of the period, and it increased the least in the latter part of the period (chart 3). The CV for per capita

transfers declined about 30 percent from 1950 to 1990, moved up in 1991, and leveled off thereafter.

Mobility.—Like per capita earnings and per capita DIR, per capita transfers by quintile converged substantially in 1950–79 (chart 6). However, per capita transfers continued to converge in 1979–99, as indicated by the declining average growth rates from the second (next to the lowest) quintile to the highest quintile.

Geographic patterns.—In contrast to earnings and DIR, the distribution of per capita transfers appears to have become more clustered geographically (see map 4 on page 48). In 1950, only weak clustering was evident; western States tended to be in the upper two quintiles, and southeastern States formed a small cluster in the lowest quintile. In 1999, however, 6 of the 10 States with the lowest per capita transfers were in a contiguous group in the Rocky Mountain region, while nearly all of the States in the top two quintiles were in the eastern portion of the country.

Implications of the Findings

One of the primary motivations in developing models of economic growth is to be able to predict how economies will evolve. The debate over the adequacy of the neoclassical model therefore has important implications regarding the ability to determine whether or not convergence will resume in the future. Although the presence or absence of convergence is not a definitive test of the neoclassical model, the finding that convergence essentially ceased in 1979 casts doubts about its adequacy as a description of the economic growth process. Nevertheless, it is still possible that a neoclassical model describes the underlying growth process. At least three possible explanations are consistent within the neoclassical framework.

One possibility is that the observed halt to convergence after 1979 is the result of transitory events and is therefore temporary. The large and rapid increase in defense spending during the 1980s may have disproportionately benefited higher income States because of the regional concentration of many defense industries. Recent research indicates a large share of the growth during the 1990s is attributable to information technology.[12] This may have contributed to the absence of convergence because these industries tend to be high-wage industries and tend to be geographically clustered. The key question regarding the effect of information technology on convergence is whether the experience of the 1990s is an abberration or is the beginning of a long-term trend.

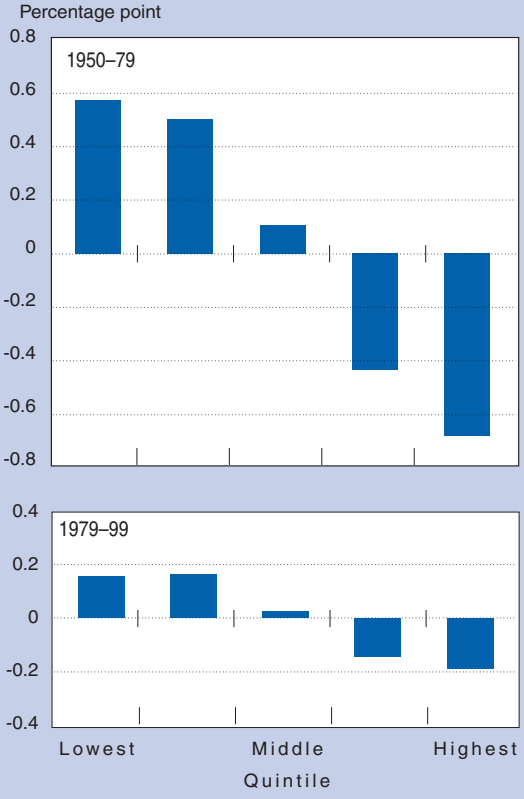
A second possibility is that the convergence in nominal incomes in 1950–79 was the result of convergence in relative prices and that the remaining differences are due to State price level differences and random variation in State economies. There is a large body of research indicating that real income differences are smaller than nominal income differences at least partly because of the presence of amenities.[13] Because many of these amenities are related to the physical characteristics of a location—such as climate—they change very slowly, if at all, so it would be surprising to find complete convergence in nominal incomes.

12. Stephen D. Oliner and Daniel E. Sichel, "The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?" *Journal of Economic Perspectives* 14 (Fall 2000): 3–22.

13. For an analysis of the effects of amenities on the regional variation in manufacturing earnings per job, see G. Andrew Bernat, Jr., "Manufacturing Earnings in BEA Component Economic Areas, 1996," SURVEY 78 (November 1998): 55–64.

