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# Regional Inequality in the United States: Long-Term Patterns, 1880-2010.

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## Introduction

In the second half of the nineteenth century, the United States saw an unprecedented economic development which turned the country into the world's first economic power. The United States began to outperform the economic leader of that time – Great Britain – and became the destination of millions of people looking for opportunities to improve their well-being. Ultimately, the United States became a model of a successful economy soon to be studied by other countries. The economic development manifested itself by the rapid advance of existing industries, the dawn of new industries and the creation of a large transportation and distributional network which gradually integrated the national market. This economic development, however, was not equally spread. On the contrary, regions with high concentration of industries emerged alongside regions with low industrial concentration. The first divergence of U.S. regions occurred during the early phase of industrialization - manufacturing began to concentrate in Northeast and Middle Atlantic whereas the South remained largely agricultural. In the second half of the nineteenth century industrialization spread across Northeast, Middle Atlantic, and Midwest regions and formed the manufacturing belt, leaving the South predominantly agricultural. The twentieth century witnessed a convergence of regional income and industrial structure, though the process was uneven and can be viewed as mostly a post-World War II development. Moreover, convergence lasted only until about the 1980s when a slow-down began, and the process even stopped.

This chapter offers an overview of the main trends of regional economic development in the United States between 1880 and 2010 at the state level. It first discusses data sources and a methodology used to estimate income per capita of US states before 1920. Various quantitative measures of regional inequality are then used to describe 130 years of regional development, attempting to offer a few stylized facts about US regional inequalities. After that, a discussion of the existing research offering insights into the determinants of unequal distribution of economic activities across the US is presented, followed by a conclusion.

## Methodology and Data Sources

To analyse the long-term development of US regional inequality, time series of real income per capita figures for US states are needed.[1] First I discuss the data sources for the nominal income per capita, then a price adjustment necessary to derive real income per capita, and finally an adjustment to construct an internationally comparable set of regional GDP per capita in 1990 GK$. Well-known figures of nominal total personal income per capita provided by the Bureau of Economic Analysis are used for the years 1930-2010.[2] Income per capita figures in 1920 come from Richard Easterlin (1957). Figures for 1880-1910 come from Klein (2013) where I followed the pioneering work of Richard Easterlin and, using his methodology, calculated states' nominal per capita income for 1890 and 1910 as well as improved his original figures for 1880 and 1900. The main idea of the methodology can be briefly described as follows.[3] For each state, a ratio of the state total personal income per capita relative to the U.S. total personal income per capita is calculated. These ratios are then used to allocate U.S. total personal income per capita among the states. The calculation consists of two main steps: estimation of the U.S. total personal income per capita by type and industry, and estimation of a ratio of state total personal income per capita to the U.S. total personal income per capita. The first stage provides U.S. total personal income per capita, and U.S. total personal income per capita by its type. There are two types of income: so-called service income which includes wages, salaries, and proprietor's income, and so-called property income consisting of rental income, personal interest income, and dividends. The second stage calculates state total personal income per capita relative to U.S. total personal income per capita, which is done by summing state total service income per capita relative to U.S. total service income per capita and state total property income per capita relative to U.S. total property income per capita. The calculation of each of those ratios forms a complex system of mutually dependent equations and the result is total personal income per capita for *each* US state.[4]

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[1] Alaska and Hawaii are excluded.
[2] The Bureau of Economic Analysis also provides real Gross State Product (GSP) figures, but they run from 1963 only.
[3] Full details of the methodology is discussed in Klein (2013).
[4] We do not have data for Oklahoma, North Dakota, and South Dakota in 1880.

To derive the real total personal income per capita of each US states, the nominal figures need to be adjusted for changes in price levels. This presents a challenge. Ideally, we would like to adjust the nominal figures across time as well as across space. However, we do not have price indices for each US states in 1880-2010. Two options are available. One is to use an US GDP deflator for the period 1880-2010, the other one is to use a spatial price-adjustment developed by Mitchener and McLean (1999) for the years 1880, 1900, 1920, 1940, 1960, and 1980. I used US GDP deflator from Johnston and Williamson (2018), adjusting the nominal figures only for temporal prices changes. Leaving spatial price-adjustment out does present a problem, but, as shown by Mitchener and McLean (1999), it is not that severe. They have shown that even after spatial price-adjustment, the trends in regional personal income remain unchanged and the effect of differences in regional price levels is trivial by and after 1920 (Mitchener and McLean, 1999, page 1026). Since it is illuminating to compare and contrast US regional development with regional developments in other countries, an internationally comparable regional figure for GDP per capita is needed. In our case, a useful short-cut is to distribute US GDP in 1990 GK$ calculated by the Maddison Project among the US states using the shares of state's total personal income on the US total personal income. Usual caveats apply here, and I consider those figures to be a set of first-generation estimates suitable only for a comparative analysis of *long-run trends* of regional GDP inequalities between the US and other countries. A more detailed calculation of an internationally comparable set of estimates of US regional GDP is an important agenda for future research. In addition to states' per capita income data, we use states' sectoral employment figures to provide further description of the main trends in regional inequality.[5]

**Basic facts of regional inequalities**

I will describe general trends in regional income inequality across US states in 1880-2010 along several dimensions: GDP per capita, sectoral employment, spatial Gini coefficient, and the concept of σ-

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[5] Employment figures for 1890 come from Perloff at al (1960), data for 1930, 1950, 1980, and 2010 come from the US Censuses and were generously provided by Alexandra Lopez Cermeno.

converge and β-convergence. Furthermore, I will look at the states' real per capita personal income relative to the US and I will consider patterns across US states as well as more broadly defined US regions. All this will allow to us to shed some first light on an undoubtedly complex process of regional development over the course of 130 years.

Figure 1 presents trends of states' GDP per capita between 1880 and 2010. We see that the (population weighted) average increased by about 850%, with the largest increase occurring after the World War II. Interestingly, the distance between the poorest and the richest US states was quite stable, beginning to widen considerably only since 1980s. As an example, the richest state in 1880 was the mining sector driven Nevada, the poorest was North Carolina while Mississippi was the poorest state in 2010 and Connecticut the richest one. Sectoral employment figures offer another angle when examining long-run regional inequality. Figure 2 plots the evolution of the sectoral employment shares between 1890 and 2010. The trends are clear: agriculture has been losing its dominant position at the expense of manufacturing and services. The service sector has been an important source of employment since the interwar years and Figure 2 strongly suggests that the structural change unfolding during the twentieth has been as much a services story as it was an industry story. To get a better sense of the changes in the location of employment in those broad sectors across US states, Figure 3 presents the coefficient of variation of location quotients, as defined in the chapter by Roses and Wolf. We see that already in 1890, the industrial sector was quite regionally concentrated. The subsequent evolution of all three sectors shows a clear pattern of spatial localization of agriculture, and dispersion of industry and services respectively. All this is suggestive of spatially uneven development of the US economy over the past 130 years. This conjecture is confirmed in Figure 4 which shows the development of a locational Gini coefficients measuring the extent of unequal distribution of GDP across US states. We see an interesting picture of relatively stable regional inequalities when we compare location Gini coefficient and 1880 and 2010. In between, however, we see a sign of what can be broadly considered an inverted U-shape curve. This indicates a rise of regional inequalities until 1930s and their subsequent decline, though not enough to consider regional inequalities in 2010 being very less pronounced than in 1880. This, at first, might look to be at odds with the dispersion of employment across US states as

captured in Figure 3. However, while the dispersion of employment in industries and services might be an indication of the process potentially leading to more equal distribution of economic activities across US states, it might have been only related to the decline of regional inequalities since their peak in 1930s.

