Regional Income Trends and Convergence

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This paper addresses the issue of income convergence among states and regions in the United States. The paper begins with a brief review of alternative ways of defining income convergence and then addresses some of the major issues in measuring the phenomenon. A summary review of the literature is then presented. This is followed by a descriptive analysis of the degree to which regional income convergence has actually taken place in the United States. Special attention is given to the Midwest and the area comprising the district of the Federal Reserve Bank of Chicago.

Convergence Defined and Measured. The term *income convergence* refers to the often observed phenomenon of per capita income differences among regions (e.g., states in the United States or countries in the world) diminishing over time. Relative convergence occurs when low-income Areas grow at a faster rate than higher-income areas. In such cases, the ratio of high-income areas to low-income areas will decline. Absolute convergence occurs when the incomes of low income areas increase in absolute (dollar) amounts more rapidly than in high-income areas. Measures of relative and absolute convergence do not always give a consistent result. For example, income in a high-income, slow-growing area may increase more in dollar terms than in a faster-growing, low-income area if the initial differential is large. The relative differential (the ratio of incomes) may decline for many years before the absolute income differential begins to decline.

In examining convergence among many areas, summary measures are used, such as the coefficient of variation or the Gini coefficient. As noted above, these measures can be based on differences in growth rates among areas or in differences in actual incomes. Generally, the impact of convergence in cross-sectional multiple regression analysis is addressed by including the beginning year income level for an area to explain the rate of growth of income for that period. Higher base year income is expected to have a negative impact on the growth rate of income.

Another question concerns exactly what aspect of income is expected to converge over time. Is it wage rates, income from wages, or per capita income from all sources including transfers? It should also be noted that convergence will not necessarily lead to equality among regions in equilibrium, just as wages or incomes within a region are not equalized among persons. Equilibrium differentials among regions for similar types of labor may result from what has been labeled "equalizing" or compensating differentials that take into account differing amenities or nonpecuniary aspects of work. In addition, nonequalizing differentials may also exist, reflecting qualitative differences in characteristics (e.g., education or experience) among people in different areas.

Hypotheses about Convergence. One of the major issues of development economics deals with why countries grow at different rates. The related question is whether incomes converge or diverge? There are many studies addressing this issue. (See, for instance, Barro (1989), Baumol (1986), Abramovitz (1986), Dowrick and Nguyen (1989), and Scott (1991).) In general, the findings of these studies suggest that convergence is occurring with relatively poorer countries growing at faster rates than the richer countries. More recently, several studies have examined the convergence issue in relation to states in the U.S. (See Barro and Sala-I-Martin (1992), Mallick (1993), Mehta, Crihfield, and Giertz (1995), and Carlino and Mills (1993).) These studies also generally find convergence.

These empirical findings of convergence relate to a number of different, but sometimes related, theoretical hypotheses that predict convergence. Such hypotheses include the following:

- Regression to the Mean—Convergence may result from an ill-defined process (observed in biology) in which characteristics of successive generations of a population moderate toward the mean.
- Diminishing Returns—Another reason for convergence is that diminishing returns to capital assures that productivity growth for a given level of technology will be slower for the area that starts from a higher level of labor productivity. This would occur even in the absence of trade between regions and without capital movements or labor migration.
- Diffusion of Technology—It has been suggested that relatively poor areas can adopt the technologies of more advanced nations without going through the slow and costly process of developing the technologies themselves. However, if the rate of technological change in high-income areas remains very high, the impact of diffusion of new technology on income differentials will be lessened.
- Trade in Goods—A long-standing issue in trade theory is the extent to which (and under what conditions) free trade in goods leads to factor price equality.
- Mobility of Labor and Capital—Convergence within a country is facilitated by the movement of labor and capital across regions and among countries where barriers for such movements are low. When wage rate differentials exist, factors tend to move to the region where the rate of return is highest: labor to high wage-rate areas from low-wage regions and capital from high-wage areas to low-wage situations. Both movements lead to a convergence of wages.
- Homogenization of Population Characteristics—Incomes among areas will tend to converge when the characteristics of their populations become more alike. In such a situation, nonequalizing differentials are reduced. For example, studies have suggested that convergence in per capita income among states is largely due to convergence of employment rates (defined as ratio of employed workers to total population) rather than of wage rates. Similarly, universal education would tend to reduce differentials.
- Government Policies—A number of government policies may also contribute to convergence. Policies set at the national level within a country (e.g., progressive taxation and universal welfare benefit levels) may lead to the convergence of incomes. Public infrastructure programs determined at the national level, such as highway construction, may also lead to a reduction of income differentials. It has also been suggested that differential policies toward economic growth (e.g., constraining the size of the public sector or emphasizing "productive" expenditures rather than redistributive ones) may lead to or retard convergence.

These various hypotheses for conversion are interrelated and not mutually exclusive. Empirically, it is often difficult to distinguish among the various causal factors.

