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1 U.S. Labor Force Estimates and Economic Growth, 1800–1860

Thomas Weiss

The level and trend of prosperity in the period before the Civil War has been of long-standing interest. Contemporaries were of course concerned about their economic status and its uncertainty, as well as the path that lay ahead. Because the period was crucial to the long-term development of the United States, many scholars have examined it, some hoping to uncover the determinants of the economic transformation, others wishing simply to better understand the country's past.

According to some scholars, America began the nineteenth century as a poor country, and the prospects did not appear bright. "The man who in the year 1800 ventured to hope for a new era in the coming century, could lay his hand on no statistics that silenced doubt" (Adams 1955, 12). By 1840, on the other hand, a contemporary visitor could report that "in no country, probably, in the world is the external condition of man so high as in the American Union. . . . Labourers [in America] are rich compared with the individuals in the same class in Europe."¹

While there are several dimensions to that "external condition," or in more modern parlance the standard of living, a key indicator is output per capita. With that quantitative evidence the nation's economic status could be as-

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1. By external condition was meant material well-being or wealth, as opposed to the internal nature of the human mind. The latter was the chief interest of the author, phrenologist George Combe. (The quotation comes from his 1841 work, *Notes on the United States of North America during a Phrenological Visit*, reprinted in Bode 1967, 294.)

sessed, its progress charted. There have been many attempts to do so, including the notable early efforts of Ezra Seaman, who generated national income estimates covering 1840, 1850, and 1860.² Those contemporary efforts, however, did not provide evidence about the changes that occurred before 1840. Seaman's works are consistent enough that we can roughly gauge the path of change over the years he examined, but we have little before that.

More systematic quantitative analysis of the period began in 1939 with Robert Martin's estimates of national income, which presented a controversial picture of change from 1799 to 1840. In his view, the American economy was no better off in 1840 than it had been near the end of the eighteenth century. During the intervening years the country had experienced substantial prosperity, but subsequently lost it. While he gave the first fairly complete statistical picture of the economy, he did not describe adequately how he constructed that particular course of events, and his estimates have been the target of much criticism and his conclusions the subject of much debate.

Simon Kuznets (1952) staked out the first opposing view, arguing that Martin's figures were implausible in light of the economy's shift out of agriculture and its westward movement. Given these reallocations of resources to more productive uses, the economy must have experienced growth. While Kuznets did not provide alternative estimates, his view was that per capita income must have risen by at least 19 percent between 1800 and 1840.³ William Parker and Franklee Whartenby (1960) raised doubts about both Martin's and Kuznets's calculations. Their argument was that agricultural productivity may have declined, which would have outweighed the other favorable effects pushing up per capita income. Douglass North (1961) questioned the Parker-Whartenby point about agricultural productivity, but still concluded that there was little growth before 1840. He argued that the economy moved with the fortunes of international trade; there were fluctuations and periods of substantial growth, especially before 1807, but overall per capita income in 1840 was probably lower than it had been in 1799. George Taylor took a longer perspective, describing change from 1607 to 1860. For this critical period he concluded that "output per capita over the years 1775 to 1840 improved slowly if at all. . . . the average for 1836-1840 was at best not much higher than that for the prosperous years around the beginning of the century" (1964, 427, 440).

The matter is still not settled despite continued efforts to fill in the blanks of the empirical record, and the years before 1840 are referred to repeatedly as a "statistical dark age." One of the more imaginative attempts to enlighten the

2. Seaman's (1852, 1868) estimates are not completely in accord with more modern definitions of national output and appear to underestimate the level of the nation's output. See Gallman (1961) for an assessment of Seaman's work, as well as that of Tucker and Burke.

3. This increase reflects just the rise in the participation rate and the shift of the work force from agricultural to nonagricultural industries. Kuznets also argued that per worker productivity probably increased so the rise in per capita income would have been even larger (1952, 221-39).

picture is that of Paul David, who produced what he termed controlled conjectures or conjectural estimates of growth.⁴ His conjectures rest heavily on two underlying series, the Towne and Rasmussen series on farm gross product and the Lebergott estimates of the labor force and its sectoral distribution.⁵ The output series in turn rests on the key assumption that in the years before 1840 much of agricultural output increased at the same rate as population.⁶ That is, output per person remained constant. While there are good reasons to challenge this, it has served as a useful approximation, and can continue to until enough new evidence on the relationships between height, nutrition, and diet is amassed.⁷ The estimates of gross domestic product per capita presented later in this paper rely on this farm output series.⁸

The other pillar of the controlled conjectures, the labor force series, has been revised with important implications for our understanding of the American past. The chief purpose of this paper is to present these new figures, although the bulk of that description is contained in the appendix. The body of the paper focuses on the substantive consequences of these revisions on agricultural productivity change and on the conjectural estimates of economic growth in the years before 1840.

A comparison of the Lebergott series and the new one is presented in table 1.1. The total labor force figures have been changed very little, but the composition has been altered substantially. The new farm figures are higher than the previous ones in the later decades of the period by a fairly uniform per-

4. Diane Lindstrom constructed a different set of hypothetical figures based on the likely values of the elasticity of demand. She first estimated growth in the Philadelphia area, and subsequently extended the procedure to the nation, making use of Poulson's data on commodity output. She found that growth between 1810 and 1840 "probably occurred at the higher end of the .53 to 1.01 percent per annum range" (1983, 689). Her work also contains useful discussions of the various estimates for the period.

5. For ease of exposition I shall refer to the Lebergott series. Lebergott (1966) developed the estimation procedures and produced the initial estimates, while David (1967) revised some of the figures, especially those for 1800. There is now very little difference between the two series. The biggest discrepancy was in the estimate for 1800, but Lebergott now accepts David's revision (Lebergott 1984, 66). David had adjusted Lebergott's slave labor estimate in 1820, 1840, and 1860, but subsequent investigation indicated the correction was unnecessary (Weiss 1986b).

6. Approximately 90 percent of the estimate of farm gross product for the years 1800 to 1830 rests on this premise. Towne and Rasmussen were dissatisfied with having to make this assumption because it implied stagnant agricultural technology and productivity. At the same time, they believed that productivity did not advance much before 1840, and so the assumption may not have done great injustice to the true trend. They did, however, caution that "small variations in the estimates of gross farm product per worker from decade to decade during 1800-40 should not be considered significant" (1960, 257).