The concepts of convergence arise from neoclassical models of economic growth. The concept of β-convergence tells us that a poor region will have a tendency to grow faster than the average, enabling it to catch up with the rich and even out regional disparities. Here we concentrate on β-unconditional convergence. The concept of σ-converge is related to the cross-sectional dispersion of regional income and convergence occurs if the dispersion – measured by, for example standard deviation, or coefficient of variation of per capita income across regions – declines over time. Table 1 presents population-weighted coefficients of variation of GDP per capital across US states between 1880 and 2010. The following basic facts emerge. Overall, regional inequality has a declining trend, though four sub-periods can be identified: 1880-1920, 1920-1940, 1940-1980, and 1980-2010. The first period shows a clear decline in regional inequality while the interwar period years (1920-1940) reversed this trend and regional inequality actually increased by 1930. The post-World War II period witnessed a rather strong regional convergence. This came to a halt by the 1980s and since then, regions began to diverge, something that was already visible in Figure 1 and can also be observed in Europe. Given the importance of the western regions and the South in the US regional development, I also calculated the coefficients of variation excluding those two regions respectively, see Table 1. Looking at the pattern of regional inequality excluding the West we see that the overall trend is preserved, and the post-1980 period suggests an even more profound increase in regional inequality. When we exclude the South, the overall trend is, again preserved though the coefficients of variation dropped considerably, much more than when excluding the West. An interesting feature emerges from the period 1940-1980. Unlike in the other two cases, the pattern of regional convergence, though still decreasing, is rather subdued, even flat in the 1950s and 1960s. This suggests, and quite strongly, that the South played a considerable role in diminishing regional inequalities in the post-World War II area as will be explored below.

The concept of β-unconditional convergence can shed further light on the patterns and possible drivers of regional inequality and convergence.[6] Figures 1-4 depict per capita average annual real growth rates against the logarithm of initial per capita values (both calculated using per capita figures in 1990 GK$) for the periods 1880-2010, 1880-1940, 1940-2010 and 1920-1940 respectively. We see that in all but one period – 1920-1940 – regional convergence follows a well-known pattern of β-unconditional convergence: US states with higher initial per capita income have lower growth rates than the states with per capita income on the opposite side of per capita spectrum. Looking more closely at the differences between the figures, we can clearly observe the changing role of the western states in convergence over time. Specifically, Figure 1 shows that the states with the highest per capita income and, subsequently the lowest growth rates in 1880-2010, are the western states. Figure 2, depicting the period 1880-1940, makes the importance of the western states even more visible. Indeed, they create almost a separate cluster. That picture changes when we look at Figure 3 showing β-unconditional convergence for the period 1940-2010. We see that, as suggested in Table 1, the West 'looses' its dominant role in explaining the patterns of post-World War II regional inequality and it is only the state of California and Nevada which remain the 'club' of high per capita real income. However, this time they are together with the state of Delaware, New York, or Connecticut. The importance of the South can be also observed in those figures, most visibly in Figure 3 where the southern states (together with North and South Dakota) are at the upper spectrum of US states with low initial per capita income but high subsequent growth rates.

The last piece of evidence helping us to describe (and also further fine-tune) basic patterns of regional inequality is the states' real per capita personal income relative to the US real per capita income, presented in Table 2. The table presents not only figures for each US state in 1880-2010, but also for four US regions (Northeast, Midwest, South, West), and the manufacturing belt and the rest of the US.[7] Looking at the overall trends across regions in the period 1880-2010, we can distinguish convergence

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[6] An extensive analysis of convergence across US states has been done by Barro and Sala-i-Martin (1991, 1992).
[7] At a disaggregated level, it is appropriate to demarcate the manufacturing belt in terms of counties. Our analysis is at the state level; states whose territory is wholly or predominantly in the Manufacturing belt are Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, and Wisconsin.

'from above', 'from below' and no convergence. Northeast and West are the regions which per capita real income converged to the US average 'from above', meaning that their 1880 per capita income was higher than the US average. South exhibits convergence 'from below' as its per capita in 1880 income was only about 50% of the US average. The performance of Midwest region in terms of convergence was very stagnant and even though there has been some signs of convergence to the US average in the twentieth century as discussed below, overall, the region started with 98% of US average real per capita income in 1880 and ended with 95% in 2010 – a sign relative stability over the course of 130 years. It is interesting to look at the region of the manufacturing belt because its existence and ultimately dissolution in the late decades of the twentieth century played a dominant role in the distribution of economic activities in Northeast, Midwest, and South. We see that despite some fluctuations in 1890 and 1910, the region held a very similar real per capita income relative to the US average in 1880-1940, declining until 1980, and then slightly increasing. The rest of the US witnessed an overall upward trend, though there has been a significant drop in 1930.

What about the relative importance of the southern and western regions in explaining the patterns of convergence in 1880-2010? As for the West, the numbers in table 2 clearly show that this region experienced a profound convergence to the US average real per capita income in the period 1880-1940, figures dropping from 92% to 19% above the US average.[8] Comparing that with Northeast and Midwest, it is clear that the western states played a dominant position in diminishing US regional inequalities before 1940. Indeed, the North-eastern states exhibited only slight convergence to the US average per capita income, Midwestern states fluctuated around the US average during the entire period of 1880-1940. As for South, the region showed only small increase in per capita income which was still only 64% of the US average in 1940.

The period after 1940 witnessed a retraction of West as the main driving region of income converge and the South was the main region behind the post-World War II regional convergence as its per capital

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[8] The choice of the year 1940 might seem a bit imprecise given that the profound decrease on real per capita income relative to the US average ended in 1930. From the point of view of long-run trends in regional inequality, the dominant role of the western regions ended in the interwar period and I opted to delineate it with the year 1940.

real income raised from 64% in 1940 to 93% in 2010. Northeast's per capita income embarked on the downward trend towards the US average, dropping from 31% above the US average in 1940 to 18% in 2010. Midwest's per capita income, again, fluctuated around the US average. It might be interesting to compare the manufacturing belt region with Northeast and Midwest. It is a rather rough comparison since the manufacturing belt does include a few of the Midwest states, but it still reveals interesting points. In the post-World War II decades, per capita income of that region declines relative to the US average, but recovers from about 1980s. This seems to be driven by the northeastern states rather than Midwest.

Before summarizing the main trends in regional inequality over the past 130 years, I will look at the evolution of per capita income relative to the US average of a few US states. Examining, for example, the state of Illinois, we can observe a pattern closely resembling an inverted U-shape. Indeed, Illinois reached its peak before World War I, plateauing in the interwar period and then declining after World War II. Michigan, arguably one of the core regions of the Manufacturing belt, also exhibits something like an inverted U-shape pattern. Unlike Illinois, it peaks in 1940 and then experienced a steady decline. A contrast to those two states are the states of California or Nevada which experienced a steady decline of their real per capita income relative to the US average over the entire period of 130 years. On the other hand, Florida and Virginia are examples of states with a gradual increase in their real per capital income relative to the US, even during the period 1880-1940, which was a period of laggard convergence among many southern states. Lastly, despite convergence and diminishing regional inequalities over the course of late nineteenth, twentieth, and early twenty first century, some US states show a remarkable persistence. There are those which were among the richest in 1880 and remained so in 2010 – for example Connecticut and Massachusetts – and there are some which were among poorest in 1880 and remained so in 2010 – for example Mississippi and West Virginia.

Overall, the evolution of regional inequalities in the United States since 1880 can be characterized as one of convergence, though not uninterrupted, accompanied by persistent of regional inequalities. Indeed, one could even say that 130 years of US regional development were 130 years of "unfulfilled convergence". The period of 1880-1940 was dominated by the West converging to the US average from

above while the convergence in the period 1940-2010 was driven by the South which was converging to the US average from below. The period of 1920-1940 did not witness convergence (quite on the contrary) and the post-1980 decades exhibit a considerable slow-down or even and end of convergence. It is important to note that though wide-spread, convergence was not universal and we have US states which persistently missed out on convergence of their real per capita income to US average. The locational Gini coefficient confirms that spatial inequalities were persistently high over the past 130 years and showed little or no sign of disappearing.