CHART 6

Per Capita Transfers: Difference From U.S. Average Annual Growth Rate



Note.—For 1950–79, the average annual growth rate of U.S. per capita transfers was 8.7 percent. For 1979–99, it was 6.7 percent.

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Because many amenities do not change over time, they could contribute to convergence—through their effect on price-level differences—only if their value to people changed over time. Although it is certainly possible that people's preferences for different amenities change over time, it is not obvious why these changes in preferences would come to a halt in 1979.[14] In order to show that convergence, and the halt to convergence in 1979, is attributable to price level changes, it is necessary to show that relative price levels declined between 1950 and 1979 and have since remained constant.[15]

A third possibility is that further convergence did not occur because the States had reached their long-run rates of per capita income growth in 1979. As mentioned above, the neoclassical growth model predicts that each economy will reach a fixed level of output per worker (assuming a constant level of technology) or a constant rate of growth (assuming a constant rate of growth in technology). Thus, if technology is growing at the same rate in all States and if the States have reached their long-run growth rates, these rates will not change, and convergence will cease. However, substantial changes in the State rankings of levels and growth of per capita income and in related factors continued after 1979.[16] Furthermore, the theory provides little guidance regarding the determinants of each State's long-run growth rate, so it is difficult to make a convincing case that States reached these rates in 1979.

Although the convergence trends described in this article appear to contradict the neoclassical growth model, it is also clear from the above discussion that this does not represent definitive evidence against the neoclassical framework. Much work remains to be done in terms of developing empirically testable theories of endogenous growth, and definitive answers are unlikely to be forthcoming without improvements in regional data. In particular, it would be extremely useful to have price deflators for the individual States. The absence of adequate deflators means it is not possible to determine how much of the convergence that occurred since 1950 can be attributed to changes in relative prices and how much to the underlying growth process. In addition, a longer time series of measures of State output—such as gross state product—is needed to avoid the complications involved in using per capita income to compare different growth models.

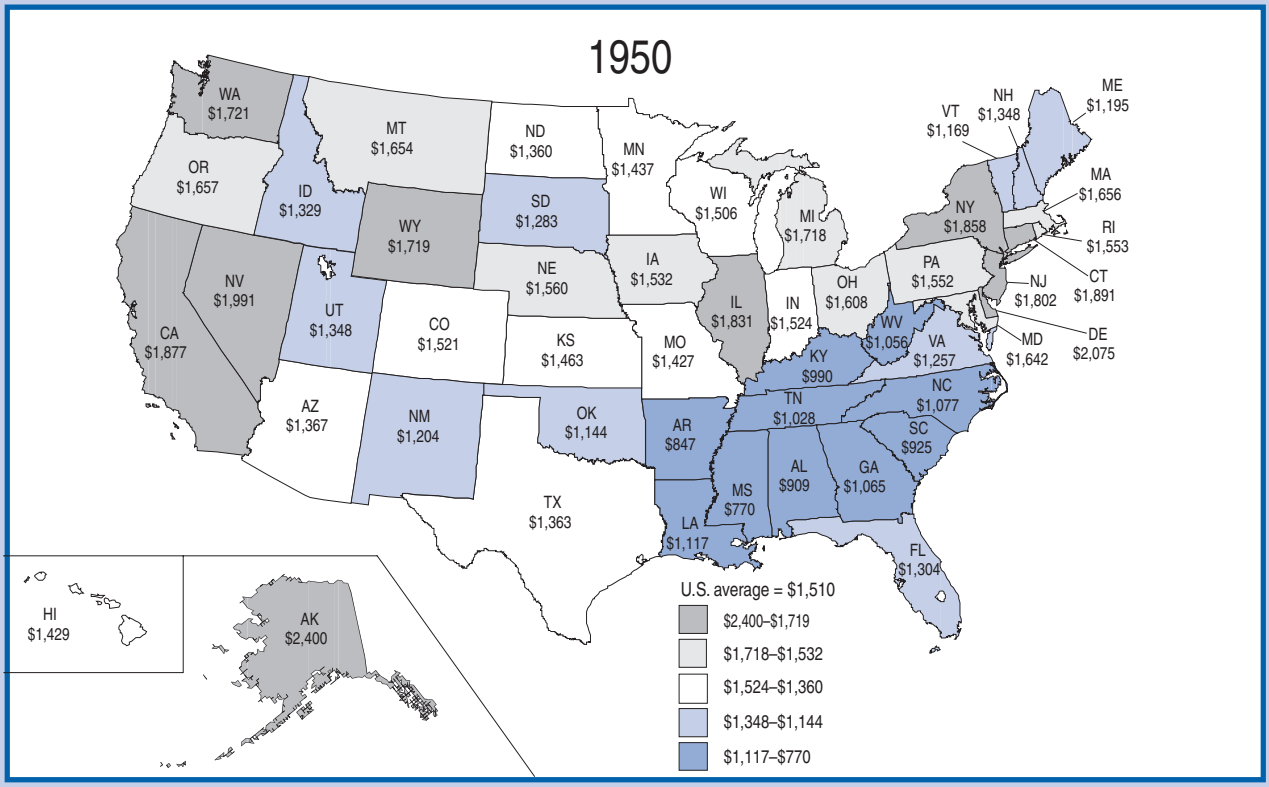
14. An example of changing preferences for amenities would be changes in how people value the warm climate of the South. Before the widespread adoption of air conditioning, hot weather was a disamenity—something to be avoided—for many people. Now that air conditioning is ubiquitous, the Southern climate is highly valued by many people. This example would contribute to divergence, rather than to convergence, in nominal incomes.