7. That evidence so far indicates a decline in stature among those born between 1835 and 1870, suggesting that those cohorts suffered nutritional deficiencies. This implies that, among other things, food output and consumption per capita may have declined after 1835 (Fogel 1986; Komlos 1987). The exact timing of this decline, its consequences for consumption and output, and the relationship of those declines to the census year's figures have yet to be established.

8. Since David's conjectural estimates rest on this series, its use here highlights the impact of the new labor force figures. As indicated in the notes to table 1, however, I have made some minor adjustments to the Towne and Rasmussen figures.

Table 1.1 Estimates of the Total and Farm Labor Force, United States, 1800 to 1860

Year	Total Labor Force (thousands of workers)		Farm Labor Force (thousands of workers)		Farm Shares (%)	
	Lebergott	Weiss	Lebergott	Weiss	Lebergott	Weiss
1800	1,680	1,712	1,400	1,274	83.3	74.4
1810	2,330	2,337	1,950	1,690	83.7	72.3
1820	3,135	3,150	2,470	2,249	78.8	71.4
1830	4,200	4,272	2,965	2,982	70.6	69.8
1840	5,660	5,778	3,570	3,882	63.1	67.2
1850	8,250	8,192	4,520	4,889	54.8	59.7
1860	11,110	11,290	5,880	6,299	52.9	55.8
<i>Average Annualized Rates of Growth</i>						
1800-1810	3.32	3.16	3.37	2.87	0.05	-0.29
1810-20	3.01	3.04	2.39	2.90	-0.60	-0.13
1820-30	2.97	3.09	1.84	2.86	-1.09	-0.22
1830-40	3.03	3.07	1.87	2.67	-1.12	-0.38
1840-50	3.84	3.55	2.39	2.33	-1.40	-1.18
1850-60	3.02	3.26	2.67	2.57	-0.35	-0.67
1800-1820	3.17	3.10	2.88	2.88	-0.28	-0.21
1820-40	3.00	3.08	1.86	2.77	-1.10	-0.30
1840-60	3.43	3.41	2.53	2.45	-0.88	-0.92
1800-1840	3.08	3.09	2.37	2.82	-0.69	-0.26
1800-1860	3.20	3.19	2.42	2.70	-0.75	-0.48

Sources: Lebergott (1966, table 1; 1984, 66); and the Appendix below.

Note: David's estimates are identical with Lebergott's in the years 1810, 1830, and 1850. In other years the differences between the David and Lebergott figures are small. David's total labor force estimates (in thousands) are 1,700 in 1800, 3,165 in 1820, 5,707 in 1840, and 11,180 in 1860; the farm figures in those respective years are 1,406, 2,500, 3,617, and 5,950 (David 1967, appendix table 1).

centage; 7 percent in 1840, 8 in 1850, and 6 in 1860. While the levels of the two series differ, they show roughly the same growth over the period, as well as over each of the two decades. In sharp contrast, the revised estimates for the opening decades of the century are below the previous figures by approximately 10 percent in 1800 and 1820 and 15 percent in 1810. In spite of these disparities, the two series show very similar changes over the earliest twenty-year period—the farm labor force increased at 2.88 percent per year.⁹ The most striking difference shows up in the years 1820 to 1840, over which time the new series increased at a rate of 2.77 percent per year, in contrast to the

9. There is, however, a noticeable difference in the growth over each of the decades. The Lebergott figure increases quite rapidly in the first decade and then much slower; my estimate shows about the same percentage increase in each of the two decades. The Lebergott series shows a small increase in the farm share of the labor force in the first decade of the century.

1.86 percent rate in the old series. The changes by decade during this subperiod are equally disparate.

An overall assessment of the two alternative series, based on comparisons between the rates of decline of the farm labor force share and of the rural population share, suggests that the new series is the more plausible.¹⁰ As can be seen in table 1.1, the farm share declined at about the same rate in each series over two of the twenty-year subperiods, 1800 to 1820 and 1840 to 1860. During those intervals the rural share of the population declined at annual rates of 0.06 and 0.57 respectively, somewhat slower than the farm shares in both periods. In the period 1820 to 1840, however, the comparative results diverge noticeably. The rural population share declined by 0.20 percent per year, and while the Weiss series declined slightly faster at 0.30 percent per year, the Lebergott farm share declined by 1.10 percent per year. This greater conformity between changes in the rural population and the farm labor force in my series provides some confidence in the new figures.¹¹

The erratic pattern of growth in Lebergott's farm labor force produces its corollary in the growth of labor productivity. A striking feature of that series is that output per worker in agriculture grew at its fastest rates of the century between 1820 and 1840.¹² Over the antebellum period, output per worker increased by 47 percent, or about \$70 (in 1840 prices), with two-thirds of the increase occurring during this twenty-year stretch.¹³ With the new labor force figures, agricultural productivity showed a healthy advance over this period, but not a record-setting performance.¹⁴ Of the \$43 increase in output per worker that took place between 1800 and 1860, only about one-third (\$15) occurred during the middle twenty years.¹⁵

10. Gallman was suspicious of the Lebergott series because it showed changes in the farm labor force that seemed inconsistent with the changes in the rural population. The disparity seemed greater in the antebellum period, when the farm share of the labor force declined by substantially more percentage points than the rural population share. Gallman focused on the changes between 1800 and 1850, noting that "the agricultural share of the work force fell by 28 percentage points between 1800 and 1850, at a time when the share of the rural population in total population was declining by only 9 points" (1975, 38).

11. Over the entire century the new series shows a much higher correlation between the change in the farm share and in the rural population share on a decade-to-decade basis. The correlation coefficient using the new series is .91, while with the Lebergott figures the coefficient is only .24.

12. The average rate of productivity advance between 1820 and 1840 depends on the definition of farm output. Using the revised figures for farm gross product, narrowly defined, the rate was 1.33 percent per year, the highest of any twenty-year period, or any decade, in the century. Using the original Towne and Rasmussen figures the rate of advance was 1.54 percent, also the highest of the century.

13. These calculations are based on the revised farm gross product series, narrowly defined (see Weiss 1990). With the original Towne and Rasmussen figures, output per worker increased by 52 percent, or \$75 dollars, with 70 percent of the increase occurring between 1820 and 1840.

