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Estimates for the Period 1880–1910

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Abstract

This paper constructs an estimate of the total personal income for every U.S state in 1880, 1890, 1900, and 1910. The series includes new figures for 1890 and 1910, and updated figures for 1880 and 1900, which were originally estimated by Richard Easterlin more than fifty years ago. The estimation follows the methodology developed by Easterlin. The paper presents a comparison of the original with the updated 1880 and 1900 figures, a formalization of Easterlin's methodology, the details of the data sources and the calculation of the new 1890 and 1910 U.S. states' total personal income estimates.

Keywords: state national income, regional GDP, regional development

Introduction

Measures of economic performance such as GDP over a long period of time are crucial for our understanding of economic development. Annual GDP figures for every U.S. state calculated from the income side for the period 1929 onwards are available from the U.S. Department of Commerce.[1] Regarding figures prior to 1929, Richard Easterlin calculated the personal income estimates for 1840, 1880, 1900, and 1920.[2] Easterlin's figures have been used in economic history as well as other areas of economics such as economic growth and regional economics for several decades and are considered the "industry standard". Indeed, even the most recent work on U.S. regional growth, convergence, and productivity still relies on Easterlin's numbers.[3] This paper contributes to the important research agenda of historical GDP by providing new estimates of the personal income of the U.S. states in 1890 and 1910 and updates of Easterlin's 1880 and 1900 figures. The paper compares the original with the updated figures, formalizes Easterlin's methodology, and discusses the details of the data sources and the calculation of the new 1890 and 1910 U.S. states' total personal income estimates.

The new 1890 and 1910 figures fill the gap in the series of the U.S. states total personal income for the post 1880 period and as a result, we obtain the estimates for *every* decennial year between 1880 and 1920. These estimates then allow us to draw a more precise picture of U.S. regional economic development in that period than we have had to date and to improve our understanding of a time that is of utmost importance in U.S. economic history.

[1] U.S. Department of Commerce (1995).

[2] Easterlin (1957), Easterlin (1960). Easterlin (1957) also provides U.S. states' total personal income in 1949–51.

[3] For example, Mitchener and Mclean (1999), Mitchener and Mclean (2003), Connolly (2004), Coleman II and Caselli (2001), Barro and Sala-i-Martin (1991).

Indeed, 1880–1920 was the period when the second industrial revolution took place, globalization was in full blossom, and when the whole U.S. economy was dramatically transforming from an agrarian to an industrial economy. It was also the period when the U.S. overtook its main European competitors, achieving higher GDP per capita than the most developed country in the world at that time—Great Britain—and became an industrial leader.

The paper follows the estimating procedure used by Richard Easterlin in his 1957 study. Easterlin developed a clever methodology to estimate the total personal income of every U.S. state in 1880 and 1900 using censuses, government reports, and various studies on U.S. personal income. He often faced a shortage of data and therefore complemented his methodology by a series of assumptions and procedures that proxied the missing data. To understand his methodology as well as those assumptions and procedures I decided to replicate his estimation of the 1880 and 1900 figures. During that process I discovered that some parts of the methodology could be updated and amended, which would then improve the original 1880 and 1900 figures. Therefore, this paper presents the updated 1880 and 1900 figures as well.[4]

The updating of the 1880 and 1900 figures includes the use of new estimates of the total personal income in 1880 calculated from the figures from Robert E. Gallman as published in Rhode (2002), and the use of Perloff et al. labor force data for 1880 and 1900.[5] I have also amended the estimates of the manufacturing sector in 1880 and 1900, which now include the hand trades and the intermittently covered industries that were excluded by Easterlin. In addition, recalculation of the 1880 and 1900 estimates allows for the correction of minor calculation mistakes, which might have happened due to the massive amount of data used to derive the total personal income for every U.S. state. This paper makes no attempt to

[4] I present only the updated 1880 and 1900 figures and the comparison with Easterlin's original estimates. The details of the calculations are available from the author upon request.

[5] Rhode (2002), Perloff et al. (1960).

recalculate the 1920 figures. Easterlin did not use his methodology to calculate the states' personal incomes in 1920; instead of this he used the figures from Maurice Leven and made several adjustments to conform to the concept of total personal income (Easterlin 1957, pp. 738–739).[6]

Before I proceed, a couple of technical issues warrant discussion. First, the paper presents a formalization of Easterlin's methodology. I decided to keep his specific terminology, which in some cases may sound outdated, such as *service income*, which denotes not the income in the service sector but the sum of wages, salaries, and the proprietor's income. Second, the main body of the paper provides only a general reference to U.S. government sources, for example the U.S. Census of Manufactures, the Interstate Commerce Commission report, etc. Detailed references are provided in a special reference table in the appendix. The paper proceeds as follows. The second section describes Easterlin's methodology, the third discusses the data sources and the details of the calculations, the fourth presents the updated 1880 and 1900 figures, the fifth presents the new 1890 and 1910 estimates, and the last concludes.

Methodology[7]

The main idea of Easterlin's methodology was to obtain the ratio of the state total personal income per capita relative to the U.S. total personal income per capita for each U.S. state. These ratios are then used to allocate the U.S. total personal income per capita among the states. The total personal income consists of what Easterlin calls *service* income and *property*

[6] Leven (1925).

[7] An extensive discussion of this methodology is presented in the earlier version of this paper, which is available from the author upon request.

income. Service income includes wages, salaries, and the proprietor's income in agriculture and six non-agriculture industries; property income includes rental income, personal interest income, and dividends, again in agriculture and six non-agriculture industries. The non-agriculture industries consist of manufacturing, mining, construction, transportation and communication and public utilities, private households including domestic service performed in private households, and "all other", which includes finance, trade, government, and other services than domestic services.

The methodology includes two main stages:

1. estimation of the U.S. total personal income per capita by type and industry, and
2. estimation of the ratio of the state total personal income per capita to the U.S. total personal income per capita.

The first stage establishes the U.S. total personal income per capita, and the U.S. total personal income per capita by type—service and property—for all the above-mentioned industries. These totals are crucial because they are going to be distributed among the U.S. states, and because they are instrumental in obtaining the sum of the ratios calculated in the second stage.

The second stage calculates the state total personal income per capita relative to the U.S. total personal income per capita. In a nutshell, it is done by summing the state total service income per capita relative to the U.S. total service income per capita and the state total property income per capita relative to the U.S. total property income per capita. The calculation of each of those ratios involves several steps and altogether it forms a complex system of mutually dependent equations. Since the first stage is a rather straightforward exercise in obtaining and adjusting the total personal income from various data sources, I leave it for the next section; here I focus on the explanation of the second stage. For the sake of clarity of notation, I am going to use the state of New York instead of the state index *i* after

the presentation of the general formula of the ratio of the state total personal income per capita to the U.S. total personal income per capita.

The state total personal income per capita ratio is calculated using the following formula:[8]

$$\frac{TPI\ pc_i}{TPI\ pcUS} = \left(\frac{SI\ pc_i^{\ Total}}{SI\ pcUS^{\ Total}} \times \frac{SI^{\ US}}{TPI^{\ US}} \right) + \left(\frac{PI\ pc_i^{\ Total}}{PI\ pcUS^{\ Total}} \times \frac{PI^{\ US}}{TPI^{\ US}} \right) \qquad (1),$$

where $TPIpc_i$ is the total personal income per capita in state *i*, *TPIpcUS* is the total personal income per capita in the U.S., $SIpc_i^{Total}$ is the total service income per capita in state *i*, $SIpcUS^{Total}$ is the total service income per capita in the U.S., $PIpc_i^{Total}$ is the total property income per capita in state *i*, $PIpcUS^{Total}$ is the total property income per capita in the U.S., SI^{US} is the total service income in the U.S., PI^{US} is the total property income in the U.S., and TPI^{US} is the total personal income in the U.S. I denote the first term in the *first* bracket on the right-hand side as the state total service income per capita ratio, the first term in the *second* bracket as the state total property income per capita ratio.[9] We see that the state total personal income per capita ratio is the sum of the state total service income per capita ratio and the state total property income per capita ratio, weighted by the share of the U.S. total service income and the U.S. total property income on the U.S. total personal income, respectively.

The calculation of the state total service income per capita ratio follows the formula:

$$\frac{SI\ pc\ NY^{\ Total}}{SI\ pcUS^{\ Total}} = \frac{SI\ pw\ NY^{\ Total}}{SI\ pwUS^{\ Total}} * \frac{share\ of\ \ population\ in\ labor\ \ force\ in\ NY}{share\ of\ \ population\ in\ labor\ \ force\ in\ US} \qquad (2),$$

[8] Easterlin calls it total income per capita relative (see Easterlin 1957, page 709).

[9] Easterlin denotes it service income per capita relative and property income per capita relative, respectively (see Easterlin 1957, page 709).

where $SIpcNY^{Total}$ is the total service income *per capita* in the state of New York, $SIpcNY^{Total}$ is the total service income *per worker* in the state of New York, and $SIpcUS^{Total}$ and $SIpwUS^{Total}$ are the U.S. counterparts. I call the first ratio on the right-hand side of equation 2 as the state service income per worker ratio. We see that the calculation of the state total service income per capita ratio consists of two parts: first, the state total service income per *worker* relative to the U.S. total service income per *worker* is estimated; second, this estimate is multiplied by the state share of the population in the labor force relative to the U.S. share of the population in the labor force.

The state total service income per worker ratio is calculated as follows:

$$\frac{SI\ pw\,NY^{Total}}{SI\ pwUS^{Total}} = \sum_j \left(\frac{SI\ pw\,NY^{j}}{SI\ pwUS^{j}} * \frac{SI\ pwUS^{j}}{SI\ pwUS^{Total}} * \frac{labor\ force\,NY^{j}}{labor\ force\ NY^{Total}} \right) \qquad (3),$$

where *j*=agriculture or non-agriculture, $SIpwUS^{j}$ is the U.S. service income per worker in sector *j*, and $SIpwNY^{j}$ is the service income per worker in sector *j* in the state of New York. The first ratio on the right-hand side of equation 3 was coined by Easterlin as the "interstate differential" and the second as the "interindustry differential". As we see, the interstate differential in a particular industry is simply the ratio of the state service income per worker in that particular industry to the U.S. service income per worker in that industry. The interindustry differential is the ratio of the U.S. service income per worker in that particular industry to the U.S. total service income per worker.

The interstate differential in agriculture is calculated as

$$\frac{SI\ pw\,NY^{Agriculture}}{SI\ pwUS^{Agriculture}} = \left(\frac{SI\ pw\,NY^{Agriculture}}{SI\ pwUS^{Agriculture}} \right) \qquad (4)$$

and in non-agriculture as

$$\frac{SI\ pw\,NY^{\,Non-agriculture}}{SI\ pwUS^{\,Non-agriculture}} = \sum_i \left(\frac{SI\ pw\,NY^{\,i}}{SI\ pwUS^{\,i}} * \frac{SI\ pwUS^{\,i}}{SI\ pwUS^{\,NA}} * \frac{labor\ force\,NY^{\,i}}{labor\ force\ NY^{\,NA}} \right) \qquad (5)\ ,$$

where i=1, …, n, n is the number of non-agriculture sectors in the economy, $SIpwNY^{\,i}$ is the service income per worker in the state of New York in industry i, $SIpwUS^{\,i}$ is the U.S. service income per worker in industry i, and $SIpwUS^{\,NA}$ is the U.S. service income per worker in the whole non-agriculture sector. Similarly as in equation 3, the first term on the right-hand side of equation 5 is called the interstate differential of sector i, and the second term is the interindustry differential of sector i.