Descriptive Analysis of Convergence in the United States. The dispersion of incomes within the United States and within the Midwest will be examined from a variety of perspectives. First, an overview of trends in convergence and divergence among the states in the U.S. during the period 1950 to 1993 is presented in figure 1. Both the coefficient of variation (COV) in per capita income (PCI) and the Gini

coefficient among states provide information about convergence. (Because of the high degree of correlation between the COV and the Gini coefficient, only the COV is presented in the remainder of the paper.)

The results indicate that, on the whole, the dispersion in PCI across the states has declined from 1950 to 1993 but not in a smooth, consistent manner. The results can be broken into four relatively distinct periods. From 1950 until 1973, convergence among the states is strong. From 1974 until 1980, dispersion remained relatively constant (convergence ceased) aside from the blip in the COV that is probably the consequence of the large increase in energy prices after the 1973 oil embargo. This is followed by a period of divergence from 1980 to 1989—a period marked by a severe recession and a major restructuring of American industry. Convergence began again after 1987 through 1993.

Figure 2 presents information about relative incomes of the major regions (the Northeast, South, Midwest, and West) in the U.S. since 1950. The general conclusion is one of strong convergence among the regions except for the important anomaly of the Northeast in the period from 1980 until 1987. After 1980, the high-income Northeast, which had experienced consistent decline since 1950, suddenly diverged from the rest of the country. This was the period of the "Massachusetts miracle," the defense buildup that differentially benefited the Northeast, and the growth in financial and legal services before the stock market crash in late 1987.

Figure 3 presents information about convergence among 12 states in the Midwest since 1950. (For reference purposes, the COV among all states, originally presented in figure 1, is also included.) Intraregional convergence within the Midwest is not nearly as consistent as national convergence in this period. The period from 1950 until 1965 was marked by volatility with no consistent convergence. Convergence was pronounced from 1968 until 1974. Following national trends, there was a general, although somewhat erratic, divergence from 1974 until 1987 when convergence began again.

Figure 4 divides the Midwest into two regions: one roughly approximating the Chicago Federal Reserve District (Illinois, Indiana, Iowa, Michigan, and Wisconsin) and the other including the remainder of the larger region. The results indicate the Chicago Fed District saw its margin dominance (in terms of relative PCI) reduced until about 1980 when a slight divergence began to reemerge. Figure 5 presents similar information about relative incomes for the states within the Chicago Fed District. The results suggest general convergence (with Michigan experiencing greater cyclical volatility throughout the period) until the early 1970s with no consistent pattern after that time.

Attention is now focused on another way of looking at convergence: the correlation between initial income and growth rates. Figure 6 plots the relationship between 1950 PCI for the four national regions plus the Chicago Fed District and growth rates from 1950 to 1993, 1950 to 1979, and 1950 to 1973. These periods generally display the expected negative relationship between initial income and growth except for the Northeast. Figure 7 breaks out the period from 1980 until 1987 when there was little convergence. Note the anomaly discussed earlier of the high-income Northeast growing rapidly during this period. Finally, figure 8 concentrates on the most recent period, from 1987 until 1993, when convergence began again.

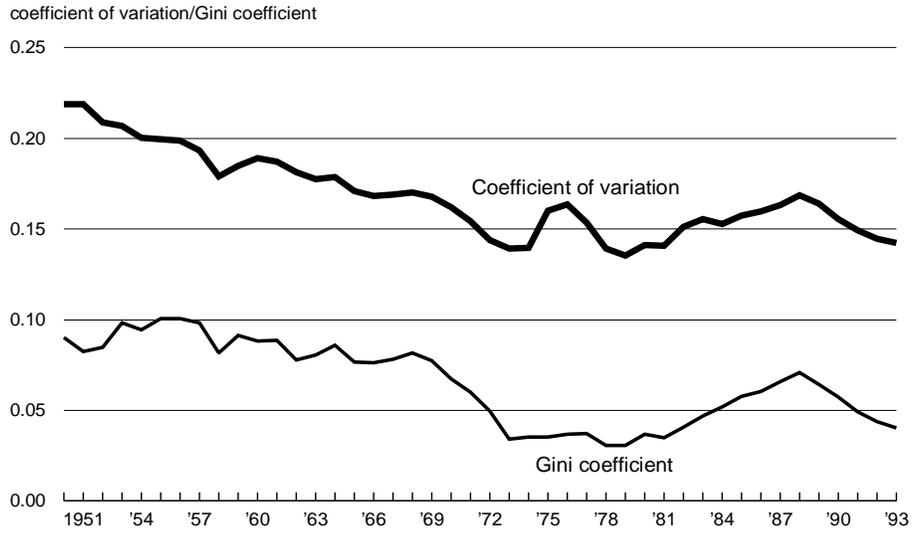**Figure 1**   Dispersion of Per Capita Income among States (1950–1993)