14. Using the revised figures for farm gross product, narrowly defined, the rate was 0.44 percent per year, one of the highest rates for the antebellum period, but below that of the postbellum decades. Using the original Towne and Rasmussen figures the rate of advance was 0.65 percent.

15. These calculations are based on the revised farm gross product series, narrowly defined (see Weiss 1990). With the original Towne and Rasmussen figures, output per worker increased by 30 percent, or \$48 dollars, with 45 percent of the increase occurring between 1820 and 1840.

Productivity increases in agriculture are an important determinant of the conjectural estimates of per capita income, and thus shape our view of changes in the standard of living before the Civil War. As will be seen, the two productivity series generate noticeably different income paths. In turn, the farm labor force is key to our understanding of the period before 1840, and it is thus worthwhile to examine these new figures. The appendix describes the figures in great detail, but a few aspects of the estimates must be highlighted here.

1.1 The Labor Force Estimates

My estimation followed Lebergott's approach but was executed at the state and regional level. In concept and coverage the new total and farm labor force estimates are similar to his. The total labor force is the sum of the workers in five population components; free males aged 16 and over, free females aged 16 and over, free males aged 10 to 15, free females aged 10 to 15, and slaves aged 10 and over. Each estimate of the number of workers is the product of the group's population and its specific participation rate. The levels and changes in the total labor force are nearly identical in the two series, with the figures differing by 2 percent or less in every year (see table 1.1).¹⁶ The more noticeable differences in the two series show up in the distribution of workers between the farm and nonfarm industries. These differences are not always in the same direction; the new figures are above the old ones in the later decades of the period but below them in the opening decades of the century. Three things account for most of the differences.

In all years the new estimates incorporate a smaller number of slaves in farming. Lebergott estimated the number of slaves engaged in farming by assuming that 95 percent of the slave population aged 10 and over lived in rural areas, 87 to 90 percent of which were engaged in farming.¹⁷ I used the county-level data on employment and population for 1820 and 1840 to estimate that roughly 75 percent of the rural slave population aged ten and over was engaged in farming. These shares were assumed to hold for the other antebellum years as well.¹⁸ The differences are substantial; in 1850 for example, my figure is smaller than Lebergott's by 329,000.¹⁹

16. These minor differences arise from the use of slightly different participation rates for certain demographic components, and because I used state-specific participation rates for each group. As the relative size of the various states' populations changed over time, the national average participation rate for each age-sex group fluctuated and diverged slightly from the constant national figure used by Lebergott.

17. Lebergott indicated that he intended to allocate only 87 percent of the rural adult slaves to farming, but in the execution the 90 percent figure was used. In 1860, he used a different figure altogether, namely, the participation rate for free males aged 15 and over.

18. The 1840 share was estimated to be .741, that for 1820 was .769. The 1840 figure was used to estimate the slave farm workers in 1850 and 1860; the 1820 figure was used in other years.

19. The differences in our estimates of the number of slaves engaged in farming amounts to about 7 percent of Lebergott's farm labor force, except in 1800 and 1860 when the figures are 3.8 and 5.1 percent (see Weiss 1991 for details).

The revised figures accord better with other evidence about the nonfarm activities in which slaves were engaged.²⁰ With the smaller share engaged in farming, nearly a fifth of the *rural* slave labor force worked at nonfarm activities. This is in stark contrast to Lebergott's estimate that virtually no rural slaves worked at nonfarm occupations, a figure much too low, given all the other activities that took place on the plantation and in rural areas more generally.²¹

In 1850 and 1860 this downward bias is more than offset by the addition to farming of workers who had reported their occupation as "laborer, not otherwise specified." Researchers have long recognized that in the postbellum period this census category included many workers who were engaged in farming, but previous estimates for the antebellum period had placed all of them in nonfarm industries, apparently because the large numbers of slaves in farming masked the problem at the national level. A careful examination of the state data, and the location of many of these workers in rural areas, argues for the assignment of many of them to farming. In particular, when one looks at just the free states, where slavery could not distort the picture, it is evident that some of these laborers must have been employed in farming (Weiss 1987c).

My allocation of some of these workers to farming raises that sector's labor force by 630,000 workers in 1850 and 582,000 in 1860. These are not trivial amounts—making up 13 percent of the farm labor force in 1850 and 9 percent in 1860—but seem clearly called for. Without such laborers, the ratio of the farm work force to the rural population in the *free states* was .15 in 1850 and .16 in 1860, substantially below the average of .192 in the years 1870 through 1910. With the addition of these workers, the 1850 and 1860 ratios are .196 and .189, respectively, very much in line with the behavior of the ratio in the postbellum years.

The third major reason the new estimates differ from the older ones is because of varying judgments about how to correct deficiencies in the census counts for 1820 and 1840. I assessed those censuses in order to determine which industries were covered, which age and sex portions of the population were included in the counts of workers, and which state figures were in need of revision (Weiss 1987a, 1988). Neither census covered all industries, but both reported figures for agriculture and for certain other commodity-producing industries. There appears, however, to be some difference in age and sex coverage. While both censuses tried to report on all workers aged ten and over, including slaves, they did so imperfectly, and the accuracy and com-

20. Blodgett's estimates for 1805 imply that only 75 percent of the slaves were engaged in farming, with 300,000 being "slaves to planters" and 100,000 being "variously employed" (1806, 89).

21. A useful collection of pertinent articles can be found in James Newton and Ronald Lewis (1978). See also Robert Starobin (1970) and John Olson (1983). Olson's sample data from plantation and probate records indicate that between 11 and 27 percent of the rural slaves were engaged in nonfarm activities. The figure derived from the county-level data falls securely in this range.

pleteness of the counts varied by county and state.²² In principle, however, they provide a count of the entire farm work force in 1840, and the bulk of it in 1820. In both years, the worst anomalies in the census figures could be identified and corrected.²³

The revisions were carried out by examining the county and subdivision data in much the same manner as had been done by Lebergott (1966). The census statistics included many slave workers, but not all, so the farm worker totals in most slave states had to be revised. Fortunately, the reported figures in a large number of southern counties were accurate and could be used to revise those in other counties (Weiss 1987a). The corrections and additions to the census counts of farm workers amounted to 206,000 in 1820 and 160,000 in 1840, increases of 11.2 percent and 4.4 percent, respectively.²⁴

1.2 Substantive Results

We can now turn to the substantive issues about the standard of living in the United States before 1860. The effect of the labor force revisions on the conjectural estimates of growth in the years before 1840 can be seen in table 1.2.²⁵ The old series is presented there along with several new versions. The figures in variant A were constructed to show the consequences of only the labor force revisions on the conjectural view of the economy's performance. The variant B estimates were refined in several ways, but still rest heavily on the productivity advances emanating from a conventional, narrowly defined agricultural output series. Variant B, however, drops the assumption that nonfarm productivity change grew at the same rate as farm productivity, and makes use of some minor adjustments to the Towne and Rasmussen estimates of farm gross product in the years 1800 to 1830.²⁶ The final variant incorporates an addi-

22. In both years the statistics in the slave states were flawed, and in 1820 the enumerations of male workers aged 10 to 15 were low in many states. It appears that males aged 10 to 15 were included in the 1820 census figures of the New England states but were not always counted elsewhere.