The calculation of the state total property income per capita ratio is complicated by the fact that the relevant data are only available for the whole U.S. Therefore Easterlin devises a methodology that overcomes this obstacle by making use of other property-income-related sources and maintaining certain assumptions. The main assumption enabling the calculation of the property income per capita ratio is that the state share in the U.S. total property income is equal to the state share in the U.S. total wealth generating this income, the so-called *income-originating wealth*. The reason for that is the possibility to obtain the figures of the states' income-originating wealth from the U.S. censuses. The calculations are done separately for the agriculture and non-agriculture sectors. The state total property income per capita relative to the U.S. property income per capita is then calculated as follows:

$$\frac{PI\ pc\,NY^{\,Total}}{PI\ pc\,US^{\,Total}} = \left(\sum_j \frac{Wealth\,NY^{\,j}}{Wealth\,US^{\,j}} * \frac{PI^{\,j}}{PI\,US^{\,Total}} \right) * \frac{Population\,NY}{Population\,US} \qquad (6)\ ,$$

where j=agriculture or non-agriculture, $PIpcNY^{Total}$ is the total property income of the state of New York, $PIpcUS^{Total}$ is the U.S. total property income per capita, $PI^{\,j}$ is the property income in sector j, $PIUS^{Total}$ is the U.S. total property income, $Wealth\ NY^{j}$ is the income-originating wealth in sector j in the state of New York, and $Wealth\ US^{\,j}$ is the income-originating wealth in sector j in the U.S. Notice that this calculation is similar to the calculation of the state total

service income ratio. The first term on the right-hand side of equation 6 is similar to the interstate differential in equation 3 and can be interpreted as the interstate differential for the income-originating wealth, while the second term is similar to the interindustry differential in equation 3 and can be viewed as the interindustry differential for the income-generating wealth.

Once all the steps of the calculation of the state total personal income per capita ratio are finished, we can obtain the value of the state total personal income per capita by multiplying that ratio by the U.S. total personal income per capita. For example, the state total personal income per capita ratio of the state of New York in 1890 is 1.58. This means that the total personal income per capita of the state of New York is 58 percent higher than the U.S. total personal income per capita. Multiplying this ratio by 185 USD, which is the U.S. total personal income per capita in 1890, we obtain 292 USD: the total personal income per capita of the state of New York in 1890. The total personal income of the state of New York in 1890 is then easily obtained by multiplying that value by the population of the state of New York in 1890.

Data Sources and Calculations

This section discusses the calculations, the data sources, and the assumptions and procedures to obtain missing data for the estimation of 1890 and 1910 U.S. state total personal income. As the methodology section revealed, the calculation involves six main elements: (1) the U.S. total personal income by type and industry (I denote it as the U.S. totals); (2) the interstate differentials; (3) the interindustry differentials; (4) the property income per capita differentials; (5) the labor force by state and industry; (6) the population by state. The U.S. totals are required for two reasons. First, they are needed to derive the interindustry

differential; second, they are needed to calculate the state total personal income using the state total personal income per capita ratios, as explained by the example at the end of the previous section. The interstate differentials and the property income differentials are the backbone of the whole methodology, expressing the relation of the state personal income per capita to the U.S. personal income per capita. The interindustry differentials help to aggregate the sectoral interindustry differentials, and the labor force and population figures adjust for the incomplete coverage of the labor force in the U.S. censuses. The discussion of the data sources and the calculations are done in that order. Before I proceed, however, the nature of the data sources and the issue of the labor force estimates warrant discussion.

The U.S Census Bureau did not provide consistent census records in our period and therefore the coverage of the economic activity varies from census to census. This required making assumptions and devising procedures to fill in the gaps. In some cases, Easterlin's assumptions used to calculate 1880 and 1900 estimates were suitable for the calculations of 1890 and 1910 estimates. In other cases, new assumptions were used in the face of different data for 1890 and 1910. To clearly distinguish between Easterlin's and my new assumptions, Easterlin's assumptions are always accompanied by references to his 1957 study.

The labor force estimates are an issue because the studies from which the labor force estimates can be drawn provide different sectoral coverage, making it difficult to exactly follow Easterlin's methodology. Easterlin used labor force data from the study by Ann Ratner Miller and Carol P. Brainerd that provides industry-specific labor force estimates for 1880, 1900, 1940 and 1950 and the industries include agriculture, forestry and fisheries, mining, construction, manufacturing, transportation and communication, trade and finance, services and public administration, and a category called "not reported".[10] Since the labor force figures are missing for 1890 and 1910, I had to use the industry-specific labor force data for those

[10] Miller and Brainerd (1957).

years from Perloff et al.[11] The study provides the decadal industry-specific labor force data for the period 1870–1950 and the industries include agriculture, forestry, fisheries, mining, manufacturing, and services. We see that the sectoral coverage in these studies differs; specifically there are no labor force estimates for construction, transportation and communication, trade and finance, or services and public administration in 1890 or 1910. As a result, I faced a challenge to follow Easterlin's methodology that, as we have seen above, relies on sectoral labor force figures. Therefore, I broke down Perloff et al. (1960) labor force data into sectors as in Miller and Brainerd (1957). The details are explained in the section "Labor Force and Population".[12]

U.S. Total Personal Income in 1890 and 1910

The total personal income of the U.S. in 1890 and 1910 is presented in Table 1. This table also shows the figures for 1880 and 1900 because they were used in the recalculation of the original 1880 and 1900 total personal income estimates, as will be discussed in the next section. The figures are derived from the total personal income (TPI) estimates of Goldsmith

[11] Perloff et al. (1960).

[12] The absence of the labor force data in 1890 and 1910 in Miller and Brainerd's (1957) study and the lack of a more detailed sectoral breakdown in Perloff et al.'s (1960) study are puzzling. In particular, the study by Perloff et al. raises a question why the sectoral coverage differs from Miller and Brainerd's since Perloff et al. use Miller and Brainerd's data on the total agriculture and total non-agriculture sector to derive their industry breakdown using the original census reports and the comparative occupational statistics of A. M. Edwards (1943). It is not clear why this is the case.

et al. (1956) and the nominal GNP estimates of Robert E. Gallman published in Rhode (2002).[13]

The estimates for 1880 and 1890 are calculated from Gallman's data as the averages of 1879–1881 and 1889–1891, respectively. Since Gallman provides GNP figures, I calculated the TPI following Easterlin's suggestion (Easterlin, 1957, page 705). First, the average GNP in 1879–1881 and in 1889–1891 are calculated from Gallman's figures as published in Rhode (2002), Table 3. Second, the average TPI in 1899–1901 is calculated from Goldsmith et al. (1956) (Table N1, page 427, column 4). Third, the ratios of the average TPI in 1899–1901 to the average GNP in 1879–1881 and in 1889–1891 are calculated. Fourth, these ratios are multiplied by Gallman's GNP figures for 1879–1881 and 1889–1891 to obtain TPI estimates. Finally, the 1880 and 1890 TPI are calculated as the average of the 1879–1881 and 1889–1891 figures obtained in the previous step. The estimates of TPI in 1900 and 1910 are calculated from Goldsmith et al. (1956) (Table N1, page 427, column 4) as the average TPI in 1899–1901 and 1909–1911, respectively.

In addition to the U.S total personal income, equations 1–6 show that we need the U.S. service income in agriculture and non-agriculture as well as the U.S. total service income and the U.S. total property income. The distribution of the U.S. total personal income between the total service income and the total property income, and between the agriculture and non-agriculture sectors is based on the shares calculated from the sectoral estimates, as will be discussed in the next section. Before that, however, a short discussion on this is needed. The sectoral estimates are presented in Table 2. The comparison of Tables 1 and 2 reveals that the total personal incomes are slightly different, with the numbers in Table 2 being generally lower (except for 1900) than in Table 1. The most likely reason for this is that the calculation

[13] Goldsmith et al. (1956). Disclaimer required by Rhode: Gallman's series was not constructed for analysis as an annual series.

of the sectoral income figures uses sources that usually do not cover the whole economy, as will be seen later on. Therefore, using the shares from Table 2 to distribute the total personal income in Table 1 between the service and property income, and between the agriculture and non-agriculture income assumes that those shares hold for the whole economy and not only for the part covered by the sources of Table 2.

U.S. Total Personal Income by Sector and Type in 1890 and 1910

The estimation of the U.S. total personal income by sector and type follows the procedure and the data sources used by Easterlin to obtain his 1880 and 1900 figures (Easterlin 1957, Table 4.2, pp. 711–714). The main data are taken from the study by Robert F. Martin (1939) (10, 58, 66–85, 90, 98–99); other data are from the Historical Statistics of the United States, Millennial edition, and the U.S. Census of Wealth (1922).[14] Martin derives his data mostly from the work of Simon Kuznets (1936) and Willford I. King (1930), and complements them by the U.S. censuses and the Interstate Commerce Commission Reports.[15] The data include the total personal income for agriculture, mining, electricity and gas, manufacturing, construction, transport and communication, trade, services, finance, and government for the period 1799–1937 (Martin 1939, pp. 10, 58, 87) and the breakdown of the total personal income in those industries between the service income and property income for the period 1899–1937 (Martin 1939, pp. 65–90). The service income in each sector is calculated as the sum of wages, salaries, entrepreneurial income, and the imputed net rent and mortgage interest of farm homes; the property income in each sector is calculated as the sum of dividends, interest payments, and net rent and royalties.

[14] Martin (1939). Detailed references to the table numbers in this study are provided in the Appendix.

[15] King (1930), Kuznets (1956). Martin's study provides detailed references to the sources in an appendix on pages 105–146.

Martin's data present two challenges in the estimation of 1890 figures.[16] First, the estimates of the total sectoral income in agriculture, transportation and communication and electricity and gas in 1889 required a revision. Second, the division of the total personal income between the service income and the property income is available only from 1899 onwards and therefore a procedure that would split the total personal income between the service and the property income in 1889 had to be devised.

The agriculture total income in 1889 needed to be recalculated because it was underestimated. The reason is that Martin uses the census value of farm products as a basis for the projection of 1899 agricultural income back to 1869. The census concept of the "value of farm products" for the years before 1899, however, is more equivalent to the "value of farm products not fed to livestock" as reported in the 1899 census and which is about 75 percent of the "value of farm products". This implies that the agricultural income for those years is underestimated by about 25 percent. Therefore, Martin's estimate was recalculated by applying the 1899 agricultural income to the ratio of the value of farm products in 1890 to the value of farm products not fed to livestock in 1899 and by adding the imputed net rent and the mortgage interest on owner-occupied farm houses, as suggested by Easterlin (Easterlin, 1957, page 712). The imputed net rent was calculated directly from Martin's (1939) data (Tables 43 and 44, pp. 98–99). Specifically, a so-called "Miscellaneous Income of Private Origin" in Table 43 was multiplied by "Net Rent on Farm Homes" in Table 44. The former is the sum of the net rent from farm homes, the net rent from non-farm homes, interest from mortgages on owned homes, and pensions and compensations for injuries; the latter is the percentage of the net rent on farm homes from "Miscellaneous Income of Private Origin". The calculation of the mortgage interest on owner-occupied farm houses is complicated by the fact that Martin provides data on the share of mortgage interest on all houses and does not distinguish between

[16] Martin's personal income estimates are for 1889. I assume that 1889 figures hold for 1890 as well.

farm and non-farm houses (Table 44, page 99). To derive the share of mortgage interest on farm houses only, I followed Easterlin's suggestion (Easterlin, 1957, page 714) and assumed that the share of the owner-occupied farm houses' mortgage interest payment on the total mortgage interest payment is the same as the share of the farm houses' net rent on the total net rent. The mortgage interest payment was then obtained by multiplying the calculated share of mortgage interest on farm houses by "Miscellaneous Income of Private Origin" in Table 43.