coefficient of variation/Gini coefficient

Figure 2   Ratio of Regional Per Capita Income to U.S. Average (1950–1993)
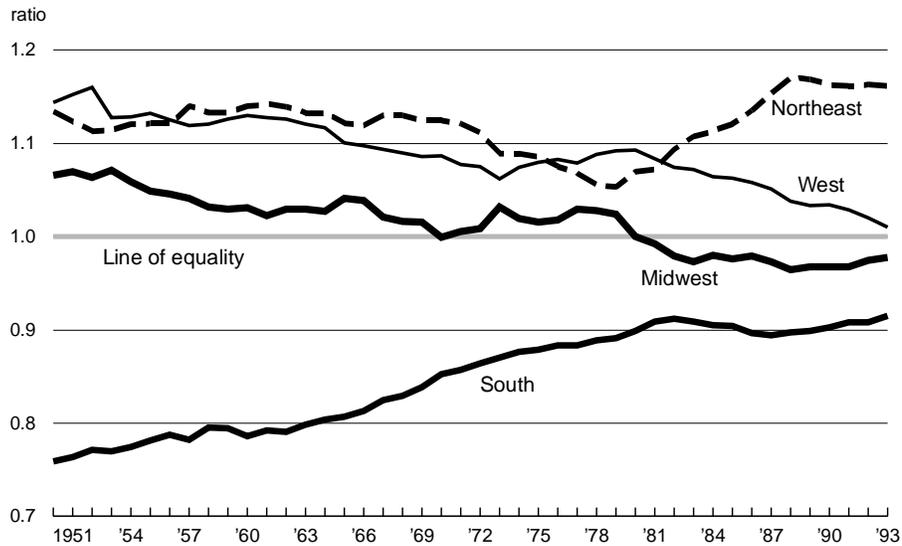
ratio

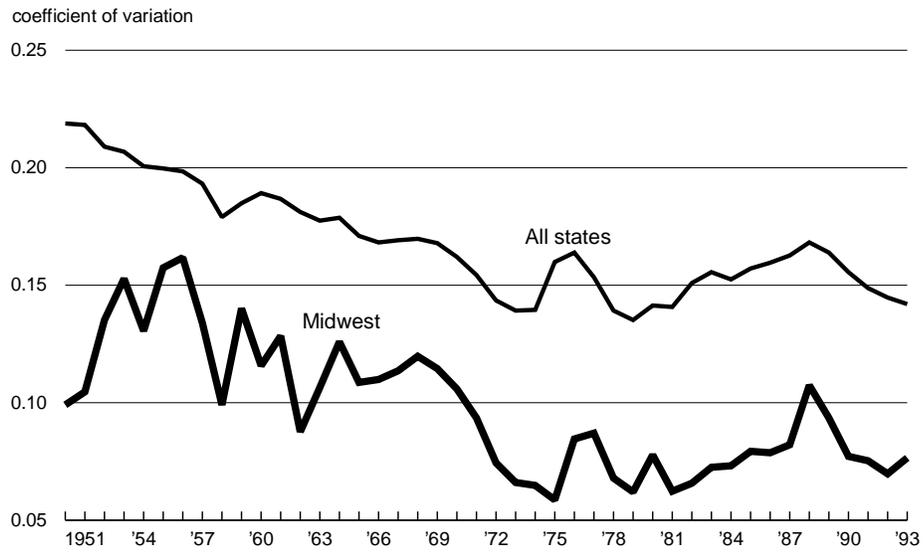**Figure 3** Dispersion of Per Capita Income among All States and among Midwest States (1950–1993)

coefficient of variation

Figure 4 Ratio of Midwest Per Capita Income (in Chicago Federal District and Outside District) to U.S. Average (1950–1993)
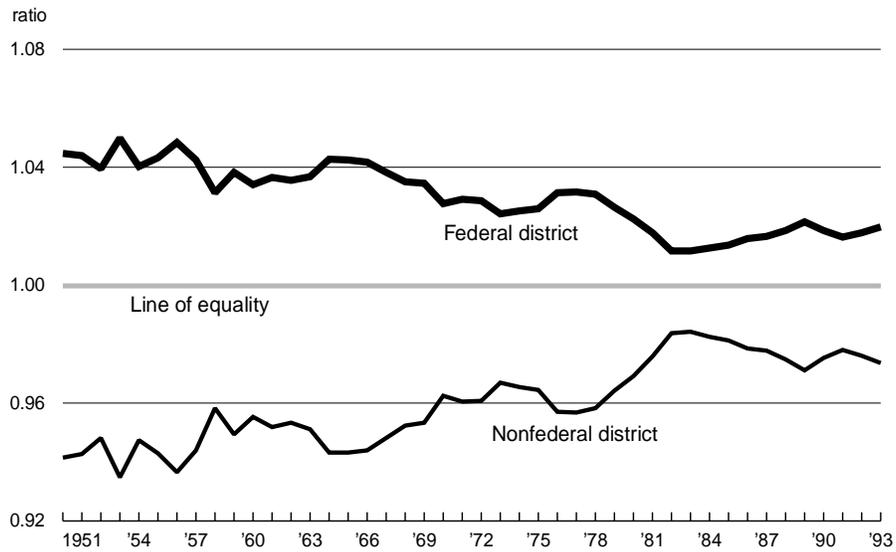
ratio