23. The 1820 census statistics were supplemented by estimates of the missing components, females aged 16 and over and free males aged 10 to 15 years. No estimate of female farm workers aged 10 to 15 was made for 1820 or for any other antebellum year. Some of these workers may be included in the 1840 and 1860 census counts, but the number must be very small. The available evidence for the postbellum period shows very few such workers.

24. My assessment of the 1840 census indicated that the reported labor force in the covered industries was low by about 300,000 workers. My adjustment procedures, however, produced a correction of only 206,000 workers, 160,000 of which were in farming. By comparison, Lebergott reduced the census count of farm employment by 148,000. Richard Easterlin, in his original examination of the 1840 census, revised the count of farm workers upward by 104,000, although in some states in the Northeast he reduced it (1960, 127). In a subsequent work he accepted Lebergott's farm totals, and thus implicitly the notion that the census figure was too high, but gave no reasons for his change of mind (1975, 110).

My adjustments reported here for 1820 and 1840 include the additions of male workers aged 10 to 15 and females aged 16, and corrections for errors of addition in the census totals.

25. The details of these conjectural estimates are presented in Weiss (1989).

26. In particular, I have revised the value of hog and cattle production in the years 1800 to 1830. For the period 1800 to 1840 or 1800 to 1860 this adjustment lowers the rate of growth of output

Table 1.2 Estimates of Gross Domestic Product per Capita (valued in 1840 prices)

Year	David Narrow GDP	Weiss		
		Variant A Narrow GDP	Variant B Narrow GDP	Variant C Broad GDP
1800	\$ 58	\$ 73	\$ 66	\$ 78
1810	56	75	69	82
1820	61	77	72	84
1830	77	83	79	90
1840	91	91	91	101
1850	100	100	100	111
1860	125	125	125	135
<i>Average Annualized Rates of Growth</i>				
1800-1820	0.27	0.28	0.41	0.46
1820-40	1.96	0.84	1.19	0.93
1840-60	1.60	1.60	1.60	1.44
1800-1840	1.13	0.56	0.80	0.69
1800-1860	1.29	0.90	1.06	0.94

Sources: David (1967, table 8); Gallman (1971, table 1); Weiss (1989, tables 4, 6); Weiss (1990).

Note: The conjectural estimating equation is

$$O/P = (LF/P)[S_a(O/LF)_a + S_n(O/LF)_n]$$

Output per capita (O/P) in any year equals the participation rate (LF/P) times the weighted average output per worker, which equals output per worker in agriculture (a) and nonagriculture (n) weighted by each sector's share of the labor force. This equation yields an index of output per capita in each decennial year 1800 through 1840, which is used to extrapolate the 1840 dollar value of per capita output to each of the other years.

In David's and my variant A series this equation was estimated by assuming that $(O/LF)_a = k(O/LF)_a$, where k is the ratio of the sectoral output per workers in the base year. The Weiss variant A series uses the new labor force estimates.

Variant B includes several modifications: I have relaxed the assumption that nonfarm productivity advanced at the same rate as that of farming; I have made some minor revisions to the Towne and Rasmussen farm gross product figures used to derive the agricultural output per worker series; and the annual value of shelter is estimated independently of the conjectural growth equation (see Weiss 1989, 1990).

The rate of nonfarm productivity advance is a weighted average of the rate for manufacturing and for all other nonagricultural industries. The manufacturing rate for 1820 to 1840 (2.3 percent per year) comes from Sokoloff (1986, table 13.6); the manufacturing rate for 1800 to 1820 and that for all other nonfarm industries for 1800 to 1840 is assumed to be the same as that in agriculture. For 1840 to 1860 the figures come from the direct estimates of nonfarm output divided by the new labor force estimates.

The per capita value of shelter for 1840 through 1860 comes from Gallman and Weiss (1969). Those figures yield a ratio of the annual flow of shelter to the stock of dwellings of roughly 20 percent. For earlier years the shelter figures were estimated as the product of that ratio times Gallman's estimates of the stock of residential dwellings (for 1800, 1805, and 1815) and by interpolation (for 1810, 1820, and 1830).

Variant C is the same as variant B except that it makes use of a broader, unconventional measure of agricultural output and gross domestic output (see table 1.3).

Poulson examined commodity production for 1809 and 1839 and estimated that commodity output per capita advanced at only 4 percent per decade (1975, 140).

Lindstrom formulated an alternative way of constructing per capita income estimates that incorporated information about the income elasticity of demand for agricultural products. She developed her method to derive growth estimates for Philadelphia. When applied to the United States, the procedure yielded growth rates ranging from 0.53 to 1.01 percent per year between 1809 and 1839 (1983, 688).

tional major refinement, the use of a less conventional, more comprehensive measure of farm output and gross domestic product that includes the value of farm improvements and home manufacturing.²⁷

In the most direct comparison, David's figures versus variant A, the levels of per capita product in the revised conjectures are higher in each year 1800 through 1830, roughly 25 percent at each of the first three benchmarks.²⁸ The two series offer different perspectives on the course of growth in the antebellum period. In the new series, growth was slower overall and exhibited more gradual acceleration over the period. According to David's estimates, the nation had reached its modern rate of growth long before the Civil War; from 1820 onward the antebellum record was nearly identical to the postbellum, doubling every forty years. In the new series there is a greater distinction between the ante- and postbellum records. In that former era the rate in each twenty-year period exceeded that of the preceding two decades, indicating clearly that the United States experienced a gradual acceleration in the growth of per capita output rather than a sharp, sudden increase.