## Regional Inequality: Determinants and Causes

The basic facts about the evolution of regional inequality discussed in the previous section provide a spring board to review various explanations trying to understand the driving forces of convergence and divergence across US states over the course of 130 years.[9] These explanation, as will be seen below, are not mutually exclusive. On the contrary, putting them together offers us a story of the regional economic development and even though it is very likely incomplete, its main characters and their contribution to that story has been quite clearly identified. There is a large number of studies investigating regional inequalities and causes related to them. Here I will concentrate only on the studies which directly examine the forces behind regional development in long-run or for the sub-periods we are interested in. There are two main ways how to review this literature: one would be to focus on specific US regions, the other would be more guided by theory and centred around the type of explanation putting forward by various studies. Here I opt for the latter one since it allows me not only to summarize the main sources of long-run regional development but also to identify future avenues of research more easily.[10]

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[9] There is a large body of important studies focusing on the issues of the measurement of convergence which are not reviewed here (e.g. Rey et al 1999, Yamamoto 2008).

[10] There is a large body of research analysing regional economic development in the US. Here I focus mostly on the studies which attempted to account for a long-run pattern of US regional inequality, leaving some studies with narrower time span out.

Broadly, we can distinguish four different types of explanations which have emerged in the literature analysing *long-term* development US regional income inequalities: factors of production, institutions, structural change, resources abundance, and economic geography. Most generally, we can broadly distinguish between fundamental drivers of regional inequalities such as institutions and geographical characteristics, and factors which can be called 'proximate' sources of regional inequalities such as factor prices, resource abundance, and structural change.

### *Proximate sources of regional inequalities*

### *Factors of Production*

Inputs of production, especially labor and human capital, received attention from scholars examining long-run regional inequalities. Mitchener and McLean (1999) put forward an explanation based on labor input and labor productivity in order to account for high levels of per capita income of the West in 1880 and its subsequent convergence to the US average from above as well as anaemic performance of the South. The decomposition of regional differences in per capita income relative to the US average revealed that high income of the West in 1880 was not only due to high level of productivity, but also due to high level of labor input driven by high percentage of males in the West and age structure which favoured high labor force participation rates. This was complemented by the abundance of resources, allowing the West to achieve high productivity levels. The subsequent convergence of the West to the national average is less understood, and standard explanations of factor mobility or diffusion of technology are not entirely convincing (Mitchener and McLean, 1999). It appears that the erosion of favourable age structure and gender ratio and resource base might help to explain rather rapid converge of the West to the US average. As for sluggish performance of South, Mitchener and McLean (1999) find that the main reason was low productivity while labor input does not help to illuminate long and persistent underperformance of that region.[11] However, low levels of human capita as measured by formal educational attainment were found to be important in explaining very slow convergence of the southern states before 1950 (Connolly 2004).

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[11] See Mitchener and McLean (1999), Table 3, page 1032.

The slow-down of convergence since 1980s has recently drawn scholarly attention and the role of labor migration, demand for skilled labor, and housing market were examined. Research has observed that the income differences across US states have been increasingly capitalized into housing prices (e.g. Van Nieuwerburgh and Weill (2010), Glaeser et al.(2005)). This, together with a fact that regional economic success after 1980 was connected to the rising importance of human capital and demand for high-skilled labor due to skill-biased technological change (Autor and Dorn (2013)), has led to an examination of the role of housing market in the rising regional inequalities. Ganong at el. (2017) show that the decline of income convergence can be explained in part by a change in the relationship between income and housing prices. Since housing prices began to account for a far greater proportion of the income differences across states after 1980s, the returns to living in productive areas has fallen for unskilled households, and their migration patterns diverge from the migration patterns of the skilled households. As a result the US economy has shifted from one in which regional labor markets clear through net migration to one in which labor markets clear through skill-sorting – high-skilled workers move to high-income places while low-skilled workers leave high-income places.

*Structural change*

Structural change has been viewed as one of the major forces of economic development.[12] Indeed, US economic development over 130 years witnessed, among other things, two structural changes: 'first' structural change when agriculture was losing to manufacturing, and 'second' structural change when manufacturing was losing to services. A study by Barro and Sala-i-Martin (1991) considers structural change as one of the explanations for the observed income convergence across US states. The effect of the differences in the sectoral composition of regions on regional income convergence and the process of narrowing those differences were examined by Kim (1998) who analysed them at broad SIC 1-digit level. Even this rather crude measure of regional industrial structure has already yielded some valuable insights in to the factors shaping US long-run development of regional inequalities. Disappointing performance of the South before 1940 can be attributed to the unfavourable industrial mix of that region

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[12] See, for example, Herrendorf et al. (2014).

focusing mostly on agriculture while rather spectacular convergence of the US economy from 1940s until 1980s can be partly attributed to the narrowing of differences in regional industrial structure. A study by Caselli and Coleman (2001) offers a valuable insight into the role of labor force reallocation in the convergence of US regions over the course of 100 years from 1880 to 1980. Their analysis focuses on the decomposition of convergence into sectoral labor reallocation effect, convergence of economy wide agricultural wages to non-agricultural (so-called between-sector convergence) and convergence of southern wages to northern wages within sectors respectively. Several important findings stand out. Southern states' convergence to Northern states before 1940 (or lack of it) was driven mostly by labor reallocation out of agriculture and convergence of agricultural to non-agricultural wages. Convergence of within-sector wages played a minor role before 1940, but that was reversed after that and the catching up of southern wages with northern wages within each sector was the main force behind post World War II convergence, accounting for about 40 percent of it. This suggests that an important part of post 1950 catch up of the South was an increase in labor productivity. Convergence of Midwest to North was largely because of agricultural out-migration. Interestingly, structural transformation played no role in regional convergence between West and North before 1940 and only a small role after that. Structural change has been also a focus of a study by Bernard et al (1996), though it concentrates only on the period 1963-1989, which, from the point of view of long-run convergence, includes the decades of both rapid and stagnating regional convergence. Also, it does not discuss specifically discuss the role of South. Despite the limitation, the findings are illuminating and suggest that structural change has contributed to about one quarter of total aggregate convergence though it argues that a shift from manufacturing to service sector reduced productivity growth.[13] This is rather potentially important finding since it implies a growth inhibiting effect of labor reallocation toward services in the 1960s, 70s, and 80s, known as Baumol disease (Baumol 1967).[14]

Though we still lack studies thoroughly examining how labor reallocation from manufacturing to services impacted the evolution of regional convergence patterns, it is important to assess the effect of

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[13] Bernard et al (1996), page 133.
[14] Similar argument is put forward by Desmet et al (2014).

the rising of service sector on regional income inequality given the growing importance of this 'second' structural transformation which started occurring, at least for the vantage point of labor productivity, in the middle of 1990s. Recent study by Desmet et al. (2014) attempts, among other things, to link structural transformation to regional distribution of economic activities. It shows a gradual increase in spatial concentration of services from 1950s as well as the rise of productivity of service sector, which began in the mid-1990s. Though still far away from informing us about the causes of regional income differences, the study captures the shift of manufacturing activities from the manufacturing belt to South, which will be discussed below, and argues for the replacement of manufacturing with service sector employment. The result of that study suggests that, given the productivity advances of service sector and the relocation of manufacturing employment from Northeast and Midwest to South, we can expect that the extend of regional income inequality will depend on how successful regions are in attracting high-productivity services and/or replacing manufacturing with service sector.