Figure 5 Ratio of Midwest States in Chicago Federal District Per Capita Income
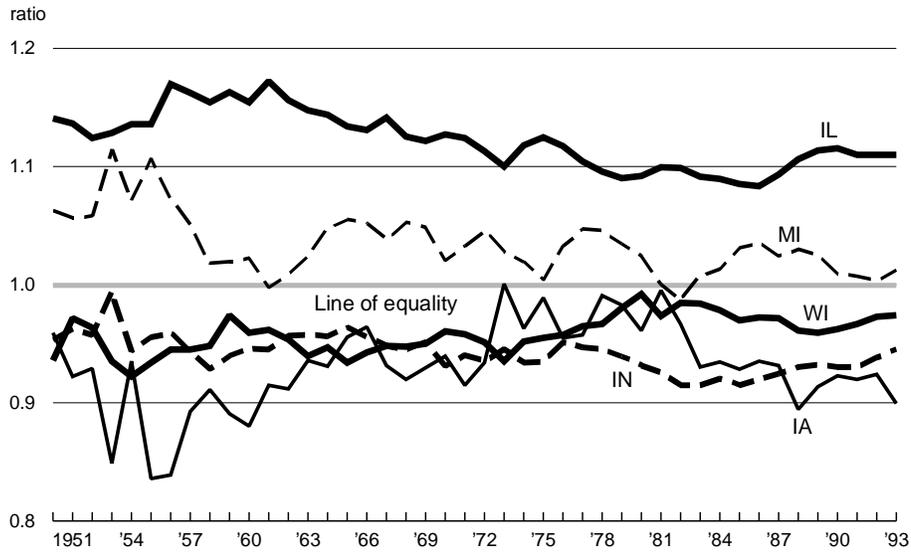to Midwest Average (1950–1993)

ratio

Figure 6 Relation of Growth Rates of Per Capita Income (1950-1983) and Initial Per Capita
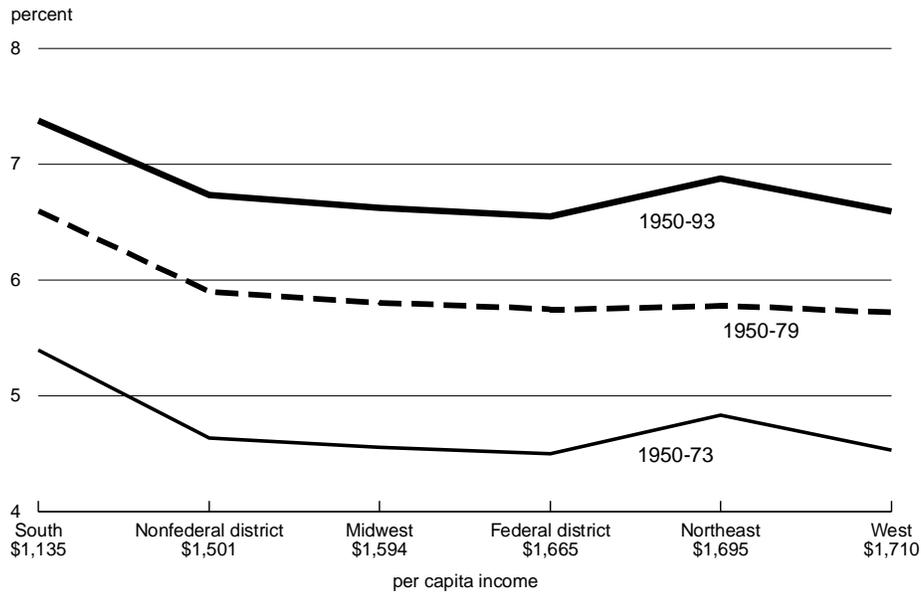Income (1950) for U.S. Regions

