# U.S. REGIONAL GROWTH AND CONVERGENCE, 1880-1980

Kris James Mitchener and Ian W. McLean

*Working Paper 98-4*

The University of Adelaide,
Department of Economics,
ADELAIDE, S.A. 5005

ISBN 0 86396 622 5

# U.S. Regional Growth and Convergence, 1880 - 1980

**Kris James Mitchener**
Department of Economics
University of California, Berkeley
Berkeley, CA 94720
kris@econ.berkeley.edu

and

**Ian W. McLean**
Department of Economics
University of Adelaide
Adelaide, South Australia 5005
imclean@economics.adelaide.edu.au

February 12, 1998

## Abstract

The historical analysis of U.S. regional growth is improved by augmenting existing estimates of state personal income per capita, extending previous studies of convergence across states, and more broadly, offering an improved basis for interpreting other issues in regional development such as the "catch-up" of the South and the convergence "from above" of the West. The income data are first adjusted for state differences in prices at six census years between 1880 and 1980. The dispersion in relative prices across states falls sharply from 1880 (when the Western states have the highest prices) to 1940 after which it increases slightly. It is also observed that regional growth assessments are sensitive to the choice of income series. We then estimate labor productivity by converting price-adjusted personal income from a *per capita* to a *per worker* basis by calculating labor input per capita for each state. It is then possible to assess the extent to which the dispersion in nominal state income resulted from price effects, demographic and labor market characteristics, or (residual) productivity differences. We find that part of the very wide variation in nominal income per capita in 1880 is due to regional price differences and state-specific demographic factors. For example, higher nominal incomes in the West than in the Northeast in 1880 are entirely due to price and labor input differences – labor productivity is identical in the two regions. We also find that convergence among regions is much weaker between 1880 and 1940 than thereafter; that convergence rates differ according to the series chosen (nominal income, price-adjusted income, or productivity); and that the West plays a crucial role in the convergence story.

JEL Classification: E23, N11, N12, O18, O47, Q33, R11.

Keywords: Economic Growth, Convergence, Regional Analysis, U.S. Economic History.

For useful comments and suggestions, we are grateful to Richard Easterlin, Martha Olney, Paul Rhode, Joshua Rosenbloom, and Richard Sutch as well as participants at the Fall 1997 All-UC Group in Economic History at UC Davis, the Cliometric Session of the ASSA Meetings in Chicago, and participants at the UC Berkeley economic history seminar. We acknowledge the financial assistance of the Department of Economics at the University of Adelaide.

# U.S. REGIONAL GROWTH AND CONVERGENCE, 1880-1980

The convergence debate among economists has proved a stimulus for historical inquiry. From the outset economic historians recognized the close links between questions of long-standing interest to them and issues central to the recent literature on growth and convergence (Abramovitz 1989). The principal focus of this expanding literature has been the analysis of the comparative performance of *national* economies – in particular whether poor countries grow faster than rich countries, and whether this catch-up effect is independent of other characteristics such as investment in human capital (Barro 1991). However, growth economists have also sought evidence of convergence at the level of *regions* within economies. Regional analysis has two advantages that should help identify the forces that drive long-run growth. Regions share attributes that are difficult to control for in cross-country studies yet also provide a heterogeneity of economic experiences.[1]

This regional dimension to the convergence debate re-focuses the attention of economic historians of the United States on an enduring theme. The growth of the national economy is frequently viewed as the outcome of the development of a number of regional economies and of their progressive integration. This is evident in the sustained attention given the formation of national commodity or factor markets, and the role of transport and communications innovations therein.[2] The same theme is illustrated by the literature on the evolution of the Southern economy, in which scholars have been challenged to account for the slow convergence of the South between the Civil War and the 1930s, and its more rapid convergence in recent decades (Wright 1987).

Although the convergence hypothesis is a useful starting point for the historical analysis of the growth of states or regions, in this paper we are not constrained simply to its formal assessment. The approach of this paper is to integrate the convergence perspective with existing

---

[1] Barro and Sala-i-Martin (1995, Chapter 11) offer a review of the evidence on regional growth and convergence in western Europe, Japan and the U.S.

[2] See, for example, Slaughter (1995), Davis (1965), Rosenbloom (1990, 1996), and Fogel (1964).

interpretations of regional development by providing new measures of regional economic performance between 1880 and 1980. As with others before us, we are heavily indebted to the pioneering work of Easterlin (1957). He compiled undeflated estimates of state personal income since the mid-nineteenth century, thus providing a quantitative basis on which to examine economic performance. He also drew attention to the implications of his figures for the interpretation of regional trends in living standards (Easterlin 1961). The potential his estimates offered for the study of regional economic inequality was illustrated by Williamson (1965). And in recent contributions to empirical growth analysis, Barro and Sala-i-Martin (especially 1991 and 1992a) based their test of the convergence hypothesis on U.S. regional evidence using Easterlin's series.

This paper reports three extensions to prior research. The nominal personal income per capita estimates of Easterlin and the Bureau of Economic Analysis are corrected for differences in prices between states, yielding a measure of price-adjusted income per capita (Sections 2 and 3). These are more appropriate than the unadjusted (nominal) figures for the examination of regional economic inequality, living standards, income convergence, or similar topics. Our second extension is to derive a proxy measure of labor productivity for each state by converting price-adjusted personal income from a *per capita* to a *per worker* basis by calculating labor input per capita. We then show that regional economic performance across the century can differ markedly depending on the selection of nominal or price-adjusted income-based measures, and whether allowance is made for state differences in labor input per capita (Section 4). Our third contribution is to suggest a framework within which differences among states in per capita nominal incomes (the series most frequently used in the study of long-run regional development in the U.S.) may be attributed to state-level variation in prices, labor input per capita, and labor productivity (Section 5).

By providing alternative measures of economic performance, we clarify several issues regarding the convergence among U.S. regions. First, we demonstrate that convergence is much weaker in the 60 years between 1880 and 1940 than thereafter, and that dispersion across states differs according to the choice of series (nominal income, price-adjusted income, or labor productivity).

Second, we observe evidence of non-convergent state-level behavior and distinct regional contributions (of the West as well as of the South) in explaining convergence among all states. And third, we find indications of a sizeable and (in this paper) unexplained dispersion in labor productivity levels across states in 1880. That is, the wide variation in 1880 nominal income per capita, which forms the backdrop for the subsequent century-long process of convergence, is not fully accounted for in terms of inter-state variation in prices or in labor input per capita.

## *1. What the Nominal Income Estimates Show*

In a series of papers, Easterlin (1960a, 1960b, 1961) drew on his regional estimates of nominal personal income to describe patterns of long-run regional change and to speculate about possible determinants of what his estimates revealed. He was aware that regional price effects had not been allowed for and might explain some of the variation in personal income. Easterlin also illustrated the possible importance of regional variation in certain attributes of the population. We later address both these topics. We also extend the time coverage to 1980 by appending Easterlin's (1957) nominal state personal income per capita estimates for 1880, 1900 and 1920 to data for 1940, 1960 and 1980 published by U.S. Department of Commerce (1995, 1996), following his convention of examining changes in our series at twenty-year intervals because of the lack of more frequent estimates prior to 1920.[3]

Some of the principal features of the long-run regional growth of the American economy revealed by the widely-used estimates of state nominal income per capita warrant brief summary, as they form the basis of later comparisons with the revisions and extensions we undertake. As can be seen in figure 1 the South as a whole trails the rest of the country for the entire century, with the East South Central recording the lowest income per capita of the nine subregions at around 50 per cent of the national average until 1940. At the other extreme, the Pacific states

[3] Because Alaska and Hawaii only became states in 1959 and reliable data are unavailable for earlier periods, we exclude these two states from our overall analysis. No estimates for state personal income per capita are available for Oklahoma in 1880, so we exclude it from our sample for that year. The Dakota Territories are separated out into North and South Dakota for purposes of analysis in 1880; they received statehood in 1889. We also refer to Montana, Washington, Idaho, Utah, Oklahoma, New Mexico, and Arizona as "states," even though they were technically still territories in 1880; their boundaries did not change between territory status and statehood. Nebraska's area, however, did increase in 1882 through acquisition of some Dakota territory lands.

start out in 1880 with an average nominal income that is twice that of the U.S. average, and four times that in the East South Central states. However the lead of both the Pacific and the (next highest ranking) Mountain states gradually declines, with per capita income in the latter reaching the national average by 1940. The Pacific remains the richest subregion throughout most of the century. The Midwest stays close to the national average throughout; while the Northeast lies above this benchmark.

Individual state histories introduce more complexity, but some prominent features should be noted. In 1880, the highest ranked states were Nevada, Montana, Arizona and California; the lowest were the Carolinas, Arkansas and Florida (Appendix table A1). A century later the states having the highest income per capita were Connecticut, California, New Jersey and Nevada; the lowest were Alabama, South Carolina, Arkansas and Mississippi. Considering just rank, there is evidence of both remarkable change and persistence. Florida has moved from near the bottom to the top twenty, Montana from second highest to the bottom twenty. A group of southern states languish near the bottom; while another group comprising some western states (California and Nevada) and some northeastern states (New York, New Jersey and Connecticut) tenaciously retain their status of having the highest incomes. The regional concentration evident in these cases is a familiar theme in the literature dealing with the economic experience of the South, but less so with respect to that of the western states. But there are two other features of these nominal income estimates relevant to the aims of this paper.

*A. Convergence*

U.S. economic growth over the last century has been accompanied by the convergence in state personal income per capita when measured in nominal prices. By convergence we mean that on average states that were poorer in 1880 have grown faster than richer states over the subsequent one hundred years such that (1) the gap in relative incomes between the richest and poorest states is smaller today than in 1880 and (2) differences in per capita income across states have declined over this period. When all states are taken relative to the U.S. average level of income per capita, the standard deviation of this time series falls from 1880 to 1920, widens slightly between 1920

and 1940, then resumes its downward trend.[4] As the first row of table 1 shows, over the span of one hundred years, the standard deviation in personal income per capita falls from 64.8 in 1880 to 13.1 in 1980. Figure 1 displays the trend in convergence in state personal income at the regional level.

The wider literature on empirical growth has drawn on the American states as an example of catch-up by lower income states or regions. Figure 2a displays this idea by plotting the log in per capita income of each state in 1880 versus its annual growth rate in income per capita from 1880 to 1980. The state-level per capita income data are quite suggestive of the convergence hypothesis: that is, the higher the initial (log) per capita income in 1880, the lower the subsequent growth rate in per capita income.[5] These data seem to confirm the existence of convergence observed by Easterlin (1960a, 1960b, 1961) in his estimates of state income since the nineteenth century (1957), and more rigorously confirmed by Barro and Sala-i-Martin (1991, 1992a, 1992b, 1995).

Upon closer inspection, however, the dispersion in log per capita income is much less between 1940 and 1980 than between 1880 and 1940, as seen in figures 2b and 2c. As regressions verify, the fit of the line is much tighter over the second subperiod (1940 to 1980). While both subperiods show a negative relationship that implies convergence, the point estimate on initial log per capita income is larger in magnitude in the second subperiod (with a smaller standard error); more of the variation in growth rates can be explained in the subperiod from 1940 to 1980 as well (higher R-squared).[6]

Further, if we examine the income data for 1880, when dispersion is greatest, the six states with the highest income are all Western states, raising the possibility that convergence after then is

---

[4] Barro and Sala-i-Martin (1995) refer to this type of convergence as sigma convergence.

[5] A regression of the annual growth rate in state income per capita on a constant and initial (1880) income per capita also confirms the existence of convergence. The sign on the coefficient for initial income per capita is negative (-0.008) and statistically very significant (SE = 0.0003); 95 percent of the variation in growth rates across states is explained.

[6] From 1880-1940, the coefficient on log initial income per capita is -0.0085 with a standard error of 0.0011 while from 1940-1980, the corresponding values on initial income are -0.016 and 0.0007. The adjusted R-squared for the first subperiod (1880-1940) is 0.55 versus 0.93 for the second subperiod (1940-1980).

being driven by the experience of this region.[7] For both the full sample period (1880 to 1980) and for the last forty years of the sample (1940 to 1980), removing the Western states does not seem to affect the convergence hypothesis.[8] But for the first 60 years, without the Western states included in the sample, there is very little downward slope in the scatter plot (as shown in figure 3), or very little convergence in growth rates from 1880 to 1940.[9] Thus the Western states appear to drive what little convergence occurred before 1940; and what happened after 1940 accounts for most of the convergence across the whole period.

### *B. Initial Dispersion*

A second and closely associated feature of the nominal income estimates is the remarkably wide dispersion of regional per capita income in the late nineteenth century U.S. In 1880 a nearly tenfold difference separated the richest (Nevada $606) and poorest (North Carolina $64) states, a gap similar to that observed in 1990 between the United States and countries such as Egypt or the Philippines (appendix table A1).[10] Of the ten states with the highest per capita incomes in 1880, seven were in the West, the other three (Massachusetts, New York, and Rhode Island) were in the Northeast. Eleven states had a per capita income of less than $100 in 1880 and all were located in the South. If these state income data are aggregated into the four census regions (and nine sub-regions) a substantial dispersion persists. The first panel of table 2 presents population-weighted estimates of regional personal income per capita.[11] Income per capita in the West was 90 percent above the national average in 1880, followed by the Northeast at 44 percent above. The Midwest was slightly below the U.S. average (by 3 percent) with the South lagging substantially at 46 percent below.

---

[7] The six states with the highest income in 1880 are Nevada, Montana, Arizona, California, Colorado, and Wyoming.

[8] The adjusted R-squared for each of these convergence regressions is 0.92 for 1880-1980 and 0.95 for the subperiod 1940-1980. The coefficient on log intial income per capita for both regressions is still negative in sign and highly significant.

[9] Without the Western states included in the sample, the adjusted R-squared for the subperiod 1880-1940 is only 0.23, and the coefficient on log initial income per capita is -0.0049 with a standard error of 0.0015. Convergence regressions excluding the West from 1880-1940 thus explain less than a quarter of the total variation in growth rates across states and less than half of what was explained when the West was included for this subperiod.

[10] State-level statistical data are presented in Appendix A.

[11] Easterlin's original regional estimates for 1880 to 1920 were not population weighted.

The extreme disparity in per capita incomes across states and regions in 1880 has received less notice than their subsequent convergence, and no attempts have been made formally to account for it. This is surprising as the two are intimately related. The convergence since 1880 is impressive only because it occurred relative to the initial marked dispersion. It is possible, of course, that the circumstances accounting for the 1880 dispersion had no bearing on the subsequent convergence process. More plausibly, history matters, and any account of the century-long reduction in regional income dispersion in the United States will be strengthened by identifying the reasons for the considerable inequality in income levels in 1880. For example, it is possible that convergence was largely driven by the waning of the same forces which accounted for the initial large dispersion, and to this degree two sides of the same coin are being examined. Convergence may then be viewed as a drawn-out process of regional re-equilibration following the combined effects of two massive and regionally-concentrated shocks to the national economy before 1870. The acquisition of the West was a favorable shock in that much of the newly acquired territory was resource rich and incomes were high from an early stage of its development. In contrast, the defeat of the South in the Civil War was a negative shock, the effected region taking many decades to recover fully. A study of regional convergence adopting 1880 as a starting date should thus avoid overlooking prior events crucial to the explanation of what happened thereafter.

### *C. Assessment of the Personal Income Estimates*

Before turning to the main tasks of this paper, some brief remarks are warranted regarding the nature of the income estimates we have been discussing. The only proxy measure of state income or product available prior to 1963 is that for personal income for which estimates are available from the Department of Commerce annually since 1929, and prior to that from Easterlin (1957) for 1880, 1900 and 1920.[12] Though a pioneering contribution, and widely used by economists and historians, Easterlin's estimates have not been revised, extended, or superceded in the 40 years since their publication. Yet personal income has conceptual limitations when pressed into use as a proxy for state income or product, its suitability depending on the purpose for which the

[12] Easterlin (1960b) also prepared estimates of personal income for 1840, but of course these cover only the states

estimates are employed. For example, income from capital is assigned to the state of residence of the owner rather than the state where it is located, and it excludes undistributed corporate earnings. More difficult is the appraisal of the reliability of the underlying estimates, though Easterlin set out in great detail the sources and methods he used.

His objective was to obtain state estimates of personal income consistent with those later produced by the Department of Commerce. The limited data available for the earlier years, and their frequently poorer quality, were Easterlin's principal challenges. One important estimation procedure employed was the use of 'interstate differentials' in income per worker available for several sectors, together with laborforce estimates by state and sector, as a basis for computing what he calls service income. With regard to estimating income from property, national totals were distributed by state on the basis of such evidence as the state shares in the national totals of various types of wealth recorded in the censuses. Critical to the estimation procedures was the assumption that the 'interstate differentials' observed in manufacturing could be applied elsewhere. Another important assumption was that the rate of return on agricultural property is the same among all states, and likewise for the rate of return on non-agricultural property. This latter assumption does allow for differences among states in the rate of return on total property due to differences in the composition of property held between agricultural and non-agricultural forms in each state. A further concern is that the coverage of the income estimates most likely varied across states. Examples include variation in the levels of on-farm consumption of own product between different agricultural regions and data limitations arising from the early stage of settlement and administration of some Western states in 1880.

It is difficult to assess how greatly the stories of regional income performance summarized in figure 1 and table 2 would be changed if improved estimates of state personal income were compiled. However an equally pressing need, and one that Easterlin recognized, is to determine the extent to which adjustment of his nominal income estimates for differences in price levels between states or regions would lead to a revision in our understanding of regional economic performance since 1880. It is the latter task to which we now turn.

---

and regions then comprising the U.S. In particular, what was to become the census region of the West was omitted.

## 2. *Relative Prices across States*

It is possible that both the initial dispersion and the subsequent convergence of nominal state incomes per capita are substantially due to the spatial and temporal variation of regional price levels. For example, to what extent did the convergence in 'nominal' incomes per capita occur via a convergence in prices, and to what extent does 'real' income convergence persist after allowance is made for regional price differences? Studies by Engel and Rogers (1996), Haines (1989), Deaton (1988) and Coelho and Shepherd (1974, 1979) have shown that there is substantial spatial variation in prices across countries, states, and regions. Easterlin (1961, pp.533-34) was aware of the possibility that the reduced dispersion in his nominal income data after 1880 might be a price phenomenon.