*Resource abundance*

Another explanation of regional convergence patterns since 1880 which has not drawn much attention from scholar is natural resources. This is not to say that the role of natural resources and their abundance did not play an important role in the explanations of US industrial success, quite the contrary (see e.g. Wright 1990, David and Wright 1997). However, there has been little done when trying to account for the long-run convergence patterns of US regions, and especially the effect of resource abundance on rapid convergence of the West before 1940, as seen earlier. We can, however, gain some insights from a couple of studies attempting to shed some light on the long-run consequences of natural resources, even though they do not explicitly address the question of regional convergence. Mitchener and McLean (2003) examine the effect of workforce in mining in 1880 on the subsequent income per capita of US states, only to find a positive association until 1920. This is suggestive of natural resources playing a positive role in at least high initial per capita income of resource abundance states in West, possibly persisting until the interwar period. Michaels (2011) investigates the long-run impact of oil abundance in the South. The results are interesting and indicate that by the middle of the twentieth century, oil sector increased per capita income and education in oil abundant counties of the US South. That effect,

however, dissipated by 1990. Hence, they suggest that oil extraction did not necessarily constrained the economic development of the South before 1940, but also did not necessarily help to spur the growth in the post-World War II are. Altogether, both studies suggest a plausible story of natural resources having a positive impact on regional economic development in late nineteenth century and possibly until about 1950, but rather muted effect after that. Still, while highly suggestive and important, we still do not know exactly the role of natural resource in the sluggish convergence of South and rapid convergence of West as well as the transmission channels of their influence. Recently, a study by Papyrakis et al. (2007) seems to be a rare case examining the effect of natural resources on GSP (Gross State Product) convergence across US states. Even though it focuses on a shorter time span including the years of 1986-2000, those are the years which were identified earlier as the years of a stagnating regional convergence, which is suggestive of a potentially detrimental effect of natural resources on regional convergence. Their findings suggest that natural resources did not affect economic growth as such, hence there is no evidence of natural resource course. However, natural resources had a negative impact on investment, schooling, R&D, and openness, and increased corruption which suggests that natural resources might be one of the reasons for economic underperformance of resource abundant regions in the 1980s and 1990s.

### *Fundamental sources of regional inequalities*

*Institutions*

Institutions are considered as one of the fundamental factors affecting long-run economic performance. Similarly, institutions can be considered as one of the fundamental causes of long-run regional inequalities. There is an extensive literature stressing the importance of specific southern institutions on the American economic development before and especially after the Civil War (e.g. Wright 1986, 2006). Indeed, the effect of the Civil War and the institution of slavery were considered as the primary reasons for the laggard performance of the southern regions. It has been argued that the legacy of slavery and especially dependence on large plantations left the South vulnerable to the slow adoption of new

technology and industrialization necessary to catch up the rest of the United States. In particular, the South witnessed low investment into physical capital and lack of labor supply for prospective manufacturing industries. Factor markets did not play a favourable role either. Out migration of educated black population not only lowered human capital levels in the South, but also limited intergenerational effect that educated black population would have had it remained in the South (Margo 1988). Recently, a few studies have attempted to empirically test a link between slavery in the US South and regional inequalities at the end of the twentieth century. Nunn (2008) found that all forms of slavery, not only large plantations, negatively affected economic development at the end of the twentieth, though this adverse effect was not due to initial economic inequality. He finds that land inequality in 1860 is uncorrelated with income in 2000 and suggests that it can be due to the catch-up process the South started in the 1940s. Bertocchi et al (2014) examine the effect of slavery on income inequality across US counties and find a robust negative correlation. They also try to examine channels through which slavery affected inequality across US counties and argue that unequal educational attainment of blacks and whites is a crucial channel through which is slavery related to inequality across US counties.

*Economic Geography*

As was discussed at the beginning of this chapter, US regions experienced a rather dramatic shift of manufacturing activities from Northeast and Midwest, and specifically a region called manufacturing belt, to South (e.g. Holmes et al 2004). Though dramatic in its scope, it was less dramatic in its speed as it took about a century for the manufacturing to start noticeably relocating to the southern states. This affected the development of regional inequalities because in many states manufacturing was a dominant sector until service sector started to gain on importance since about 1990s.

Our discussion has already pointed out the existence and potential importance of the manufacturing belt. This term has long been used to describe the remarkable spatial concentration of industry in the United States that prevailed from the late 19th century to about the third quarter of the 20th century. Indeed, in 1900, about 4/5th of American manufacturing output was produced in this part of the country which comprised only 1/6th of its land area and a little over half its population (Klein and Crafts 2012). Another remarkable feature was its long persistence for almost a century. The causes of dominant

concentration of manufacturing activities in the Manufacturing belt for about a century have been a point of interest for many scholars and it is clear that they most likely have a direct relationship to the causes of long-run regional inequalities. Various explanations have been put forward including factor endowments, proximity to suppliers and purchasers of intermediate goods (forward and backward linkages respectively), high market accessibility in the context of scale economies, and declining transport costs (Harris 1954, Perloff et al 1960, Meyer 1983, 1989, Krugman 1991, Kim 1995, Healey 2015). A debate between factor endowment-type explanation (Kim 1995, 1999) and market access-type explanation revived by Krugman (1991) has yielded some robust conclusions. Klein and Crafts (2012) have tested the relative importance of both types of explanations by examining the persistence of the Manufacturing belt in 1880-1920 using an empirical model which subsumes both market-potential and factor-endowment arguments. The results show that it was market potential that was at the heart of the existence of the manufacturing belt, that it mattered *more* than factor endowments, and that its impact came through interactions both with scale economies and with both forward and backward linkages. Market potential explanation is intimately linked to transportation costs and we can better understand the development of regional inequalities income if we consider an explanation advanced by 'new economic geography' (Krugman 1991). This explanation, though stylized, offers valuable insights into a link between transportation costs and regional inequalities, and, as empirical evidence reviewed above suggested, should not be neglected.  In the second half of the nineteenth century, when the US began to rapidly industrialized, transportation costs began to fall dramatically especially with the advancements of railroads which were complementing the existing system of navigable river, coastal shipping, and canals. The concentration of manufacturing activities in Northeast and Midwest, which emerged in the first half of the nineteenth century, took advantage of it and locked their initial advantage in. Even though the West had abundance of natural resources and demographic structure favouring large labor supply, and South abolished slavery, it was not strong enough to pull manufacturing out of the Manufacturing belt for about a century. As a result, the rise and persistence of the manufacturing belt from the second half of the nineteenth to the second half of the twentieth century allowed Northeast and Midwest to forge ahead of the southern states, opening up large North-South per capita income gap.

The dominance of the manufacturing belt started to erode noticeably from 1970s with manufacturing sector relocating to South. Indeed, the southern states experienced a boom in the decades after the World War II, allowing to them to catch up on per capita income with the rest of the US. The causes of this rather spectacular reversal of anaemic growth performance of now called the Sun Belt are still debated. As our earlier discussion would imply, structural change and factors of production were considered very importance source of growing productivity of South. However, amenities and housing supply were found to be important too (e.g. Glaser et al 2008). What about the role of transportation costs? Transportation costs continued to decline even further throughout the twentieth century as transportation sector witnessed improvements in technology, organization of transport network, the rise of trucking, and investment into new railroad infrastructure such as interstate highway system (Glaeser et al 2004). The implications of even lower transport costs for regional convergence are outlined by new economic geography models which predict that in interaction with high factor costs in geographically concentrated areas, regional disparities will narrow as manufacturing activities will relocate (e.g. Combes at al 2008). That seems to be a story of the manufacturing belt – high wage costs and strong unions were pushing the costs of production up, very likely above agglomeration benefits such as access to intermediate goods offered by the manufacturing belt. Once the transportation costs declined sufficiently enough not to make access to intermediate goods prohibitively expensive, industries began to relocate to South where the cost of labor was lower.

**Conclusion**

Overall, research on US regional activities has identified several channels which could explain long-run development of regional income as presented earlier in this chapter. Narrowing down of regional disparities was due to the forces behind structural change, decline of transportation costs, and even the abundance of raw materials. At the same time, lack of convergence of especially the South before 1940 was attributed to the inner working of labor markets, and the specifics of the southern institutions and the persisting effects of slavery. The slow-down of regional convergence since the 1980s was attributed mainly to the rising housing prices, high demand for skilled labor, and even the abundance of raw materials. Certainly, other factors are in play to explain the dynamism of US regional development and

more work would need to be done to in the areas such as infrastructure, and state regulation and licencing to examine their effects on narrowing/widening of regional income inequalities.