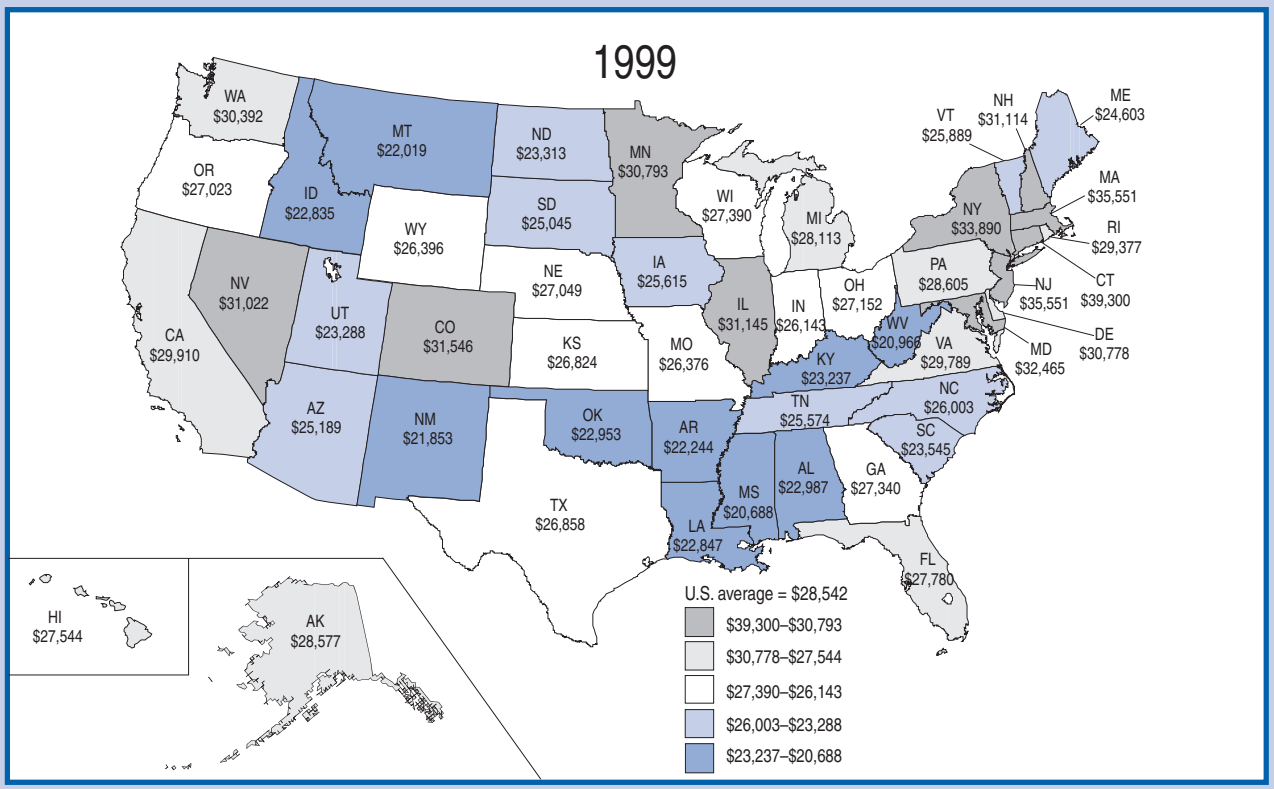
15. Sala-i-Martin states that price-level changes are unlikely to be the cause of convergence; see Xavier X. Sala-i-Martin, "Regional Cohesion: Evidence and Theories of Regional Growth and Convergence," *European Economic Review* 40 (1996): 1340. For a contrary view, see Steve Deller, Martin Shields, and David Tomberlin, "Price Differentials and Trends in State Income Levels: A Research Note," *The Review of Regional Studies* 26 (1996): 99–113.