The revision of the total income for transportation, communication and public utilities (TCPU) in 1889 was necessary because Martin's estimates are overestimated. This was revealed by comparing the service income per worker in this sector with the service income per worker in all sectors and the non-agriculture sectors. Specifically, the service income per worker in TCPU exceeds that for all sectors by 65 percent and in non-agriculture sectors by 25 percent. This seems to be inconsistent with the TCPU sector in 1899, which is based on fuller information, and which shows that the service income per worker in TCPU exceeds that in all sectors by only 37 percent and in the non-agriculture sectors by 7 percent. To correct this, I followed Easterlin, who, facing a similar problem for 1879, proposed to multiply the average employee compensation in TCPU, calculated from the U.S. census, by the total labor force in TCPU (Easterlin, 1957, pp. 712–713).[17]

The division of the total income in each sector in 1889 between the service income and property income was based on the trends in the shares of property income on the total income in each sector between 1899 and 1929 calculated from Martin (pp. 66–85, 90), as Easterlin did for 1879 (Easterlin 1957, page 713). The only clear trend appears in agriculture, which shows about a one-percent decrease per decade. Therefore, the agriculture average

[17] The U.S. census of transportation covers approximately 500,000 employees out of about 800,000 workers in the whole sector. The correction assumes that the average employee compensation covered by the census is equal to the average employee compensation in the whole sector.

share of property income was decreased by one percent on 1889.[18] For all other industries, the average share of property income in 1899–1904 was used. The property income in each sector was then obtained by multiplying those shares by the total personal income.

In addition to the sectoral service and property income in 1889, we need the U.S. total service income and U.S. total property income in that year, as was discussed at the end of the previous section. The U.S. total service income in 1889 was calculated as the sum of the sectoral service incomes. The U.S. total property income in 1889 was calculated as the sum of the sectoral property incomes, the government interest payment, and a miscellaneous category that includes net rent and mortgage interest on owned non-farm homes. The government interest payment consists of federal, state, and local interest payments. The federal government interest payment was taken from the Historical Statistics of the United States, Millennial Edition, Volume 5 (pages 5–97, Table Ee650-661).[19] The state and local government interest payment was calculated by multiplying the estimated ratio of the interest rate on the state and local debt to the amount of the state and local debt. The interest rate was derived in three steps, as suggested by Easterlin (Easterlin 1957, pp.713–714) for 1879:

[18] It is not clear why Easterlin chose this time period. I have also considered shorter time periods (1899–1915, 1899–1909, 1899–1905) and the calculated trends do not suggest a decrease of the shares of property income in agriculture. To see whether decreasing the share of property income in agriculture by one percent, as suggested by Easterlin, yields different property income in agriculture than in the case when we do not decrease it, I calculated the property income in both cases. The quantitative difference is miniscule.

[19] Easterlin used the data from Historical Statistics of the United States published in 1947 (page 306, series P-137). Those data are virtually the same as the ones used in this study.

$$1.\ Average\ State\ \&\ Local\ Interest\ Rate_{1902} = \frac{State\ \&\ Local\ Interest\ Payment_{1902}}{State\ \&\ Local\ Debt_{1902}}$$

$$2.\ Average\ Federal\ Interest\ Rate_{1902} = \frac{Federal\ Interest\ Payment_{1902}}{Federal\ Debt_{1902}}$$

.

$$3.\ Average\ State\ \&\ Local\ Interest\ Rate_{1889} = \frac{Average\ State\ \&\ Local\ Interest\ Rate_{1889}}{Average\ Federal\ Interest\ Rate_{1889}} \times$$

$$\times\ Average\ Federal\ Interest\ Rate_{1889}$$

The state and local debt and interest rate payments were derived from the U.S. census of wealth (1922); the federal debt is taken from the Historical Statistics of the United States, Millennial Edition, Volume 5 (page 5–97, Table Ee650–661).[20] In the last step it is assumed that that the ratio of the average state and local interest payment to the average federal interest payment in 1889 is equal to the ratio in 1902, calculated from the first two steps.

The imputed net rent on owner-occupied non-farm houses and the mortgage interest payment on owner-occupied non-farm houses are derived from Martin's data (Martin, 1939, pp. 98–99, Tables 43 and 44) and the calculation follows Easterlin (Easterlin 1957, page 713). The imputed net rent was calculated similarly as in the case of the farm homes: "Miscellaneous Income of Private Origin" in Table 43 was multiplied by "Net Rent on Non-Farm Homes" in Table 44. As for the mortgage interest payment on non-farm houses, I faced a similar situation as the case with the mortgage interest on owner-occupied farm houses, and therefore assumed, similarly to the farm houses case, that the share of the owner-occupied non-farm houses' mortgage interest payment on the total mortgage interest payment is the same as the share of the non-farm houses' net rent on the total net rent.

[20] Again, Easterlin used the data from Historical Statistics of the United States published in 1947 (page 306, series P-136, P-137). Those data are virtually the same as the ones used in this study.

As for 1910, Martin's data (Martin, 1939, pp. 10, 58, 66–85, 90, 98–99) were used again to obtain service income and property income in each sector. The service income is calculated as the sum of wages, salaries, entrepreneurial income, and the imputed net rent and mortgage interest of farm homes; the property income is calculated as the sum of dividends, interest payments, and net rent and royalties. The imputed net rents on the mortgage interest payment on farms were calculated exactly as for 1889. The U.S. total service income is derived by summing the sectoral service incomes; the U.S. total property income as the sum of the sectoral property incomes and the imputed net rent and mortgage interest on owned non-farm homes. The mortgage interest on owned non-farm homes was also calculated exactly as for 1889. All sectoral and U.S. total figures were calculated for the period 1909–1911 and the final figure for 1910 was obtained as the arithmetic mean for that period.[21]

Interstate Differentials in 1890

The calculations are based on wages, salaries, and the number of employees obtained from the U.S. censuses, various reports of the U.S. Bureau of Census, and the Interstate Commerce Commission. The major departure from Easterlin is the manufacturing and construction sector. Specifically, this paper aggregates the manufacturing and construction sector and the hand trades and intermittently-covered industries. Easterlin treats manufacturing and construction separately and excludes the hand trades and intermittently-covered industries. The reason for this departure is the lack of labor force data for construction in 1890 and 1910 as explained earlier, and the possibility presented by the U.S. censuses of manufactures to

[21] The use of the arithmetic mean was not possible in the calculations of 1890 figures because Martin's study only provides the annual estimates from 1899 onwards.

aggregate the manufacturing and construction sectors without violating Easterlin's methodology. The details are explained in the section on manufacturing and construction.

Agriculture

The calculation of the interstate differential in agriculture presents a challenge because the U.S. censuses of agriculture do not provide data on the total compensation of agriculture employees and the total number of agriculture employees. Therefore, Easterlin proposes (Easterlin 1957, pp. 714–717) using agriculture labor force figures instead of the number of agriculture employees and a proxy for the net income in agriculture. The calculation of the interstate differentials then consists of three stages: the calculation of the net income, the calculation of the states' labor force shares in agriculture, and the final interstate differential calculation.

As for the net income, Easterlin uses the value of farm products not fed to livestock and an adjustment to relate this value to the net income. The calculation involves three steps. First, the percentage of the U.S. value of farm products not fed to livestock is calculated for each state using the U.S. Census of Agriculture data. Second, the ratio of the above-calculated percentage to the net income from farming in 1929 and 1939 was computed. Finally, the percentage calculated in the first step is adjusted proportionately based on the ratio calculated in the second step. This final adjustment involves for some states raising and for some lowering the calculated percentage. Easterlin does not provide a reference to the source used in calculating the ratio to adjust the percentage of the U.S. value of farm products not fed to livestock (second step). He provides, however, the final adjusted percentages for 1880 and 1900 (Easterlin 1957, Table 4.3, page 716). Therefore, I use the average of the 1880 and 1900 figures for 1890, and 1900 figures for 1910. The final adjusted percentages provided by

Easterlin are similar in both years ranging, in absolute values, from 0.01 to 0.68 percent in 1880 and from 0.01 to 0.57 percent in 1900.

As for the number of persons engaged in agriculture in each state, the agricultural labor force figures are used to calculate the percentage of the agricultural labor force in each state from to the U.S. total labor force; the data come from Perloff et al. (1960) (pp. 624, 628, 630, Tables A-2, A-4, A-5). Finally, the interstate differential for each state is calculated as the ratio of the adjusted percentage of the value of farm products not fed to livestock obtained in the previous paragraph to the percentage of the agriculture labor force calculated for each state.

Mining

The interstate differential for mining was calculated from the U.S. census of mining and quarrying. It was calculated in two steps. First, the state compensation per employee and the total U.S. compensation per employee was calculated by dividing the compensations by the total number of employees in each case. Then, the state total compensation per employee was expressed relative to the U.S. total compensation per employee.

The 1890 census reports data on the total number of persons employed and their total wages for the following mining industries: anthracite coal, asphalthum, barites, bluestone, bituminous coal, copper, corundum, fluorspar, gold and silver, granite, graphite, gypsum mines, infusorial earth, iron ore, lead and zinc, limestone, marble, metallic paint, mica, millstone, natural gas, nickel and cobalt, ochre mines, petroleum, precious stone, pyrites, quicksilver, sandstone, slate, soapstone, sulphur, tin, and whetstone. For some states, the number of firms in the industries was very small. To prevent the possibility of revealing the identity of the firms, the census aggregates the total number of employees and their wages in those states. I distributed these figures among the relevant states proportionately except for

asphalthum and infusorial earth where I used the states' share in their aggregate production. Using the proportional rule does not introduce much of an error because the states' share in their aggregate production is relatively equal, and the total number of employees and aggregate production of these states is very small relative to the U.S. total mining and quarrying employees and production, respectively.[22] Asphalthum and infusorial earth are the exceptions because the states' share in their aggregate production is very uneven: ninety-three percent of the asphalthum production was in California and eighty-eight percent of insuforial earth production was in Maryland.

Manufacturing, Construction, and Hand Trades

The calculation of the interstate differential in the manufacturing sector differs from Easterlin's. Easterlin uses the data from his study on manufacturing activity (Easterlin 1957, pp. 683–691, Tables M-2 to M-6) while this study uses directly the U.S. census of manufactures data.[23] Easterlin's manufacturing data differ from the U.S. census of manufactures data because they exclude the hand trades (which includes the construction trades), and the intermittently-covered industries. The exclusion of the construction trades was done to derive the figures for the manufacturing sector only; other hand trades were excluded to obtain the data for establishments operating under a factory system, and the intermittently covered industries were taken out to ensure the comparability of the estimates over time (Easterlin 1957, pp. 637–638). In the calculation of his 1880 and 1900 figures, Easterlin adds the construction sector to the final figures in the form of a separate sector and

[22] The share of the total number of employees on the U.S. mining and quarrying is around three percent and the share of aggregate production is around four percent.

[23] Easterlin (1957). That study provides various series on manufacturing for the period 1869–1949, including the number of establishments, average number of wage earners, total wages, value of products, and value added.

the data are derived directly from the U.S. Census of Manufactures by simply adding up six construction trades he originally excluded from the manufacturing data: carpentering, masonry, plumbing, painting, paperhanging, plastering and stuccowork. He, however, does not include the rest of the excluded industries into the final total personal income estimates.

It is not clear why Easterlin uses the manufacturing data derived in his 1957 study. The reason seems to be an improvement of the comparability of the estimates across the census years, which was one of the reasons why he excluded the hand trades and the intermittently covered industries (Easterlin 1957, page 717). One may wonder, however, why sectoral comparability and not sectoral comprehensiveness is an issue in estimating the total personal income. I decided to include the hand trades into the state income estimates because they represent a part of the state's total personal income. Excluding them for the purpose of the comparability of the manufacturing sector estimates over time is a valid reason for comparative purposes, but not for the calculation of the total personal income, which is a comprehensive measure of economic activities.

The use of the U.S. census of manufactures data enables me to treat manufacturing and construction as one sector since, as was indicated above, the censuses report the data for those industries altogether. Information on the total compensation and the total number of employees in manufacturing in 1890 is taken from the Census of Manufactures; information on the total compensation and the total number of employees in construction in 1890 come from the same Census of Manufactures and the construction trades include carpentering, masonry, plumbing, painting, paperhanging, plastering and stuccowork.