Citing a lack of reliable data on price levels by state, Barro and Sala-i-Martin (1991, 1992a) computed 'real' income by dividing state income per capita by the national values of the consumer price index. This may go some way toward eliminating any trend in prices across time that is common to all states and regions. It does not, however, correct for differences in regional price levels at a point in time or for changes in the relationship between the price levels of different regions over time. Because there is no consumer price index across states that is benchmarked to a single year, we construct the next best alternative.[13] We first gather price indexes for each of our six time periods. Then we construct a "relative" price index that measures, for a particular year, how the price level for any given state deviates from the U.S. average. We create state price relatives primarily using city-level data for twenty-year intervals from 1880 to 1980. Our data sources and procedures are described in Appendix B.

Two aspects of the resulting relative price estimates for the 48 states warrant emphasis. The first is that in 1880 there is a striking clustering of states by region when they are ranked on the basis

[13] The Bureau of Economic Analysis' project on gross state-product produces implicit price deflators for 1977-91; however, these are constructed using national price deflators from 61 industries and simply adjusting state data by its sectoral share of output. Because these deflators are produced from the estimates of national gross product originating, they cannot be used to determine relative differences in prices across states (See Beemiller and Dunbar, 1994).

of their price levels. The ten states with the highest price levels in 1880 relative to the U.S. average are all located in the West, and nine out of the ten states with the lowest price levels in 1880 are located either in the South or Midwest (appendix table A2).[14] As Haines suggests, the high prices in the Pacific and Mountain regions are the result of all components of the index being higher, but in particular, fuel and lighting were especially expensive in these regions. While the Northeast also had relatively high prices for fuel and lighting in 1880, the prices for manufactured goods, and most notably clothing and furniture, offset the higher energy prices (Haines, 1989, p.102). By 1920, however, no Western states were among the ten with the highest relative price levels, and three (Oregon, Washington, and Idaho) had among the lowest prices. A mixture of states in the Northeast, South and Midwest made up the ten with the highest prices in 1920, while the ten with the lowest relative prices were located in the Midwest, West and South. The regional concentration of states by their price levels has disappeared.

The second notable aspect of our estimates of state price levels is their dramatic convergence between 1880 and 1940, but not thereafter. The process of transforming markets from a local orientation to a regional or national one is a hallmark of economic development. Davis (1965) and Rosenbloom (1990, 1996), for example, have documented the late nineteenth and early twentieth century process of moving from regional factor markets to integrated national markets for capital and labor, respectively. Despite regional differences in tastes, one might also expect to observe convergence in prices over time as market integration occurs, transportation and communication links become more reliable, distribution costs decline, and informational asymmetries across regions fall. Our relative price indices support this hypothesis – at least during the six decades before 1940. Idaho and Montana recorded the highest relative prices in 1880, 40 percent above Kentucky, the state with the lowest prices. By 1920 the difference between the state with the highest and lowest relative prices had fallen to 20 percent, and by 1940 to 12 percent. The second row of table 1 shows the dispersion in prices across states from 1880 to 1980. Between 1880 and 1940 the standard deviation in the relative price index falls from 8.6

[14] We further considered whether these results were sensitive to the spatial search procedure described in Appendix B. The states for which we had to estimate data are not geographically concentrated in any one region: six are in the West, two are in the South, and one is in the Midwest. If we exclude these states from our sample, all the remaining states in the Pacific or Mountain subregions still have the highest relative prices and none of these Western states is in the bottom ten states in terms of prices.

to 2.7. Curiously, prices exhibit divergence thereafter, the standard deviation rising to 8.0 by 1980. This reversal may be due to the widening range of housing prices across regions during the postwar era.[15]

We may conclude that, by these measures of dispersion, there is convergence in prices across U.S. states between 1880 and 1940, and it is virtually complete by the latter date. Some of the observed convergence in nominal incomes per capita prior to 1940 is thus attributable to the reduced dispersion in price levels, while the continued income convergence after 1940 occurs despite the divergence in prices. Hence no reliable analysis of regional income convergence in the U.S. over the last century is possible without taking account of the significant changes which occurred in the dispersion of state price levels.

### 3. *Price-Adjusted Income per Capita*

It was anticipated that when the per capita nominal income data were adjusted for differences in relative prices the ranking of states would change, especially for the West, and most markedly in 1880. This prior was based on the observations that the greatest dispersion both in nominal incomes per capita and in relative prices occurred in 1880, and that states in the western region of the country in 1880 had both high nominal incomes and high price levels. Easterlin (1957, p.745) clearly expected such an outcome: "the available evidence suggests that the purchasing power of money is lower in the higher income states. This would imply that the present current dollar figures overstate the relative level of economic welfare in these states." Surprisingly, the differences between the price-adjusted and unadjusted incomes, by state or by region, (considering the rankings rather than absolute values) are not dramatic; nonetheless, the dispersion of price-adjusted income across states declines (table 1). When adjusted for differences in price levels, the income per person for the West as a whole falls from being 90 percent above the national average to being 66 percent higher in 1880 (bottom panel of table 2), remaining above the U.S. average over the entire century although the margin declines relative to the unadjusted data. The Northeast looks similar to the West in that it is above the U.S. average

[15] Much of the regional variation in prices since 1940 is driven by the housing component of the relative price

from 1880 to 1960. The Midwest's income per capita hovers around the U.S. average for our entire sample period, while that of the South is below the U.S. average for all periods, but converging on it, especially after 1940. [16]

Nevada still has the highest per capita income of any state in 1880, although its income now is only 8.5 times as large as North Carolina's (still the poorest state) versus 10 times as large with no price adjustment (appendix table A3). Six of the ten states with the highest price-adjusted per capita income in 1880 are in the West. Massachusetts, New York, and Rhode Island all remained among the top ten and were joined by another Northeastern state, Connecticut. At the other end of the distribution, eleven of the twelve states with price-adjusted per capita personal income of less than $100 in 1880 were located in the South, the exception being New Mexico. By 1940 a marked reduction in price-adjusted income dispersion has occurred relative to 1880, and each of the four census regions now has a state among the ten richest. Price adjustment in 1940 has little impact on the income gap between the richest and poorest states. By 1980 the poorest states are no longer located solely in the South, while the ten richest states continue to be drawn from all census regions. The gap between the richest and poorest states also continues to fall, with Wyoming having an income only 1.6 times that of Maine in 1980.

A more general assessment of the impact that these regional price adjustments on incomes per capita had across states and over time can be seen by examining the dispersion in the price data. As seen in the third row of table 1, with the U.S. average set at 100, the standard deviation of unadjusted state incomes in 1880 was 65, whereas the price-adjusted figure was 55. By 1900 the figures are 43 and 39 respectively. By 1920 the difference has been eliminated (both 29). Thus a significant part of the regional dispersion in incomes in the Easterlin data for 1880 and 1900 is due to the effect of differences in regional price-levels, but this effect is trivial by 1920.

---

indexes.

[16] It is interesting to note that this ranking is different from that established by Rosenbloom (1996) for real earnings in manufacturing in the late nineteenth century. Specifically, the Northeast and Midwest look comparable in his study, but our price-adjusted income per capita estimates indicate a substantial gap in favor of the Northeast. Reconciling this difference is difficult because average earnings and income per capita can diverge for many reasons, and the relative importance of manufacturing varies across states.

Thereafter there is little difference between the dispersion in the two income measures: both increase between 1920 and 1940, then decline (to 13 and 12 respectively in 1980).[17]

It is worth noting an implication of these price-adjusted estimates for the study of Southern economic history. Because the income gap between the richest and poorest states decreases over the course of the century, the Southern states in the lowest income group are catching-up to the rest of the U.S. This well-known feature of long-run growth in the U.S. persists in the price-adjusted data, though it occurs mainly since 1940. We can conclude that the catch-up of the South is not primarily a price phenomenon. Of course, the reasons for the persistence of the low ranking of some Southern states throughout the convergence process has been widely canvassed in the literature.[18]

*4. Interpretation*

Broader issues about regional economic performance inevitably arise in any effort to interpret these superior estimates of income. One is whether the explanation of regional convergence can proceed *as if* the standard case of convergence among national economies was under examination. The several meanings of convergence are an added complication. Easterlin applied the term to a reduction in dispersion of state and regional nominal incomes per capita, and in tables and figures expressed the underlying estimates relative to the average for the U.S. Of course, a reduction in dispersion is consistent with convergence to any reference case, from the highest to the lowest ranked state or region. Hence the use of the term catch-up in the growth literature, where the reference is to the leader region or country. Convergence then occurs if initially lower income regions grow at a faster rate than those that have higher incomes, thus catching up (from below).

In the empirical growth and convergence literature catch up is often explained as the result of the diffusion of technology (broadly defined) from the most advanced economy (which by definition

[17] Persson (1997) reports a similar exercise on county-level data for Sweden since 1911, in which incomes are adjusted for differences in the regional cost of living.
[18] For example, see Wright (1987).

has the highest productivity and hence income per capita) to the technologically less advanced economies. The latter are inside a production frontier defined by the state of knowledge available worldwide, and growth is easier when moving towards the frontier by borrowing, imitation, etc, than it is for the leader economy that can grow only by pushing out the frontier. A further assumption is that the technology of most relevance to catch up relates to manufacturing or knowledge industries. This characterization seems generally to accord with the role played by Britain in the nineteenth century and the U.S. in the twentieth in relation to other economies now members of a club of rich industrial countries.

The application of this perspective on convergence and catch up to the regional level implies a special role for the leader state or region. If the Northeast region, and states such as New York, had stood out as unrivalled leaders in terms of income per capita at the beginning of the period, with other regions and states converging from below, there would exist a close parallel with the history of convergence among the currently rich economies. Further consistency with the standard model would be observed if the rich Northeast was initially the most industrialized region, while the Midwest, South and West started out not only non-industrialized but also poorer. However in the case of U.S. regions the convergence story is more complicated. In terms of both nominal and price-adjusted per capita income, the West is richer than the Northeast at the beginning of the period; it is not industrialized, and while some states in the West lose their early positions near the top of the income per capita rankings, others (most importantly California) do not. In country studies, there have been some rich economies (Australia before 1890 or some oil-rich sheikdoms recently) with a per capita income above that of the leading industrial economy. The analogue here is the appropriate treatment of the leading Western states (such as Nevada or California) compared to the more "advanced" economies of the Northeastern states. For example, it may be more appropriate to regard the rest of the U.S. as converging on the West from below rather than thinking (as Easterlin's presentation of his estimates encourages) of the West converging from above on the U.S. "average."

In contrast to the South, where the reasons for the low level of income in 1880 are well known, and the reasons for the long-delayed catch-up have been much canvassed, the symmetric case of

the West has attracted far less attention from economists and historians. That the West was natural resource rich (in per capita terms) is surely part of the story, but so was the Midwest (with a lower income per capita). And for some Mountain states their resource booms did not bring lasting prosperity, in contrast to the experience of California.[19] The very diversity of the West cautions against hasty generalization and simple contrasts with the Northeast. What is it about California, Nevada, New York, and Massachusetts that has allowed them to sustain their (relatively) high levels of per capita income over such a long period? They had very different economies in the late nineteenth century, suggesting persistence was not simply associated with a particular population size, resource base, location, or economic structure. How have two of these states in particular (New York and California) been able to absorb large numbers of new citizens and experience extensive as well as intensive growth? California's experience is the most striking. The state's population grew from 865,000 in 1880 to 23.7 million in 1980. This is a population growth rate of 3.36 percent year, exceeding that of most low-income countries in the postwar era. Migration may play only a minor role in convergence, as Barro and Sala-i-Martin (1991) argue. Continuing high levels of migration did not quickly eliminate the (differential income or wage) incentive for further migration to California, for example, while in other initially high income Western states it did – their relative income levels fell and their populations stagnated.[20]

This discussion has implications for the wider literature on growth and convergence. First, the idea that catch up is driven by the diffusion of technology from advanced to less advanced economies is not supported by the history of U.S. regions. Allowance must be made for other bases for "leadership" in any model of growth and convergence. Second, the recent suggestion (Sachs and Warner 1995) that resource abundance impacts negatively on growth might have to be qualified in the case of U.S. regions. California was resource abundant during the early decades of its economic development, and in 1880 had a relatively high income per capita. Since 1880, it has experienced lower growth *rates* per capita than the U.S. average, as predicted by the convergence hypothesis. But its *level* of income per capita ranked at or near the top throughout,

[19] For a discussion of the reasons for sustained growth in the California economy during the decades following the gold rush see McLean (1993).

[20] In his study of income convergence across Swedish countries since 1911, Persson (1997, p.1,851) finds "no

despite a population increase of 30 million. The positive role of resource abundance in development is lost in a model that examines rates of growth without reference to levels and what determines them. Finally, this discussion of the growth experience of Western states and the possible role of resource abundance in accounting for high levels of income at the regional level is consistent with the suggestion by Wright (1990) that resource abundance played a larger role than hitherto thought in accounting for U.S. industrial leadership – at least until 1940.

### 5. *Labor Input by State*

The discussion so far has emphasized the improved historical understanding of regional economic performance that would flow from the estimation of income per capita adjusted for regional differences in prices. This adjustment represents a significant advance on the work of Easterlin and of Barro and Sala-i-Martin. However, with the price-adjusted income estimates we have constructed, other important lines of inquiry are possible. One which we do not pursue would be to examine the relationship between the price-adjusted income per capita and the industrial structure of each state and region.[21] A second possible line of inquiry, and that taken up in the rest of this paper, is to utilize available demographic and labor force data at the state level to obtain some insight into the proximate causes of regional variation in the income-based measures already compiled. For instance, any effort to account for regional income dispersion should include an assessment of the possible contribution of demographic and labor market differences. To illustrate, a state whose population has a higher (lower) than average masculinity, or workforce participation rate, or proportion of its population of working age, will, *ceteris paribus*, have a higher (lower) income when measured in per capita terms. How much of the regional dispersion in per capita income in the U.S., and changes in it over time, is due to these characteristics?

A further reason for examining demographic and labor force data at the state and regional level is that an additional indicator of economic performance can be constructed. Some measure of real output *per worker* is the variable typically used in testing the empirical implications of growth

---

empirical evidence that migration has contributed to the observed convergence in any major way."

models in the tradition of Solow (1956) and subsequent theorists. It is thus desirable to obtain a measure of labor productivity at the regional level in order to determine the contribution of regional productivity differences to the regional dispersion of income per capita. Hence in this section we first estimate labor input per capita, which in turn permits the derivation of a proxy measure of labor productivity by state. We then show the extent to which the interstate variation in price-adjusted income reported in section 3 was due to interstate variation in labor input.

### *A. Labor Input Estimation*

To create a time series that resembles labor productivity, we convert our price-adjusted income *per capita* data into a price-adjusted income *per worker* series by allowing for variation in demographic characteristics and participation rates across states. We make this adjustment by calculating a measure of labor input per capita (also referred to as the employment to population ratio). We define labor input per capita, $l$, for each state as

$$(1) \qquad l = g[a_m * w_m] + (1-g)[a_f * w_f]$$

where $g$ is the proportion of males in the total population, $a_m$ is the fraction of the total male population that is of working age, and $a_f$ is the fraction of the total female population that is of working age – where working age is defined as ten years and older from 1880 to 1940 and 15 years and older for 1960 and 1980.[22] Labor force participation rates for males, $w_m$, and females, $w_f$, are the proportion of gainfully employed workers in the labor force, where labor force is

---

[21] Easterlin investigated this relationship using his nominal income estimates.

[22] The definition of working-age population reflects changing trends in school participation rates among younger children, a changing social climate represented by legislation such as the Child Labor Act (enacted in 1916 that outlawed employment of children in interstate commerce but was overturned by the Supreme Court in 1918 in *Hammer v Dagenhart*), early restrictions in the District of Columbia's on hiring children, and the Fair Labor Standards Act of 1938 which greatly reduced the number of children under age fifteen who were participating in the labor force in the latter half of the twentieth century. Labor force participation rates are defined analogously to account for these factors as well. Miller and Brainerd (1957, p.364) report that the percent of male workers ages 10-13 gainfully occupied falls from 2 percent in 1900 to 0.4 percent in 1930, and for females, it falls from 3.9 percent to 0.7 percent over the same interval. Our definition of 10 and over for the period prior to 1940 and 15 and over thereafter coincides with the U.S. census' shift in its definition of the labor force (Miller and Brainerd, 1957, p.364).

defined for individuals 10 years and older from 1880 to 1940 and 15 years and older for 1960 and 1980.[23]

The relation between income per capita ($y$) and income (output) per worker ($q$) can be expressed as

$$(2) \qquad q = (y/l).$$

To illustrate, if there are two states both with $y$ = \$100, but $l$ = 0.4 in the first and 0.5 in the second, then their labor productivity levels are \$250 and \$200, respectively. Higher productivity per worker in the former offsets its less favorable employment to population ratio. Alternatively, one state may have a higher income per capita than another solely because it has a higher labor input per capita - indeed, workers in the former may be *less* productive. Only where labor input per capita is equal across states and time will the analysis of income serve as an acceptable proxy for that of labor productivity.

As shown in the fourth row of table 1, there is considerable initial dispersion in labor input per capita, but the dispersion declines until 1940 after which there is little change. Remarkably, eight of the ten states that have the highest labor input per capita in 1880 are located in the West; Montana leads at 64 percent above the U.S. average (appendix table A4).[24] By 1980, the ten states with the highest labor input per capita come from all four major census regions. At the other end of the distribution there is a clearer geographical concentration. Six of the 10 states with the lowest labor input per capita are located in the Midwest region in 1880, but as the twentieth century proceeds, Southern states increasingly make up the majority of those with the lowest labor input per capita. This evidence suggests that the (relatively) low labor input in the South may partly account for the lower regional incomes there, just as the initially high incomes

[23] Data on total population, male and female population, and working-age population are from the U.S. Department of Commerce, Bureau of Census (1880, 1902, 1920, 1940, 1960, 1980). Estimates for participation rates are obtained from Miller and Brainerd (1957) for 1880 to 1940, from the U.S. Department of Commerce, Bureau of the Census (1960) for 1960, and from U.S. Department of Commerce, *Statistical Abstract of the United States* (1981) for 1980.