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**Figure 1: GDP per capita across US States, 1880-2010 (1900GK$).**
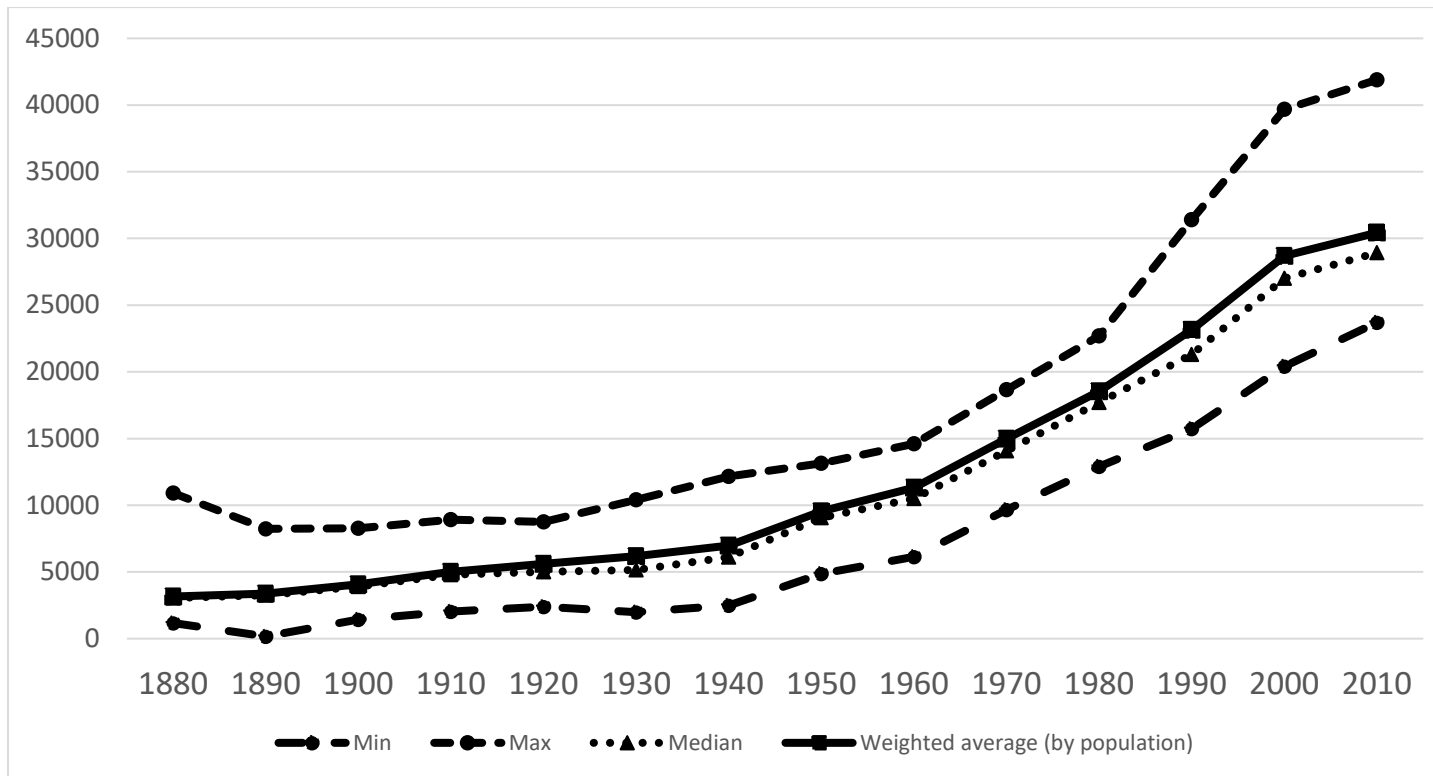