While the two series tell dissimilar stories about the entire antebellum period, the difference rests entirely on the subperiod 1820 to 1840. There is no difference between the two series regarding the growth of per capita output between 1840 and 1860 because both series are based on Gallman's direct measures of output. Very similar results prevail for the earliest twenty years as well; the levels of output per capita differ, but the rates of growth are equal and low.

The discrepancy in the middle twenty years reflects the revisions to the underlying labor force series. The new series shows a more rapid growth of the farm labor force over this period, which results in a much slower rate of

by very little, only 0.08 percent per year in the first instance and 0.06 in the second. The growth during the 1830s, however, is reduced more noticeably from 3.57 to 3.25 percent per year. These adjustments are explained in Weiss (1990).

27. In order to obtain this more comprehensive measure I estimated the value of farm improvements and home manufacturing by extending back to 1800 Gallman's estimates of those components for the years after 1839. These adjustments have very little effect on the growth of farm gross product over the entire antebellum period, but do reduce growth by about 0.2 percent per year between 1820 and 1840. As will be seen, this adjustment is dwarfed by the impact of the labor force revisions.

Gallman's estimate of home manufacturing is more comprehensive than that of Towne and Rasmussen, and includes home baked goods, home production of textiles and clothing, and the value of home butchering (Gallman 1966, 35, 71-76). The Towne and Rasmussen figures include only the value of home textile production.

28. The higher levels pass Gallman's test of the reasonableness of the implicit flow of nonperishable consumption and investment spending (1971, table 4), and the changes in the new residuals imply an income elasticity of demand for nonperishables that is more consistent with other evidence for the nineteenth century. The new nonperishable figures yield elasticities of 1.7 for the period 1800 to 1820, and 1.8 for the years 1820 to 1840. David's figures give elasticities of 2.4 and 2.5 for those same periods. The new figures are somewhat higher than that implied by the direct income figures for 1840 to 1860 (1.31) and fall in the upper range of those for the late nineteenth century, but they are nonetheless much closer than David's.

agricultural productivity advance and a smaller shift in the composition of the work force toward the more productive nonagricultural sectors. The underlying difference in agricultural productivity growth is so great that even when nonfarm productivity is allowed to grow much faster than farm in the years 1820 to 1840, as is shown in variant B, the new income figures still show a slower rate of advance than did David's conjectures. The standard of living in this case falls between the David and variant A versions, the per capita figures being 12 to 21 percent above David's in the years 1800 through 1820, and approximately 10 percent below my variant A estimates. While lower than the variant A figures, they nonetheless seem high enough to pass Gallman's test of the reasonableness of the implicit flow of nonperishable consumption and investment spending.²⁹

The chief alterations resulting from the relaxation of the assumption of equal productivity advance are, by construction, concentrated in the middle twenty years. The David series showed an annual growth of per capita income of only 0.27 percent between 1800 and 1820, then a much more substantial increase of 1.96 percent over the subsequent twenty-year period, followed by a slightly slower rise of 1.60 percent over the years 1840 to 1860. In the variant A case, which shows only the effect of using the new labor force estimates, the conjectural growth was also very small in the opening twenty years and then picked up in each of the subsequent twenty-year periods. In the variant B series the pattern of acceleration still prevails, but with a noticeable quickening of the rate after 1820.³⁰ Still, the revised pace of 1.19 percent per year is well below David's figure, the rate in each twenty-year period exceeds that of the preceding two decades, and there is still a greater distinction between the ante- and postbellum records than was revealed in David's series.

The broadening of the output measure (variant C) adds considerably to the average per capita output, raising it by \$10 to \$12 in each year. As these amounts are slightly larger in the earliest years and are larger fractions of the output, the rate of growth is altered as well. The effect on growth, however, is not too substantial, lowering the rate for the longer periods, 1800 to 1840 or 1800 to 1860, by about 0.1 percent.

Even at these slower rates, the standard of living advanced noticeably during the period, especially after 1830. And, as with the other variants, the rate of advance accelerated in each succeeding twenty-year period, proceeding smoothly from a modest rate of 0.46 percent per year in the opening twenty years of the century to 1.44 for the closing twenty years.

29. Gallman has estimated that the flow of perishable consumption per capita was quite steady over the course of the nineteenth century, changing primarily because of changes in the composition of the population (1971, 71-79; 1972, 197). His estimates showed a very mild rise from \$42 in 1800 to \$45 in 1840. When these perishable consumption estimates were subtracted from the per capita income figures implied by David's conjectural growth rates, the residuals were quite small, implausibly so in Gallman's view (1971, 81). The residuals implied by the variant B figures are not as large as in variant A, but are well above David's.

The components of this comprehensive estimate of gross domestic product are presented in table 1.3. As can be seen, the increase in per capita output from 1820 to 1840 gets a boost from the rise in the value of shelter, which increased by \$3.40 over the twenty years, or at an annual rate of 2.18 percent. This could be the result strictly of the estimating procedures, but even without that increase, per capita output rose by nearly \$14, or at a rate of 0.82 percent.

More telling, perhaps, is the increase in the residual, the portion of output beyond the apparent basic necessities. In 1800 the value of that residual was only \$19. While Henry Adams did not know the exact figure, he made a perceptive comment about the precarious size and nature of the overall output level. "Not only were these slender resources, but they were also of a kind not easily converted to the ready uses required for rapid development" (Adams 1955, 28). That critical component, however, increased by \$17 between 1800 and 1840, and another \$23 in the subsequent twenty years. It increased at a rate in excess of 1 percent per year in each twenty-year period, and each decade except the second. Over the longer term this residual increased at 1.6 percent per year in the first forty years and 1.9 percent for the entire antebellum period. As Adams hinted, this was the output needed for industrialization, and of course provided as well the discretionary items that are the fruits of economic progress. In this light, Americans were advancing in style.