[24] The outlier among western states is Utah which has the lowest labor input per capita of any state in 1880, some 20 per cent below the U.S. average.

in the West may be due in part to that region's initially high labor input. We provide a more complete accounting of the regional and temporal variation in labor input per capita in Appendix C, where we examine its three components in some detail.

Using the census aggregated subregions, figure 4 shows the initial dispersion in labor input per capita and the convergence that occurs up to 1940. As with income per capita, the Pacific converges on the U.S. average from above. The Mountain subregion has the highest labor input per capita relative to the U.S. average in 1880. New England assumes the top spot by 1920 and holds it thereafter, less a result of a relative increase in its own labor input per capita, and more a result of the large declines in the Pacific and Mountain states. In fact, by 1920, the Mountain states have fallen from being 30 percent above to 4 percent below the U.S. average.

### *B. Labor Productivity among States*

One region may have a higher real income per capita than another region either because its workers are more productive or because the proportion of the population working is higher. In the former case, the explanation must be sought among possible sources of the greater efficiency, such as more capital per worker, a higher proportion of the workforce in high productivity sectors, or a more favorable institutional environment. In the latter case, the proximate explanation lies among the demographic and related factors producing the higher employment-population ratio. We can extend our analysis to permit the identification of the relative importance of these sources of U.S. regional growth. The first step is to estimate labor productivity by state. Following equation 2, we divide each state's price-adjusted personal income by its labor input per capita to calculate, residually, a proxy measure of labor productivity, or more precisely, price-adjusted personal income per worker.

As with nominal income per capita, the Western states are prominent among those with the highest labor productivity in 1880: five of the top ten are located in the West (four more are located in the Northeast).[25] Nevada still holds the top spot followed by California. And as was the

[25] Appendix table 5 shows productivity values from 1880 to 1980 for each state.

case also with income per capita, the South has nine of the ten states with the lowest productivity levels in 1880. Nevada is now only 5.7 times more productive than North Carolina (the least productive) compared with the nearly tenfold difference in nominal income per capita and the gap of 8.5 with the price-adjusted income per capita series between the highest and lowest ranked states. Thus the dispersion in the 1880 income-based measures has been reduced significantly (40 percent) by moving to a measure of labor productivity. But the disparity remains substantial, requires explanation, and constitutes the initial conditions for the subsequent process of *productivity* convergence. By 1980 the ten states with the lowest labor productivity are no longer concentrated in the South, while the ten highest productivity states are from all census regions, with Florida and California holding the top two spots. The gap between the most and least productive states has fallen markedly over the century with Florida only 1.7 times more productive than Vermont (the lowest ranked).

At the regional level, the West, which started out 90 percent above the national average in nominal income per capita data in 1880, or 66 per cent above in price-adjusted terms, falls further (after labor input per capita is taken into account) to only being 31 percent above the national average in terms of productivity. In fact, as table 3 shows, the income per capita advantage the West enjoyed over the Northeast completely evaporates when we move to a measure of productivity. If we still observe convergence in the productivity series over time, then the adjustments we have made to the data suggest that convergence is not occurring for identical reasons across regions. While the average productivity level for Western states remains above the national average from 1880 to 1980, the West lies below the Northeast until 1960. This indicates that higher productivity was not the reason for the West having a higher income per capita (nominal or price-adjusted) than the Northeast in the late nineteenth century. In contrast to the case of the West, moving to a measure of productivity results in the South closing very little of the gap vis-a-vis the U.S. average until the postwar period. That is, Southern productivity until 1960 was only one to four percentage points closer to the U.S. average than was Southern price-adjusted income per capita. And the South remains below the national average level of labor productivity for the entire sample period. Taken together, this suggests the slow catch-up of the

South in income terms is primarily due to changes in productivity (relative to the national average) rather than to price or labor input effects.

As the last row of table 1 shows, the dispersion in the labor productivity (price-adjusted income per worker) data as measured by the standard deviation of the productivity values relative to the U.S. average declines from 1880 to 1920. The variation in productivity levels across states increases slightly in 1940 before continuing its narrowing. From 1880 to 1980, the standard deviation falls from 37 points to 11 points relative to the U.S. average. The regional data also show a general trend in declining dispersion. From 1940 onward, the West is again dragged down by the Mountain states which exhibit the "overshooting" phenomenon (relative to the U.S. average) they displayed in the price-adjusted income per capita series. Moving to a measure of labor productivity does not seem to affect the subregional trends we observed in the Midwest and Northeast for both the nominal and price-adjusted income per capita.

Having examined nominal state personal income, the price-adjusted series, and the proxy labor productivity series, we can now summarize how each of these transformations affected the dispersion in the data. Table 1 shows standard deviations for each of the above series, as well as for prices and labor input per capita, calculated relative to the U.S. average. The dispersion in 1880 income per capita across states is reduced by 16 percent when we adjust the series for differences in prices across states, and declines by nearly 44 percent when we adjust the series for both demographic factors and prices. Prices slightly decrease the dispersion of the income per capita data in 1940, but the productivity effect continues to reduce the variance across states. By 1980 prices only reduce the dispersion by 7 percent, but demographic factors combined with prices reduce the standard deviation by 16 percent.

We can reassess the evidence on convergence by employing the nominal state income per worker series. Figure 5a shows that a clear negative relationship between initial income per worker and the growth rate in income per worker still exists from 1880 to 1980, suggesting that states with low levels in 1880 have grown faster from 1880 to 1980 than those with high initial income per worker. Using these data, the subperiod from 1880-1940 again shows less of a tendency toward

convergence (figure 5b). Furthermore, while five of the ten states with the highest initial income per worker are from the West, the region is not nearly as dominant as it was when we examined state nominal income per capita. An important part of the convergence story has thus been explained by moving to a series that adjusts for the variation across states in prices and in labor input per capita.

When we examine the period from 1940 to 1980, we again observe convergence across states. Figure 5c shows that initially low income per worker levels led to higher growth rates over this sub-period. The two states that lie outside the main clump of data are Mississippi which had the lowest initial level in 1940 and the highest growth rate from 1940 to 1980 and Delaware which had the highest initial level in 1940 and the lowest subsequent growth rate in income per worker.

*C. Counterfactual Labor Input*

An alternative means exists by which we may illustrate the importance of the variation we have observed in labor input per capita across states and regions. We do this by somewhat reversing the procedures followed above. First, we take as given the levels of labor productivity previously estimated. Next, by rewriting equation 2, we note that price-adjusted income per capita ( $y$ ) is equal to the product of labor productivity ( $q$ ) and labor input per capita ( $l$ ). We can then show how important the variations (around the U.S. average) in labor input per capita were in accounting for the levels of price-adjusted income per capita by substituting U.S. average labor input per capita ( $l^{us}$ ) for the actual state or regional labor input per capita ( $l$ ). This produces a "counterfactual" value of $y$, denoted $y'$, which is the product of each state's (or region's) actual productivity and the average U.S. labor input per capita: $y' = q * (l^{us})$. By comparing $y$ and $y'$ for each state and region, we can see how much higher (lower) a state's actual price-adjusted income was as a consequence of its labor input per capita being above (below) the average for the U.S. Table 4 reports for the four census regions the percentage change in price-adjusted income per capita resulting from the deviation in labor input per capita from the U.S. average. We previously described some of the main features of the variation in labor input per capita, but

this counterfactual exercise underscores the importance that variation in demographic and labor force characteristics has on the distribution of incomes at the regional level.

The impact of the variation in labor input per capita across regions is striking (table 4). For the West, incomes in 1880 are 26 percent higher than they would have been in the absence of the region's higher (than national average) level of labor input per capita. This premium fades to around ten percent in 1900 and six percent in 1920 as the West's labor input per capita declines relative to the U.S. as a whole. Incomes in the Northeast also get a boost (until 1980) from a more favorable labor input per capita there, though it is less dramatic in 1880 than what is observed in the West. By contrast the Midwest in 1880 has an income seven percent below what it would have had with U.S. average labor input per capita, but this drag on incomes has disappeared by 1940. Finally, in the South, the lower than average labor input per capita has a consistently negative effect on incomes. In each of 1920, 1940 and 1960 incomes were about six percent lower than they would have been with U.S.-average labor input per capita.

### *6. Decomposition of Interstate Variation in Nominal Income Per Capita*

A significant contribution of this paper is to provide a framework within which it is possible to assign interstate differences in nominal personal income to each of the three sources we have discussed thus far: price differences, differences in labor input per capita, and (residually) differences in a proxy measure of labor productivity. As we have noted, Easterlin speculated about the possible influence of regional price differences, but did not make any allowance for them. He also devoted considerable attention to the discussion of regional differences in demographic characteristics and participation rates. Our contribution is to systematically decompose the interstate variations in nominal income into the three sources, and to do this comprehensively for each state and the six census years in the study. These are of course only proximate sources of income differences, behind which lie deeper causes whose identification is not attempted here. But the decomposition exercise is undertaken in a way that should provide a suitable starting point for the investigation of topics beyond those addressed in this paper.

For a given year, if the income per capita figure for any state at any census is expressed relative to the U.S. average, then the difference between the two can be decomposed into the portion arising from the state in question having: (1) a price level that is above or below the national average; (2) a labor input per capita that is higher or lower than the average; and (3) a level of productivity per worker that is greater than or less than that for the country as a whole. The relative contributions of each to the overall difference in income from the U.S. average serves as a convenient summary indicator of the proximate reasons why any state departs from 'average' income levels. More formally, let *NYC* = nominal personal income per capita, *PYC* = price-adjusted personal income per capita, and *PYW* = labor productivity (price-adjusted personal income per worker), for each state in a given year, where all values are expressed relative to the U.S. average (set = 100). Then the deviation from the U.S. average by any state's *NYC* can be decomposed into a price component (*pri*), a labor input component (*lab*) and a productivity component (*pdy*), where

(3) $pri = [(NYC - PYC)/(NYC - 100)]*100,$

(4) $lab = [PYC - PYW)/(NYC - 100)]*100,$

(5) $pdy = [(RYW - 100)/(NYC - 100)]*100,$ and

(6) $pri + lab + pdy = 1.$

There are two additional points that help to clarify the results from such a decomposition exercise. First, the decomposition reflects only the *relative* contributions of the three defined sources that account for a particular state having a level of income different from the national average. Second, a state's actual income per capita may deviate from the U.S. average by a large or small (positive or negative) amount. These two pieces of information need to be considered together: how big is the deviation to be decomposed and what are the relative contributions of the three sources to that deviation? Many states have income levels quite similar to that of the U.S. as a whole, and the decomposition exercise in their case usually yields little information (though sometimes there can be substantial but off-setting influences on a state's relative income, and here the decomposition exercise is particularly revealing). The outlier states – those with income levels far above or below the national average – are of course the states one is most interested in, and in determining the reason for their relatively good or poor performance.

For each of the four main regions and the nine subregions, table 5 reports the percentage deviation from the U.S. average nominal income per capita due to the three effects described above, and shown in equations 3-5. The large numbers for the Midwest (North Central) region and subregions at several censuses, and the Mountain subregion in 1920, are due to the relatively small differences between U.S. average and regional incomes that are to be explained, and hence the variations in the components are relatively large. In these, as in all the cases, interest lies in the sign as well as with the magnitudes of the deviations reported.

Of perhaps more interest is why the Western states are so far above the U.S. average in the early part of the period, and why the Southern states are so far below. Our decomposition reveals that the West had a relatively high income in 1880 in about equal measure because of its relatively high level of productivity, a relatively favorable labor input per capita, and a relatively high price level. Over time, and as Western incomes converged on the U.S. average from above, productivity differences come to account for more of the (continuing) higher Western incomes, with the favorable labor input per capita in the region contributing much less (until 1980). By contrast, the relatively low Southern incomes are explained (in this framework) for most of the period almost entirely by the region's relatively low productivity. Neither prices nor labor input per capita in the South were very different from the U.S. averages until after 1940.

## *7. Conclusion*

In this paper we have extended Easterlin's historical analysis of nominal income in U.S. states and regions, brought the coverage up to 1980, and provided regional standard of living estimates that take account of interstate variation in prices. We have also derived a proxy measure of labor productivity by state, and shown how comparative regional performance across the last century is sensitive to the choice of indicator – nominal income per capita, price-adjusted income per capita, or labor productivity. And we have demonstrated how the variation across states and regions in the widely-cited nominal income figures may be decomposed into price, labor input

and residual productivity effects, offering a framework for identifying the deeper determinants of regional economic performance (Mitchener and McLean, 1998).

We find that, compared to Easterlin's nominal estimates, correcting for regional price differences has little impact of the relative performance of the South, but somewhat reduces the above-average level of income in the West at the beginning of the period. The favorable performance of the West in price-adjusted income per capita is due in about equal measure to its higher than average levels of both labor input and productivity, whereas the poor performance in the South seems due almost entirely to its low levels of productivity.

We also find that the evidence of convergence over the century to 1980 is sensitive to the choice of terminal dates, the inclusion of outlier states, and the selection made among alternative series. Much of the century-long convergence occurs only after 1940, with the South playing an important role. Prior to 1940, and especially if the West is excluded, or if price-adjusted income or productivity is the series selected, the evidence for convergence is much weaker.

**Table 1. A Look at Convergence Through Measures of Dispersion**
**(Standard Deviation, Relative to the U.S. Average)**

| Series | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 |
|---|---|---|---|---|---|---|
| Nominal State Per Capita Income | 64.8 | 43.2 | 28.8 | 32.3 | 18.0 | 13.1 |
| State Prices | 8.6 | 7.1 | 4.1 | 2.7 | 5.3 | 8.0 |
| Price-Adjusted State Per Capita Income | 54.7 | 38.8 | 29.1 | 31.4 | 15.5 | 12.2 |
| Labor Input per Capita | 19.2 | 10.2 | 9.2 | 7.7 | 6.7 | 6.2 |
| Nominal State Income per Worker | 41.7 | 35.4 | 23.2 | 26.7 | 13.5 | 10.4 |
| Price-Adjusted State Income per Worker | 36.6 | 32.8 | 23.7 | 25.8 | 11.7 | 11.0 |

**Sources and Notes:**

Authors' calculations as described in the text. This table summarizes data on prices and income across states. Each of the series above is calculated relative to the U.S. average. The standard deviation is then measured for each series and displayed in summary form above.

**Table 2. Nominal Regional Personal Income per Capita Relative to the U.S. (Population-Weighted, U.S. = 100)**

| Region | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 |
|---|---|---|---|---|---|---|
| Pacific | 204 | 163 | 138 | 131 | 119 | 115 |
| Mountain | 167 | 139 | 100 | 87 | 94 | 95 |
| West North Central | 83 | 96 | 86 | 81 | 94 | 96 |
| East North Central | 102 | 106 | 109 | 112 | 107 | 102 |
| West South Central | 60 | 61 | 72 | 65 | 81 | 94 |
| East South Central | 51 | 49 | 52 | 49 | 68 | 78 |
| South Atlantic | 53 | 53 | 65 | 72 | 82 | 92 |
| Middle Atlantic | 145 | 142 | 135 | 132 | 115 | 108 |
| New England | 140 | 133 | 124 | 128 | 110 | 106 |
| | | | | | | |
| West | 190 | 153 | 124 | 118 | 113 | 109 |
| Midwest | 97 | 103 | 101 | 101 | 103 | 100 |
| South | 54 | 54 | 64 | 64 | 79 | 90 |
| Northeast | 144 | 139 | 132 | 131 | 114 | 107 |

**Price-Adjusted Personal Income per Capita Relative to U.S. (U.S. = 100)**

| Region | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 |
|---|---|---|---|---|---|---|
| Pacific | 177 | 147 | 139 | 127 | 114 | 112 |
| Mountain | 147 | 126 | 99 | 85 | 94 | 96 |
| West North Central | 89 | 103 | 87 | 81 | 94 | 97 |
| East North Central | 107 | 112 | 109 | 112 | 104 | 101 |
| West South Central | 59 | 59 | 71 | 65 | 89 | 103 |
| East South Central | 54 | 52 | 51 | 50 | 70 | 81 |
| South Atlantic | 54 | 52 | 64 | 71 | 84 | 92 |
| Middle Atlantic | 143 | 140 | 139 | 132 | 110 | 101 |
| New England | 134 | 128 | 118 | 125 | 102 | 91 |
| | | | | | | |
| West | 166 | 138 | 124 | 115 | 109 | 108 |
| Midwest | 103 | 109 | 101 | 101 | 101 | 99 |
| South | 55 | 54 | 63 | 64 | 82 | 93 |
| Northeast | 141 | 137 | 133 | 130 | 108 | 98 |

**Sources and Notes:**

Authors' calculations based on data from appendix tables A1 and A3. Population data are from U.S. Department of Commerce, Bureau of the Census (1975), Series A 195, pp.24-37 and Series A 7, pg. 8; and U.S. Department of Commerce, Bureau of the Census (1980), table 25, p.22. Population figures are for resident populations of states. Regions are defined according to census definitions where the West consists of the subregions Pacific and Mountain; the Midwest or North Central is made up of West North Central and East North Central; the South is composed of West South Central, East South Central, and the South Atlantic; and the Northeast is the Middle Atlantic and New England.

**Table 3. Price-Adjusted Income per Worker Relative to U.S. Average (U.S. = 100)**

| Region | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 |
|---|---|---|---|---|---|---|
| Pacific | 143 | 130 | 126 | 120 | 110 | 108 |
| Mountain | 110 | 119 | 103 | 92 | 98 | 95 |
| West North Central | 102 | 111 | 93 | 84 | 94 | 92 |
| East North Central | 115 | 116 | 108 | 110 | 104 | 100 |
| West South Central | 59 | 64 | 77 | 70 | 95 | 105 |
| East South Central | 57 | 53 | 55 | 55 | 78 | 87 |
| South Atlantic | 54 | 53 | 67 | 73 | 86 | 93 |
| Middle Atlantic | 139 | 133 | 131 | 124 | 105 | 104 |
| New England | 118 | 114 | 106 | 116 | 97 | 86 |
| | | | | | | |
| West | 131 | 126 | 117 | 112 | 107 | 105 |
| Midwest | 110 | 114 | 102 | 101 | 101 | 98 |
| South | 56 | 56 | 67 | 67 | 87 | 96 |
| Northeast | 133 | 128 | 125 | 122 | 103 | 99 |

**Sources and Notes:**

Authors' calculations based on data from appendix table A5 and population data described in table 2.