percent

Figure 7 Relation of Growth Rates of Per Capita Income (1980–1987) and Initial Per Capita Income (1980) for U.S. Regions
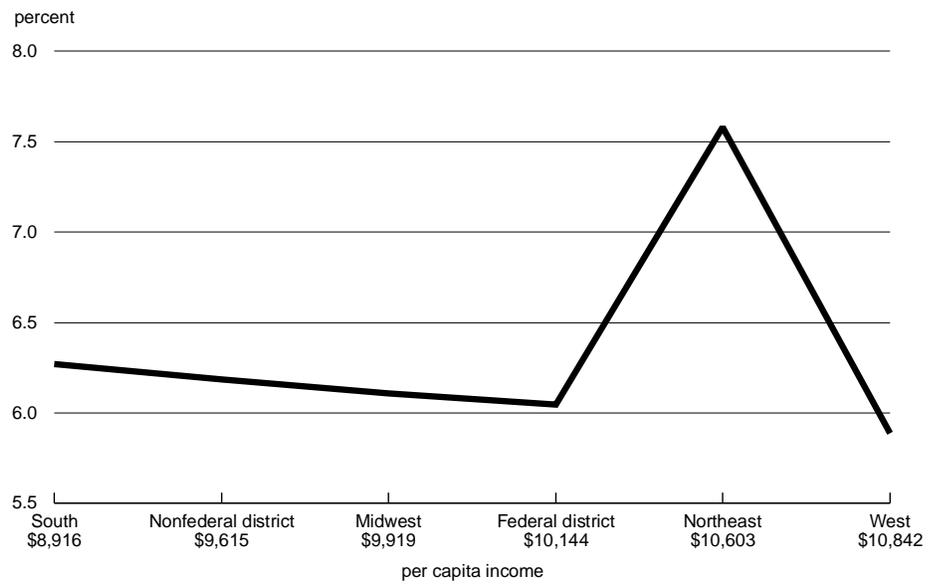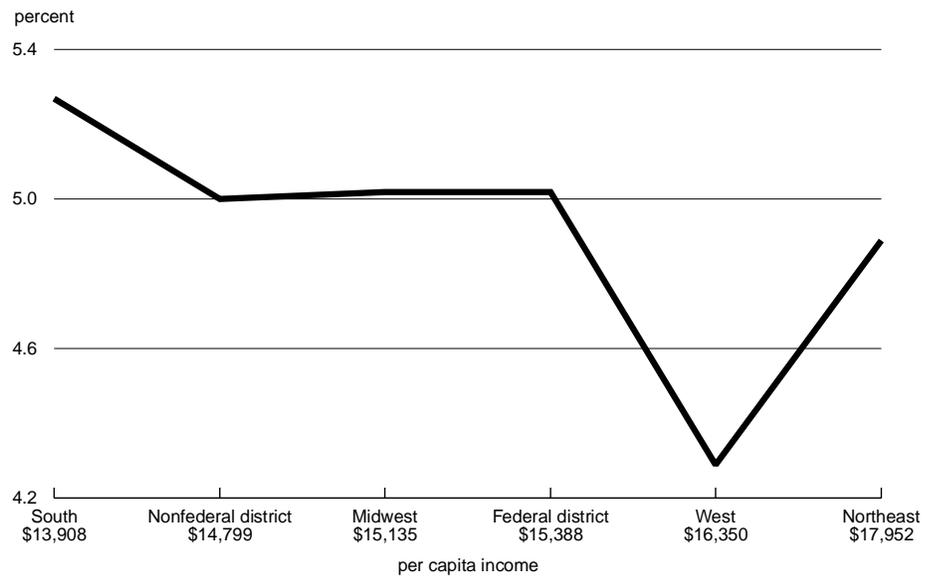
percent

| | South $8,916 | Nonfederal district $9,615 | Midwest $9,919 | Federal district $10,144 | Northeast $10,603 | West $10,842 |

per capita income

Figure 8 Relation of Growth Rates of Per Capita Income (1987–1993) and Initial Per Capita Income (1987) for U.S. Regions

percent

| | South $13,908 | Nonfederal district $14,799 | Midwest $15,135 | Federal district $15,388 | West $16,350 | Northeast $17,952 |

per capita income

Figures 9 through 11 present similar information relating growth rates to initial income for the 12 states in the Midwest region for various periods. In figure 9, for both the overall period from 1950 until 1993 and for the period from 1950 until 1979, the expected negative relation indicating convergence emerges. However, for the period from 1980 to 1987 (figure 10), incomes tend to diverge among states in the region. Finally, after 1987 (figure 11) convergence resumes.

Next, the rural vs. urban dimension of convergence is examined. Figure 12 presents information about the dispersion among regions for metropolitan areas and for nonmetropolitan (rural) areas. Value added per employee is used instead of income and the data are only available from 1963 through 1987 every four years. The national results suggest a much greater dispersion in rural incomes among regions than in metropolitan incomes. Convergence in rural incomes is also more pronounced than in urban incomes. Figure 13 presents similar information for states in the Midwest region. In 1963 the dispersion of rural incomes is much more pronounced than for urban incomes. However, by 1987 the dispersion among rural areas