16. For instance, preliminary results from the 2000 Census indicate that significant demographic changes occurred during the 1990s. Likewise, the industrial composition of States continues to change; recent research shows that States' industrial structures became more similar throughout the 1980s and 1990s even as convergence in State per capita income seemed to end (see G. Andrew Bernat, Jr. and Eric Repice, "Industrial Composition of State Earnings in 1958–1998," SURVEY 80 (February 2000): 70–78).

MAP 1

Per Capita Personal Income





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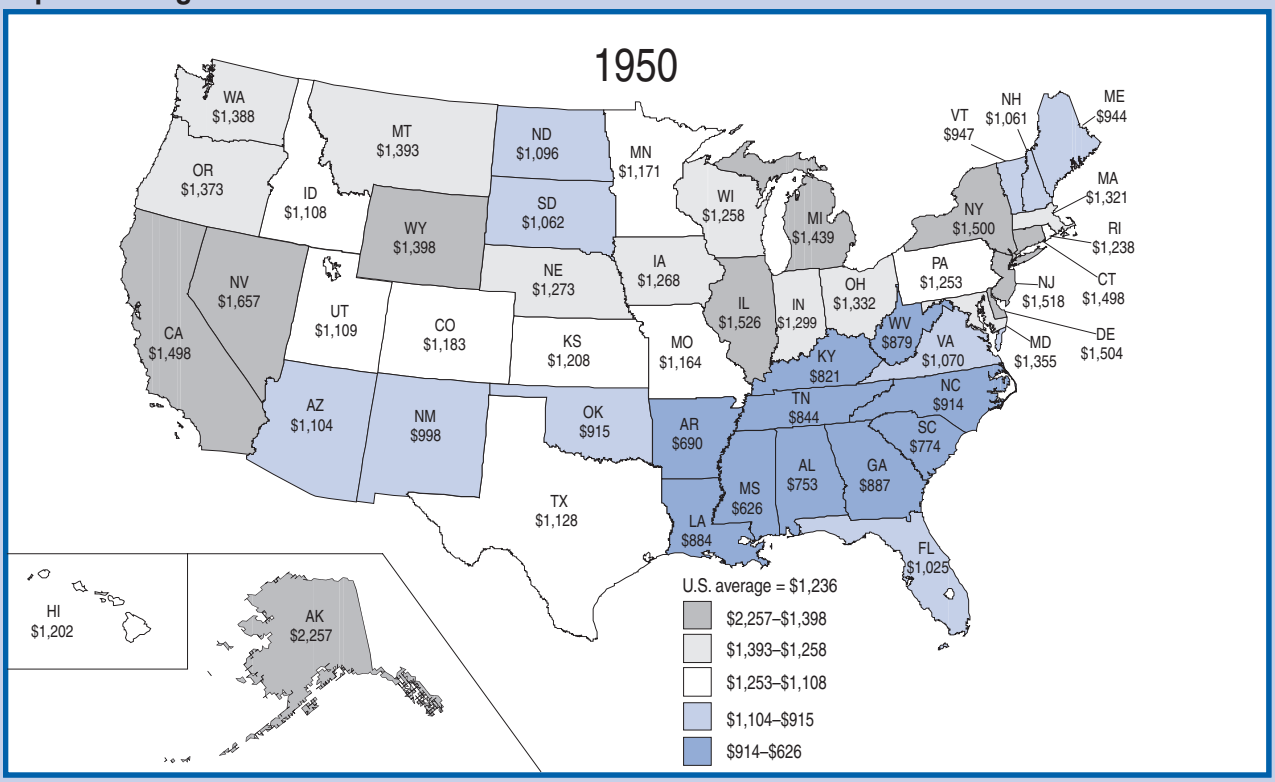
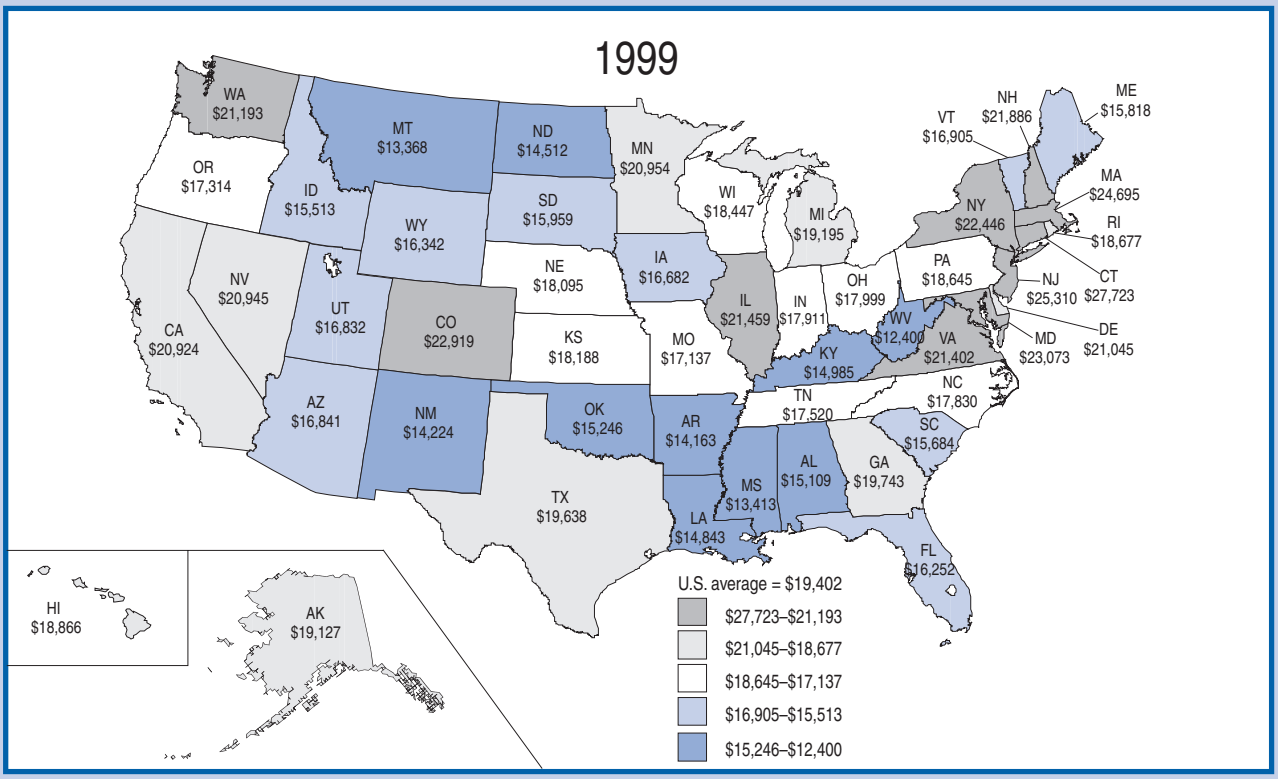
MAP 2