**Table 4. Effect of Labor Input per Capita on Regional Incomes (Percentage Deviation from Observed Income per Capita When U.S. Average Labor Input per Capita is substituted)**

| Region | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 |
|---|---|---|---|---|---|---|
| West | 26.4 | 9.8 | 5.7 | 2.3 | 2.1 | 3.1 |
| Midwest | -6.7 | -4.8 | -1.8 | 0.1 | -0.4 | 1.3 |
| South | -1.5 | -3.2 | -6.2 | -5.5 | -5.5 | -2.8 |
| Northeast | 5.7 | 6.7 | 7.1 | 7.1 | 5.0 | -1.0 |

**Sources and Notes:**

Authors' calculations as described in the text. This table shows the percentage change in price-adjusted income per capita resulting from the deviation in a region's labor input per capita from the U.S. average.

**Table 5. Explaining Deviations from the U.S. Average Income per Capita**
**(Percent Deviation from U.S. Average)**

| Region | 1880 Deviation from Average due to: Prices | Labor | Productivity | 1900 Deviation from Average due to: Prices | Labor | Productivity |
|---|---|---|---|---|---|---|
| Pacific | 26.1 | 32.2 | 41.7 | 25.3 | 26.3 | 48.4 |
| Mountain | 29.8 | 54.6 | 15.6 | 34.5 | 16.5 | 48.9 |
| West North Central | 34.4 | 77.7 | -12.0 | 174.6 | 222.3 | -296.9 |
| East North Central | -295.2 | -469.4 | 864.7 | -86.5 | -64.9 | 251.4 |
| West South Central | -1.5 | -0.3 | 101.8 | -4.5 | 12.7 | 91.8 |
| East South Central | 7.1 | 5.8 | 87.2 | 5.3 | 1.9 | 92.8 |
| South Atlantic | 1.6 | -0.5 | 98.8 | -1.3 | 1.3 | 100.0 |
| Middle Atlantic | 3.6 | 9.3 | 87.2 | 3.8 | 16.6 | 79.6 |
| New England | 14.9 | 40.6 | 44.5 | 17.4 | 39.2 | 43.4 |
| West | 27.1 | 38.4 | 34.5 | 28.1 | 23.3 | 48.6 |
| Midwest | 210.1 | 283.0 | -393.1 | -216.2 | -198.8 | 515.0 |
| South | 3.0 | 1.8 | 95.1 | 0.2 | 3.8 | 95.9 |
| Northeast | 6.5 | 17.3 | 76.2 | 8.9 | 21.7 | 71.4 |

| Region | 1920 Deviation from Average due to: Prices | Labor | Productivity | 1940 Deviation from Average due to: Prices | Labor | Productivity |
|---|---|---|---|---|---|---|
| Pacific | -2.2 | 34.3 | 67.9 | 13.7 | 21.3 | 65.0 |
| Mountain | -306.7 | 1676.7 | -1270.0 | -13.6 | 55.7 | 57.9 |
| West North Central | 2.9 | 47.2 | 49.9 | 0.3 | 16.3 | 83.4 |
| East North Central | 3.1 | 11.6 | 85.3 | -0.4 | 13.1 | 87.3 |
| West South Central | -6.1 | 22.8 | 83.3 | 0.5 | 14.2 | 85.3 |
| East South Central | -1.7 | 7.3 | 94.5 | 1.0 | 9.9 | 89.0 |
| South Atlantic | -2.8 | 8.3 | 94.5 | -2.7 | 7.0 | 95.7 |
| Middle Atlantic | -12.0 | 22.5 | 89.5 | -1.1 | 27.4 | 73.7 |
| New England | 27.6 | 49.2 | 23.2 | 11.1 | 30.1 | 58.8 |
| West | -1.1 | 28.1 | 72.9 | 19.6 | 13.9 | 66.5 |
| Midwest | 5.5 | -329.8 | 424.3 | -3.4 | 3.7 | 99.7 |
| South | -3.2 | 11.5 | 91.7 | -0.3 | 10.3 | 90.0 |
| Northeast | -4.5 | 27.6 | 76.9 | 1.4 | 28.0 | 70.6 |

| Region | 1960 Deviation from Average due to: Prices | Labor | Productivity | 1980 Deviation from Average due to: Prices | Labor | Productivity |
|---|---|---|---|---|---|---|
| Pacific | 26.3 | 22.9 | 50.8 | 14.5 | 27.2 | 58.3 |
| Mountain | 2.1 | 72.3 | 25.6 | 15.2 | -23.9 | 108.7 |
| West North Central | -4.9 | 7.5 | 97.4 | 23.4 | -98.0 | 174.6 |
| East North Central | 40.6 | -0.8 | 60.2 | 50.2 | 26.9 | 22.9 |
| West South Central | 39.8 | 33.4 | 26.8 | 143.1 | 40.4 | -83.5 |
| East South Central | 6.9 | 24.6 | 68.5 | 15.9 | 25.3 | 58.7 |
| South Atlantic | 9.9 | 12.6 | 77.5 | 0.0 | 19.7 | 80.3 |
| Middle Atlantic | 36.2 | 32.8 | 31.0 | 92.2 | -36.8 | 44.6 |
| New England | 74.8 | 58.6 | -33.3 | 244.9 | 77.4 | -222.3 |
| West | 29.2 | 17.1 | 53.7 | 14.3 | 34.7 | 50.9 |
| Midwest | 70.4 | -14.3 | 43.9 | -71.5 | -309.8 | 481.3 |
| South | 17.0 | 22.3 | 60.7 | 33.7 | 26.0 | 40.3 |
| Northeast | 42.7 | 37.1 | 20.2 | 124.4 | -12.7 | -11.7 |

**Sources and Notes:**

Authors' calculations as described in the text. This table shows the percentage deviation from the U.S. average nominal per capita income due to three effects: (1) a price level that is above or below the U.S. average; (2) a labor input per capita that is higher or lower than average; and (3) a level of productivity that is greater than or less than that for the country as a whole.