Sources: see text

**Figure 2: Sectoral Employment Shares across US States, 1890-2010.**
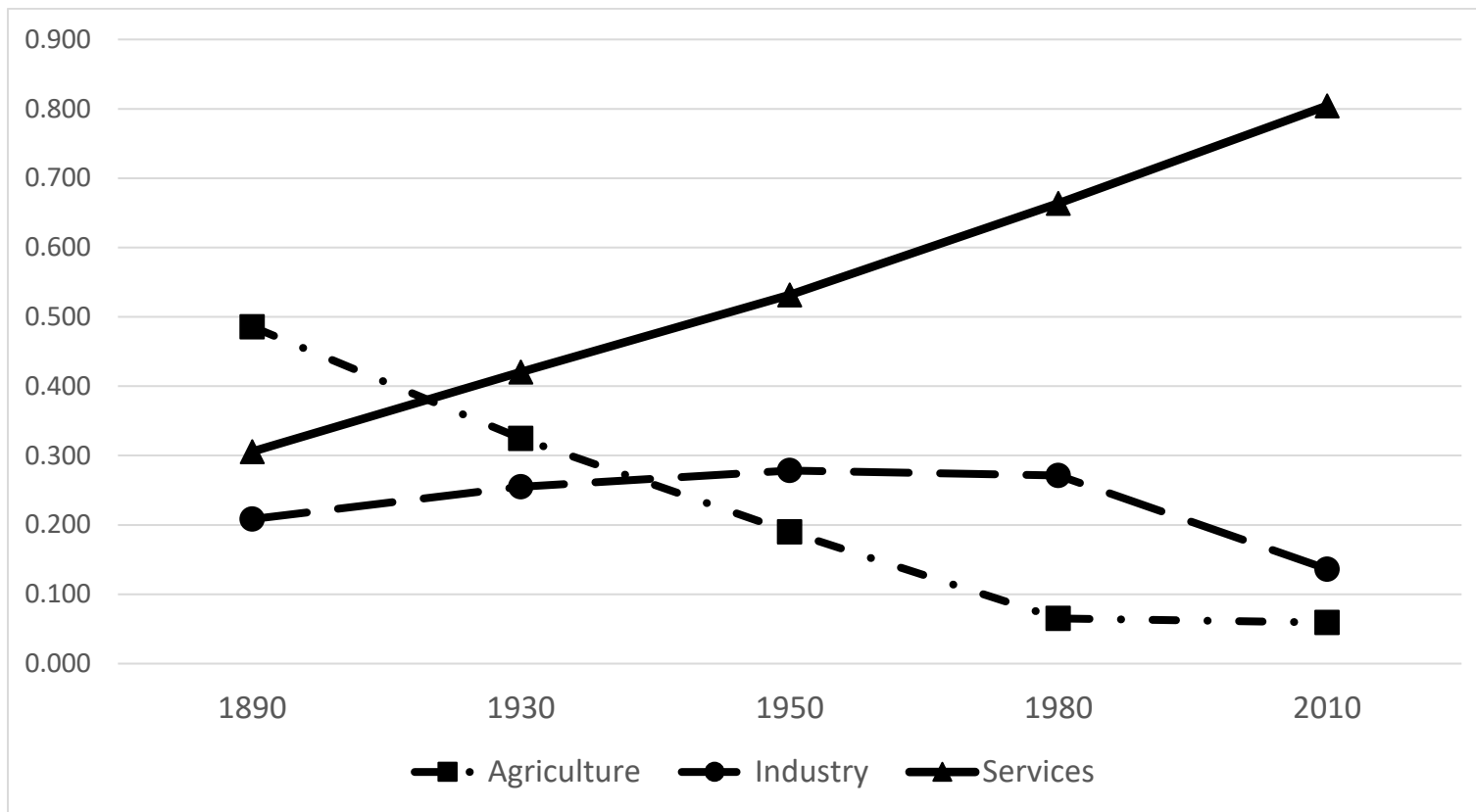


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**Figure 3: The Coefficient of Variation of Location Quotient of Agriculture, Industry, and Services across US States, 1890-2010.**
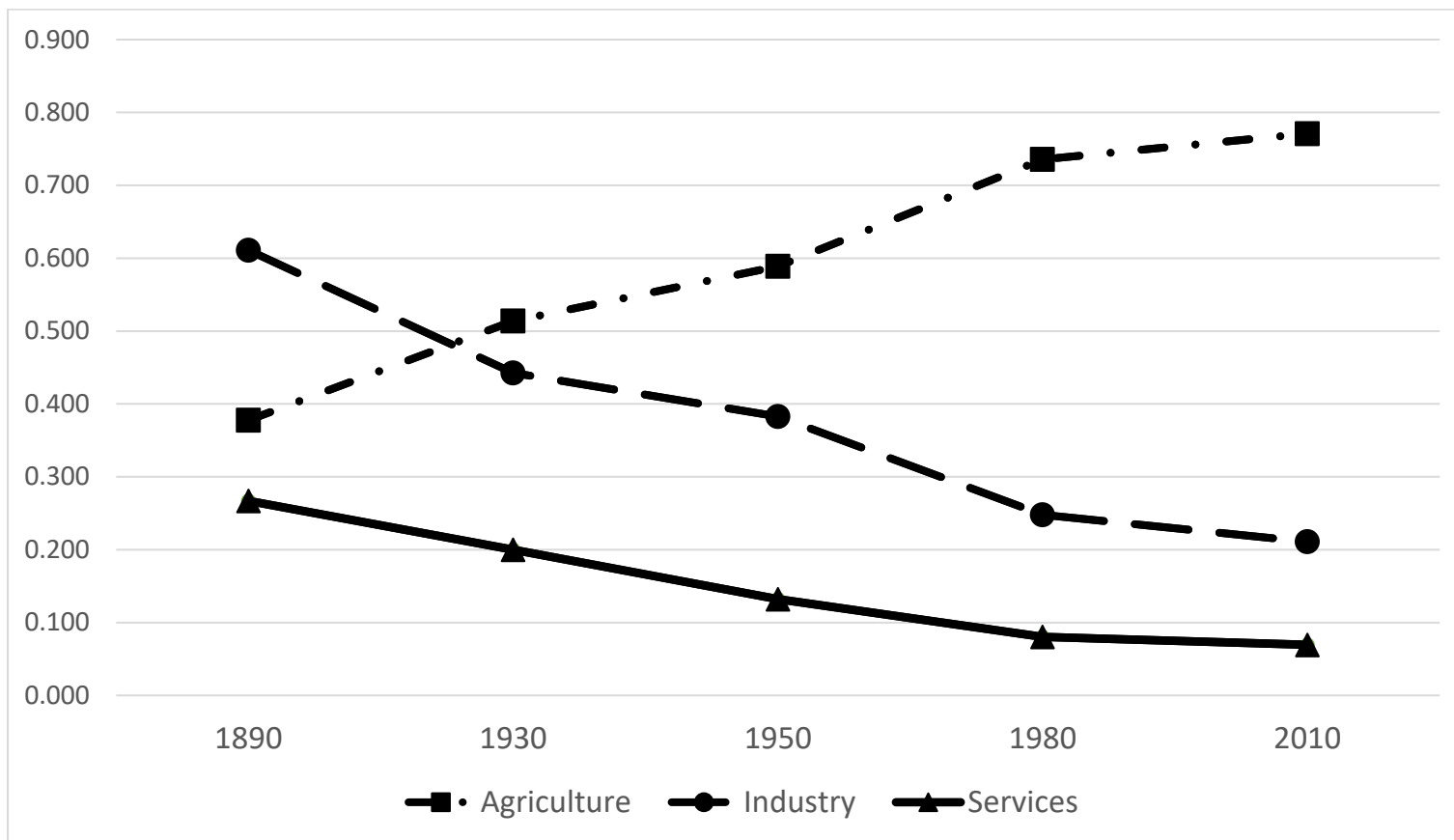


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**Figure 4: Locational Gini Coefficients across US States, 1880-2010.**
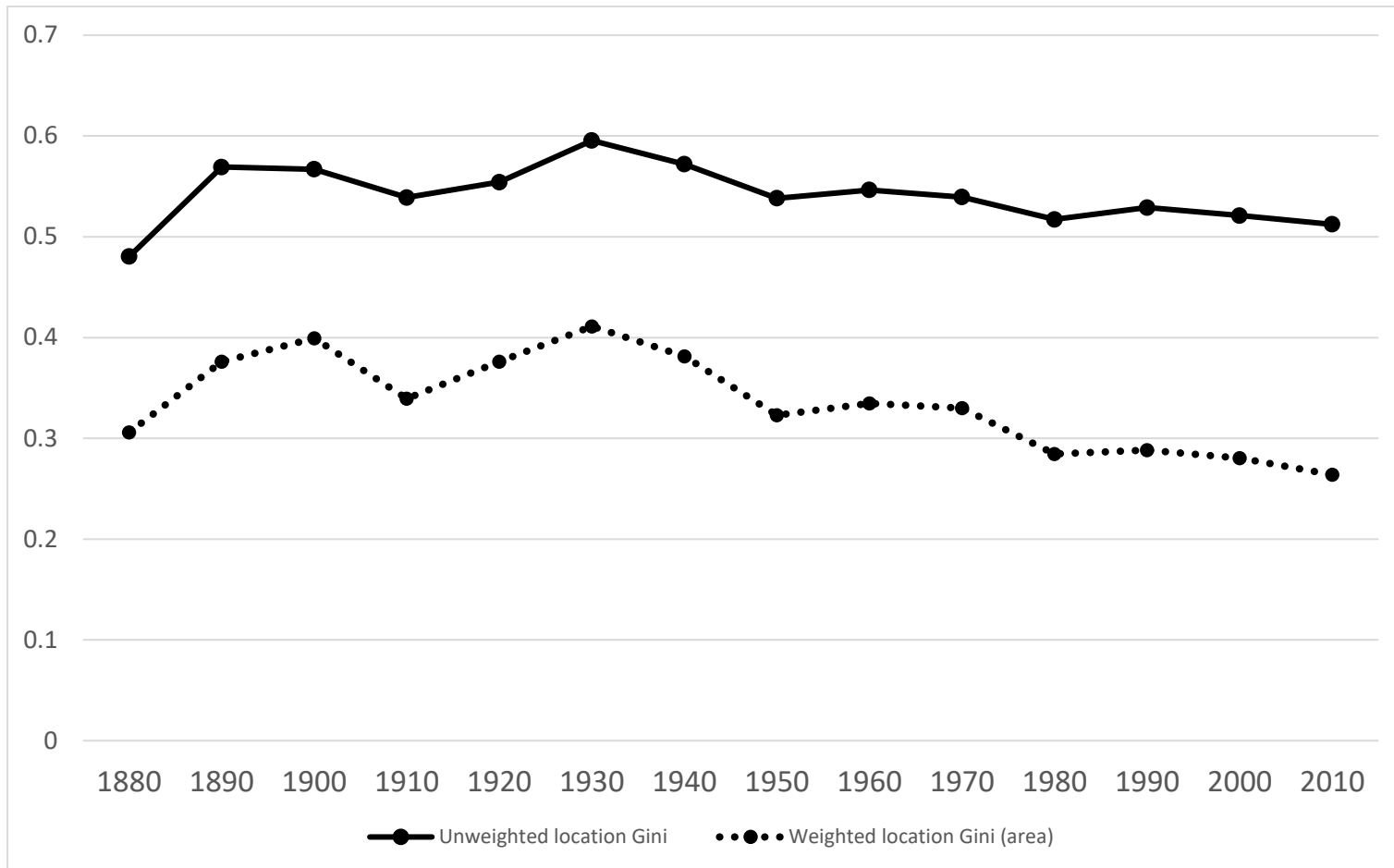


Sources: see text

Note: The calculation of location Gini coefficients is based on GDP per capita in 1990GK$