When combined with other evidence about economic performance between the Revolution and the Embargo of 1807, it appears that the young nation was reasonably well-off for some time, and showed improvement after 1793. Goldin and Lewis (1980) have estimated rates of growth for the period 1793 to 1807, and Jones (1980) has provided an estimate of per capita output for 1774.³¹ Goldin and Lewis produced four variants but felt there was "some empirical basis for accepting the upper bound estimates," and so I have focused on just that one.³² I have produced a narrow and a broad measure of

30. The acceleration in the variant B series reflects a different pattern of labor productivity growth. The growth of total output per worker between 1820 and 1840 is now faster than that underlying the variant A series, but still slower than David's. While the pattern of acceleration now seems more like his, the source of it is fundamentally different. In David's series the acceleration of total output per worker required a sharp rise in agricultural productivity growth, from virtually zero to 1.35 percent per year, and a substantial effect from the shift of labor toward the more productive nonfarm industries. Now the overall acceleration is accomplished with only a mild increase in the rate of agricultural productivity advance and rests more on the speeding up of productivity advance in manufacturing.

31. Gallman has produced an estimate for 1774 as well, by invoking some reasonable judgments about the minimum productivity change that occurred between 1774 and 1840. He argued that with no increase in productivity, per capita income in 1840 would have been 22 percent higher than it was in 1774, and with only modest productivity gains, per capita output would have increased by 35 to 40 percent (Gallman 1972, 23-24). He placed the 1774 value between \$60 and \$70 (in 1840 prices). Jones used Gallman's range to confirm the reasonableness of her estimates.

32. Goldin and Lewis showed fairly rapid growth between 1793 and 1807, with per capita income advancing at an annual rate of between 0.86 and 1.33 percent. These rates are below the 1.6 found for the late antebellum years, but are higher than the rate of advance over the longer period of 1800 to 1840. Most of the growth in their series occurred very early, before 1800 and

Table 1.3 Per Capita Values of Gross Domestic Product and Components (1840 prices)

	GDP Variant C	Perishable Output	Nonperishable Output			
			Shelter	Home Manufacturing	Farm Improvements	Residual
1800	77.61	42.00	5.50	8.55	2.45	19.10
1810	81.70	43.00	5.80	8.53	2.93	21.45
1820	83.90	43.00	6.30	8.52	2.75	23.33
1830	90.16	44.00	7.80	8.38	2.49	27.49
1840	101.03	45.00	9.70	8.00	2.32	36.01
1850	110.84	47.00	9.00	8.35	2.51	43.98
1860	134.61	55.00	9.90	8.01	2.03	59.67
<i>Average Annualized Rates of Growth</i>						
1800-1810	0.52	0.24	0.53	-0.03	1.80	1.16
1810-20	0.27	0.00	0.83	-0.01	-0.63	0.85
1820-30	0.72	0.23	2.16	-0.16	-1.01	1.65
1830-40	1.15	0.22	2.20	-0.46	-0.70	2.74
1840-50	0.93	0.44	-0.75	0.42	0.81	2.02
1850-60	1.96	1.58	0.96	-0.41	-2.12	3.10
1800-1820	0.39	0.12	0.68	-0.02	0.58	1.01
1810-30	0.49	0.12	1.49	-0.09	-0.82	1.25
1820-40	0.93	0.23	2.18	-0.31	-0.85	2.19
1830-50	1.04	0.33	0.72	-0.02	0.06	2.38
1840-60	1.45	1.01	0.10	0.01	-0.66	2.56
1800-1840	0.66	0.17	1.43	-0.17	-0.14	1.60
1800-1860	0.92	0.45	0.98	-0.11	-0.31	1.92

Sources: See the notes to table 1.2 for the derivation of the per capita values of GDP and shelter. The values of home manufacturing and farm improvements come from Weiss (1990). The perishable figures come from Gallman (1971, table 4). The residual is obtained by subtracting these four other figures from GDP. The sum of perishable output, shelter, and the residual equals the variant B measure of GDP per capita shown in table 1.2.

GDP, the difference being the inclusion of the value of home manufacturing and farm improvements in the broader variant (see table 1.4). I have assumed that the rates of growth of the two series were the same from 1774 to 1800, just as they were from 1800 to 1820.³³ The levels of output, however, differed by nearly 20 percent.

For the last quarter of the eighteenth century, per capita output increased at

especially between 1793 and 1796. I have used just one of the upper-bound estimates, that with the higher values of the elasticity of export supply and import demand. The differences in their series using lower elasticities are concentrated in the years 1793 to 1798. See Goldin and Lewis (1980, 20, table 7).

33. After 1820 or so the value of farm improvements and home manufacturing grew more slowly than the rest of gross national product.

Table 1.4 Estimates of Gross Domestic Product and Per Capita Gross Domestic Product, 1774 to 1810 (valued in 1840 prices)

	Population (thousands)	Narrow Definition		Broad Definition	
		Per Capita	Total	Per Capita	Total
1774	2,419	\$ 60	\$ 144	\$ 70	\$ 170
1793	4,332	59	257	70	302
1800	5,297	66	348	78	411
1807	6,644	71	473	84	558
1810	7,224	69	500	82	590
<i>Average Annualized Rates of Growth</i>					
1774-93	3.11	-0.03	3.08	-0.04	3.08
1793-1800	2.91	1.51	4.47	1.52	4.47
1800-1807	3.29	1.15	4.48	1.16	4.48
1793-1807	3.10	1.34	4.47	1.34	4.48
1793-1810	3.05	0.93	4.01	0.93	4.01
1774-1800	3.06	0.38	3.45	0.37	3.45
1774-1810	3.09	0.42	3.52	0.42	3.51

Sources: The 1774 population was calculated by assuming that population grew at the same rate between 1770 and 1774 as it had in the preceding decade (U.S. Bureau of the Census, 1975, ser. A-7).

The narrow 1774 per capita output figure comes from Jones (1980). She derived per capita income figures in pounds sterling by dividing her wealth estimates by assumed wealth-income ratios. I used the higher of her two estimates (12.7 pounds) because she argued that her wealth estimates may be too low, and Gallman has argued that an even lower wealth-income ratio would be appropriate. I converted her figure to dollars at the par value of exchange (\$4.44 per pound) and deflated by the David-Solar price index to value it in 1840 prices.

The broader value was obtained by multiplying the narrow figure by the ratio of broad to narrow GDP (1.18) that prevailed in the years 1800 and 1810.

The total GDP figures are equal to the population times the estimated per capita figures, and are in millions of dollars.

The 1800 and 1810 per capita figures come from table 1.3.

The 1793 and 1807 figures were derived by assuming that the rates of growth estimated by Goldin and Lewis prevailed between those dates and 1800. I used the rates derived from their upper-bound estimates (1980, 20, variant 4 in table 7).