Figure 9 Relation of Growth Rates of Per Capita Income (1950-1993) and
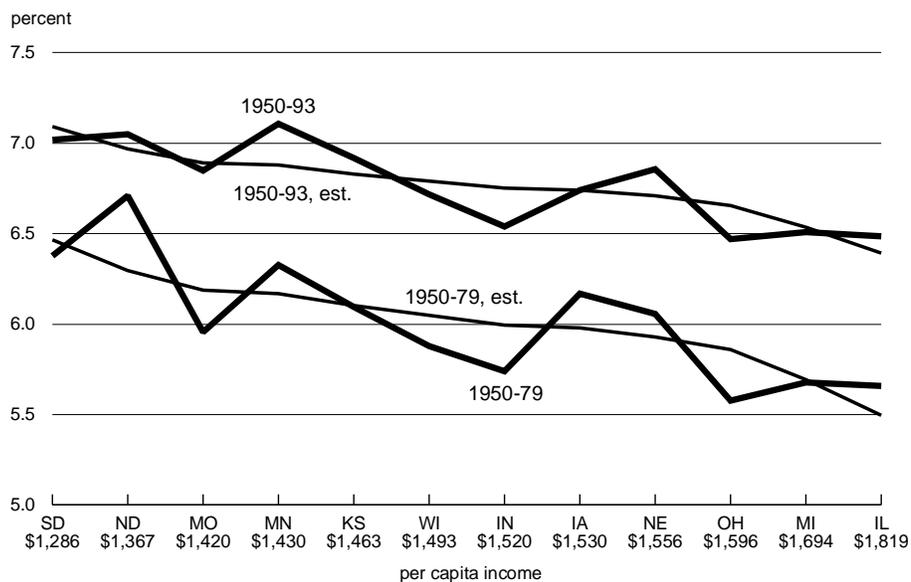Initial Per Capita Income (1950) for Midwest States

Figure 10 Relation of Growth Rates of Per Capita Income (1980–1987) and Initial Per Capita Income (1980) for Midwest States
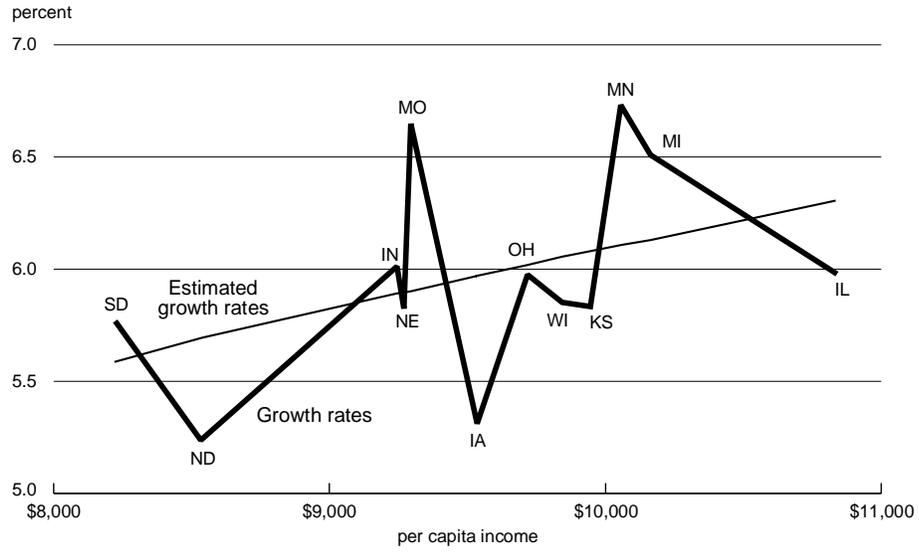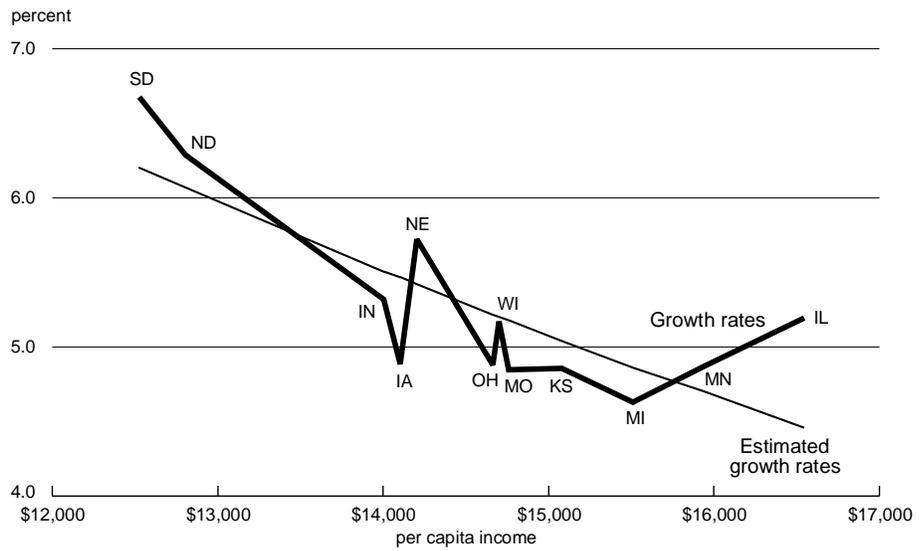
percent