The interstate differential, as in the case of mining, was calculated in two steps. First, the state and U.S. total compensation per employee was computed by dividing the total compensation by the total number of employees in each case. Second, the state compensation per employee was expressed as the ratio to the U.S. total compensation per employee.

Transportation, Communication, and Public Utilities

Information on the transportation, communication and public utilities sectors (TCPU) in 1890 comes from the 1890 Report on Transportation Business and the Sixteenth Annual Report of the Interstate Commerce Commission. The census provides information on the number of employees and their total compensation for the following industries: railways operated by animal power and water transport on the Atlantic coast, the Gulf of Mexico, the Pacific coast, the Great Lakes, Lake Champlain, and on the Mississippi and Ohio rivers. Information is provided by state except for transportation on the lakes and rivers where the census reports information for the ports, and the Mississippi and Ohio rivers with their inflows. As for the lakes, I distribute the number of employees and their compensation among states according to the location of the ports. As for the rivers, the distribution is done under the assumption that most of the water transport takes place in the states where the rivers flow into the Ohio or Mississippi rivers. The Interstate Commerce commission reports data on the total number of employees and their total compensation in railroads for ten regional groups.[24] Since the data for 1890 are not available, I used the closest available data, which are for 1895. I follow Easterlin (Easterlin 1957, page 719) and aggregate the transportation industries into the regional groups defined for railroads and calculate the interstate differentials under the assumption that the state's differential equals the interregional differential of the group the

[24] The composition of the regional groups is the following: group 1: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut; group 2: New York, Pennsylvania, Maryland, Delaware, New Jersey; group 3: Ohio, Michigan, Indiana; group 4: Virginia, West Virginia, North Carolina, South Carolina; group 5: Kentucky, Tennessee, Mississippi, Alabama, Georgia, Florida; group 6: Illinois, Iowa, Wisconsin, Minnesota, North Dakota, South Dakota; group 7: Nebraska, Wyoming, Montana; group 8: Arkansas, Oklahoma, Kansa, Colorado, Missouri; group 9: Louisiana, Texas; group 10: New Mexico, Idaho, Utah, Arizona, California, Nevada, Oregon, Washington.

state belongs to. We see that the TCPU estimates in 1890 consist of the transportation sector only. Unfortunately, we are left with no choice but to assume, similarly to Easterlin, that the interstate differential of the transportation sector proxies the whole TCPU sector.

Private Household and "All Other"

The private household sector includes domestic service performed in private households, and "all other" includes finance, trade, government, and other services than domestic services. I follow Easterlin (Easterlin 1957, page 721) and assume that the interstate differential in this sector is the same as the interstate differentials for manufacturing.

Interstate Differentials in 1910

The calculations of the interstate differentials in 1910 follow closely that of 1890. As for agriculture, I used the same procedure I used to estimate the 1890 figures. Hence, the net income was calculated in three stages as discussed earlier. The data come from the census of agriculture in 1910, Easterlin (1957, Table 4.3), and Perloff et al. (1960) (pp. 624, 628, 630, Tables A-2, A-4, A-5). As for mining, the 1910 census reports the summary tables on the total number of employees and their total yearly compensation in all mining industries by states and therefore no adjustments similar to those for 1890 were needed. The manufacturing data come from the Census of Manufactures for 1910. The census provides information on the total number of salaried personnel, the average number of wage earners, and the total yearly compensation. The construction data, however, have to be estimated because the 1910 census did not collect information on the hand trades, which include the construction trades. I utilize the fact that the Censuses of Manufactures in 1890 and 1900 provide information on the

construction trades and use the following equalities to estimate the total compensation paid to construction employees and the total employment in 1910:

$$\frac{\left(\frac{Total\ Compensatin\ \ Construction}{Total\ Compensation\ Manufacturing}\right)_{1900}}{\left(\frac{Total\ Compensatin\ \ Construction}{Total\ Compensation\ Manufacturing}\right)_{1890}} = \frac{\left(\frac{Total\ Compensation\ \ Construction}{Total\ Compensation\ Manufacturing}\right)_{1910}}{\left(\frac{Total\ Compensatin\ \ Construction}{Total\ Compensation\ Manufacturing}\right)_{1900}}$$

.

$$\frac{\left(\frac{Total\ Employees\ Construction}{Total\ Employees\ Manufacturing}\right)_{1900}}{\left(\frac{Total\ Employees\ Construction}{Total\ Employees\ Manufacturing}\right)_{1890}} = \frac{\left(\frac{Total\ Employees\ Construction}{Total\ Employees\ Manufacturing}\right)_{1910}}{\left(\frac{Total\ Employees\ Construction}{Total\ Employees\ Manufacturing}\right)_{1900}}$$

The estimates of the total compensation and total number of employees in construction in 1910 were then added to the total compensation and total number of employees in manufacturing in 1910.

The data on TCPU in 1910 come from the census reports on central electric light and power stations, street and electric railways, and from the Twentieth Annual Report of the Statistics of Railways published by the Interstate Commerce Commission. The Interstate Commerce Commission reports data on railways and the coverage and structure is identical to the one described above. The census reports provide information on the total number of employees and their total compensation.[25] As happened in the case of mining in 1890, the census reports only aggregate figures for states with a small number of firms. I distributed those figures among the relevant states proportionately. This does not impose any serious bias into the final industry estimates since the distributed share of employment and paid compensation on the U.S. total TCPU sector is very small (less than one percent). As in 1890, the final TCPU figures are aggregated into the regional groups and the interstate differentials are calculated under the assumption that the state's differential is equal to the interregional

[25] The census reports also distinguish between salaried personnel and wage earners, and provide a breakdown into several occupation categories.

differential of the group the state belongs to. Finally, the interstate differential in "private household" and "all other" is again assumed to be the same as the interstate differentials for manufacturing.

Interindustry Differentials in 1890 and 1910

The interindustry differentials in 1890 and 1910 are calculated according to the formula in equation 3. They are based on the sectoral service income estimates from Martin (1939) as described in the section "U.S. Total Personal Income by Sector and Type in 1890 and 1910", and the labor force data that are going to be discussed in the section "Labor Force and Population". However, the interindustry differentials for the sectors private household and "all other", needed to be calculated differently. The reason is that there are no sectoral income data or labor force data available for those industries.[26] Therefore, the following procedure developed by Easterlin is used (Easterlin 1957, page 724).

First, the interindustry differential for the service sector *excluding* transport and communication and public utilities—the so-called trade-private household sector—is calculated in the same way as for other non-agriculture sectors:

$$Interindustry\ differential^{TP} = \frac{SI\ pw\ US^{TP}}{SI\ pw\ US^{NA}} \qquad (9),$$

where *TP* denotes the trade-private household sector in the economy, $SIpwUS^{TP}$ is the U.S. service income per worker in the trade-private household sector, and $SIpwUS^{NA}$ is the U.S. service income per worker in the whole non-agriculture sector. Easterlin calls it the *trade-*

[26] Martin's study provides data for the private household sector, but they can not be used because in addition to domestic service the data also includes the category "professional services, restaurants, hotels, etc.".

private household differential, a bit misleading terminology because finance, government, and other-than-private sectors are included.

Second, a new set of yearly interindustry differentials for the private household and "all other" sectors is calculated for 1921–1929, using Simon Kuznets' data (Kuznets 1954, pp. 342, 346, 762; Tables 67, 69, 762) according to the formula:

$$Interindustry\ differential_{TP}^{\ k} = \frac{SI\ pw\ US^{k}}{SI\ pw\ US^{TP}} \qquad (10),$$

where *k* is private household or "all other", *TP* denotes the trade-private household sector in the economy, $SIpwUS^{k}$ is the U.S. service income per worker in industry *k*, and $SIpwUS^{TP}$ is the U.S. service income per worker in the trade-private household sector. These yearly interindustry differentials were then averaged to obtain a single figure.

Finally, the interindustry differential for private household and "all other" is obtained by multiplying equations 9 and 10, respectively:

$$Interindustry\ differential^{k} = Interindustry\ differential^{TP} * Interindustry\ differential_{TP}^{\ k} =$$

$$= \frac{SI\ pwUS^{TP}}{SI\ pwUS^{NA}} * \frac{SI\ pwUS^{k}}{SI\ pwUS^{TP}} = \frac{SI\ pwUS^{k}}{SI\ pwUS^{NA}} \qquad (11),$$

where *k* is private household or "all other".

Property Income per Capita Differentials for 1890 and 1910

As was discussed in the methodology section, the state total property income per capita differential is derived using the so-called "income originating wealth" concept developed by Easterlin (Easterlin 1957, pp.733–735). This section discusses this concept, describes the

procedure to derive income originating wealth for 1890 and 1910, and at the end provides the details of the calculation of the property income per capita differentials.

"Income originating wealth" is a proxy for the missing property income data. These data are obtained under the assumption that the distribution of the wealth that originates the property income among the U.S. states is the same as the distribution of the property income among the U.S states. The income originating wealth is derived for the agriculture and non-agriculture sectors separately. The procedure calculates the amount of wealth *owned* by the residents of the state as opposed to the amount of wealth *located* in the state. This distinction is important because the wealth owned by the residents of the state might not be located only in that state. For example, the income originating wealth of Californians can be located not only in California, but also in other U.S. states. The U.S. censuses usually provide the data to calculate only the amount of wealth located in the state and therefore Easterlin devised an adjustment that derives the amount of wealth owned by the residents of the state from the wealth located in the state. The whole procedure of calculating the amount of wealth owned by the residents of the state consists of two steps. First, the amount of wealth located in the state is calculated from the U.S. censuses. Second, that wealth is adjusted to obtain the amount of wealth owned by the residents of the state.

After we obtain the amount of wealth owned by the residents of the state for the agriculture and the non-agriculture sectors, we calculate the share of the agricultural wealth owned by the residents of the state to the U.S. agriculture wealth and the share of the non-agricultural wealth owned by the residents of the state to the U.S. non-agriculture wealth, as required by equation 6.

Agriculture Property Income

As for the agriculture sector, it is assumed that the agricultural wealth located in the state equals the agricultural wealth owned by the residents of that state and so no adjustment is needed. The total agricultural wealth located in the state is calculated as the sum of the rents on farms leased from non-farmers (further on as rent) and the farm mortgages held by non-farmers. We see that this type of agricultural wealth is actually very close to the agricultural property income. This is important to realize since we encounter the agricultural wealth located in the state again in the calculation of the non-agricultural wealth located in the state and we are going to see that it is calculated differently. I provide a thorough discussion of this in the next section.

Rent in 1890 was calculated as the value of the land and buildings on rented farms assuming that other components of farm property such as farm implements are owned by tenants. The value of the land and buildings in the census is not subdivided by the tenure of the operator. Therefore, the following adjustment proposed by Easterlin is used (Easterlin 1957, page 733). The 1890 census provides information on the number of rented farms as well as the total number of farms by state. The 1900 census provides information on the total value of the land and buildings for all farms and for rented farms. Assuming that the ratio of the average value of the land and buildings on rented farms to the average value of land and buildings on all farms in 1890 was the same as in 1900, the value of land and buildings of rented farms in 1890 was calculated as follows:

$$\mathrm{Re}\,nt_{1890} = Value\ L\ \&\ B_{1890} \times \frac{\#\,rented\ \ farms_{1890}}{\#\,all\ \ farms_{1890}} \times \frac{Avg\ value\ rented\ \ farms_{1900}}{Avg\ value\ all\ \ farms_{1900}} =$$

$$= Value\ L\ \&\ B_{1890} \times \frac{Value\ rent\ \ farms_{1890}}{Value\ all\ \ farms_{1890}},$$

where Value $L\&B_{1890}$ is the total value of land and buildings in 1890. The mortgage interest was calculated using information on mortgage encumbrance from the 1890 report on Farm and Homes.