Per Capita Earnings





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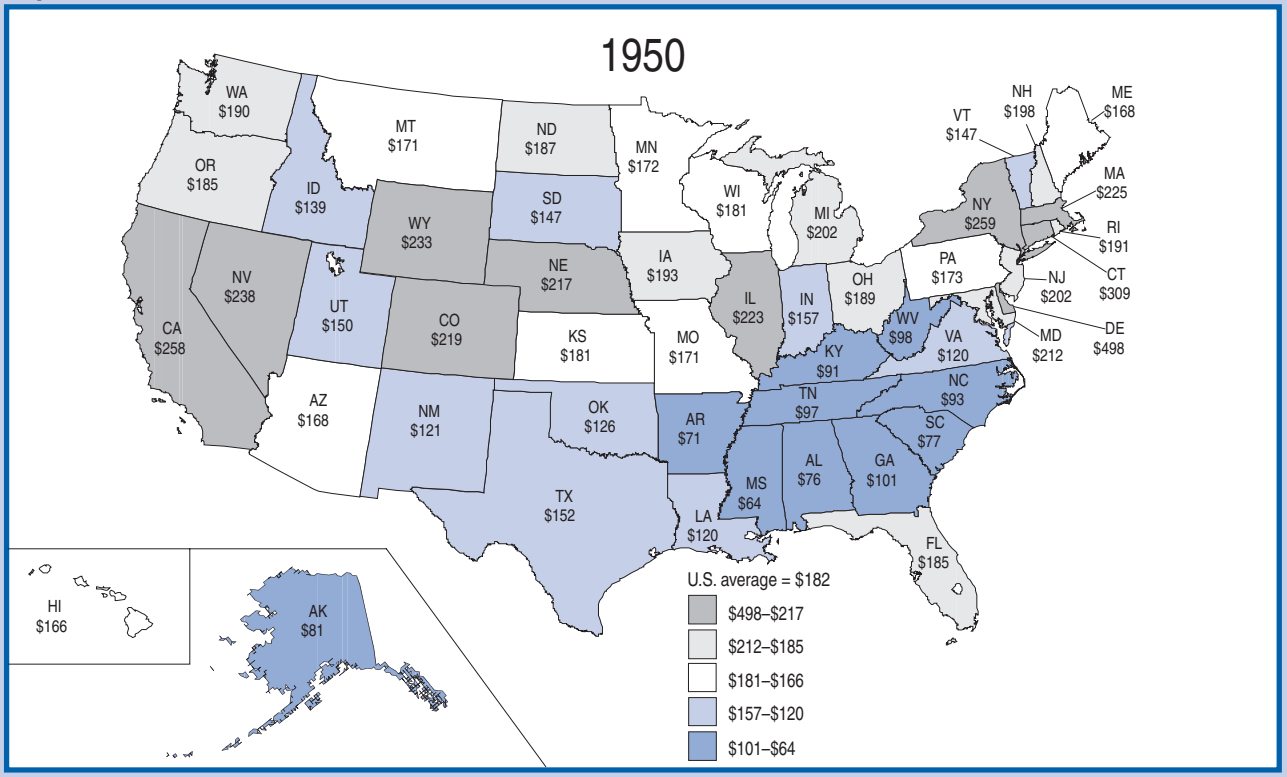
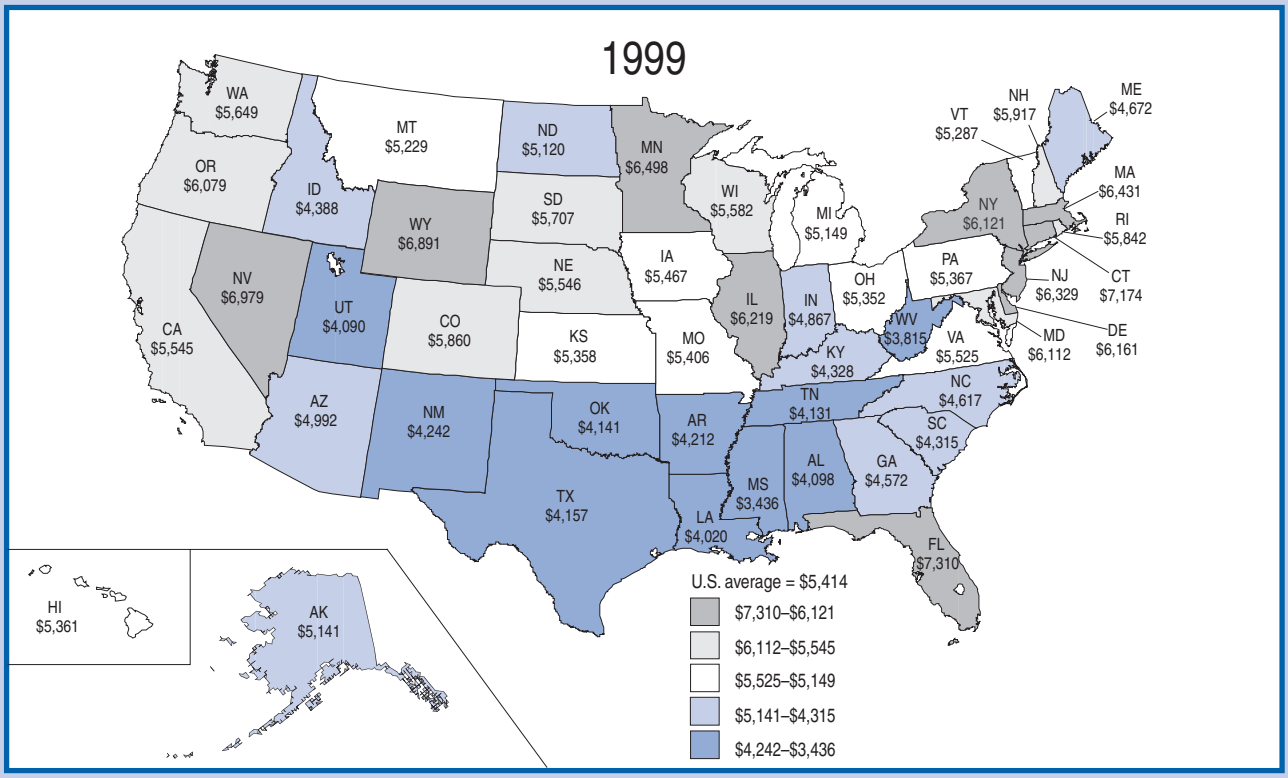
MAP 3