- 7.0

MN

MO

MI

6.5

IN   OH

SD   Estimated   IL
growth rates   6.0

NE   WI KS

5.5

Growth rates

IA

ND

5.0

$8,000 $9,000 $10,000 $11,000

per capita income

Figure 11 Relation of Growth Rates of Per Capita Income (1987–1993) and Initial Per Capita Income (1987) for Midwest States

percent

- 7.0

SD

ND

6.0

NE

IN   WI   Growth rates   IL

5.0

IA   OH MO KS   MN

MI

Estimated
growth rates

4.0

$12,000 $13,000 $14,000 $15,000 $16,000 $17,000

per capita income

Figure 12

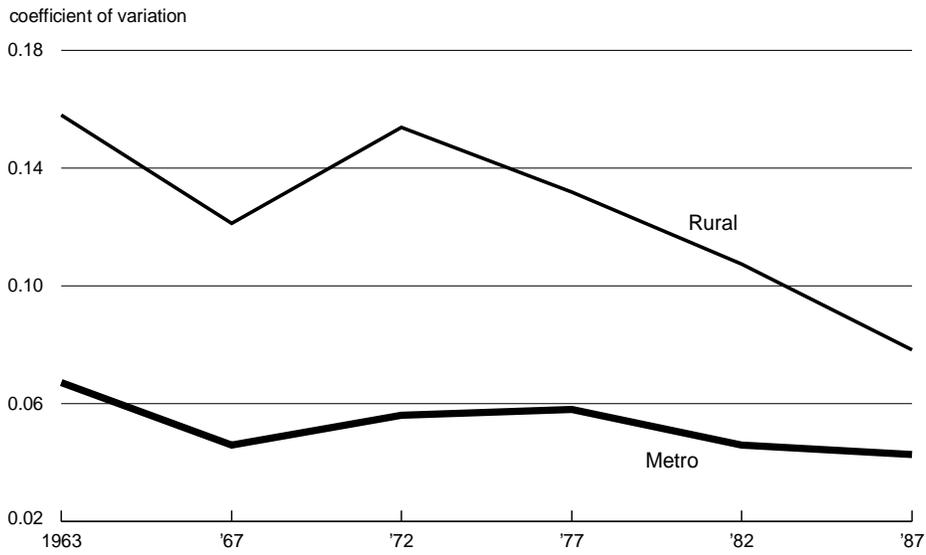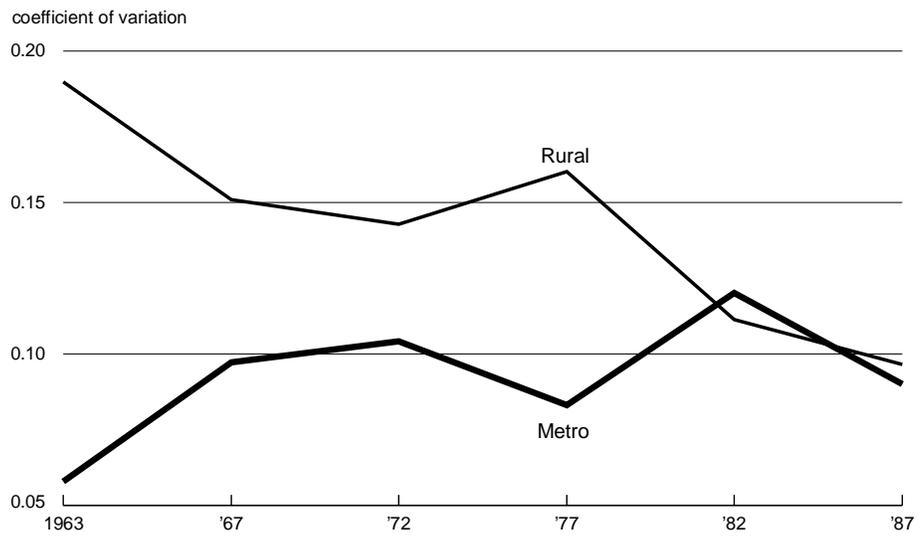Dispersion among Regions in Value Added per Employee in Metropolitan and Rural Areas (1963–1987)

coefficient of variation

Figure 13 Dispersion Among States in Midwest in Value Added per Employee in Metropolitan and Rural Areas (1963–1987)

coefficient of variation

and among urban areas in the Midwest is virtually identical as measured by the COV. During the 1963 to 1987 period, there is marked convergence in rural incomes with modest divergence in urban incomes.

Figures 14 and 15 explore the question of convergence between rural and urban area incomes in the nation and the Midwest. For the nation as a whole, figure 14 indicates that there is still a substantial disparity between metropolitan and rural value added per employee with convergence ceasing after 1977. For the Midwest (figure 15), convergence continued until 1982 when rural and urban value added per employee were almost equal. Incomes diverged, however, from 1982 to 1987.