Figure 1. Per Capita Regional Personal Income Relative to U.S. Average

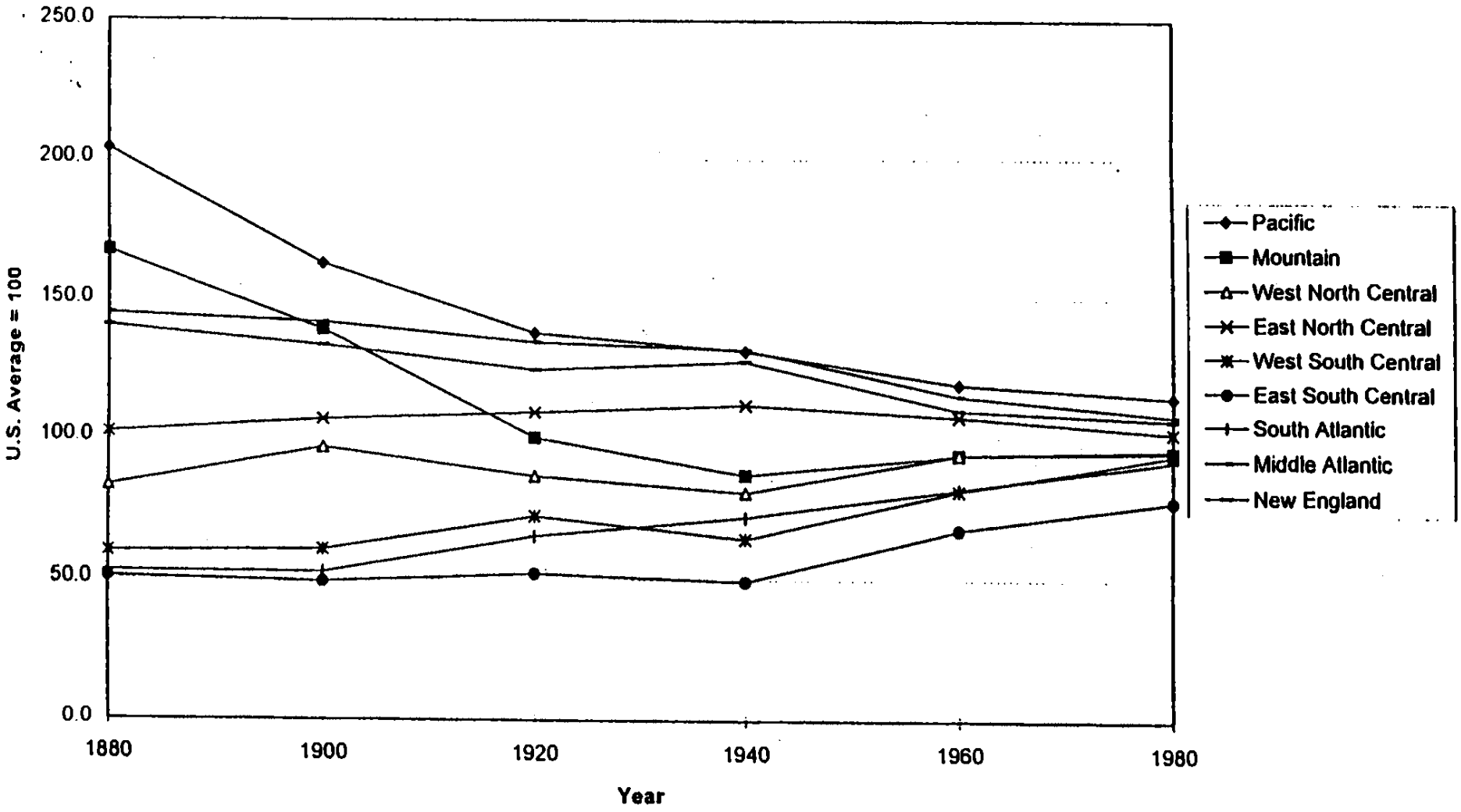


Figure 2a. Convergence in Income per Capita: 1880 - 1980

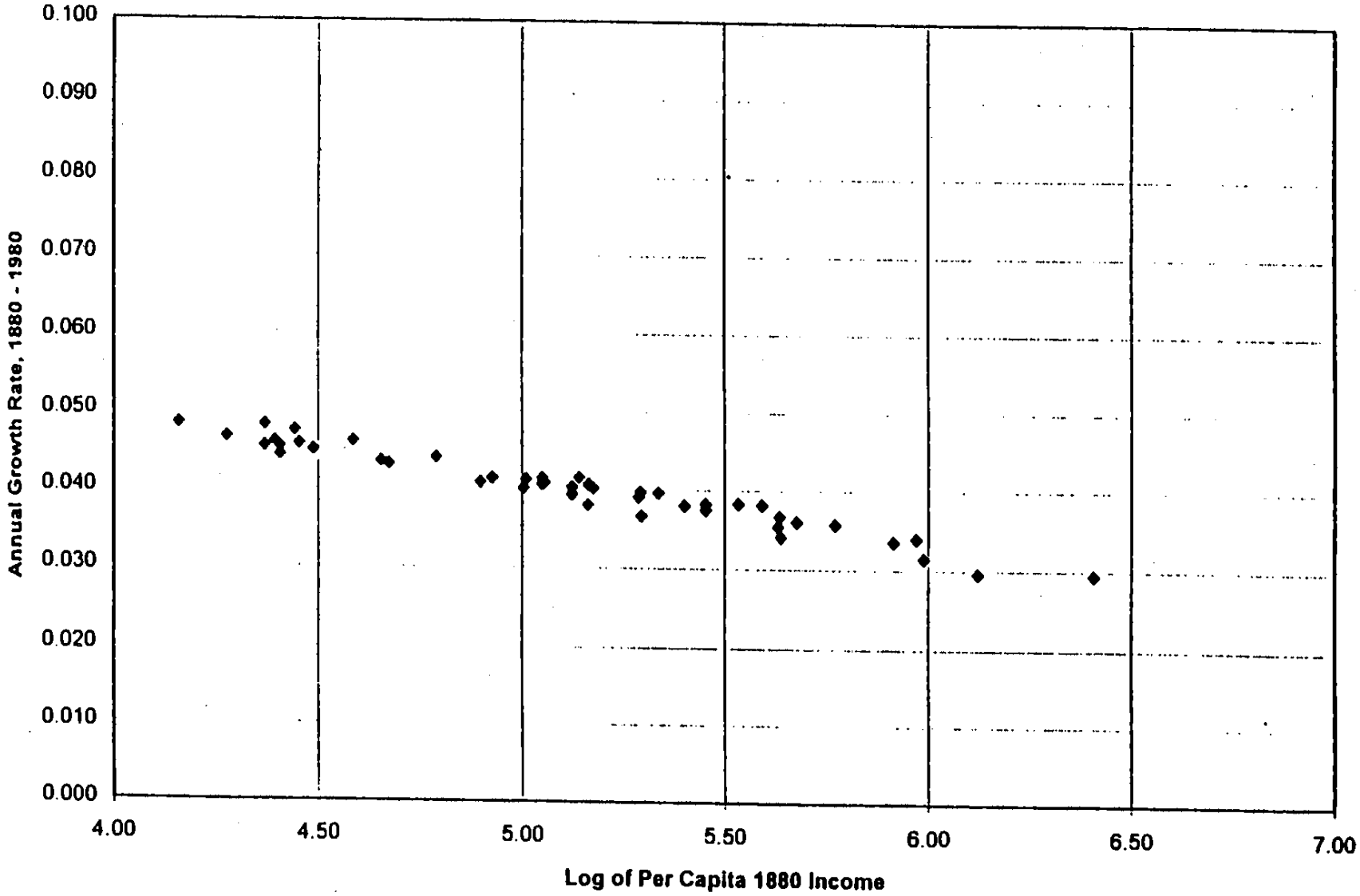


Figure 2b. Convergence in Income per Capita: 1880 - 1940

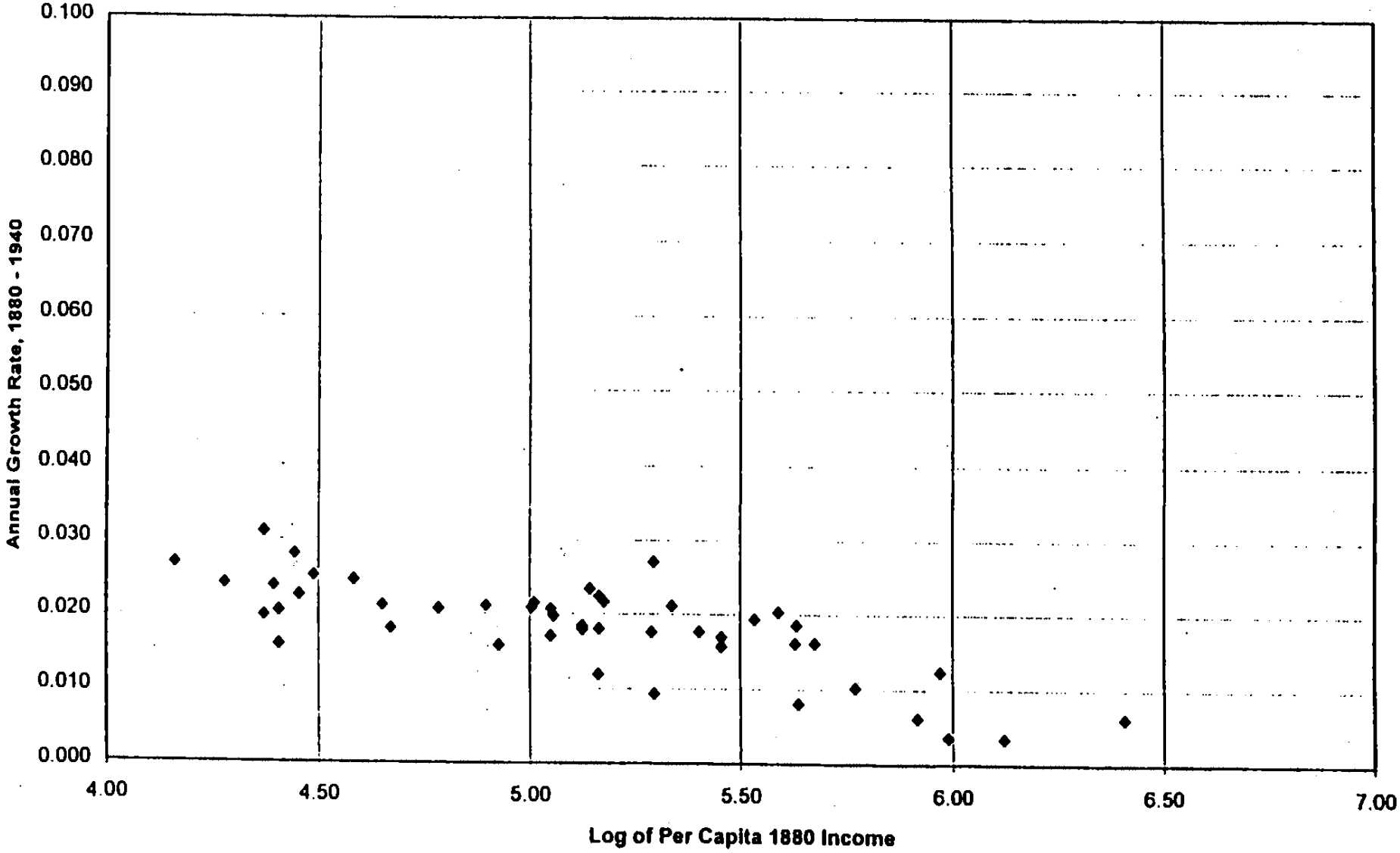


Figure 2c. Convergence in Income per Capita: 1940 - 1980

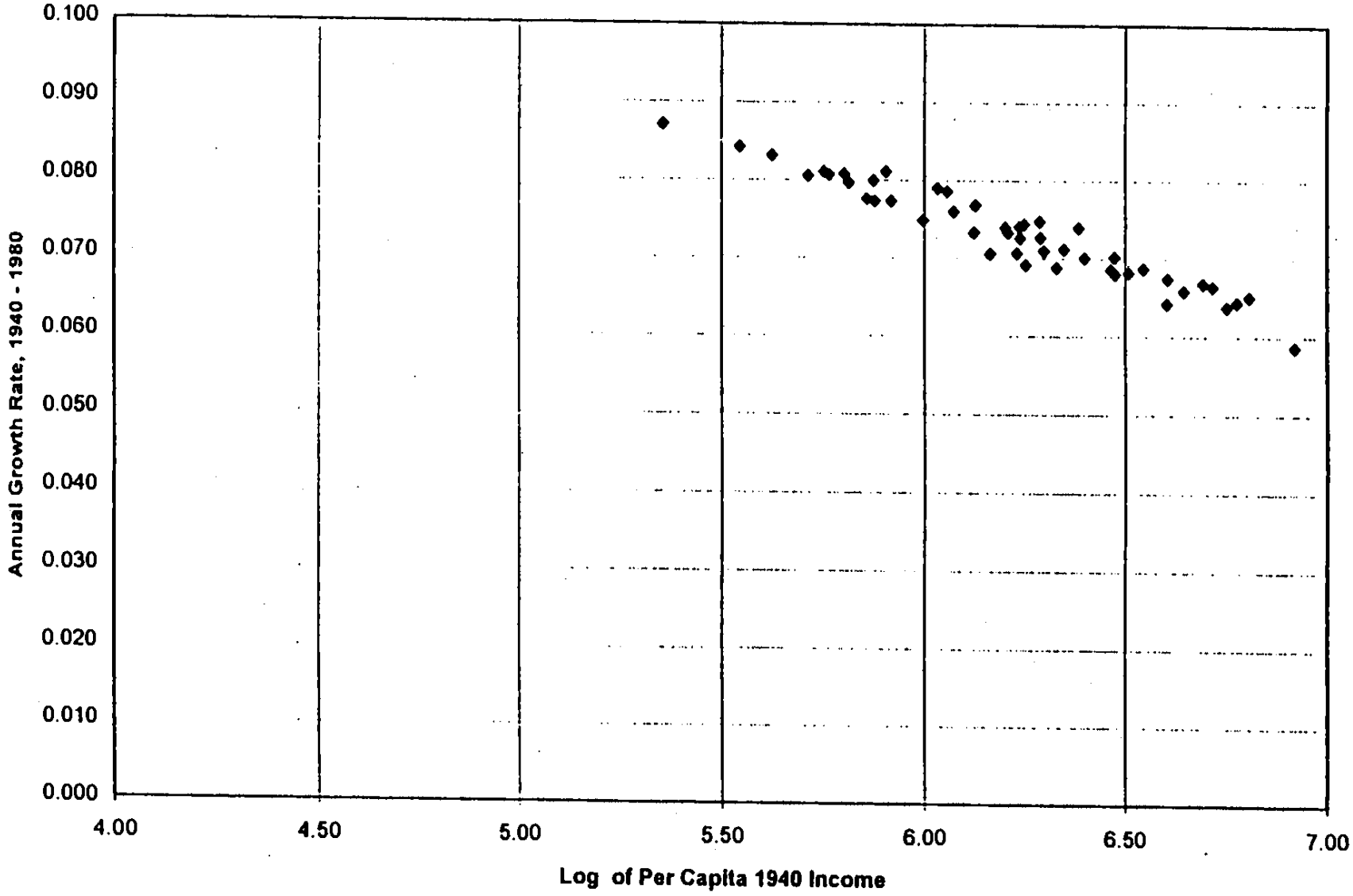
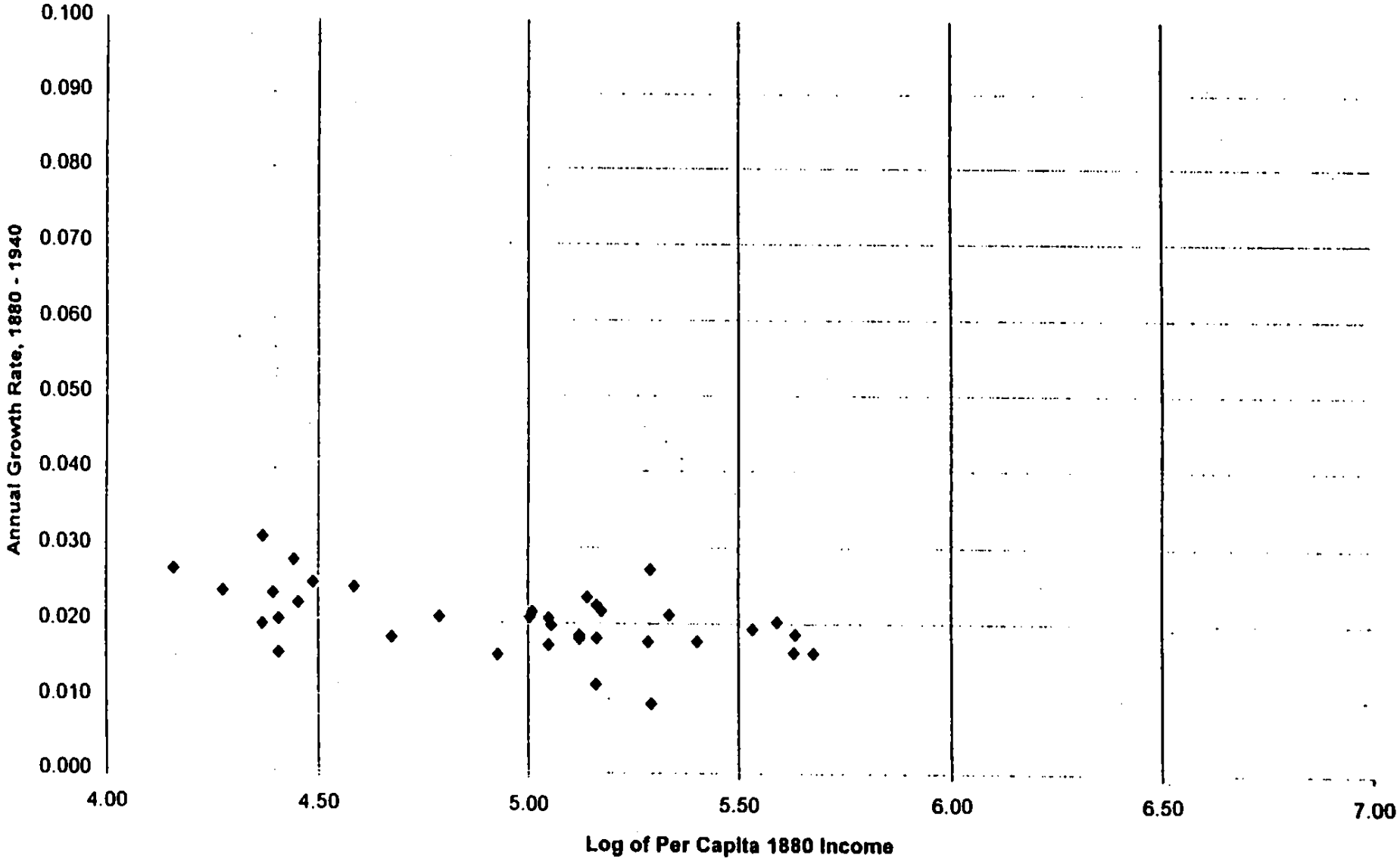
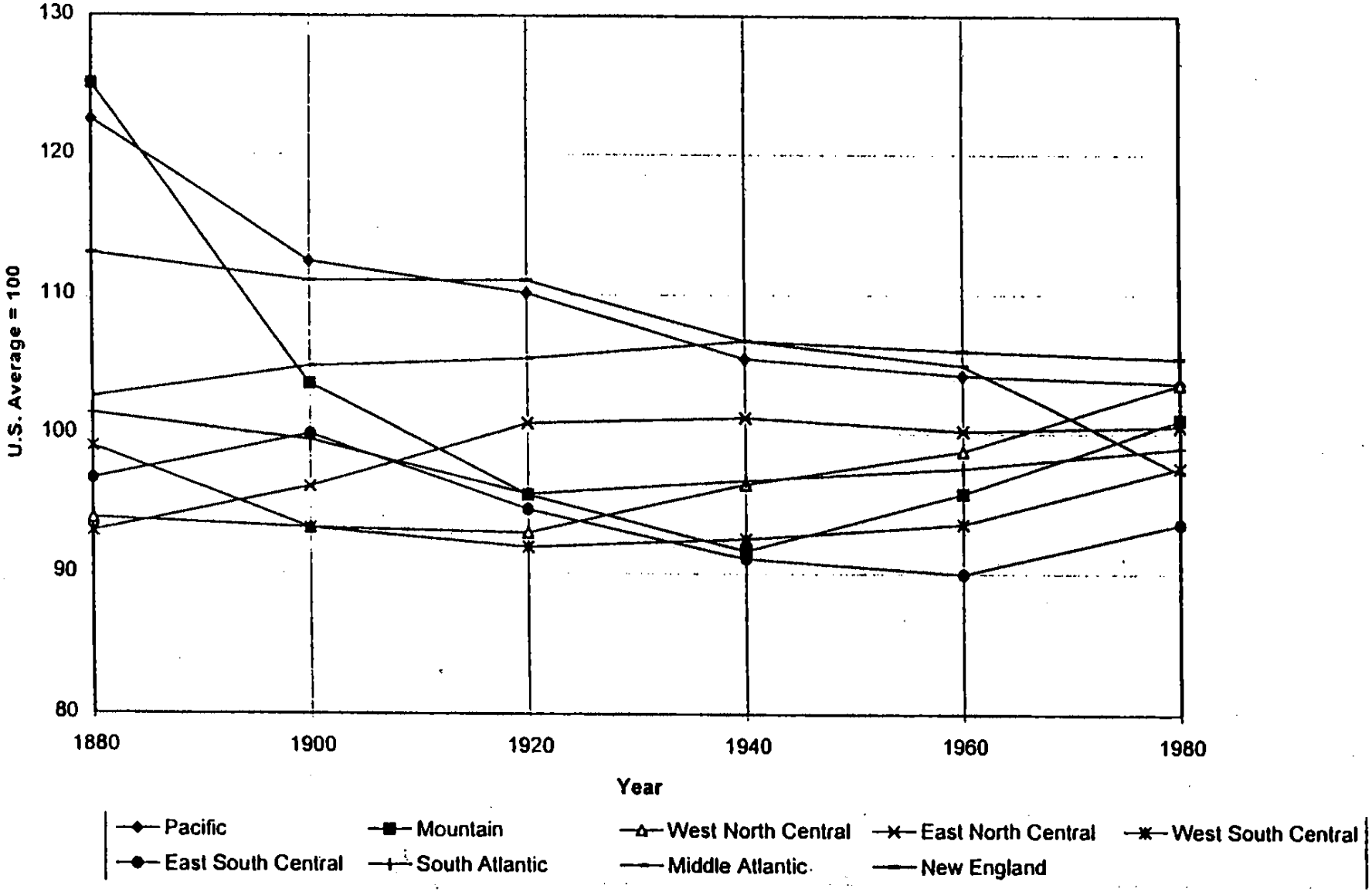


Figure 3. Convergence in Income per Capita Without the West: 1880 - 1940



## Figure 4. Labor Input per Capita Relative to U.S. Average




Notes: Data are population-weighted regional estimates of labor input per capita.