**Table 5: σ-convergence among US states, 1880-2010 (population weighted coefficient of variation).**

| Region | 1880 | 1890 | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 | 1970 | 1980 | 1990 | 2000 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All US | 0.45 | 0.42 | 0.40 | 0.34 | 0.33 | 0.39 | 0.33 | 0.21 | 0.19 | 0.15 | 0.12 | 0.14 | 0.13 | 0.13 |
| Less West | 0.48 | 0.39 | 0.39 | 0.33 | 0.33 | 0.40 | 0.34 | 0.21 | 0.19 | 0.15 | 0.11 | 0.15 | 0.14 | 0.14 |
| Less South | 0.37 | 0.27 | 0.22 | 0.19 | 0.21 | 0.25 | 0.21 | 0.11 | 0.11 | 0.10 | 0.09 | 0.12 | 0.12 | 0.13 |

Source: see text

Note: The calculation of location Gini coefficients is based on GDP per capita in 1990GK$

## Table 6: Relative Per Capita Total Personal Income of the US States (United States=1)

| US State/US Region | 1880 | 1890 | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 | 1970 | 1980 | 1990 | 2000 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | 0.47 | 0.49 | 0.43 | 0.50 | 0.48 | 0.43 | 0.47 | 0.60 | 0.68 | 0.73 | 0.78 | 0.81 | 0.79 | 0.84 |
| Arizona | 2.84 | 1.15 | 1.57 | 1.26 | 1.08 | 0.83 | 0.85 | 0.90 | 0.91 | 0.94 | 0.94 | 0.87 | 0.87 | 0.87 |
| Arkansas | 0.45 | 0.44 | 0.43 | 0.50 | 0.50 | 0.36 | 0.43 | 0.56 | 0.62 | 0.70 | 0.75 | 0.74 | 0.74 | 0.82 |
| California | 2.27 | 1.97 | 1.78 | 1.80 | 1.53 | 1.44 | 1.42 | 1.24 | 1.24 | 1.18 | 1.18 | 1.10 | 1.10 | 1.07 |
| Colorado | 2.20 | 2.08 | 1.55 | 1.34 | 1.12 | 0.92 | 0.91 | 1.01 | 1.03 | 0.99 | 1.06 | 1.00 | 1.12 | 1.06 |
| Connecticut | 1.50 | 1.44 | 1.44 | 1.21 | 1.21 | 1.49 | 1.55 | 1.25 | 1.23 | 1.24 | 1.22 | 1.35 | 1.38 | 1.37 |
| Delaware | 1.16 | 1.09 | 1.09 | 0.99 | 1.09 | 1.38 | 1.73 | 1.37 | 1.24 | 1.12 | 1.07 | 1.10 | 1.02 | 0.99 |
| Florida | 0.45 | 0.76 | 0.61 | 0.67 | 0.67 | 0.75 | 0.88 | 0.86 | 0.89 | 0.98 | 0.98 | 1.00 | 0.96 | 0.96 |
| Georgia | 0.49 | 0.53 | 0.43 | 0.48 | 0.53 | 0.49 | 0.56 | 0.70 | 0.74 | 0.83 | 0.83 | 0.91 | 0.94 | 0.87 |
| Idaho | 1.73 | 1.12 | 1.07 | 0.99 | 0.92 | 0.79 | 0.77 | 0.88 | 0.83 | 0.87 | 0.86 | 0.81 | 0.81 | 0.80 |
| Illinois | 1.18 | 1.25 | 1.27 | 1.34 | 1.27 | 1.30 | 1.27 | 1.22 | 1.18 | 1.12 | 1.09 | 1.08 | 1.08 | 1.05 |
| Indiana | 0.85 | 0.77 | 0.90 | 0.93 | 0.89 | 0.83 | 0.93 | 1.01 | 0.97 | 0.93 | 0.93 | 0.90 | 0.91 | 0.85 |
| Iowa | 0.96 | 0.95 | 0.97 | 1.13 | 0.87 | 0.81 | 0.83 | 1.02 | 0.91 | 0.95 | 0.95 | 0.90 | 0.90 | 0.95 |
| Kansas | 0.68 | 0.88 | 0.92 | 1.06 | 0.90 | 0.74 | 0.71 | 0.97 | 0.94 | 0.94 | 0.98 | 0.93 | 0.94 | 0.98 |
| Kentucky | 0.61 | 0.61 | 0.59 | 0.62 | 0.62 | 0.52 | 0.53 | 0.65 | 0.71 | 0.78 | 0.80 | 0.79 | 0.82 | 0.81 |
| Louisiana | 0.81 | 0.66 | 0.62 | 0.69 | 0.66 | 0.57 | 0.61 | 0.74 | 0.74 | 0.76 | 0.87 | 0.78 | 0.78 | 0.93 |
| Maine | 0.84 | 0.84 | 0.93 | 0.91 | 0.94 | 0.92 | 0.89 | 0.79 | 0.84 | 0.84 | 0.83 | 0.89 | 0.88 | 0.92 |
| Maryland | 0.96 | 0.97 | 1.00 | 0.96 | 1.12 | 1.15 | 1.20 | 1.09 | 1.04 | 1.12 | 1.11 | 1.17 | 1.14 | 1.23 |
| Massachusetts | 1.65 | 1.54 | 1.53 | 1.26 | 1.39 | 1.35 | 1.32 | 1.10 | 1.10 | 1.10 | 1.05 | 1.18 | 1.26 | 1.28 |
| Michigan | 0.98 | 0.87 | 0.91 | 0.96 | 1.10 | 1.06 | 1.15 | 1.14 | 1.07 | 1.03 | 1.02 | 0.97 | 0.97 | 0.87 |
| Minnesota | 1.00 | 1.01 | 1.02 | 1.09 | 0.88 | 0.88 | 0.88 | 0.95 | 0.94 | 0.99 | 1.01 | 1.02 | 1.08 | 1.07 |
| Mississippi | 0.47 | 0.45 | 0.41 | 0.46 | 0.43 | 0.32 | 0.35 | 0.51 | 0.54 | 0.64 | 0.69 | 0.68 | 0.71 | 0.78 |
| Missouri | 0.89 | 0.91 | 0.93 | 0.93 | 0.90 | 0.90 | 0.87 | 0.95 | 0.97 | 0.94 | 0.92 | 0.91 | 0.92 | 0.93 |
| Montana | 2.59 | 2.43 | 2.02 | 1.47 | 0.96 | 0.80 | 0.95 | 1.10 | 0.91 | 0.89 | 0.90 | 0.79 | 0.77 | 0.88 |
| Nebraska | 0.89 | 1.04 | 1.03 | 1.11 | 0.86 | 0.82 | 0.74 | 1.04 | 0.95 | 0.93 | 0.91 | 0.93 | 0.94 | 0.99 |
| Nevada | 3.43 | 2.22 | 1.95 | 1.73 | 1.45 | 1.34 | 1.51 | 1.32 | 1.29 | 1.21 | 1.16 | 1.04 | 1.02 | 0.92 |
| New Hampshire | 1.09 | 1.05 | 1.07 | 0.97 | 1.01 | 1.04 | 0.98 | 0.89 | 0.97 | 0.95 | 0.97 | 1.05 | 1.12 | 1.09 |
| New Jersey | 1.44 | 1.38 | 1.41 | 1.22 | 1.25 | 1.37 | 1.39 | 1.20 | 1.18 | 1.18 | 1.16 | 1.26 | 1.28 | 1.28 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New Mexico | 0.64 | 0.72 | 0.73 | 0.68 | 0.73 | 0.53 | 0.63 | 0.80 | 0.83 | 0.78 | 0.83 | 0.77 | 0.75 | 0.84 |
| New York | 1.57 | 1.58 | 1.53 | 1.50 | 1.58 | 1.67 | 1.47 | 1.23 | 1.24 | 1.19 | 1.09 | 1.23 | 1.14 | 1.21 |
| North Carolina | 0.37 | 0.33 | 0.35 | 0.41 | 0.54 | 0.46 | 0.54 | 0.71 | 0.71 | 0.80 | 0.81 | 0.89 | 0.92 | 0.88 |
| North Dakota | - | 1.03 | 1.04 | 0.93 | 0.70 | 0.50 | 0.59 | 0.92 | 0.82 | 0.80 | 0.78 | 0.82 | 0.84 | 1.07 |
| Ohio | 1.01 | 1.02 | 1.10 | 1.06 | 1.09 | 1.07 | 1.11 | 1.06 | 1.05 | 1.00 | 0.99 | 0.96 | 0.95 | 0.91 |
| Oklahoma | - | 0.05 | 0.47 | 0.75 | 0.77 | 0.59 | 0.62 | 0.76 | 0.84 | 0.85 | 0.94 | 0.83 | 0.81 | 0.89 |
| Oregon | 1.27 | 1.30 | 1.21 | 1.35 | 1.14 | 0.97 | 1.02 | 1.10 | 1.00 | 0.96 | 1.00 | 0.92 | 0.95 | 0.91 |
| Pennsylvania | 1.28 | 1.23 | 1.25 | 1.08 | 1.14 | 1.15 | 1.10 | 1.03 | 1.01 | 1.00 | 0.99 | 1.00 | 0.99 | 1.02 |
| Rhode Island | 1.55 | 1.47 | 1.48 | 1.23 | 1.30 | 1.28 | 1.27 | 1.03 | 1.00 | 1.00 | 0.96 | 1.02 | 0.97 | 1.05 |
| South Carolina | 0.42 | 0.40 | 0.36 | 0.42 | 0.52 | 0.39 | 0.52 | 0.61 | 0.63 | 0.75 | 0.77 | 0.82 | 0.83 | 0.81 |
| South Dakota | - | 0.74 | 0.90 | 0.95 | 0.83 | 0.57 | 0.60 | 0.86 | 0.83 | 0.80 | 0.80 | 0.83 | 0.87 | 0.99 |
| Tennessee | 0.46 | 0.50 | 0.50 | 0.54 | 0.55 | 0.52 | 0.57 | 0.68 | 0.72 | 0.78 | 0.82 | 0.86 | 0.88 | 0.88 |
| Texas | 0.56 | 0.71 | 0.67 | 0.79 | 0.83 | 0.66 | 0.73 | 0.90 | 0.86 | 0.89 | 0.98 | 0.89 | 0.94 | 0.94 |
| Utah | 0.77 | 1.02 | 0.90 | 1.01 | 0.85 | 0.80 | 0.80 | 0.89 | 0.90 | 0.83 | 0.84 | 0.77 | 0.81 | 0.81 |
| Vermont | 0.94 | 0.96 | 0.94 | 0.95 | 0.89 | 0.92 | 0.87 | 0.77 | 0.84 | 0.89 | 0.85 | 0.91 | 0.93 | 1.00 |
| Virginia | 0.48 | 0.51 | 0.55 | 0.59 | 0.65 | 0.62 | 0.78 | 0.83 | 0.84 | 0.93 | 1.00 | 1.05 | 1.04 | 1.11 |
| Washington | 1.03 | 1.67 | 1.39 | 1.47 | 1.18 | 1.06 | 1.11 | 1.14 | 1.07 | 1.03 | 1.07 | 1.01 | 1.07 | 1.07 |
| West Virginia | 0.50 | 0.50 | 0.59 | 0.73 | 0.79 | 0.66 | 0.68 | 0.70 | 0.73 | 0.76 | 0.80 | 0.75 | 0.73 | 0.80 |
| Wisconsin | 0.88 | 0.80 | 0.89 | 0.89 | 0.93 | 0.94 | 0.92 | 1.00 | 0.99 | 0.97 | 1.00 | 0.93 | 0.96 | 0.96 |
| Wyoming | 1.96 | 1.99 | 1.54 | 1.19 | 1.38 | 0.93 | 1.00 | 1.14 | 1.02 | 0.96 | 1.16 | 0.93 | 0.97 | 1.12 |
| | | | | | | | | | | | | | | |
| Northeast | 1.42 | 1.39 | 1.39 | 1.27 | 1.33 | 1.40 | 1.31 | 1.13 | 1.14 | 1.12 | 1.07 | 1.16 | 1.15 | 1.18 |
| Midwest | 0.97 | 0.97 | 1.02 | 1.07 | 1.02 | 1.00 | 1.01 | 1.06 | 1.03 | 1.00 | 1.00 | 0.97 | 0.98 | 0.95 |
| South | 0.54 | 0.55 | 0.53 | 0.61 | 0.65 | 0.57 | 0.64 | 0.75 | 0.78 | 0.85 | 0.90 | 0.90 | 0.91 | 0.93 |
| West | 1.92 | 1.73 | 1.51 | 1.45 | 1.25 | 1.16 | 1.19 | 1.15 | 1.13 | 1.09 | 1.10 | 1.03 | 1.04 | 1.01 |
| | | | | | | | | | | | | | | |
| Manufacturing belt region | 1.18 | 1.16 | 1.20 | 1.15 | 1.20 | 1.23 | 1.20 | 1.10 | 1.09 | 1.07 | 1.04 | 1.08 | 1.07 | 1.08 |
| Rest of United States | 0.91 | 0.93 | 0.92 | 0.95 | 0.98 | 0.91 | 0.93 | 0.96 | 0.97 | 0.98 | 0.99 | 0.98 | 0.98 | 0.98 |