Rent in 1910 was calculated similarly to 1890 and the value of the land and buildings of rented farms is directly reported in the 1910 census. The value of mortgage debt was calculated by multiplying the value of average mortgage debt per farm by the total number of mortgaged farms, as reported in the 1910 census. The census reports two different figures for the total number of mortgaged farms. One is the total number of mortgaged farms reported as being mortgaged irrespective of whether the farms report the value of mortgage or not; the other is the total number of mortgaged farms for which the value of the land and buildings and the amount of mortgage debt were reported. The former figure exceeds the latter by about twenty-three percent. The value of the average mortgage debt per farm as reported in the census was calculated using the latter figure. This means that it is the average mortgage debt of those farms that reported the value of its mortgage and not the average mortgage debt of all mortgaged farms. Multiplying that average by the number of all mortgaged farms yields the total amount of mortgage debt under the assumption that the value of average mortgage debt per farm is the same for all mortgaged farms regardless of whether they do or do not report their mortgage debt. This assumption seems plausible since there is no indication that the average value of mortgage debt per farm reporting the value of its debt is different than the average value of mortgage debt per farm not reporting the value of its debt.

Non-Agriculture Property Income and Property Income per Capita Differentials

In the non-agriculture sector, the simplifying assumption that the wealth located in the state is equal to the wealth owned by the residents of the state is dropped and the non-agricultural wealth owned by the residents of the state is calculated using the previously

mentioned two-step procedure devised by Easterlin. In the first step, the non-agriculture wealth located in each state is calculated by subtracting the agricultural wealth located in each state from the total wealth located in each state and then expressing it as the share of the U.S. total non-agricultural wealth. The total wealth located in the state in 1890 and 1910 comes from the relevant U.S. censuses. The agricultural wealth in 1890 and 1910 also comes from those censuses and was calculated as the sum of the value of farm property including land with improvements, implements and machinery, livestock and the value of farm products (following Easterlin (1957, page 736), the agricultural wealth located in the state is calculated differently than in the previous section; I discuss this issue in the following paragraph). In the second step, the ratios of the shares of the non-agricultural wealth *owned* by the residents of the state to the shares of the non-agricultural wealth *located* in the state in 1890 and 1910 are calculated from the data provided by Easterlin (Easterlin 1957, Table 4.6, pp. 730–731). Specifically, the average of the 1880 and 1900 ratios are used to obtain the 1890 ratios, and the average of the 1900 and 1920 ratios to obtain the 1910 ratios. In the last step, these ratios are multiplied by the share of non-agricultural wealth located in each state as calculated in the first step for 1890 and 1910.[27]

[27] The calculation of 1880, 1900, and 1920 ratios follows Easterlin (1957, pages 733–737). The data for 1880 come from 1880 U.S. Census, which provides the data on the wealth located in the state as well as the wealth owned by the residents of the state. The calculation of the non-agricultural wealth owned by the residents of the state is a straightforward subtraction of the agricultural wealth owned by the residents from the total wealth owned by the residents of the state. A similar calculation was performed for the non-agricultural wealth located in the state. The data for 1920 come from the study by Maurice Level (1925), the U.S. Census of Wealth (1922), and the Census of Agriculture in 1920 and 1930. Specifically, the non-agricultural wealth owned by the residents of the state is calculated from Level (1925) under the assumption that it is equal to the non-agricultural property income. The non-agricultural property income is obtained as a straightforward subtraction of the agricultural property income from the total property income. The non-agriculture wealth located in the state was obtained from the U.S Census of Wealth (1922) and the Census of Agriculture in 1920 and 1930. As in the previous

Before we proceed further, a discussion of the calculation of the non-agricultural wealth is warranted. We have seen that the agricultural wealth located in the state that was subtracted from the total wealth located in the state (AW1) in order to obtain the non-agriculture wealth located in the state was calculated *differently* than the agricultural wealth located in the state that was used to obtain the agricultural wealth owned by the residents of the state (AW2). One may ask why Easterlin did that. He is silent about this, but we can try to figure out the reason. When we compare both figures, AW1 is much larger than AW2. This indeed makes sense since AW2 includes only property income payments to the population engaged in the agriculture sector, while AW1 contains the total value of land, capital and agricultural products. By calculating AW2, Easterlin uses information that is very close to the actual property income received in agriculture. However, similar information is *not* available for the non-agriculture sector; therefore he has to use the only available information: the non-agricultural wealth located in the state that comes from the U.S. censuses. To obtain this figure, he needs to subtract the total agricultural wealth located in the state from the total wealth located in the state and then use the already-discussed adjustment to obtain the non-agricultural wealth owned by the residents of the state.

Having obtained the shares of the agricultural and non-agricultural wealth owned by the residents of the state to the U.S. agriculture and non-agriculture wealth, respectively, we can proceed to the calculation of the property income per capita differentials according to equation 6. We see that in addition to the wealth shares, we need to calculate the ratio of the U.S. property income in agriculture and non-agriculture relative to the U.S. total property income respectively, and the ratio of the state to the U.S. population. The former is calculated

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cases, it was obtained by subtracting the agricultural wealth located in the state from the total wealth located in the state. The agricultural censuses in 1920 and 1930 were used to derive one component of the agricultural wealth—the value of land and buildings. The 1900 ratios were obtained as the average of the 1880 and 1920 ratios. The details of the calculation and the data sources are available from the author upon request.

using the figures discussed in the section “Total Personal Income by Sector and Type in 1890 and 1910”, the latter is obtained using the population figures discussed in the next section.

Labor Force and Population

The labor force figures for the whole U.S. and by states were taken from the study by Perloff et al. (1960) (pp. 622–635, Tables A-1 to A-7). As was mentioned earlier, the issue of the sectoral coverage needed to be solved. The sectoral labor force data from Perloff et al. (1960) are disaggregated only to agriculture, forestry, fishing, manufacturing, mining, and services. This presents a challenge to follow Easterlin’s methodology because we lack the labor force data for construction, transportation and communication and public utilities, private household, and “all other”. As for the construction sector, the issue was resolved by aggregating it with manufacturing, as explained in the section “Manufacturing, Construction, and Hand Trades”.

The labor force data of other missing sectors were estimated using Perloff et al. (1960) labor force estimates of the service sector (page 634, Table A-7), and Miller and Brainerd (1956) labor force data on transportation and communication and public utilities, private household, and “all other” in 1880 and 1900 (pp. 623–631, Table L-5). As for 1890, I did the following. I calculated the share of each service sector labor force on the total service sector labor force in 1880 and 1900. Then I averaged them to obtain the share of each service sector labor force in 1890, and finally multiplied those shares by the service sector labor force from Perloff et al. (1960). As for 1910, I used the shares of each service sector labor force on the total service sector labor force in 1890 and 1900 to obtain the relevant shares in 1910. Specifically, I assumed that for each service sector, the ratio of the share of the labor force on the total service labor force in 1900 to the similar share in 1890 is the same as the ratio of 1910 to 1900. Then I multiplied those ratios by the corresponding service sector share of the

labor force on the total service labor force in 1900, and thus obtained for each service sector the share of its labor force on the total service labor force in 1910. Finally, the labor force figures were obtained by multiplying those shares by the total service sector labor force from Perloff et al. (1960). The population figures are from the Historical Statistics of the United States, Millennial Edition, Volume 1, Population (Tables Aa9-14, Aa2244-2340).

Updated 1880 and 1900 Figures

As was discussed in the introduction, the re-estimation of the 1880 and 1900 figures involved three updates: the new estimates of the total personal income in 1880 calculated from the figures by Robert E. Gallman in Rhode (2002), the new estimates of the manufacturing sector in 1880 and 1900 that now include the hand trades and the intermittently covered industries, and the use of Perloff et al. (1960) labor force data for 1880 and 1900. In addition, the recalculation of the 1880 and 1900 estimates allows a correction for calculation mistakes.

All this, of course, is going to change the states' personal income estimates and I will address this in the next paragraphs. Before that, a short discussion on the use of Perloff et al. (1960) rather than Miller and Brainerd (1957) labor force data is warranted. As was discussed earlier, the estimation of 1890 and 1910 data required the use of Perloff's (1960) labor force data, because Miller and Brainerd (1956) provides labor force estimates only for 1880 and 1900. This poses a challenge if one wants to estimate the state personal income in 1880–1910 with the labor force data coming from the same source because the sectoral coverage differs between Perloff et al. (1960) and Miller and Brainerd (1957). However, it is a straightforward exercise to break down Perloff et al. (1960) estimates for 1880 and 1900 into Miller and Brainerd (1957) sectoral coverage using the share of the industry labor force on the total labor

force calculated from Miller and Brainerd (1957) data and applied to Perloff et al. (1960) data (specifically, the labor force in transportation and communication and public utilities, private household, and the so-called "all other" sector is calculated that way). Evidently, the resulting labor force figures are going to be different from Miller and Brainerd (1957). To see how different they are, Table 3 presents a comparison of Miller and Brainerd (1957) with Perloff et al. (1960) labor force figures. We see that the split between the agriculture and the non-agriculture sectors is very similar, which is not surprising since, as was mentioned earlier, Perloff et al. rely on Miller and Brainerd's figures. What changes, however, is the breakdown of the non-agriculture labor force between manufacturing and construction, mining, and service sectors. We see that Perloff et al. increase the share of manufacturing and construction by around seven percent in 1880 and around four percent in 1900 and decrease the labor force in mining by slightly less than one percent in 1880 and 1900 and by less than six percent in the service sector in 1880 and by less than five percent in 1900. We can, of course, expect that this change is going to affect the total personal income estimates, but the effect is likely to be small since this change accounts only for about six percent of the non-agriculture labor force. I return to this issue later in this section.

Before I present the states' total personal income estimates derived in this study and compare them with the original Easterlin estimates, I am going to present the estimates of the U.S. total personal income, its breakdown by sector and type, and the interindustry differentials in 1800 and 1900. Table 1 shows the U.S. total personal income between 1880 and 1910 with the breakdown between service income and property income, and the breakdown of the service personal income between the agriculture and the non-agriculture sectors. Panel A presents the estimates derived in the section "U.S. Totals 1880–1910", which includes new 1880 estimates; Panel B comes from Easterlin (Easterlin 1957, Table 4.1, page 705). We see that the total personal income in 1880 in Panel A is higher than the 1880 figure

in Panel B (by about one percent), which is due to the fact that Gallman's latest estimates were used. This new figure translates into the breakdown between the service and the property income as well as between the agriculture and the non-agriculture sectors, which were calculated using the shares derived from Table 2. We see that the differences between Easterlin's figures and the figures calculated in this study are larger in 1880 than in 1900. This is due to the fact that the 1880 figures were derived using the new total personal income as well as the newly calculated shares from Table 2 while the only new element used to calculate the 1900 figures is the shares coming from Table 2.

Table 2 presents the breakdown of the total personal income estimates between service income and property income and the detailed breakdown of the non-agriculture service income among various industries calculated in the section "Total Personal Income by Sector and Type"; Panel A shows the figures calculated in this study; Panel B is Easterlin's table (Easterlin 1957, Table 4.2, page 711) slightly adjusted by adding a "Miscellaneous" category into the "Property Income Total" category.[28] The differences between the figures in Panel A and Panel B are on average around 2.4 percent in 1880 and around 1.7 percent in 1900. The reason is very likely a rounding error, since the calculations of the sectoral estimates involve several steps, similar to the ones described in the section "Total Sectoral Income 1890 and 1910".[29]

The differences in the total personal income automatically translate into the differences in the total personal income per worker and capita, as seen in Table 4. Again, Panel A presents the estimates calculated in this study; Panel B presents Easterlin's estimates

[28] This adjustment is justified because Easterlin's "Miscellaneous" category contains imputed rents and mortgage interest on non-farm owner-occupied homes that are part of the property income.