Figure 5a. Convergence in Income per Worker: 1880 - 1980

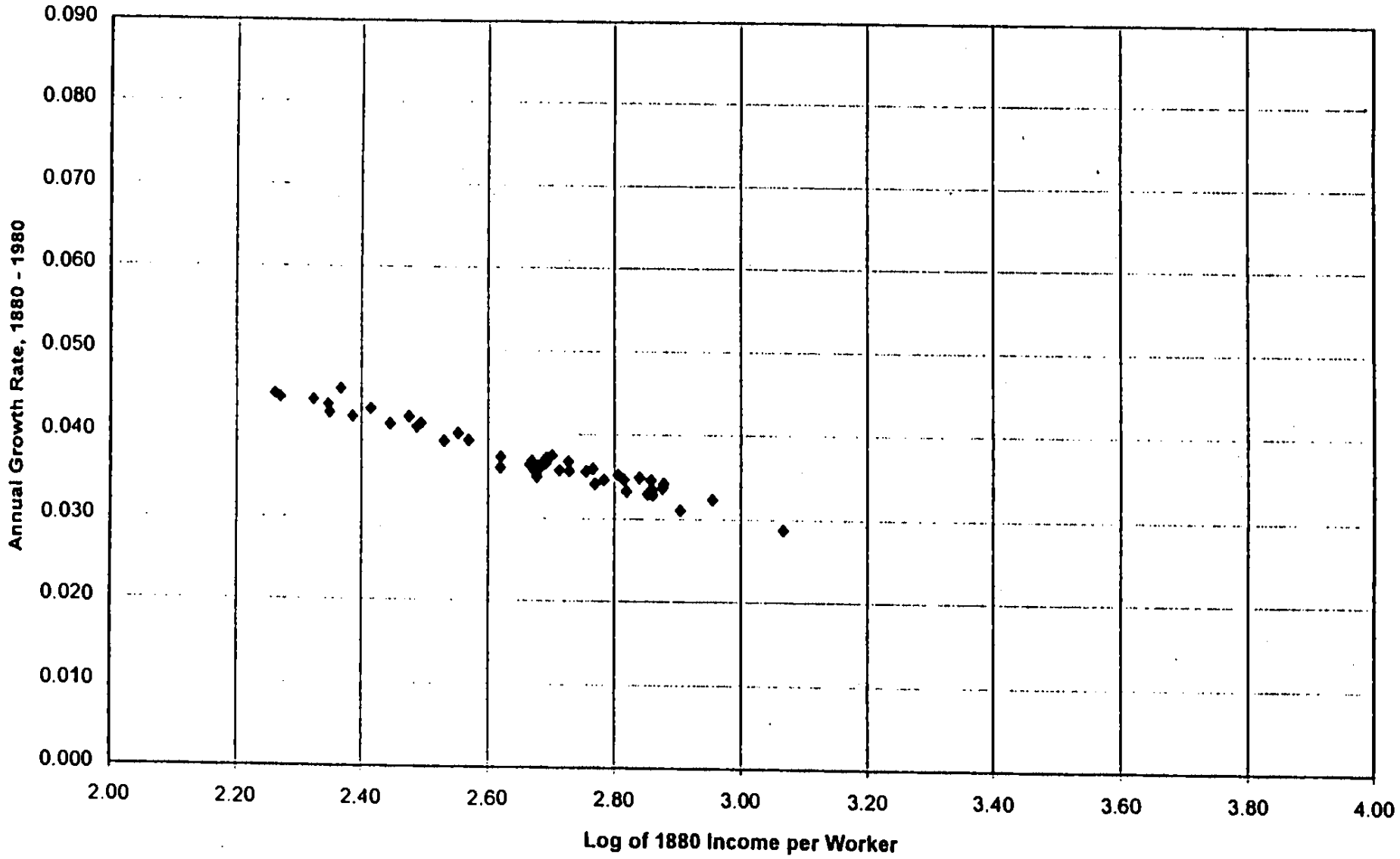


Figure 5b. Convergence in Income per Worker: 1880 - 1940

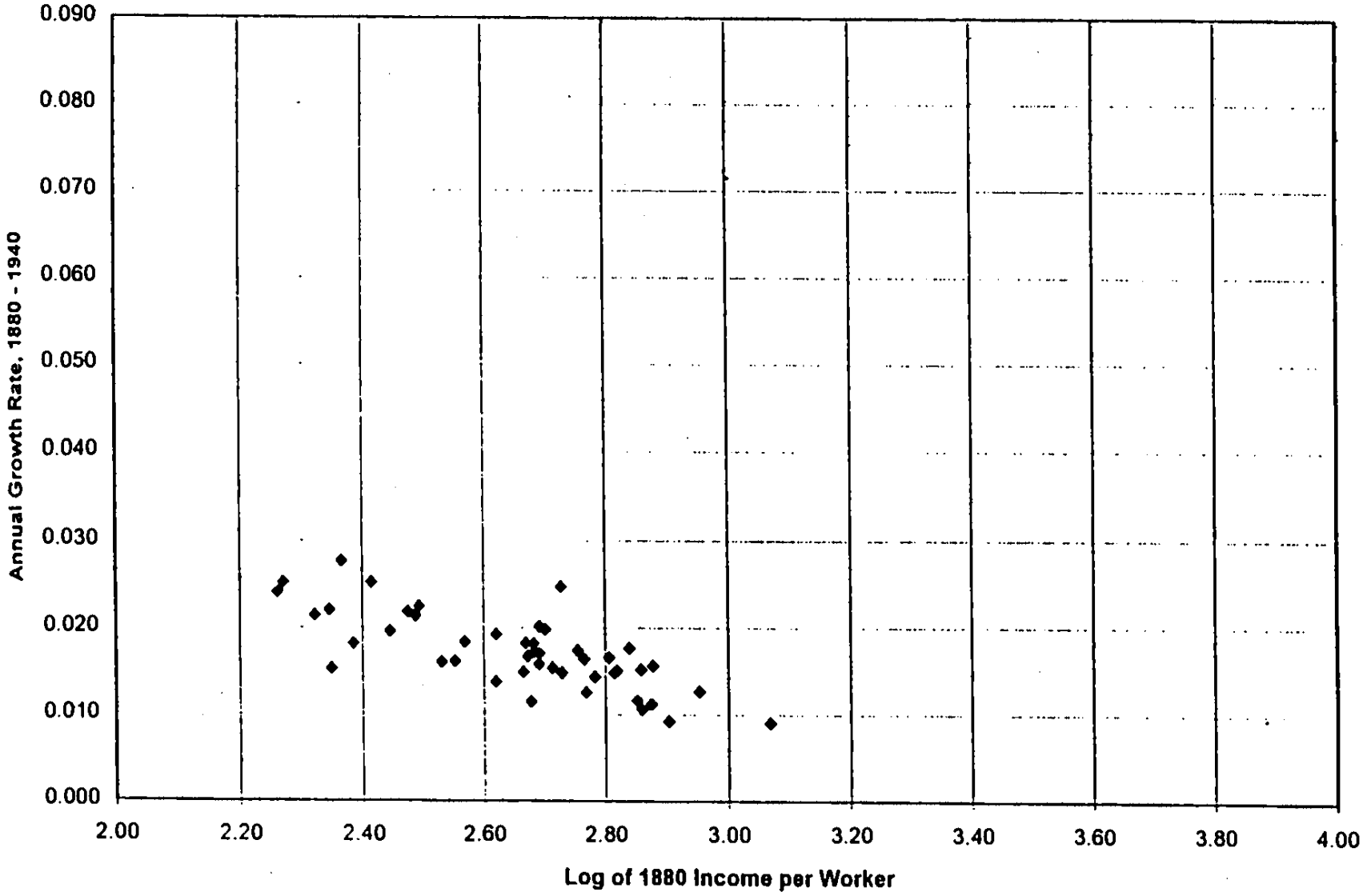
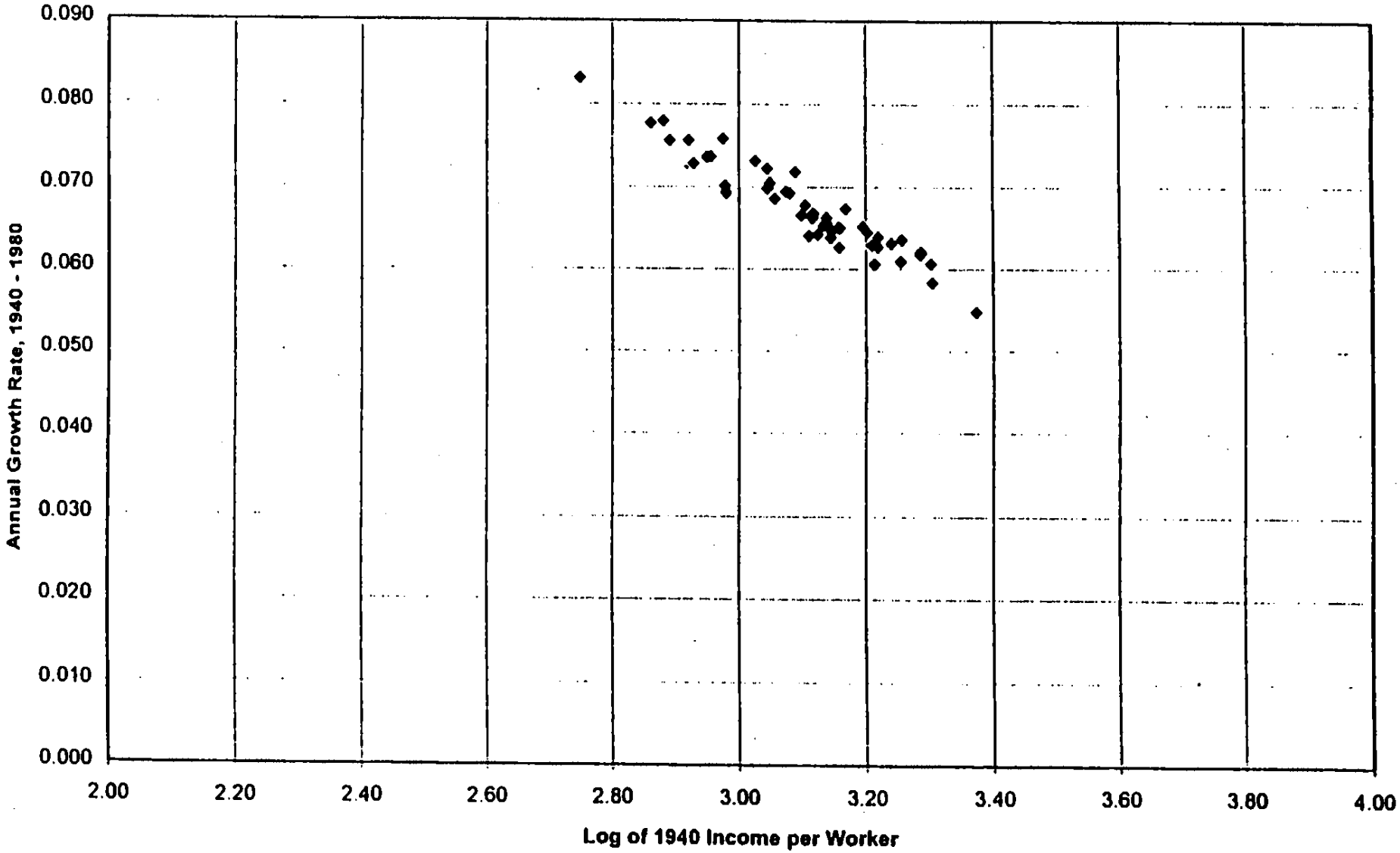


Figure 5c. Convergence in Income per Worker: 1940 - 1980



*Appendix A: State-Level Data*

**Table A1. State Personal Income Per Capita**
**(Current Dollars)**

| State | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 |
|---|---|---|---|---|---|---|
| Alabama | 82 | 88 | 313 | 277 | 1545 | 7720 |
| Arizona | 389 | 321 | 701 | 497 | 2048 | 9328 |
| Arkansas | 79 | 89 | 329 | 256 | 1407 | 7457 |
| California | 392 | 385 | 998 | 826 | 2788 | 11792 |
| Colorado | 371 | 318 | 726 | 538 | 2330 | 10710 |
| Connecticut | 268 | 278 | 789 | 905 | 2911 | 12246 |
| Delaware | 199 | 220 | 708 | 1013 | 2794 | 10614 |
| Florida | 79 | 112 | 437 | 511 | 2014 | 9894 |
| Georgia | 86 | 86 | 348 | 331 | 1691 | 8395 |
| Idaho | 281 | 221 | 597 | 457 | 1892 | 8569 |
| Illinois | 208 | 260 | 829 | 740 | 2686 | 10988 |
| Indiana | 150 | 182 | 582 | 544 | 2201 | 9307 |
| Iowa | 168 | 202 | 584 | 493 | 2056 | 9505 |
| Kansas | 120 | 187 | 588 | 417 | 2167 | 9877 |
| Kentucky | 107 | 120 | 400 | 315 | 1623 | 8079 |
| Louisiana | 138 | 128 | 426 | 356 | 1689 | 8761 |
| Maine | 149 | 187 | 611 | 519 | 1906 | 8259 |
| Maryland | 171 | 204 | 726 | 697 | 2373 | 10889 |
| Massachusetts | 292 | 304 | 907 | 770 | 2496 | 10745 |
| Michigan | 175 | 185 | 719 | 671 | 2378 | 10273 |
| Minnesota | 175 | 207 | 574 | 517 | 2140 | 10149 |
| Mississippi | 82 | 84 | 281 | 212 | 1236 | 6915 |
| Missouri | 157 | 188 | 584 | 512 | 2141 | 9341 |
| Montana | 456 | 415 | 627 | 561 | 2060 | 8825 |
| Nebraska | 156 | 212 | 557 | 434 | 2126 | 9096 |
| Nevada | 606 | 395 | 939 | 878 | 2854 | 11577 |
| New Hampshire | 198 | 214 | 657 | 571 | 2193 | 9854 |
| New Jersey | 253 | 277 | 812 | 807 | 2748 | 11703 |
| New Mexico | 105 | 148 | 477 | 372 | 1865 | 8222 |
| New York | 280 | 323 | 1026 | 856 | 2756 | 11003 |
| North Carolina | 64 | 72 | 354 | 319 | 1623 | 8067 |
| North Dakota | 199 | 209 | 456 | 350 | 1817 | 7825 |
| Ohio | 177 | 222 | 707 | 649 | 2370 | 9872 |
| Oklahoma | | 114 | 504 | 387 | 1913 | 9444 |
| Oregon | 234 | 248 | 744 | 801 | 2271 | 9938 |
| Pennsylvania | 222 | 250 | 744 | 642 | 2281 | 9989 |
| Rhode Island | 279 | 293 | 649 | 738 | 2220 | 9646 |
| South Carolina | 72 | 74 | 336 | 303 | 1430 | 7624 |
| South Dakota | 175 | 183 | 539 | 357 | 1885 | 7886 |
| Tennessee | 81 | 101 | 361 | 335 | 1612 | 8123 |
| Texas | 98 | 138 | 539 | 427 | 1951 | 9922 |
| Utah | 134 | 183 | 556 | 475 | 2012 | 8003 |
| Vermont | 168 | 190 | 580 | 508 | 1915 | 8583 |
| Virginia | 85 | 110 | 420 | 458 | 1921 | 9918 |
| Washington | 234 | 296 | 770 | 648 | 2426 | 10755 |
| West Virginia | 89 | 117 | 513 | 402 | 1623 | 8041 |
| Wisconsin | 156 | 179 | 608 | 539 | 2236 | 9874 |
| Wyoming | 321 | 311 | 902 | 592 | 2302 | 11414 |
| | | | | | | |
| U.S. Average | 175 | 203 | 658 | 585 | 2258 | 10029 |
| Standard Deviation | 113.36 | 87.67 | 189.52 | 189.13 | 405.68 | 1313.39 |

**Sources and Notes:**

1880, 1900 and 1920 data are from Easterlin (1957), Table Y1, p.753. 1940, 1960 data are from U.S. Department of Commerce, Bureau of Economic Analysis (1995), table 2, pp.11, 13. 1980 data are from U.S. Department of Commerce, Bureau of Economic Analysis (1996), table 2, p.62. Easterlin provides no data for Oklahoma for 1880. And for North and South Dakota for that year, we divide the 1900 per capita income of each state by the combined per capita income for the two state (as given in Easterlin), and multiply each of these ratios by the combined 1880 per capita income figure that Easterlin provides. Easterlin's personal income figure for the U.S. as a whole and thus his personal income per capita figure seem to include the Dakotas, so we include them in our analysis for 1880 as well.

**Table A2. State Price Relatives**
**(U.S. = 100)**

| State | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 |
|---|---|---|---|---|---|---|
| Alabama | 98.2 | 99.3 | 101.5 | 96.9 | 92.7 | 91.3 |
| Arizona | 111.5 | 107.2 | 102.7 | 103.1 | 104.5 | 98.6 |
| Arkansas | 100.9 | 102.0 | 98.0 | 97.0 | 91.7 | 91.5 |
| California | 115.9 | 111.4 | 101.8 | 104.7 | 104.5 | 102.0 |
| Colorado | 111.5 | 107.2 | 102.7 | 103.1 | 97.2 | 98.6 |
| Connecticut | 108.3 | 108.3 | 106.9 | 103.3 | 107.2 | 116.8 |
| Delaware | 94.4 | 94.4 | 96.4 | 102.3 | 104.1 | 112.9 |
| Florida | 106.3 | 109.1 | 105.6 | 100.5 | 92.7 | 91.3 |
| Georgia | 103.9 | 106.7 | 104.1 | 96.8 | 92.7 | 91.3 |
| Idaho | 123.8 | 119.0 | 94.6 | 98.6 | 104.2 | 101.1 |
| Illinois | 95.6 | 95.3 | 100.2 | 99.5 | 105.6 | 101.1 |
| Indiana | 93.7 | 93.4 | 94.9 | 96.1 | 105.6 | 101.1 |
| Iowa | 91.5 | 91.2 | 99.5 | 100.4 | 101.3 | 99.4 |
| Kansas | 102.4 | 102.1 | 99.7 | 98.5 | 97.2 | 97.3 |
| Kentucky | 88.7 | 89.7 | 101.7 | 100.0 | 99.3 | 98.0 |
| Louisiana | 98.4 | 99.5 | 89.3 | 91.9 | 91.7 | 91.5 |
| Maine | 101.0 | 101.0 | 97.2 | 97.7 | 107.2 | 116.8 |
| Maryland | 91.9 | 94.4 | 96.4 | 102.3 | 104.1 | 112.9 |
| Massachusetts | 104.2 | 104.2 | 106.9 | 103.3 | 107.2 | 116.8 |
| Michigan | 93.9 | 93.6 | 109.0 | 101.6 | 97.7 | 100.1 |
| Minnesota | 90.8 | 90.5 | 99.3 | 102.2 | 104.1 | 102.1 |
| Mississippi | 93.4 | 94.4 | 101.6 | 98.5 | 95.5 | 94.4 |
| Missouri | 92.4 | 92.1 | 99.7 | 98.5 | 98.4 | 96.7 |
| Montana | 123.8 | 119.0 | 97.8 | 100.7 | 104.2 | 100.6 |
| Nebraska | 95.8 | 95.5 | 99.7 | 98.5 | 97.8 | 97.0 |
| Nevada | 113.1 | 108.7 | 97.9 | 100.2 | 104.5 | 102.0 |
| New Hampshire | 99.8 | 99.8 | 102.0 | 96.0 | 107.2 | 116.8 |
| New Jersey | 103.1 | 103.1 | 97.0 | 99.4 | 104.3 | 110.5 |
| New Mexico | 111.5 | 107.2 | 102.7 | 103.1 | 91.7 | 98.6 |
| New York | 100.6 | 100.6 | 97.1 | 100.7 | 109.0 | 109.7 |
| North Carolina | 101.8 | 104.5 | 102.8 | 103.1 | 101.0 | 106.9 |
| North Dakota | 106.0 | 105.7 | 99.3 | 102.2 | 104.1 | 102.1 |
| Ohio | 95.9 | 95.6 | 96.0 | 100.1 | 101.4 | 99.7 |
| Oklahoma | 103.4 | 104.5 | 106.6 | 102.1 | 91.7 | 91.5 |
| Oregon | 110.3 | 106.0 | 94.1 | 95.8 | 104.3 | 101.6 |
| Pennsylvania | 101.3 | 101.3 | 96.9 | 98.2 | 98.8 | 101.3 |
| Rhode Island | 105.9 | 105.9 | 106.9 | 103.3 | 107.2 | 116.8 |
| South Carolina | 95.9 | 98.5 | 104.1 | 96.8 | 92.7 | 91.3 |
| South Dakota | 96.0 | 95.7 | 99.3 | 102.2 | 104.1 | 102.1 |
| Tennessee | 97.6 | 98.7 | 101.7 | 100.0 | 99.3 | 98.0 |
| Texas | 103.4 | 104.5 | 106.6 | 102.1 | 91.7 | 91.5 |
| Utah | 111.5 | 107.2 | 102.7 | 103.1 | 99.4 | 98.6 |
| Vermont | 106.5 | 106.5 | 104.5 | 99.7 | 107.2 | 116.8 |
| Virginia | 104.6 | 107.4 | 102.8 | 103.1 | 101.0 | 108.9 |
| Washington | 116.7 | 112.2 | 95.1 | 101.5 | 104.2 | 101.1 |
| West Virginia | 92.4 | 94.9 | 99.6 | 102.7 | 102.5 | 110.9 |
| Wisconsin | 96.8 | 96.5 | 104.6 | 102.3 | 107.0 | 103.9 |
| Wyoming | 117.7 | 113.1 | 102.7 | 103.1 | 101.8 | 98.6 |
| Standard Deviation | 8.6 | 7.1 | 4.1 | 2.7 | 5.3 | 8.0 |

**Sources and Notes:**
Data sources and computations are described in Appendix B.

**Table A3. Price-Adjusted State Personal Income per Capita (Price-Adjusted Dollars)**

| State | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 |
|---|---|---|---|---|---|---|
| Alabama | 84 | 89 | 308 | 286 | 1668 | 8452 |
| Arizona | 358 | 300 | 683 | 482 | 1960 | 9459 |
| Arkansas | 78 | 87 | 336 | 264 | 1535 | 8149 |
| California | 338 | 328 | 981 | 789 | 2668 | 11558 |
| Colorado | 333 | 297 | 709 | 522 | 2396 | 10861 |
| Connecticut | 247 | 257 | 738 | 678 | 2716 | 10481 |
| Delaware | 211 | 233 | 734 | 990 | 2684 | 9402 |
| Florida | 74 | 103 | 414 | 509 | 2172 | 10832 |
| Georgia | 83 | 81 | 334 | 342 | 1824 | 9191 |
| Idaho | 227 | 186 | 631 | 463 | 1816 | 8474 |
| Illinois | 218 | 273 | 827 | 743 | 2544 | 10867 |
| Indiana | 180 | 195 | 614 | 566 | 2085 | 9206 |
| Iowa | 184 | 221 | 567 | 491 | 2031 | 9559 |
| Kansas | 117 | 183 | 590 | 423 | 2229 | 10154 |
| Kentucky | 121 | 134 | 393 | 315 | 1635 | 8240 |
| Louisiana | 140 | 129 | 477 | 387 | 1843 | 9574 |
| Maine | 148 | 185 | 629 | 531 | 1778 | 7069 |
| Maryland | 186 | 216 | 753 | 681 | 2280 | 9646 |
| Massachusetts | 280 | 292 | 849 | 745 | 2329 | 9197 |
| Michigan | 186 | 198 | 660 | 661 | 2433 | 10258 |
| Minnesota | 193 | 229 | 578 | 506 | 2055 | 9936 |
| Mississippi | 88 | 89 | 277 | 215 | 1294 | 7325 |
| Missouri | 170 | 204 | 586 | 520 | 2177 | 9657 |
| Montana | 368 | 349 | 641 | 557 | 1978 | 8770 |
| Nebraska | 163 | 222 | 559 | 441 | 2174 | 9377 |
| Nevada | 536 | 363 | 959 | 876 | 2731 | 11347 |
| New Hampshire | 198 | 214 | 644 | 595 | 2046 | 8434 |
| New Jersey | 245 | 269 | 837 | 812 | 2635 | 10594 |
| New Mexico | 94 | 138 | 464 | 361 | 2035 | 8338 |
| New York | 278 | 321 | 1057 | 850 | 2529 | 10032 |
| North Carolina | 63 | 69 | 345 | 310 | 1607 | 7405 |
| North Dakota | 188 | 198 | 461 | 342 | 1745 | 7661 |
| Ohio | 185 | 232 | 736 | 649 | 2338 | 9906 |
| Oklahoma | | 109 | 473 | 359 | 2087 | 10321 |
| Oregon | 212 | 234 | 790 | 628 | 2177 | 9784 |
| Pennsylvania | 219 | 247 | 768 | 654 | 2308 | 9864 |
| Rhode Island | 263 | 277 | 794 | 714 | 2071 | 8256 |
| South Carolina | 75 | 75 | 323 | 313 | 1542 | 8347 |
| South Dakota | 182 | 191 | 543 | 349 | 1791 | 7701 |
| Tennessee | 83 | 102 | 355 | 335 | 1624 | 8285 |
| Texas | 95 | 132 | 506 | 418 | 2128 | 10843 |
| Utah | 120 | 171 | 541 | 461 | 2024 | 8116 |
| Vermont | 158 | 178 | 555 | 510 | 1787 | 7346 |
| Virginia | 81 | 102 | 409 | 444 | 1902 | 9104 |
| Washington | 201 | 264 | 809 | 638 | 2329 | 10636 |
| West Virginia | 96 | 123 | 515 | 392 | 1583 | 7250 |
| Wisconsin | 161 | 185 | 581 | 527 | 2090 | 9507 |
| Wyoming | 273 | 275 | 878 | 574 | 2260 | 11575 |
| U.S. Average | 175 | 203 | 658 | 585 | 2258 | 10029 |
| Standard Deviation | 96 | 79 | 191 | 184 | 350 | 1220 |

Sources and Notes:

Authors' calculations based on tables A1 and A2 as described in the text.