Source: see text

**Figure 1: β-unconditional convergence among US states, 1880-2010.**



**Figure 2: β- unconditional convergence among US states, 1880-1940.**

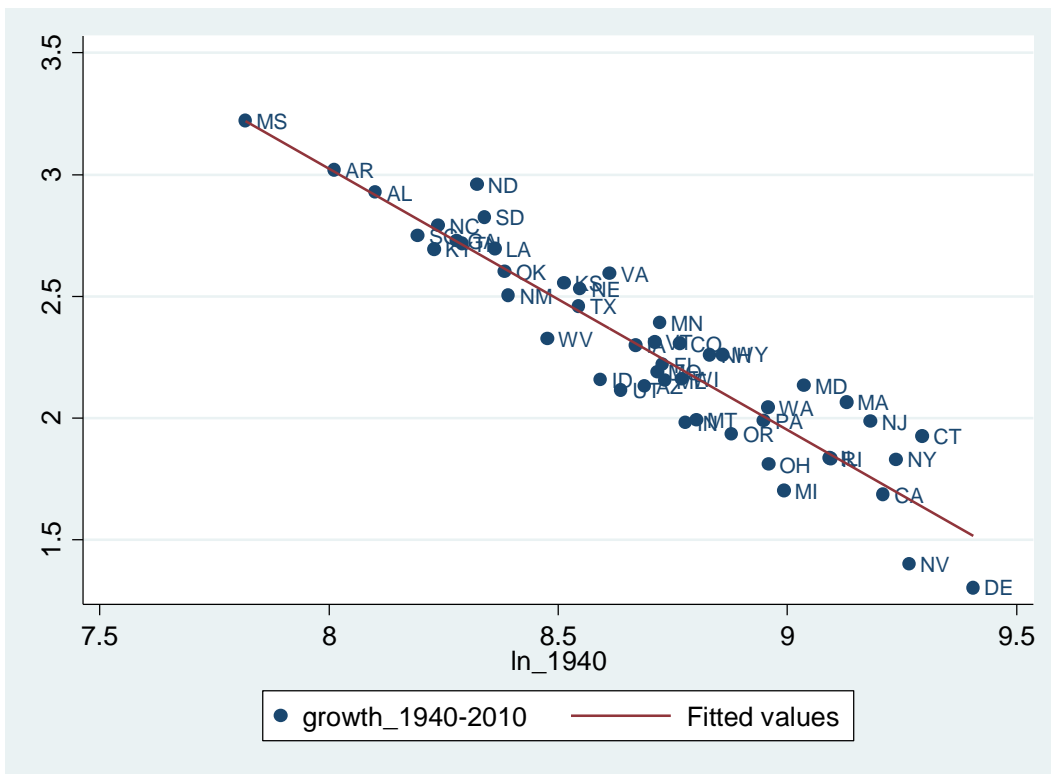**Figure 3: β- unconditional convergence among US states, 1940-2010.**



**Figure 4: β- unconditional convergence among US states, 1920-1940.**