[29] The details of the calculations are presented in the earlier version of the paper which available from the author upon request.

(Easterlin 1957, Tables Y-1 to Y-5, pages 753–757).[30] The differences are on average 1.7 and 1.5 percent for the per worker income and 0.9 and 0.7 for the per capita income in 1880 and 1900, respectively.

The calculation of the interindustry differential is based on the sectoral income estimates derived in the section "'U.S. Total Personal Income by Sector and Type in 1890 and 1910" and the labor force figures derived in the section "Labor Force and Population". Since they differ slightly from Easterlin's figures, as shown in Table 2 and Table 3, we should expect small differences in the interindustry differentials as well. Easterlin's interindustry differentials (Easterlin, 1957, page 723, Table 4.4) and the differentials derived in this study are presented in Table 5. The differences are on average around 2.5 percent in 1880 and around 1.9 percent in 1900.

The final estimates of the total personal income in 1880 and 1900, their comparison with Easterlin's original estimates and the summary statistics of the percentage differences between those two sets of estimates are shown in Table 6. We see that the percentage differences can go either way, though the number of states for which the difference is positive or zero is larger than the number of states with a negative difference: there are states like Massachusetts, whose updated total personal income per capita is larger in 1880 and 1900 than Easterlin's original figures, states like Indiana, whose updated figures are lower in both years than the original figures, and states like Florida, whose updated figures are lower in 1880 and larger in 1900 than the original ones. The average percentage difference between the updated and Easterlin's original figures is 1.8 percent and 1.96 percent in 1880 and 1900, respectively; the minimum is zero and the maximum 19.1 and 21.3 percent in 1880 and 1900, respectively. The zero percentage differences between the updated and Easterlin's original

[30] Easterlin does not provide the total personal income per worker.

figures are due to rounding. The updated figures are always different from Easterlin's and a zero difference between two figures says that the difference is less than 0.1 percent.

The standard deviations in 1880 and 1900 are around three percent; I have also calculated the standard deviation without the maximum values of the percentage deviation because, as we can see from Table 6, there is only one state in each year (Arizona in 1880 and Oklahoma in 1900) that largely exceeds the percentage deviations of the other states and that biases the standard deviations upward. The resulting standard deviations are then around 1.7 percent in both years. The summary statistics also show the number of states for which percentage deviations are in one of the five intervals. We see that in both years, the percentage difference in most of the states is up to two percent; one state in each year shows more than a ten percent difference and eleven states in 1800 and six states in 1900 have the same total personal income estimates. Overall, we can say that the updated total personal income per capita estimates for 1880 and 1900 are close to the original Easterlin estimates, except for Arizona in 1880 and Oklahoma in 1900. This strongly suggests that the picture of the regional economic development based on Easterlin's original figures would be preserved. The complete set of the newly estimated figures including the total personal income, the service income, the service income per capita and per worker, the property income, the agriculture service income, the agriculture service income per worker, the non-agriculture service income and the non-agriculture service income per worker are presented in Tables 8 and 9.

As was mentioned earlier, the updated estimates for 1880 and 1900 are different because: (1) the new total personal income in 1880, (2) the inclusion of the hand trades and intermittently covered industries, (3) the use of Perloff et al. (1960) figures, and (4) the correction for the calculation error. It is instructive to see how much of the differences

between Easterlin's figures and the updated figures are because of these updates. Therefore I breakdown the differences into four categories:

- a percentage difference between Easterlin's figures and the updated figures following Easterlin's data sources without any adjustments,
- a percentage difference between the updated figures following Easterlin's data sources without any adjustments and the updated figures with the interindustry differentials calculated in this study and the manufacturing sector including the hand trades and the intermittently covered industries,
- a percentage difference between the updated figures with the interindustry differentials calculated in this study and the manufacturing sector containing the hand trades and the intermittently covered industries, and updated figures with the total personal income per capita calculated in this study,
- a percentage difference between the updated figures with the total personal income per capita calculated in this study and the updated figures with Perloff's labor force figures.

The first percentage difference will be denoted as *the calculation difference*, the second as *the interindustry & hand trades difference*, the third as *the total income difference*, and the last one as *the labor force difference*. The summary of all four types of difference are presented in the form of the average percentage difference taken across all U.S. states in Table 7.[31] We see that the differences are rather small, ranging from 0.49 to 2.19. In general, the differences are slightly larger for 1880 than for 1900; "the calculation difference" is the largest, followed by

[31] The average percentage difference is calculated in two steps: first, the percentage difference for every U.S. state is calculated, then the average of those differences is calculated.

"the labor force difference" and "the total income difference".[32] Again, the overall picture is that the new 1880 and 1900 estimates are very close to the original Easterlin estimates, suggesting that the slight changes of the data sources do not dramatically change the regional GDPs calculated more than fifty years ago.

Before I proceed to the new 1890 and 1910 estimates, the differences between the original and the updated total personal income of Arizona in 1880 and Oklahoma in 1900 need to be discussed. We have seen in Table 6 that the updated figure for Arizona in 1880 exceeds the original by nineteen percent and the new figure for Oklahoma in 1900 is around twenty-one percent lower than the original. Unfortunately, we do not have enough information to figure out where exactly Easterlin's and this study's calculations differ. We can, however, at least identify the sectors and for Arizona also the type of error. As for Arizona in 1880, the comparisons of the updated agriculture service income per worker, the non-agriculture service income per worker, and the property income per capita with Easterlin's figures respectively reveals that the non-agricultural service income per worker differs about twenty-three percent while the other figures differ only about two percent. The analysis of the error type revealed that "the calculation error" contributes about seventeen percent to the difference in the non-agriculture service income per worker, indicating that the non-agriculture sectors are the reason for the difference between the updated and the original figure. As for Oklahoma in 1900, the reason is the difference of the agriculture income per worker, which is thirty-nine percent; the similar difference for the non-agricultural service income per worker is only 0.8 percent. Unfortunately, here we have no additional information from Easterlin to find out exactly what causes that difference.

[32] The same exercise was done for the service income per worker and service income per capita. The picture remains similar and the calculations are available from the author upon request.

New 1890 and 1910 Estimates

Finally, this section presents the new estimates of the total personal income for every U.S. state in 1890 and 1910. The estimates, as well as the per capita and per worker figures and the breakdown into service income, property income, agricultural service income and non-agricultural service income are presented in Tables 8 and 9. Before I discuss those figures, let's look at the figures in Tables 1, 2, and 4 first. Table 1 presents the totals with the sectoral breakdown. We see that the 1890 figures nicely fall between the 1880 and 1900 figures, as one would expect. Table 2 shows a detailed sectoral breakdown of the total personal income. The pattern that emerges from that table is of a declining trend of the share of service income on the total personal income and a rising trend in the share of property income. This suggests that calculating the property income is crucial for an accurate estimate of the total personal income, especially as we go further into the twentieth century. As for the non-agriculture sectors, we see that the share of services in TCPU and mining has an increasing trend while the share of "all other" sectors, which includes trade, services, finance, and government, decreases, and the share of manufacturing and construction exhibit first an increasing and then a more or less steady trend. The share of the agriculture service income is, not surprisingly, declining. An interesting picture emerges from Table 4, which shows the total personal income per capita and per worker figures as well as the figures of the service income per capita and per worker. We see that while the per capita income is increasing in time, the service income per worker slightly declines in 1890 relative to 1880 and then continues to rise from 1900 on. The sectoral breakdown of that figure into the agriculture and the non-agriculture sectors shows that the non-agriculture sectors cause the decline. Since the total service income and the service income per capita increase relative to 1880, the reason has to be the development of the labor force. Indeed, the total labor force figures from Perloff et al.

(1960) show around a thirty percent increase in the labor force between 1880 and 1890, while the total population increased only about twenty six percent.

Table 8 presents the state estimates of the U.S. states' total personal income, total personal income per capita, service income, and service income per capita and per worker in 1880–1910. In general, the total personal income exhibits an increasing trend; a similar trend holds for the total personal income per capita in most of the states. There are some exceptions such as Arizona and Nevada, which show a rather steep decline in the per capita figures between 1880 and 1900, a few Midwest states like Indiana and Michigan that show a slight decline and a few New England states like Connecticut, Massachusetts, and Rhode Island showing a slight decrease as well. A similar picture emerges from the service income per capita figures. As for the service income, it shows an increasing trend, except for Arizona and Nevada between 1880 and 1890. However, in several states the service income per worker in 1890 does not follow an increasing trend as suggested by the 1880 and 1900 figures, for example Arizona, California, Delaware, Maine, Maryland, Michigan, Rhode Island or Wisconsin. The reason is the decline of the U.S. service income per worker as discussed in the previous paragraph.

Table 9 shows the figures of the property income and the breakdown of the service income into the agriculture service income, the non-agriculture service income, the agriculture service income per worker and the non-agriculture service income per worker in 1880–1910. The property income and the non-agriculture service income show an increasing trend between 1880 and 1910; the agriculture service income is increasing for many states except for the states like New York, Ohio, or Pennsylvania. The non-agricultural service income per worker shows a decreasing trend in many states between 1880 and 1900. It is interesting that the non-agriculture income per worker does not always fall squarely between the 1880 and 1900 figures and the decline between 1880 and 1890 is often quite steep. For example, the

non-agricultural income per worker in Pennsylvania is 621 in 1880; it then falls to 567 in 1890 and climbs to 580 in 1900. A similar picture emerges from Ohio with the non-agricultural income per worker being 629 in 1880, falling to 567 in 1890 only to rise to 580 in 1900.

To see the regional distribution of the total personal income per capita based on the new 1880–1910 figures and compare them with the original Easterlin figures, Table 10 replicates the first part of Table 1 from Mitchener and McLean, which uses Easterlin's figures.[33] The table expresses the total personal income per capita relative to the U.S. population weighted average. First, we see that the regional distribution of the income per capita in 1880 and 1900 emerging from Mitchener and McLean figures is preserved when we use the updated 1880 and 1900 figures, corroborating the earlier comparison of the updated and Easterlin figures. Second, the new 1890 and 1910 figures shed more light on the character of the nominal personal income per capita changes relative to the U.S. average in 1880–1910. We see, for example, that New England experienced quite a drop in the per capita income relative to the average U.S. in 1890 only to climb slightly up in 1900 and then go down in 1910 again. The East South Central region, the poorest of the U.S. regions, experienced a slight increase in the nominal per capita income relative to the U.S. in 1890 only to go down in 1900 and then up in 1910. The Pacific and Mountain regions, the wealthiest U.S. regions in terms of the nominal per capita figures, experienced in general a decline throughout the entire 1880–1910 period, with the Pacific region picking up slightly after 1900.

[33] Mitchener and Mclean (1999).

Conclusion

This paper estimates the U.S. states' personal income in 1880–1910. The estimates include updated 1880 and 1900 figures and newly constructed 1890 and 1910 figures. The estimation followed the methodology developed by Richard Easterlin, which was accompanied by Easterlin's assumptions and procedures to proxy the missing data as well as new assumptions and procedures developed specifically to proxy the missing data in 1890 and 1910. As a result, we have a new series of the U.S. states' GDP estimated from the income side for every decade from 1880 to 1910. This series will, hopefully, serve the future research on U.S. regional development by providing more data to draw more precise pictures of the regional economic processes around the turn of the twentieth century.

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Table 1: U.S. Total Personal Income, 1880–1910, in millions of current $U.S.