**Table A4. Labor Input Per Capita Relative to the U.S.**
**(U.S. Average = 100)**

| State | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 |
|---|---|---|---|---|---|---|
| Alabama | 112 | 109 | 98 | 91 | 90 | 91 |
| Arizona | 159 | 114 | 99 | 90 | 92 | 97 |
| Arkansas | 94 | 97 | 92 | 88 | 87 | 93 |
| California | 125 | 113 | 112 | 106 | 105 | 104 |
| Colorado | 150 | 106 | 99 | 94 | 99 | 112 |
| Connecticut | 112 | 111 | 109 | 112 | 108 | 109 |
| Delaware | 107 | 103 | 104 | 107 | 102 | 101 |
| Florida | 98 | 100 | 101 | 104 | 98 | 92 |
| Georgia | 112 | 102 | 99 | 99 | 98 | 99 |
| Idaho | 138 | 101 | 90 | 91 | 96 | 96 |
| Illinois | 94 | 98 | 103 | 106 | 105 | 102 |
| Indiana | 93 | 93 | 97 | 97 | 99 | 101 |
| Iowa | 94 | 93 | 91 | 94 | 98 | 104 |
| Kansas | 93 | 90 | 90 | 93 | 100 | 106 |
| Kentucky | 91 | 92 | 89 | 88 | 87 | 97 |
| Louisiana | 111 | 101 | 94 | 94 | 86 | 91 |
| Maine | 103 | 104 | 102 | 97 | 98 | 96 |
| Maryland | 100 | 101 | 106 | 105 | 103 | 108 |
| Massachusetts | 117 | 113 | 114 | 106 | 106 | 105 |
| Michigan | 100 | 98 | 102 | 101 | 96 | 97 |
| Minnesota | 94 | 96 | 97 | 98 | 98 | 108 |
| Mississippi | 106 | 109 | 102 | 94 | 87 | 90 |
| Missouri | 92 | 94 | 98 | 100 | 99 | 98 |
| Montana | 164 | 123 | 99 | 100 | 96 | 100 |
| Nebraska | 97 | 92 | 90 | 95 | 101 | 104 |
| Nevada | 149 | 122 | 123 | 108 | 115 | 113 |
| New Hampshire | 118 | 113 | 111 | 105 | 106 | 108 |
| New Jersey | 101 | 105 | 106 | 111 | 106 | 103 |
| New Mexico | 98 | 88 | 86 | 84 | 88 | 92 |
| New York | 107 | 108 | 110 | 110 | 107 | 96 |
| North Carolina | 99 | 99 | 89 | 94 | 98 | 104 |
| North Dakota | 121 | 96 | 81 | 92 | 93 | 100 |
| Ohio | 90 | 97 | 102 | 100 | 98 | 99 |
| Oklahoma | | 90 | 85 | 86 | 94 | 97 |
| Oregon | 111 | 107 | 105 | 104 | 99 | 103 |
| Pennsylvania | 98 | 102 | 100 | 100 | 100 | 96 |
| Rhode Island | 122 | 117 | 116 | 112 | 108 | 105 |
| South Carolina | 114 | 111 | 102 | 97 | 96 | 96 |
| South Dakota | 121 | 89 | 86 | 93 | 95 | 104 |
| Tennessee | 84 | 94 | 90 | 92 | 94 | 96 |
| Texas | 95 | 89 | 94 | 96 | 97 | 101 |
| Utah | 80 | 80 | 84 | 82 | 91 | 92 |
| Vermont | 103 | 103 | 100 | 98 | 98 | 104 |
| Virginia | 94 | 93 | 92 | 96 | 99 | 105 |
| Washington | 116 | 114 | 108 | 103 | 101 | 102 |
| West Virginia | 82 | 89 | 85 | 83 | 81 | 84 |
| Wisconsin | 91 | 93 | 96 | 98 | 99 | 105 |
| Wyoming | 123 | 125 | 107 | 100 | 101 | 105 |
| Standard Deviation | 19.2 | 10.3 | 9.2 | 7.7 | 6.7 | 6.2 |

**Sources and Notes:**

Authors' calculations based on data from Miller and Brainerd (1957), U.S. Department of Commerce, Bureau of the Census (1880, 1902, 1920, 1940, 1960a, 1960b, 1980, 1981).

**Table A5. Price-Adjusted State Personal Income per Worker**
**(Price-Adjusted Dollars)**

| State | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 |
|---|---|---|---|---|---|---|
| Alabama | 214 | 213 | 797 | 785 | 4854 | 18836 |
| Arizona | 650 | 690 | 1748 | 1331 | 5553 | 19744 |
| Arkansas | 241 | 236 | 927 | 749 | 4622 | 17768 |
| California | 777 | 755 | 2223 | 1846 | 6652 | 22472 |
| Colorado | 639 | 733 | 1818 | 1389 | 6313 | 19633 |
| Connecticut | 638 | 605 | 1727 | 1943 | 6557 | 19494 |
| Delaware | 566 | 590 | 1794 | 2309 | 6882 | 18762 |
| Florida | 219 | 269 | 1041 | 1221 | 5821 | 23734 |
| Georgia | 214 | 207 | 857 | 862 | 4868 | 18802 |
| Idaho | 475 | 479 | 1772 | 1271 | 4953 | 17810 |
| Illinois | 670 | 729 | 2042 | 1746 | 6343 | 21514 |
| Indiana | 498 | 546 | 1610 | 1456 | 5511 | 18388 |
| Iowa | 565 | 625 | 1586 | 1300 | 5429 | 18623 |
| Kansas | 362 | 531 | 1671 | 1138 | 5850 | 19314 |
| Kentucky | 383 | 382 | 1118 | 891 | 4926 | 17236 |
| Louisiana | 363 | 332 | 1284 | 1027 | 5641 | 21362 |
| Maine | 413 | 464 | 1558 | 1361 | 4762 | 14880 |
| Maryland | 536 | 560 | 1809 | 1618 | 5821 | 18045 |
| Massachusetts | 693 | 678 | 1891 | 1743 | 5746 | 17665 |
| Michigan | 536 | 528 | 1641 | 1632 | 6610 | 21355 |
| Minnesota | 590 | 620 | 1522 | 1281 | 5500 | 18564 |
| Mississippi | 239 | 214 | 687 | 570 | 3911 | 16516 |
| Missouri | 532 | 565 | 1513 | 1292 | 5739 | 19832 |
| Montana | 648 | 739 | 1643 | 1384 | 5369 | 17810 |
| Nebraska | 483 | 633 | 1585 | 1155 | 5627 | 18266 |
| Nevada | 1035 | 777 | 1976 | 2012 | 6234 | 20390 |
| New Hampshire | 483 | 494 | 1479 | 1412 | 5048 | 15841 |
| New Jersey | 699 | 668 | 2016 | 1818 | 6499 | 20839 |
| New Mexico | 276 | 409 | 1371 | 1075 | 6063 | 18383 |
| New York | 751 | 779 | 2438 | 1923 | 6178 | 21166 |
| North Carolina | 183 | 182 | 984 | 824 | 4287 | 14360 |
| North Dakota | 449 | 536 | 1442 | 931 | 4913 | 15417 |
| Ohio | 593 | 625 | 1842 | 1620 | 6226 | 20167 |
| Oklahoma | | 318 | 1407 | 1041 | 5819 | 21610 |
| Oregon | 550 | 570 | 1920 | 1507 | 5750 | 19184 |
| Pennsylvania | 644 | 635 | 1954 | 1623 | 6031 | 20809 |
| Rhode Island | 622 | 618 | 1745 | 1583 | 5043 | 15827 |
| South Carolina | 191 | 176 | 806 | 804 | 4227 | 17533 |
| South Dakota | 434 | 560 | 1597 | 935 | 4920 | 14965 |
| Tennessee | 286 | 284 | 1000 | 904 | 4520 | 17516 |
| Texas | 289 | 390 | 1371 | 1086 | 5744 | 21794 |
| Utah | 432 | 559 | 1630 | 1397 | 5813 | 17907 |
| Vermont | 442 | 454 | 1413 | 1293 | 4776 | 14329 |
| Virginia | 249 | 287 | 1133 | 1151 | 5021 | 17527 |
| Washington | 500 | 607 | 1897 | 1546 | 6039 | 21077 |
| West Virginia | 338 | 363 | 1535 | 1171 | 5146 | 17352 |
| Wisconsin | 508 | 524 | 1537 | 1345 | 5512 | 18258 |
| Wyoming | 638 | 575 | 2094 | 1431 | 5886 | 22184 |
| U.S. Average | 505 | 531 | 1672 | 1457 | 5911 | 20275 |
| Standard Deviation | 185 | 174 | 396 | 376 | 694 | 2229 |

Sources and Notes:

Authors' calculations based on tables A1, A2, and A4 as described in the text.

## *Appendix B: State Price Relatives*

This appendix describes the methods and data used to create state-price relatives from 1880 to 1980. These price relatives are then employed in estimating both price-adjusted state income per capita and for calculating our measure of labor productivity, or price-adjusted income per worker. They may also be used to examine product market integration over the period 1880 to 1980.

Haines (1989) reports a state-by-state price relative index for 1890 using retail price data on 215 commodities from seventy towns and 30 cities contained in the 1891 Aldrich report, and budget shares from the U.S. commissioner of labor survey of 1889-90 and the Aldrich report. State-level data prior to 1890 are fragmentary at best. According to Rosenbloom (1996, p.635), there are no comprehensive state or regional cost of living estimates available between 1870 and 1890; and while Coehlo and Shepherd (1974) have constructed regional price estimates for the period 1851-1880, they are not calculated at the state level nor do they include the Pacific or Mountain regions.

Thus we use Haines' 1890 index A (which includes commodity groups such as food, clothing, fuel and light, furniture, and liquor and tobacco) for our measure of relative state prices in 1880. Index A is a fixed-weight Laspeyres index with the base weights being national average weights. This index excludes housing which was 13.7 percent of a typical consumer's budget in 1890 (Haines, p.105). Because the data available on housing prices are of limited coverage across cities and towns (Haines lacks data on rents per room for cities or towns in 19 states), index B, which includes housing, covers only 21 states as opposed to 40 in index A. Furthermore, Haines emphasizes the special problems of late nineteenth century housing prices and the difficulty of obtaining reliable estimates. so we use the index excluding the housing component. As Rosenbloom (1996, p.636) points out, it is unfortunate that "data on housing costs, which are likely to have been one of the most variable components of expenditures, are too rare to be included, but their small weight in total expenditures means that even if they varied substantially they would not have a great effect on the overall index."

We estimate values for the nine missing states in Haines' sample based on a spatial search procedure. When a state did not have a price level, we interpolated one using the following search algorithm to find the "closest" state spatially: (1) search for any contiguous state in the census subregion and use its price; (2) if more than one state is contiguous, then compute the arithmetic mean; (3) if there are no contiguous states in the subregion, then use the price relative from a contiguous state in the census region; (4) if more than one contiguous state has a price relative, then compute the arithmetic mean; (5) if there are no contiguous states in the census region with price relatives, then average the values of any contiguous states that have price relatives; (6) if no contiguous state has a price relative, then compute the arithmetic mean of all states that are two states away.

We also considered other spatial search algorithms, although the data did not appear sensitive to the choice of procedures. In particular, we considered basing our search algorithm on just contiguous states, regardless of census region. For 1880, Idaho is the state showing the largest difference in relative price level in the change to this methodology: 6.9 percentage points (from 23.8 percent above the U.S. average to 16.9 percent above). We also considered weighting price data according to the population of the adjacent states. But since Haines employs a simple arithmetic mean to tally state price levels from city data, we also decided to use a non-population weighted average with the price data to be consistent with his approach. The size of the city for which prices are reported should not influence the proxy value of the price information for our purposes (proxy value for us is a function of distance). In considering either our census-region approach or the alternative approach of simply using conterminous states, the absolute differences are small if we compare population weighted to non-population weighted estimates – with Wyoming having the largest range at 8.1 percentage points (from 2.3 percent above the U.S. average to 10.4 percent above, using the conterminous states approach).

To calculate a relative price index for 1900, we pursue the methodology proposed in Rosenbloom (1996) and adjust Haines' 1890 estimates using a relative retail food prices index from the U.S. Department of Labor (1915) which provides information on regional price movements in retail

food between 1890 and 1900 for five census regions: North Atlantic, South Atlantic, North Central, South Central, and Western. Definitions of 1915-defined census regions are provided within the document (U.S. Department of Labor, 1915, p.126). We use the "relative prices weighted according to the average consumption of the various articles of food in workingmen's families in each geographical division." Fifteen food items are included in the index that represent two-thirds of a family's total food budget in 1901. According to Haines (1989, p.105), budget share data from the 1889-90 U.S. commissioner of labor survey shows that food was a significant proportion of a family's budget – 44.2 percent of a typical family's expenditure. Excluding housing, as Haines' index A does, raises food's budget share to 51.2 percent of the total, suggesting that it is a good proxy for the total cost of living during this period. We compute the ratio of retail food prices in 1900 to those in 1890 for each region, adjust for the change in U.S. overall food prices, and apply this ratio to our expanded version of Haines' 1890 data to obtain a state-by-state relative price index for 1900. While this technique effectively freezes any interstate variation *within* a region, it does adjust for price changes that occurred between 1890 and 1900 *across* regions.

The Bureau of Labor Statistics has published price series for selected major cities for most of the twentieth century, variously described as cost of living or consumer price indexes. While these series are useful in tracking the inflation rate for a particular city, they do not capture intercity price differences; that is, they do not reflect differences in price levels (or the differences in cost of living levels) between cities. As noted by the Bureau of Labor Statistics, "These individual area indexes are not based on a uniform 'market basket' of goods and services, but on a particular 'market basket', or pattern of expenditures, of wage- and clerical-worker families, in each area. Like the U.S. urban CPI, each city index is designed to measure changes in price levels over time; and the index weights for the city remain constant over time except for major periodical revisions. In the absence of a common set of weights, the Consumer Price Indexes for individual cities cannot be used to measure differences in price levels among cities." (Brackett 1969, p.16, fn.8) To assemble state relative prices since 1900 we utilized the limited pieces of appropriate budget or expenditure information along with urban price indexes to link these to the years in this study - 1920, 1940, 1960 and 1980.

There are few occasions on which a consistent household budget study has been undertaken for U.S. cities. Three components are required. First, a nationally-standardized basket of goods and services has to be drawn up representing a particular standard of living (but possibly allowing for some limited substitution of items, for example between cities having very different climates). Second, national expenditure weights for each item in the household budget should be obtained from a consumer expenditure survey conducted at or near the same date. And third, representative prices of all items in the basket must be available for each city. It is then possible to compute the differences among cities in the cost of living (or in the average level of consumer prices) for the defined household.

A 1946-47 study of a typical 'city worker's family budget' provides one benchmark. The budget included expenditure for categories such as food, rent, heat and utilities, housefurnishings, household operations, clothing, medical care, transportation, recreation, and miscellaneous items. Fortunately, the two expenditure surveys on which the 1946-47 basket was compiled were conducted in 1934-36 and 1941, making this postwar benchmark usable for the interwar period. The relative differences in price *levels* of family budgets across cities in 1946-47 were thus adjusted to 1940 and 1920 using the *movements* in the BLS indexes of prices for each city, appropriately spliced to accommodate changes in the base year. The updated 1946-47 budget study (U.S. Department of Labor 1951) is adjusted to 1940 using the city-level CPI from the *Monthly Labor Review* (February 1950, p.240) and the *Statistical Abstract*, 1942, p.378. To adjust the 1946-47 budget study to 1920, we use additional CPI price data from the *Statistical Abstract* for 1934, p.290 and for 1939, p.322.

The updating of the postwar city worker's family budget was discontinued in 1951 because of the increasing inappropriateness of the interwar expenditure weights it incorporated. In 1959 the BLS undertook an "interim" revision of the worker's budget for 20 large cities (Lamale and Stotz 1960). However we did not use this as the basis for our 1960 estimates of price levels partly because there had still been no updating of expenditure patterns, and partly because an alternative basis existed which had a slightly larger city coverage and a far more timely budget study. A new

expenditure survey was conducted in 1960-61, but the standardized urban budget study utilizing this information was first compiled for 1966 (Groom 1967). Thus for our 1960 estimates of state price levels we draw on the differences in price levels between cities in the 1966 budget study, and again use the movements in the CPI for individual cities to adjust these back to 1960 prices.

Finally, for 1980 we are able to use directly the BLS family budget survey prepared in that year.[26] Of three budgets available, we selected the one closest in design to the earlier studies: the budget applying to the "intermediate" level urban living standard for a four-person family.

For the four census years from 1920 to 1980 in the study, we follow Haines' (1989) procedure for creating a state index out of city data. We derive state relative prices by assigning each city to the appropriate state, and computing the simple arithmetic mean if there are multiple cities for a state. For states in which there are no city observations we followed the spatial search procedure described above to obtain price relatives for all states. For 1920 and 1940 there are 32 and 34 cities respectively for which we have price relatives. Because the indexes for 1960 and 1980 use standard metropolitan statistical areas (SMSAs) our coverage of states is actually broader than indicated by the number of cities (19 in 1960 and 22 in 1980). These SMSAs often cover several adjacent states, so we are able to assign price relatives to more states.

[26] Data are from U.S. Department of Commerce, *Statistical Abstract of the United States* (1981), p.472. Discussion of the figures is provided in U.S. Department of Labor (1981), pp.56-58.