The rates of growth reported here were calculated from the unrounded figures.

an annual rate of 0.38 percent per year.³⁴ This is barely slower than that for the first two decades of the nineteenth century, but noticeably below the rates that prevailed thereafter. All of this early growth, however, was concentrated in the period after 1793. The economy suffered a setback during the Revolution and in the years immediately thereafter, but it was apparently quite mild.³⁵

34. For the entire thirty-six-year period, per capita output grew at 0.42 percent per year, and gross domestic product increased at the healthy rate of 3.5 percent per year.

35. If Gallman's higher estimate (\$70) were the true figure for 1774, then the turmoil was much more serious. Jones's lower figure (\$51) implies that the economy experienced a healthy advance during the period. (See McCusker 1978 for a discussion of the problems of converting colonial values to dollar figures.)

Following that disruption came a particularly strong expansionary performance. From 1793 to 1807 per capita output grew at 1.34 percent per year, faster than any twenty-year period in the first half of the nineteenth century.³⁶ Some of this ebullient performance from 1793 to 1807 may reflect business-cycle recovery or long swing expansion and perhaps exaggerates the long-term trend rate of growth. While the cyclical location of 1793 is not known for certain, 1807 is usually thought of as a peak.³⁷ A true appreciation of that period's performance must await a clearer picture of the cyclical and long swing behavior for the entire antebellum period.³⁸

There was a noticeable difference within this expansionary phase. The first half of the period had the better performance, increasing at 1.51 percent per year, and much of this increase was concentrated in the shorter period 1793–96. In the second subperiod, from 1800 to the Embargo of 1807, per capita output still grew quite rapidly (1.15 percent), but noticeably slower than the preceding seven-year period. The combination of evidence reveals that in spite of this early surge the opening decade of the nineteenth century showed one of the slowest rates of advance in the antebellum period. After 1807 the economy again faltered, with per capita output showing a small absolute decline (about \$1.50) between 1807 and 1810, resulting in a noticeable slowing of the rate of growth for the entire decade to just 0.5 percent per year. This setback is, of course, consistent with the well-known effects of the embargo. What is worth noting, however, is that the decline was small, the level of per capita output remained fairly stable during the period of disruption, and it subsequently recovered quite nicely.

One of the more striking features of the American economic performance that emerges from this combined series is the similarity to the British record as reconstructed by N. F. R. Crafts.³⁹ Over the long period from 1774 to 1831 Crafts's evidence indicates that British per capita output grew at 0.40 percent per year, extremely close to the U.S. figure for that same period—0.38 percent using the broad measure of output, 0.43 using the narrow.⁴⁰ Within that

36. Only the late antebellum period, 1840 to 1860, had a better record, and even then only the narrowly defined measure showed clearly superior results. The broadly defined series advanced at 1.44 percent per year over those twenty years, barely faster than the performance between 1793 to 1807.

37. See Engerman and Gallman (1983, 17) for a discussion of the cyclicity in this period.

38. The conjectural benchmark estimates for 1800 through 1840 are not influenced by those economic fluctuations because a big chunk of output was derived by assuming a constant per capita value of farm products. The economy's fluctuations are masked, but the underlying trend is more evident.

39. Some of his figures have been challenged by others, such as Mokyr (1987) and Williamson (1987). More recently, Hoppit, in a generally critical essay about producing quantitative estimates of national product before 1831, nevertheless allows that "Crafts's estimates are generally preferable to those of Deane and Cole" (1990, 176). See also Harley (1990) for a recent discussion of the state of the debate.

40. For the slightly longer period 1774 to 1840 (1841 in the British case), the rates are 0.50 for Britain and 0.55 for the broad U.S. measure, 0.64 for the narrow.

time span the performances are amazingly alike. From 1780 to 1801 the British per capita figure advanced at 0.35 percent per year, virtually identical to the U.S. rate of 0.38 from 1774 to 1800.⁴¹ From 1801 to 1831 the British figure of 0.52 percent per year is again nearly identical to the growth in the broad measure of U.S. output per capita (0.50 percent per year) that took place between 1800 and 1830, but slightly less than the advance in the more narrowly defined series (0.61 percent per year).⁴²

Given these comparative growth rates, the per capita figures remained in roughly the same proportion over the period. British output per capita was close to 30 percent above the narrowly defined U.S. figure through 1820, the margin narrowing thereafter to 22 percent in 1830 and 18 percent in 1840.⁴³ Using the broad measure of U.S. output, the advantage is narrowed considerably to around 10 percent for the entire period, but again showing convergence after 1820.⁴⁴

The Deane and Cole estimates show much more rapid growth and a much different relative standing. Using the narrow measure of output, the American figure exceeded the British in 1774 by about 14 percent (about \$8 in 1840 prices). With the much more rapid British growth underlying the Deane and Cole series, the income levels were brought to rough equality by 1793 and remained in that relative position until 1810, with the British subsequently moving ahead by 7 percent in 1820 and about 20 percent in 1830 and 1840. With the broader measure, however, the U.S. figure exceeded the British up through 1820, then slipped below by 5 percent in 1830 and 1840.

It is well to realize that these similar rates of growth in the per capita figures mean much higher rates of growth of aggregate output in America, where the economy had to provide for a much faster growing population. The American economy was advancing at a rate near to or above 3.0 percent per year from 1774 on, and probably from some earlier date as well. According to Crafts the British "it seems clear did not reach a 3 percent per year growth in real output

41. Taking into account the very slow growth or decline that occurred between 1774 and 1780, the U.S. record after 1780 would have surpassed the British.

42. Both performances, of course, differ from the record revealed in the Deane and Cole figures; growth of 1.11 percent between 1774 and 1831, 1.08 in the last two decades of the eighteenth century, and 1.32 percent between 1801 and 1831 (Deane and Cole 1962, 282).

43. The ratio peaked in 1793 with the British figure being 36 percent above the American. I have converted the British figures to dollars using the official exchange value of \$4.44 per British pound. Davis and Hughes (1960, 55) argue that the true par value for the period 1834 to 1874 was \$4.87.

44. In the broad measure as well there were slight variations in the relative positions, with a peak in 1793 when the British figure was 16 percent above the U.S.