Per Capita Dividends, Interest, and Rent





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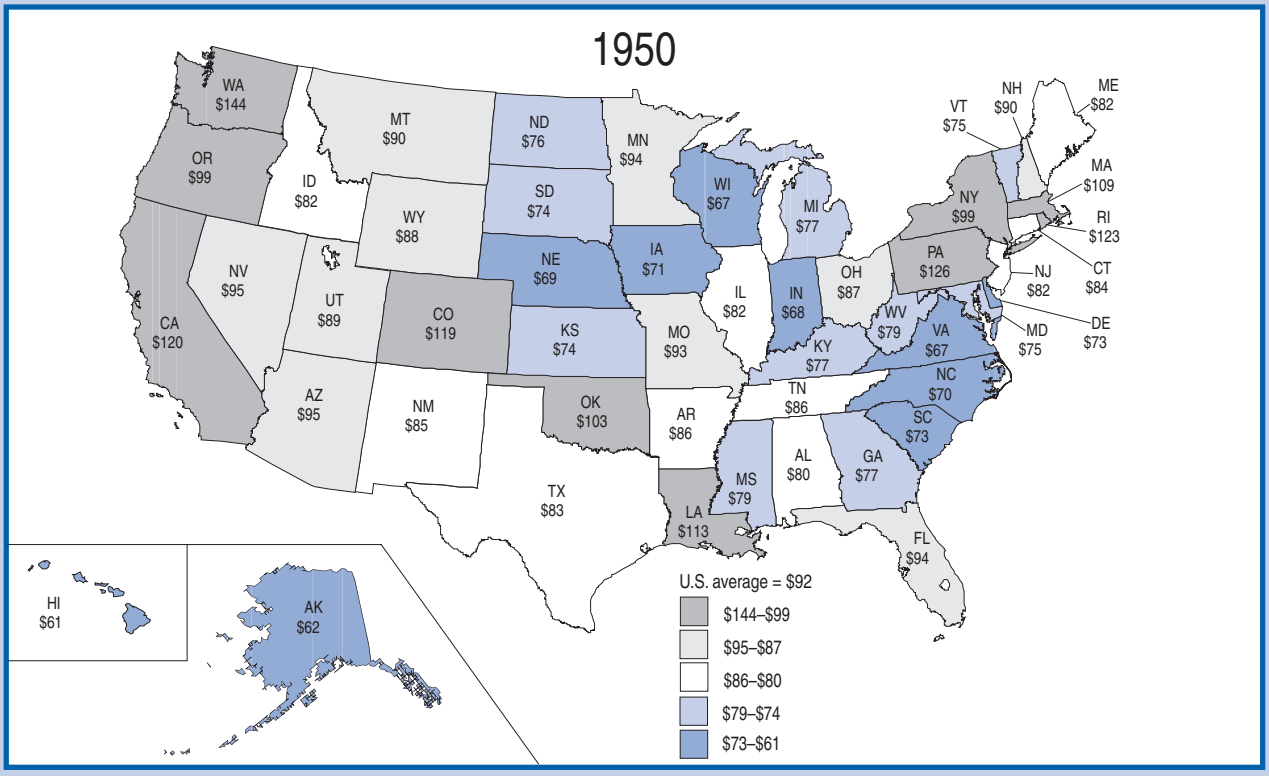