## *Appendix C: Partitioning Labor Input Per Capita*

What explains the initially high levels of labor input per capita in the Pacific and Mountain states, the initially low levels in the Midwest, or the subsequent decline in the Mountain states that we reported in Section 5A? Possible answers lie in the variation over time and space in a host of characteristics that account for the proportion of any population in employment. These characteristics may be demographic (the proportion of children in the population), social (legal limits on the age of workers), economic (farming offers employment opportunities for family members), or cultural (attitudes towards married women in the workforce). A thorough exploration of this topic is not possible here; however, our data do allow us to consider some factors that may have been important. Specifically, we can partition the labor input equation into its three components – the masculinity ratio, the age distribution of the population, and the labor force participation rate. We offer here a few general observations about each.

### *A. Masculinity Ratio*

Western states initially exhibited extraordinarily high proportions of males in their populations. The seven states that had the most males as a percent of total population in 1880 were all in the West, and all had over 60 percent of their populations consisting of males, with Montana the highest at 72 percent. By 1920, nine of the ten states with the highest masculinity were still located in the West, with ratios between 53 and 60 percent. By 1960, only ten states had more males than females, but again eight of the ten were in the West. Indeed, at twenty-year intervals, no Western state had more females than males until 1960. Conversely, the states with the most females in the population tended to be located in the South or Northeast from 1880 to 1980.

As figure C1 shows, convergence in gender ratios is driven by the decline in masculinity in the Pacific and Mountain subregions. The dispersion in the masculinity ratio across the fifty states falls from 6.5 percentage points in 1880 to 2 percentage points in 1920 to less than one percentage point in 1980. This suggests that regional differences in demographic factors may

create significant variation in labor input per capita across states, and hence in income per worker or labor productivity among states.

### *B. Age Structure of the Population*

Both the West and Northeast exhibit relatively high percentages of their total populations that are of working age in 1880; these two regions account for all 15 of the states with the highest working-age populations.[27] Indeed, the West and Northeast both have working-age population ratios that are five percentage points above the national average in 1880, and nine percentage points above the South. The national average of the working-age population ratio increases until 1940, with the Northeast still the highest at 86 percent, although the gap between the Northeast and South has declined to six percentage points. From 1960 onwards, when we use 15 and older as our definition of working-age population, there is little dispersion across regions in working-age population ratios.

The reason for the high percentages of working-age individuals in the Northeast and West is revealed to be quite different in 1880. The Northeast displays the highest proportion of working-age females in 1880, whereas the West is below the U.S. average and even lags the Midwest. In contrast, the West has a higher proportion of working-age males than any other region in 1880, four percentage points higher than the next highest region (the Northeast) and 13 percentage points higher than the South. Four Mountain states (Montana, Nevada, Arizona, and Colorado) have percentages greater than 85 percent in 1880. The relatively low percentage of working-age males in the South may partly be a result of the large number of working-age males killed during the Civil War (although the percentage of females in the working-age population in the South is also below the national average in 1880).

[27] Because the definition of what constitutes "working age" is not static in our tables, it is difficult to make comparisons with data before and after 1940 when the definition of working age changes from the percent of the total population that is 10 and older to the percent that is 15 and older. Furthermore, the changing definition of labor force will also make intertemporal comparisons of labor force participation rates difficult to capture; nevertheless, we make this adjustment to capture the economically relevant portion of the population that is engaged in work.

The declining dispersion in working-age population over the twentieth century is also present in the disaggregated series with the female working-age population dispersion declining at about the same rate as the aggregate series. Nonetheless, in 1880 there is considerably more variation across states in the male data than in the female data, 0.60 compared to 0.47. This difference is virtually eliminated, though, by 1900. Because our data only begin in 1880, we may be picking up the tail end of a nineteenth century trend of declining dispersion across states in working-age males.

*C. Labor Force Participation*

With our definition of the labor force, the U.S. average for male participation hovers between 72 and 80 percent over the entire sample period. Furthermore, there is little variation in male participation rates across the states. The standard deviation of the series in 1880 is 4.5 percentage points; it falls to only 1.8 percentage points by 1940 before rising to 3.2 percentage points in 1980. In contrast, as table C1 shows, female labor force participation rates across states are very low initially, but rise rapidly over the course of the twentieth century, from an average of 15 percent in 1880 to 52 percent by 1980. These state-level trends confirm Goldin's (1990) findings at the national level. And there is a larger degree of initial variation across states and regions in female than in male participation rates. The South has a female labor force participation rate of 19 percent, led by the South Atlantic states, while the West and Midwest have meager rates of nine percent in 1880 – pulled down by the Mountain and West North Central states in particular. At the state level, the standard deviation of female participation rates in 1880 is 7.8 percentage points, with South Carolina having the highest rate at 35 percent and Idaho the lowest at just over four percent. And while the Dakotas exhibited very high initial male participation rates, female participation rates in these two states are the second and third lowest in 1880. Arizona and Idaho also had very high male participation rates coupled with very low female participation rates in 1880. Midwestern and Western participation rates finally reach the national average in 1960 and surpass it by 1980 at which time the standard deviation in participation rates across states has fallen to just over three percentage points.

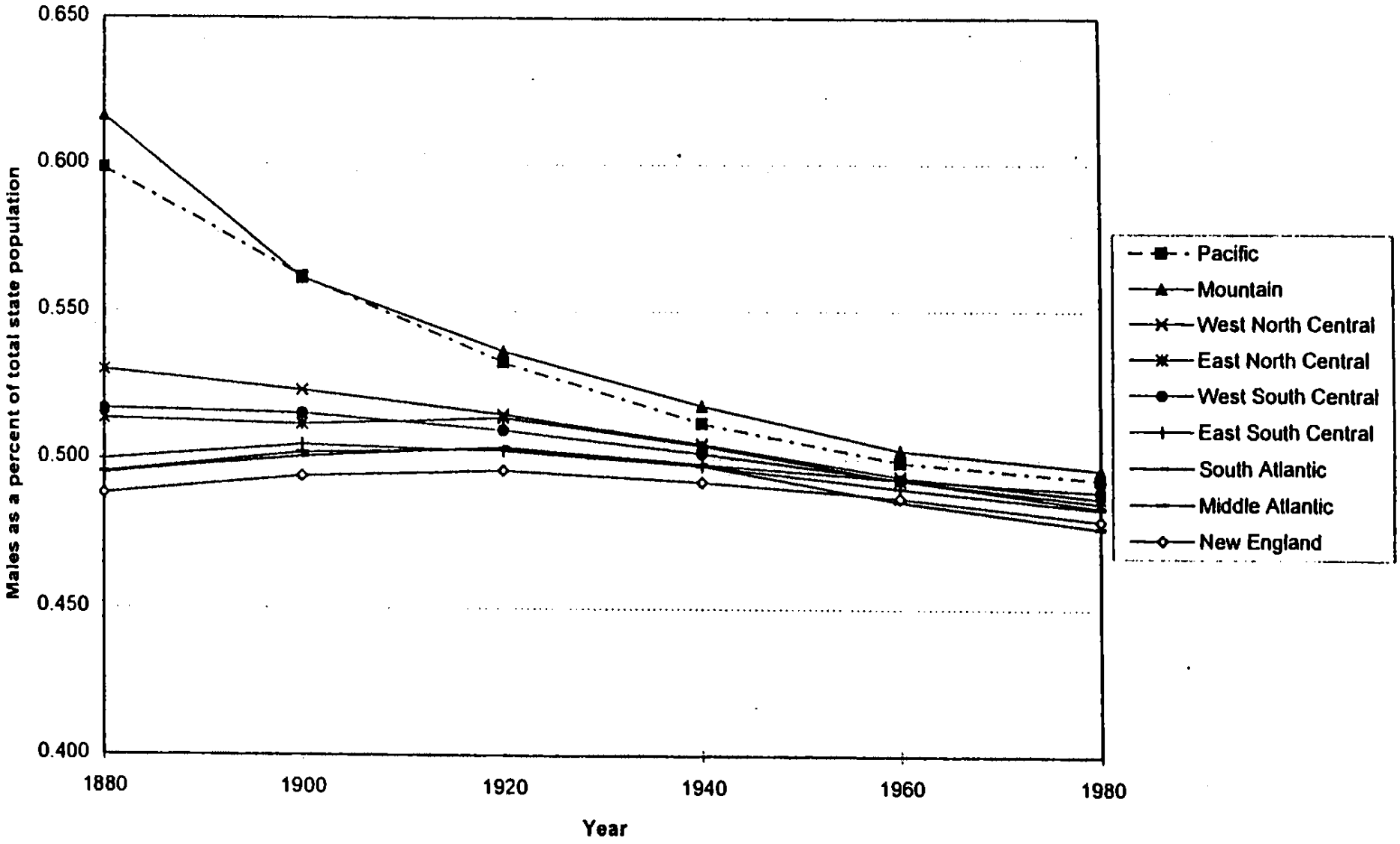
**Table C1. Female Regional Participation Rates, 1880 to 1980 (Population Weighted)**

| Regions | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 |
|---|---|---|---|---|---|---|
| Pacific | 0.10 | 0.15 | 0.20 | 0.24 | 0.36 | 0.54 |
| Mountain | 0.07 | 0.13 | 0.15 | 0.18 | 0.33 | 0.53 |
| West North Central | 0.08 | 0.13 | 0.16 | 0.20 | 0.33 | 0.54 |
| East North Central | 0.09 | 0.15 | 0.19 | 0.22 | 0.34 | 0.52 |
| West South Central | 0.17 | 0.17 | 0.18 | 0.20 | 0.32 | 0.51 |
| East South Central | 0.18 | 0.22 | 0.21 | 0.20 | 0.31 | 0.49 |
| South Atlantic | 0.21 | 0.24 | 0.23 | 0.25 | 0.35 | 0.51 |
| Middle Atlantic | 0.16 | 0.21 | 0.24 | 0.27 | 0.36 | 0.48 |
| New England | 0.20 | 0.26 | 0.29 | 0.29 | 0.38 | 0.55 |
| West | 0.09 | 0.14 | 0.18 | 0.22 | 0.35 | 0.54 |
| Midwest | 0.09 | 0.14 | 0.18 | 0.21 | 0.34 | 0.53 |
| South | 0.19 | 0.21 | 0.21 | 0.22 | 0.33 | 0.51 |
| Northeast | 0.17 | 0.22 | 0.25 | 0.27 | 0.36 | 0.50 |
| U.S. Average | 0.15 | 0.19 | 0.21 | 0.23 | 0.35 | 0.52 |

**Sources and Notes:**

Authors' calculations based on data from Miller and Brainerd (1957), U.S. Department of Commerce, Bureau of the Census (1960), and U.S. Department of Commerce, Bureau of the Census (1981).

## Figure C1. Regional Masculinity Ratios



# References


Abramovitz, Moses. (1989). *Thinking about Growth and other Essays on Economic Growth and Welfare* Cambridge: Cambridge University Press.

Barro, Robert J. (1991). "Economic growth in a Cross Section of Countries", *Quarterly Journal of Economics* 106 (2): 407–443.

Barro, Robert J. and Xavier Sala-i-Martin. (1995). *Economic Growth* New York: McGraw-Hill Inc.

Barro, Robert J. and Xavier Sala-i-Martin. (1992a). "Convergence," *Journal of Political Economy*, 100(2): 223-251.

Barro, Robert J. and Xavier Sala-i-Martin. (1992b). "Regional Growth and Migration: A Japan-United States Comparison," *Journal of the Japanese and International Economies*, 6 (December): 312-346.

Barro, Robert J. and Xavier Sala-i-Martin. (1991). "Convergence across States and Regions," *Brookings Papers on Economic Activity* (1): 107-182.

Beemiller, Richard M. and Ann E. Dunbar. (1994). "Gross State Product," *Survey of Current Business* 73 (August): 80-97.

Brackett, Jean C. (1969). "New BLS Budgets Provide Yardsticks for Measuring Family Living Costs," *Monthly Labor Review* 92(4): 3-16.

Coehlo, P.R. and J.F. Shepherd. (1974). "Differences in Regional Prices: the United States, 1851-1880," *Journal of Economic History* 34(3): 551-91.

Coehlo, P.R. and J.F. Shepherd. (1979). "The Impact of Regional Differences in Prices and Wages on Economic Growth: The United States in 1890," *Journal of Economic History* 39(1): 69-85.

Davis, Lance E. (1965). "The Investment Market, 1870-1914: The Evolution of a National Market," *Journal of Economic History* 25(3): 355-99.

Deaton, Angus (1988). "Quantity, Quality, and Spatial Variation of Price," *American Economic Review* 78(3): 418-30.

Easterlin, Richard A. (1961). "Regional Income Trends, 1840-1950," in Seymour E. Harris (ed.) *American Economic History* New York: McGraw-Hill Book Company, 525-47.

Easterlin, Richard A. (1960a). "Regional Growth in Income: Long Term Tendencies," in Simon Kuznets, Ann Ratner Miller and Richard A. Easterlin *Population Redistribution and Economic Growth: United States, 1870-1950, volume 2* Philadelphia: The American Philosophical Society, 140-203.

Easterlin, Richard A. (1960b). "Interregional Differences in Per Capita Income, Population, and Total Income, 1840-1950," in National Bureau of Economic Research, *Studies in Income and Wealth Vol. 24, Trends in the American Economy in the Nineteenth Century* Princeton: Princeton University Press, 73-140.

Easterlin, Richard A. (1957). "State Income Estimates," in Everett S. Lee, Ann Ratner Miller, Carol Brainerd, and Richard A. Easterlin *Population Redistribution and Economic Growth: United States, 1870-1950, volume 1* Philadelphia: The American Philosophical Society.

Engel, Charles and John H. Rogers. (1996). "How wide is the Border?" *American Economic Review* 86(5): 1112-25.

Fogel, Robert W. (1979). *Railroads and American Economic Growth* Baltimore: Johns Hopkins University Press.

Goldin, Claudia. (1990). *Understanding the Gender Gap: An Economic History of American Women* New York: Oxford University Press.

Groom, Phylis. (1967). "A New City Worker's Family Budget," *Monthly Labor Review* 90(11): 1-8.

Haines, Michael R. (1989) "A State and Local Consumer Price Index for the United States in 1890," *Historical Methods* 22(3): 97-105.

Lamale, Helen H. and Margaret S. Stotz (1960). "The Interim City Worker's Family Budget," *Monthly Labor Review* 83(8): 785-808.

McLean, Ian W. (1993), "No Flash in the Pan: Resource Abundance and Economic Growth in California 1848-1910," Center for International Economic Studies Seminar Paper 93-09, University of Adelaide, December.

Miller, Ann Ratner and Carol P. Brainerd. (1957). "Labor Force Estimates," in Everett S. Lee, Ann Ratner Miller, Carol Brainerd, and Richard A. Easterlin *Population Redistribution and Economic Growth: United States, 1870-1950, volume 1*, Philadelphia: The American Philosophical Society.

Mitchener, Kris James and Ian W. McLean. (1998). "The Productivity of U.S. States," mimeo, Department of Economics, University of California, Berkeley (January).

Persson, Joakim. (1997). "Convergence across the Swedish counties, 1911-1993" *European Economic Review* 41(9): 1835-52.

Rosenbloom, Joshua L. (1996). "Wast there a National Labor Market at the End of the Nineteenth Century? New Evidence on Earnings in Manufacturing," *Journal of Economic History* 56(3): 626-56.

Rosenbloom, Joshua L. (1990). "One Market or Many? Labor Market Integration in the Late Nineteenth-Century United States," *Journal of Economic History* 50(1): 85-107.

Sachs, Jeffrey and Andrew Warner. (1995). "Natural Resource Abundance and Economic Growth," NBER Working Paper 5398, December.

Slaughter, Matthew J. (1995). "The Antebellum Transportation Revolution and Factor-Price Convergence," NBER Working Paper 5303.

Solow, Robert M. (1956). "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics* 70(1): 65-94.

U.S. Department of Commerce, Bureau of Economic Analysis. (1996). "Comprehensive Revision of State Personal Income, 1969-1995," *Survey of Current Business* 76 (October): 62.

U.S. Department of Commerce, Bureau of Economic Analysis. (1995). *State Personal Income: 1929-93* Washington, D.C.: U.S. GPO.

U.S. Department of Commerce, Bureau of the Census. (various issues). *Statistical Abstract of the United States* Washington, D.C.: U.S. GPO.

U.S. Department of Commerce, Bureau of the Census. (1980). *Census of the Population: 1980* Washington, D.C.: U.S. Department of Commerce.

U.S. Department of Commerce, Bureau of the Census. (1960). *Census of the Population: 1960* Washington, D.C.: U.S. Department of Commerce.

U.S. Department of Commerce, Bureau of the Census. (1940). *Census of the Population: 1940* Washington, D.C.: U.S. Department of Commerce.

U.S. Department of Commerce, Bureau of the Census. (1920). *Census of the Population: 1920* Washington, D.C.: U.S. Department of Commerce.

U.S. Department of Commerce, Bureau of the Census. (1902). *Twelfth Census of the United States: 1900, vol.2* Washington, D.C.: U.S. Census Office.

U.S. Department of Commerce, Bureau of the Census. (1880). *Census of the Population: 1880* Washington, D.C.: U.S. Department of Commerce.

U.S. Department of Labor, Bureau of Labor Statistics. (1915). "Retail Prices: 1907 to December 1914," *Bulletin 156.*

U.S. Department of Labor, Bureau of Labor Statistics. (1981). "Family Budgets," *Monthly Labor Review* 104(8): 56-58.

U.S. Department of Labor, Bureau of Labor Statistics. (1951). "Family Budget of a City Worker, October 1950," *Monthly Labor Review* 69(2): 152-155.

U.S. Department of Labor, Bureau of Labor Statistics. (various issues). *Monthly Labor Review.*

Williamson, Jeffrey G. (1965). "Regional Inequality and the Process of National Development: A Description of the Patterns," *Economic Development and Cultural Change* 13(4, part 2): 3-84.

Wright, Gavin. (1990)."The Origins of American Industrial Success, 1879-1940," *American Economic Review* 80 (September): 651-668.

Wright, Gavin. (1987). "The Economic Revolution in the American South," *Journal of Economic Perspectives* 1(1): 161-78.