Concluding Remarks. The results presented here suggest that long-term convergence has taken place among regions and states in the U.S. and among states within the Midwest. However, long-term convergence in the last two decades has often been halted or even reversed over short time periods, probably in response to shocks caused by changes in the economy, such as shifts in comparative advantage among regions. Increased interregional and world trade along with capital and labor mobility may have led to a rough equilibrium where convergence and divergence are now the result of adjustments to discrete shocks, not to a long-run equilibrating process. Some observers have also suggested that regional variations in the timing and strength of the business cycle are more pronounced than in the past, which may help explain some of the recent volatility in dispersion.

Figure 14 Ratio of Metropolitan and Rural Value Added per Employee in U.S. to U.S. Average (1963-1987)
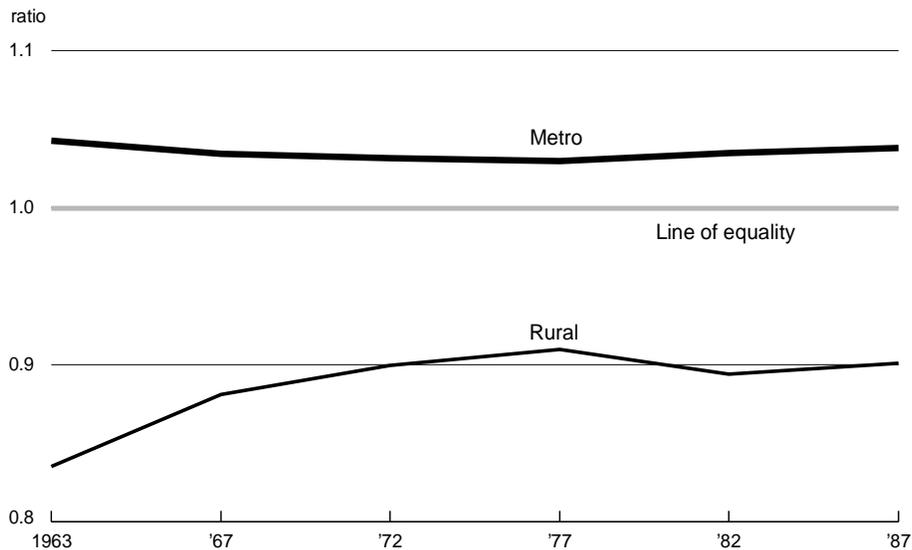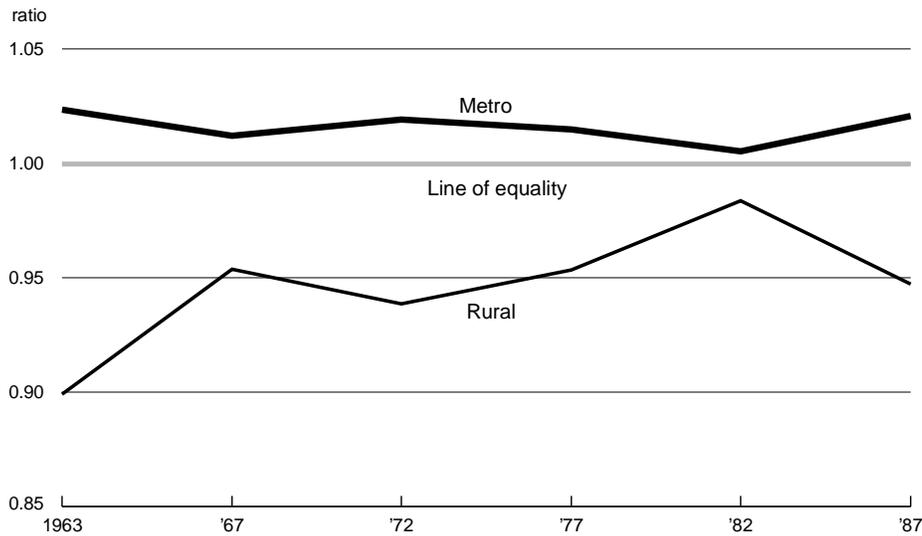
Figure 15 Ratio of Metropolitan and Rural Value Added per Employee in Midwest to Midwest Average (1963–1987)

It is interesting to note that changes in geographic dispersion often coincide with other important changes in the economy. For example, the end of convergence in the early 1970s took place at about the same time as several other important changes in the U.S. economy, including a major reduction in the growth rate of per capita income, an increase in the overall level of inequality, an end to a period of declining poverty rates, the energy crisis, and a new era of environmental controls. Similarly, the regional divergence experienced beginning in the early 1980s coincided with a major recession, a restructuring of the manufacturing sector of the U.S. economy, and further increases in the overall level of inequality.

This paper has not attempted to isolate the determinants of convergence, but it is clear that there are a number of important trends that deserve more detailed analysis.

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