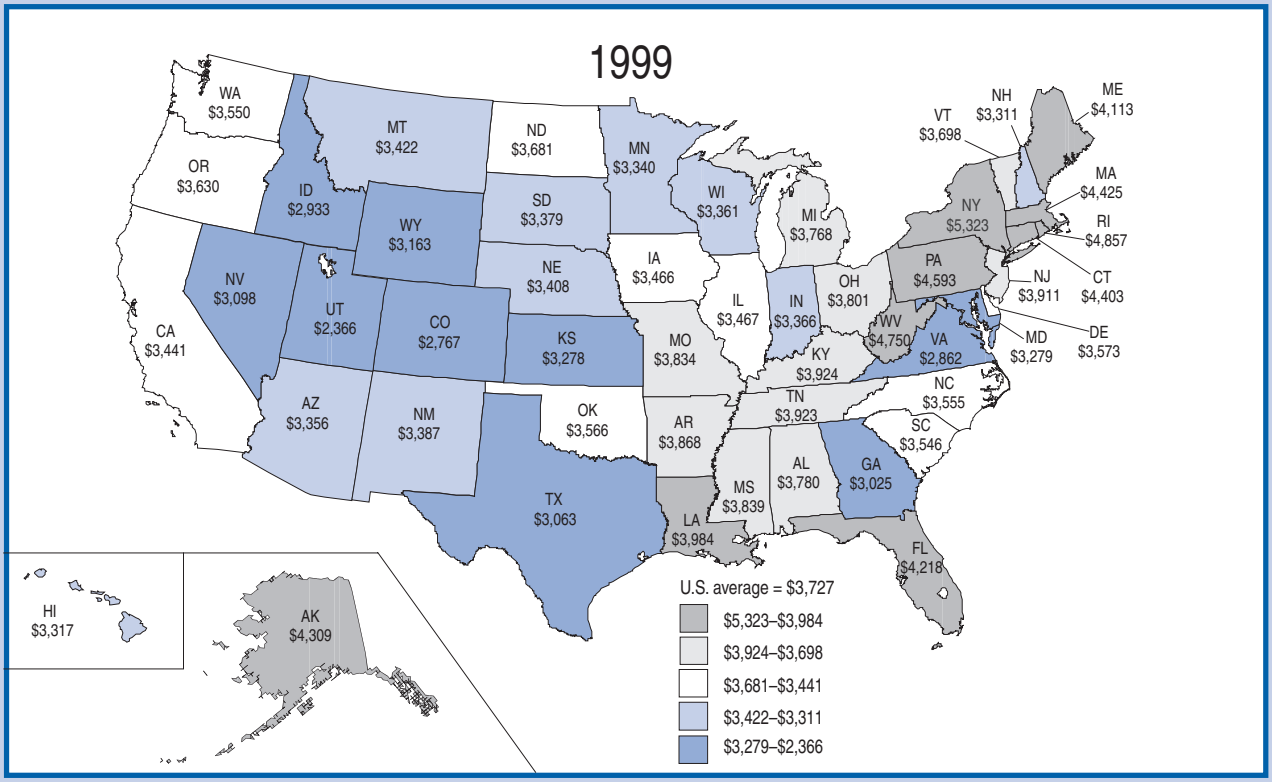
MAP 4

Per Capita Transfers





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