		1879-1881	1889-1891	1899-1901	1909-1911
		(1)	(2)	(3)	(4)
			Panel A: This study		
(1)	**Total Personal Income**	8824	11688	15390	27542
(2)	Service Income	7545	9809	12805	22835
(3)	Agriculture	1973	2197	2539	4732
(4)	Non-Agriculture	5572	7612	10266	18102
(5)	Property Income	1279	1879	2585	4707
			Panel B: Easterlin's figures		
(6)	**Total Personal Income**	8740	-	15390	-
(7)	Service Income	7373	-	12866	-
(8)	Agriculture	1968	-	2613	-
(9)	Non-Agriculture	5405	-	10253	-
(10)	Property Income	1367	-	2524	-

Sources:

Panel A: Row 1:

Column 1: arithmetic average of 1879, 1880, 1881 estimates.
The estimates in each year were derived from Rhode (2002), Table 3 and Goldsmith et al. (1956), page 427, Table N1, column 4 under the assumption that the relative change in total personal income between the particular year and the average for 1899–1901 is the same as the relative change in the gross national product.

Column 2: arithmetic average of 1889, 1890 and 1891 estimates. The estimates in each year are derived using the same sources and procedure as the estimates in column 1.

Column 3 and 4: arithmetic average of personal income of 1899–1901 and 1909–1911.
The data come from Goldsmith et al. (1956), page 427, Table N1, column 4.

Rows 2–5, Columns 1–4:

Derived by redistributing the United States totals in row 1 in the same proportions as in Table 3.

Panel B:

Column 1, Rows 6–10:

Easterlin (1957), page 705, Table 4.1, column 1, rows 1–5.

Column 2, Rows 6–10:

Easterlin (1957), page 705, Table 4.1, column 2, rows 1–5.

Table 2: U.S. Sectoral Income Estimates 1880–1910, in millions of current $U.S.

	1880	1890	1900	1910
	(1)	(2)	(3)	(4)
		Panel A: This study		
Service Income Total	6123	9064	13464	22809
Agriculture	1601	2030	2670	4727
Non-agriculture	4522	7034	10794	18082
Man& Constr	1182	2364	3150	5735
Mining	121	183	358	708
TCPU	367	429	1165	2009
All Other	2852	4058	6121	9630
Property Income Total	1038	1736	2718	4702
Total Personal Income	7161	10800	16182	27511
		Panel B: Easterlin's figures		
Service Income Total	6016	-	13578	-
Agriculture	1606	-	2758	-
Non-agriculture	4410	-	10821	-
Man& Constr	1196	-	3203	-
Mining	121	-	365	-
TCPU	366	-	1192	-
All Other	2727	-	6061	-
Property Income Total	1115	-	2664	-
Total Personal Income	7131	-	16242	-

Note: TCPU stands for Transportation, Communication and Public Utilities
All Other includes: trade, services, finance, and government.

Sources:
Panel A, columns 1–4
Figures are derived using data from Martin (1939), pp. 10–99. The agriculture and TCPU needed adjustments as described in the section ”U.S. Total Personal Income and Sector and Type in 1890 and 1910”. Property Income was derived using U.S Historical Statistics, Millennial Edition, as well.
Panel B, column 1:
Easterlin (1957), page 711, Table 4.2, columns under the heading 1879.
Panel B, column 3:
Easterlin (1957), page 711, Table 4.2, columns under the heading 1899–1901.

Table 3: Labor Force in 1880 and 1900 (in 00s and %).

	1880 (in 00)	1880 (%)	1900 (in 00)	1900 (%)
		Miller and Brainerd		
Total Labor Force	173921	100.00	290732	100.00
Agricultural	86391	49.67	113888	39.17
Non-Agricultural	87530	50.33	176845	60.83
Manuf&Constr	33218	37.95	63918	36.14
Mining	3271	3.74	7465	4.22
Services	51041	58.31	105462	59.64
Total Non-Agricultural	87530	100.00	176845	100.00
		Perloff et al.		
Total Labor Force	173921	100.00	290732	100.00
Agricultural	86876	49.95	114976	39.55
Non-Agricultural	87045	50.05	175757	60.45
Manuf&Constr	38415	44.13	71992	40.96
Mining	2978	3.42	6943	3.95
Services	45653	52.45	96821	55.09
Total Non-Agricultural	87045	100.00	175757	100.00

Sources: Miller and Brainerd (1957), pp. 623–631, Table L-5,
Perloff et al. (1960), pp. 622–635, Tables A-1 – A-7.

Table 4: U.S. Personal Income Per Worker and Per Capita 1880–1910

	1879–1881	1889–1891	1899–1901	1909–1911
		Panel A: This study		
Total Personal Income per Worker	507	514	529	722
Service Income per Worker	434	431	440	598
Agriculture	227	233	221	375
Non-Agriculture	640	572	584	709
Total Personal Income per Capita	176	185	202	298
Service Income per Capita	150	156	168	247
		Panel B: Easterlin's figures		
Total Personal Income per Worker	**-**	-	-	-
Service Income per Worker	426	-	444	-
Agriculture	228	-	229	-
Non-Agriculture	622	-	584	-
Total Personal Income per Capita	175	-	203	-
Service Income per Capita	148	-	170	-

Sources:
Panel A:
Income figures come from Table 2
Labor force figures: Perloff et al. (1960), pp. 622–635, Tables A-1 to A-7
Population figures: Historical Statistics of the United States, Millennial Edition, Volume 1, Tables Aa9-14, Aa2244-2340.
Panel B:
Easterlin (1957), Tables Y-1 to Y-4, pages 753–756.

Table 5: Interindustry Differentials 1880–1910.

	1880	1890	1900	1910
		Panel A: This Study		
Agriculture	52	57	50	68
Non-agriculture	148	132	133	118
Manuf.&Constr.	76	81	85	92
Mining	78	78	82	72
TCPU	96	99	98	98
Private HH	79	73	70	69
All Other	145	133	126	126
		Panel B: Easterlin's Figures		
Agriculture	54	-	52	-
Non-agriculture	146	-	131	-
Manuf.&Constr.	75	-	85	-
Mining	77	-	83	-
TCPU	93	-	100	-
Private HH	76	-	68	-
All Other	141	-	126	-

Note: TCPU stands for Transportation, Communication and Public Utilities

Sources:
Panel A:
Income figures: Table 2 and Table 3.
Labor force figures: Perloff et al. (1960), pp. 622–635,
Tables A-1 to A-7.
Panel B:
Easterlin (1957), page 723, Table 4.4.

Table 6: U.S. States Total Personal Income per Capita (TPI pc) in 1880 and 1900; Comparison of Easterlin and this Study Estimates; in current $U.S.

	TPI pc		%	TPI pc		%
	Easterlin	This Study	Difference	Easterlin	This Study	Difference
	1880			**1900**		
United States	175	176	0.6	203	202	-0.5
Alabama	82	82	0.0	88	87	-1.1
Arizona	399	493	19.1	321	324	0.9
Arkansas	79	79	0.0	89	87	-2.3
California	392	397	1.3	365	360	-1.4
Colorado	371	387	4.1	318	318	0.0
Connecticut	268	270	0.7	278	289	3.8
Delaware	199	205	2.9	220	221	0.5
Florida	79	78	-1.3	112	123	8.9
Georgia	86	86	0.0	86	87	1.1
Idaho	281	305	7.9	221	223	0.9
Illinois	208	208	0.0	260	257	-1.2
Indiana	150	149	-0.7	182	182	0.0
Iowa	168	168	0.0	202	196	-3.1
Kansas	120	119	-0.8	187	185	-1.1
Kentucky	107	106	-0.9	120	120	0.0
Louisiana	138	141	2.1	128	125	-2.4
Maine	149	150	0.7	187	189	1.1
Maryland	171	168	-1.8	204	202	-1.0
Massachusetts	292	294	0.7	304	308	1.3
Michigan	175	173	-1.2	185	184	-0.5
Minnesota	175	175	0.0	207	206	-0.5
Mississippi	82	83	1.2	84	83	-1.2
Missouri	157	157	0.0	188	187	-0.5
Montana	456	452	-0.9	415	417	0.5
Nebraska	156	156	0.0	212	208	-1.9
Nevada	606	602	-0.7	395	403	2.0
New Hampshire	198	195	-1.5	214	217	1.4
New Jersey	253	255	0.8	277	284	2.5
New Mexico	105	111	5.4	148	149	0.7
New York	280	278	-0.7	323	307	-5.2
North Carolina	64	65	1.5	72	71	-1.4
North Dakota	na	na	na	209	209	0.0
Ohio	177	178	0.6	222	223	0.4
Oklahoma	na	na	na	114	94	-21.3
Oregon	234	223	-4.9	248	245	-1.2

Table 6: Continued

Pennsylvania	222	225	1.3	250	254	1.6
Rhode Island	279	279	0.0	293	299	2.0
South Carolina	72	74	2.7	74	73	-1.4
South Dakota	na	na	na	183	181	-1.1
Tennessee	81	81	0.0	101	100	-1.0
Texas	98	97	-1.0	138	136	-1.5
Utah	134	135	0.7	183	183	0.0
Vermont	168	166	-1.2	190	191	0.5
Virginia	85	85	0.0	110	112	1.8
Washington	234	232	-0.9	296	284	-4.2
West Virginia	89	88	-1.1	117	121	3.3
Wisconsin	156	155	-0.6	179	179	0.0
Wyoming	321	341	5.9	311	318	2.2
North and South Dakota	186	192	3.1			

Summary statistics of the absolute values of the percentage differences:	**1880**	**1900**
Mean	1.8	1.96
Std Dev	3.1	3.2
Std Dev without maximum values	1.7	1.6
Min	0.0	0.0
Max	19.1	21.3
Number of states with % difference		
0%	11	6
< 2%	25	30
2%-5%	6	9
5%-10%	3	2
> 10%	1	1

Sources: Easterlin (1957), Table Y-1; This Study: Table 8.

Table 7: The Average Percentage Difference Between Updated Figures and Easterlin's Figures, 1880, 1900.

	1880	1900
	TPIpc	**TPIpc**
Calculation Difference	1.7	1.35
Interindustry & Hand Trades Diff	0.84	0.69
Total Income Difference	0.54	0.49
Labor Force Difference	0.88	0.99

Sources: see text

Table 8: Total Personal Income, Total Personal Income per Capita, Service Income, Service Income per Capita, Service Income per Worker, 1880–1910, in current $U.S.

	Total Personal Income in millions of current dollars				Total Personal Income pc in current dollars				Service Income in millions of current dollars				Service Income pw in current dollars				Service Income pc in current dollars			
	1880	1890	1900	1910	1880	1890	1900	1910	1880	1890	1900	1910	1880	1890	1900	1910	1880	1890	1900	1910
United States	8,824	11,688	15,390	27,537	176	185	202	298	7,545	9,809	12,805	22,825	434	431	440	598	150	156	168	247
Alabama	104	138	160	319	82	91	87	149	94	125	142	282	191	229	186	283	75	82	78	132
Arizona	20	19	40	76	493	213	324	372	19	16	35	69	872	587	658	786	480	176	285	338
Arkansas	64	92	114	237	79	82	87	151	58	83	101	208	224	239	209	309	73	74	77	132
California	344	443	534	1,268	397	365	360	533	299	364	419	988	796	667	651	892	346	300	282	415
Colorado	75	159	172	318	387	385	318	398	72	136	150	270	707	708	688	796	368	330	278	338
Connecticut	168	199	263	401	270	266	289	360	140	170	219	327	581	534	567	666	225	228	241	293
Delaware	30	34	41	59	205	202	221	294	25	29	33	49	463	442	449	568	172	169	177	241
Florida	21	55	65	151	78	141	123	200	19	47	56	130	204	339	278	405	69	119	106	173
Georgia	133	181	193	376	86	99	87	144	117	161	170	335	196	239	197	289	76	87	77	128
Idaho	10	18	36	96	305	206	223	294	10	17	33	88	635	468	521	674	303	187	202	271
Illinois	640	887	1,238	2,248	208	232	257	399	547	749	1,030	1,826	548	551	571	795	178	196	214	324
Indiana	296	313	457	748	149	143	182	277	258	271	402	657	406	372	448	634	130	123	160	243
Iowa	273	336	437	751	168	176	196	337	238	298	382	651	451	469	484	788	147	156	171	293
Kansas	118	233	272	533	119	163	185	315	106	202	237	459	330	445	466	738	106	141	161	271
Kentucky	175	209	257	421	106	112	120	184	154	180	221	370	296	304	293	427	93	97	103	162
Louisiana	132	137	173	341	141	123	125	206	120	123	148	292	332	290	277	430	128	110	107	176
Maine	97	103	131	200	150	156	189	269	83	90	111	175	359	347	400	571	128	135	159	235
Maryland	157	187	240	369	168	179	202	285	128	151	192	293	394	382	420	542	137	145	162	226
Massachusetts	525	737	864	1,466	294	265	308	396	424	637	695	1,241	589	544	575	680	238	240	248	309
Michigan	284	338	447	804	173	161	184	286	249	290	378	681	438	380	418	612	152	138	156	242
Minnesota	137	245	360	677	175	187	206	326	121	209	305	573	473	444	472	686	154	160	174	276
Mississippi	94	107	128	247	83	83	83	137	86	98	117	229	208	211	182	260	76	76	76	127
Missouri	340	450	581	914	157	168	187	278	297	390	498	798	428	439	445	619	137	146	160	242
Montana	18	64	102	164	452	449	417	436	17	56	90	147	777	776	788	825	441	394	372	392
Nebraska	71	205	222	393	156	193	208	330	65	184	194	340	425	499	518	771	143	173	182	285

Table 8: Continued

Nevada	37	19	17	42	602	411	403	511	36	17	14	37	1,104	727	725	818	571	361	339	449
New Hampshire	68	73	89	125	195	195	217	290	58	65	77	109	411	395	428	570	169	173	186	254
New Jersey	289	368	535	922	255	255	284	363	238	321	441	749	601	560	583	698	211	222	234	295
New Mexico	13	21	29	66	111	132	149	201	13	18	25	59	317	332	376	485	108	113	127	180
New York	1,413	1,951	2,229	4,277	278	282	307	477	1,152	1,613	1,690	3,439	612	578	565	759	227	235	233	333
North Carolina	91	98	135	270	65	60	71	123	79	85	120	242	166	157	167	255	57	52	63	110
North Dakota	na	36	67	160	na	190	209	277	na	34	60	142	na	496	511	655	na	177	188	247
Ohio	569	693	928	1,511	178	189	223	317	476	587	786	1,298	479	459	509	676	149	160	189	272
Oklahoma	na	2	75	369	na	9	94	222	na	2	59	318	na	88	222	532	na	7	75	192
Oregon	39	77	101	270	223	241	245	401	37	66	88	233	549	515	521	763	211	206	213	346
Pennsylvania	965	1,396	1,600	2,671	225	248	254	352	784	1120	1,290	2,420	539	507	527	645	183	190	205	264
Rhode Island	77	94	128	198	279	273	299	365	62	76	100	161	531	485	522	640	224	220	234	297
South Carolina	74	86	98	191	74	75	73	126	66	77	87	169	167	174	152	233	66	67	65	112
South Dakota	na	48	73	165	na	137	181	282	na	44	66	147	na	386	478	670	na	127	163	251
Tennessee	125	162	203	354	81	92	100	162	108	143	181	321	242	257	249	375	70	81	90	147
Texas	155	304	414	977	97	161	136	265	137	268	350	781	263	340	339	482	86	106	115	193
Utah	19	40	51	111	135	188	183	298	18	34	43	99	444	506	514	754	123	161	157	266
Vermont	55	59	66	101	166	177	191	283	48	53	57	89	402	407	421	616	143	158	165	249
Virginia	128	156	208	361	85	94	112	175	109	135	181	314	221	244	273	394	72	82	97	152
Washington	17	110	147	498	232	309	284	436	16	94	129	433	547	571	572	830	219	264	249	379
West Virginia	55	70	116	265	88	92	121	217	48	61	102	222	273	273	313	496	78	80	106	182
Wisconsin	204	249	370	620	155	147	179	266	180	210	316	538	432	363	432	603	137	124	153	231
Wyoming	7	23	29	51	341	368	318	352	7	21	26	46	766	693	579	632	327	341	277	319
North and South Dakota	26				192				25				425				182			

Sources: see text.

Table 9: Property Income, Non-Agriculture Service Income, Agriculture Service Income, Non-Agriculture Service Income pw, Agriculture Service Income pw, 1880–1910, in current $U.S.

	Property Income				Non-Agric Service Income				Agric Service Income				Non-Agric Service Income pw				Agric Service Income pw			
	in millions of current dollars				in millions of current dollars				in millions of current dollars				in current dollars				in current dollars			
	1880	1890	1900	1910	1880	1890	1900	1910	1880	1890	1900	1910	1880	1890	1900	1910	1880	1890	1900	1910
United States	1,279	1,879	2,585	4,707	5,572	7,612	10,266	18,102	1,973	2,197	2,539	4,732	640	572	584	709	227	233	221	375
Alabama	10	14	17	36	38	64	81	169	56	59	61	113	472	438	379	512	135	150	111	170
Arizona	1	3	5	7	19	15	31	65	1	1	4	5	1,064	802	874	988	131	114	237	212
Arkansas	5	9	12	29	15	35	52	116	43	47	49	92	404	444	446	581	192	177	134	195
California	43	81	116	280	246	286	338	859	53	78	81	132	903	738	716	974	514	493	470	587
Colorado	4	24	21	48	68	125	132	238	4	12	18	33	795	840	785	941	258	269	355	382
Connecticut	27	30	44	75	125	154	203	309	16	16	15	19	652	581	608	697	317	309	295	410
Delaware	5	6	8	11	20	23	28	41	6	6	5	8	609	533	546	656	254	265	227	338
Florida	2	9	9	21	11	36	44	108	7	11	12	23	442	572	421	551	111	145	125	180
Georgia	15	21	23	41	51	85	101	207	66	74	69	128	398	366	336	476	140	170	122	177
Idaho	0	2	3	7	9	13	23	59	1	3	10	30	790	657	712	806	289	224	323	510
Illinois	90	143	207	422	375	581	858	1,511	171	165	172	321	743	666	668	819	346	343	330	710
Indiana	37	44	54	91	155	185	296	483	102	85	107	176	599	506	578	697	271	235	276	512
Iowa	34	40	55	100	129	153	219	348	108	142	163	303	667	536	570	737	323	410	402	856
Kansas	12	32	36	74	64	115	137	273	41	85	100	186	648	620	636	788	186	319	341	677
Kentucky	21	30	36	51	96	120	151	251	57	59	70	120	571	489	492	608	162	171	157	264
Louisiana	12	15	24	49	78	74	99	200	42	48	49	92	666	484	498	604	171	179	147	265
Maine	14	14	20	25	65	70	93	142	18	20	18	33	484	427	502	635	187	209	194	405
Maryland	28	37	48	76	102	127	168	256	26	24	24	38	476	452	496	605	234	210	201	324
Massachusetts	95	134	170	245	406	552	671	1,104	20	35	22	51	632	571	595	689	255	292	282	555
Michigan	34	50	68	123	167	214	303	543	81	75	75	140	613	497	555	699	274	226	209	417
Minnesota	16	37	55	104	79	144	222	419	41	64	83	156	767	566	619	764	273	297	290	542
Mississippi	8	9	11	18	23	31	50	102	62	65	68	127	402	360	397	506	175	174	130	187
Missouri	42	62	82	116	211	290	388	609	85	98	110	190	715	629	631	734	215	232	218	416
Montana	1	8	11	17	16	51	75	119	2	6	15	29	942	930	912	963	303	315	473	522
Nebraska	6	22	28	53	39	124	117	197	25	60	77	144	733	672	678	824	255	324	382	709

Table 9: Continued

Nevada	2	2	3	5	33	15	11	32	3	2	4	5	1,242	858	835	879	460	380	517	583
New Hampshire	9	8	13	15	48	53	67	91	11	12	10	18	518	447	492	588	214	265	228	504
New Jersey	48	49	94	173	212	295	417	718	26	26	24	35	656	602	618	722	362	318	290	434
New Mexico	0	3	4	7	11	16	18	51	2	2	6	8	636	693	602	942	76	52	180	115
New York	247	348	543	1,039	996	1,268	1,565	2,871	159	144	124	181	689	637	607	792	361	323	296	477
North Carolina	11	13	15	28	28	39	61	132	51	45	59	110	284	269	282	392	133	114	118	180
North Dakota	na	3	7	17	na	14	27	80	na	19	33	62	0	645	652	927	na	418	436	476
Ohio	89	110	142	213	336	466	648	1,103	140	119	137	199	629	569	602	736	304	262	292	474
Oklahoma	na	1	16	50	na	1	34	204	na	0	25	115	0	222	500	819	na	27	128	329
Oregon	2	11	13	37	25	48	66	191	12	17	22	42	796	676	670	881	330	306	310	480
Pennsylvania	172	225	311	461	670	899	1,186	1,984	116	128	103	164	621	567	580	681	306	276	256	398
Rhode Island	14	19	28	37	59	72	97	156	3	4	3	6	572	508	539	651	225	275	264	498
South Carolina	8	9	11	22	25	30	40	82	40	46	47	87	343	306	268	381	126	134	111	170
South Dakota	na	4	7	18	na	24	33	86	na	20	33	61	0	578	665	915	na	272	373	487
Tennessee	16	21	21	33	53	93	122	218	55	49	60	104	443	458	445	564	168	140	132	222
Texas	18	58	64	166	73	136	195	460	64	100	156	292	581	576	585	738	161	217	223	312
Utah	2	6	7	12	15	30	34	84	3	4	9	16	675	683	668	888	164	184	275	426
Vermont	7	7	9	12	30	34	43	64	18	18	14	25	534	489	539	672	281	308	249	513
Virginia	18	22	27	47	66	97	128	216	43	38	52	98	352	374	407	496	140	128	151	272
Washington	1	17	18	65	13	82	108	366	4	12	20	68	902	734	718	924	235	230	273	544
West Virginia	6	9	14	43	31	43	77	188	17	18	25	35	538	454	501	672	144	141	145	207
Wisconsin	23	41	53	82	115	146	237	412	65	63	79	128	610	472	557	702	283	236	258	419
Wyoming	0	2	4	5	6	19	19	38	0	2	7	9	945	923	662	785	189	206	432	343
North and South Dakota	1				20				5				791				139			

Sources: see text.

Table 10: Nominal Personal Income per Capita Relative to the U.S. Average, 1880–1910 (population weighted, U.S.=100)

Region	1880	1890	1900	1910
		Panel A: This Study		
New England	142	136	138	118
Middle Atlantic	146	143	141	130
East North Central	102	101	107	109
West North Central	90	95	97	104
South Altantic	53	55	54	58
East South Central	51	53	49	54
West South Central	60	61	59	71
Mountain	176	164	142	118
Pacific	206	183	162	163
Northeast	145	141	140	127
Midwest	85	87	90	94
South	56	58	57	65
West	195	175	154	146
		Panel B: Mitchener and McLean		
New England	140	-	133	-
Middle Atlantic	145	-	142	-
East North Central	102	-	106	-
West North Central	83	-	96	-
South Altantic	53	-	53	-
East South Central	51	-	49	-
West South Central	60	-	61	-
Mountain	167	-	139	-
Pacific	204	-	163	-
Northeast	144	-	139	-
Midwest	97	-	103	-
South	54	-	54	-
West	190	-	153	-

Sources:
Panel A:
Nominal Personal Income: Table 7.
Population Figures: U.S. Historical Statistics, Millennial Edition, Volume 1, Tables Aa9-14, Aa2244-2340.
Panel B:
Mitchener and McLean (1999), Table 1, Panel A, page 1019.