It is not clear whether the British figure represents the narrow or broad measure of output. Neither Crafts nor Deane and Cole make obvious whether their GDP statistics include the value of farm improvements or home manufacturing. It appears from the sources used that they are excluded, so the proper comparison is with the narrow U.S. figure. On the other hand, these items were of lesser importance in Great Britain, so there was a much smaller difference between the narrow and broad measures there, and thus comparisons with the broad U.S. figure seem pertinent as well.

before 1830” (1985, 47). The Deane and Cole figures, on the other hand, show that they did so in the 1820s, as well as for the longer period 1800 to 1831.⁴⁵

McCloskey has praised the British economy for showing “substantial growth of income per head in the face of a sharp rise in the number of heads” (1981, 117). He based this observation on the growth implicit in the Deane and Cole figures, and on the relatively slow growth of British population, and so would be less impressed by the slower growth shown in Crafts’s estimates. The U.S. experience, on the other hand, merits that earlier awe, generating growth of per capita output equal to that of the most advanced nation in the face of a sharply faster increase in the number of people producing and consuming that burgeoning output.

1.3 Conclusions

This paper has set out new estimates of the American labor force for the antebellum period, and considered their consequences for our understanding of economic growth and the standard of living at the time. The alterations to the labor force series have a noticeable impact on that record, largely because the revisions are concentrated in the agricultural sector, raising the size of that sector’s labor force in the later years of the period and lowering it in the opening decades of the century. These changes affect the rate and pattern of agricultural productivity advance and by assumption the pace and pattern of advance in nonagricultural industries too. The relaxation of certain operating assumptions underlying the conjectural figures gives a boost to output per capita and its growth after 1820, while broadening the measure of output to include the value of home manufacturing and farm improvements raises the level of output, but slows the growth slightly.

Overall the revised picture of growth is more modest than was revealed in the earlier conjectural estimates, but the growth was still a notable accomplishment. In the broadest measure of output, growth over the entire antebellum period was close to 1 percent per year; for the period 1800 to 1840 it was slightly lower (0.7 percent per year). Even with this modest increase the economy of 1840 had clearly surpassed the achievements at the turn of the century, or that just prior to the Revolution. It was not quite the suddenly buoyant performance revealed in the conjectures of Paul David, but it was better than pictured by earlier writers. George Taylor and Douglass North, along with Robert Martin, had clearly underestimated the economy’s long-term performance and its ability to deal with misfortune and to recover from it. Even Kuznets’s suggestion that per capita output had increased by at least 19 percent between 1800 and 1840 was a bit pessimistic.

45. According to Crafts, national product estimated by Deane and Cole increased at 3.06 percent per year between 1801 and 1831 (1985, 45).

The focus here has been on the dollar figures of output, which is just one aspect of the living standard. They mask the low, and perhaps declining, life expectancy, ignore the trauma of public outbreaks of disease, and fail to capture the impact of the possibly declining dietary standards. The figures also overlook the lack of privacy afforded by crowded housing, the monotony of life, the lack of variety, and the long hours required to obtain this average output. Still, it appears that the average American with a per capita output of nearly \$80 at the turn of the century could have been quite comfortable. With the subsequent increases the average person could indeed have measured up to George Combe's calculation that "reckoning the whole property, and the whole population of the Union, and dividing the value of the one by the sum of the other, my impression is that the product would shew [*sic*] a larger amount of wealth for each individual in the United States, than exists in any other country in the world, Great Britain alone probably excepted" (Bode 1967, 295).

Appendix

The Total Labor Force

The total labor force is the sum of estimates of the number of workers in five population groups; free males aged 16 and over, free females aged 16 and over, free males aged 10 to 15, free females aged 10 to 15, and slaves aged 10 and over. The number of workers in each group was estimated as the product of the population and the group's specific participation rate. This is the same method used by Lebergott (1966) to derive estimates of the national labor force. My calculations, however, were made at the state level, and the national total was built up from the individual state estimates (see table 1A.1).⁴⁶

The participation rates assumed to prevail in the antebellum years for each group were estimated from the available census statistics. Data on certain groups, primarily adult males, were collected by the census in some antebellum years, but for the most part the evidence pertained to the postbellum period. For each state, a participation rate was estimated for each of the four free population groups, using primarily the census evidence for 1870 through 1920. For slaves aged 10 and over, I used the participation rate postulated by Lebergott and subsequently used by David (1967).

Examination of the individual state data for each age-sex group indicated that a trend was evident only in the participation rate of females aged 16 and over. For the others, the postbellum means were assumed to have held in the antebellum years as well. These figures gave an unadjusted level of the ante-

46. The census population figures were reorganized in certain years in order to obtain the age breakdowns desired. It was also necessary to estimate the sex distribution of slaves in 1800 and 1810. For details of this estimation see Weiss (1987b).

Table 1A.1 Estimates of the U.S. Labor Force, 1800 to 1860 (hundreds of workers aged 10 and over)

	1800	1810	1820	1830	1840	1850	1860
Alabama			521	1,261	2,551	3,425	4,481
Arkansas			48	103	348	764	1,637
California						780	2,036
Colorado							295
Connecticut	694	744	813	940	1,029	1,294	1,621
Dakotas							10
Delaware	191	207	214	225	235	274	359
District of Columbia	32	56	84	105	108	165	250
Florida				155	265	390	619
Georgia	666	1,060	474	2,169	2,883	3,903	4,765
Illinois		33	150	389	1,319	2,360	5,167
Indiana	16	59	352	803	1,705	2,699	3,795
Iowa					132	535	1,922
Kansas							323
Kentucky	672	1,270	1,846	2,348	2,724	3,474	4,124
Louisiana		435	747	1,093	1,752	2,561	3,509
Maine	361	554	756	1,080	1,410	1,821	2,081
Maryland	1,273	1,409	1,493	1,627	1,665	2,104	2,385
Massachusetts	1,229	1,425	1,636	2,037	2,632	3,681	4,544
Michigan		17	36	106	640	1,219	2,386
Minnesota						25	538
Mississippi	38	182	334	620	1,761	2,798	3,968
Missouri			215	435	1,213	2,210	3,771
Nebraska							103
Nevada							57
New Hampshire	486	581	698	817	920	1,138	1,178
New Jersey	592	698	808	943	1,118	1,492	2,156
New Mexico						194	261
New York	1,628	2,610	3,863	5,604	7,591	10,363	13,471
North Carolina	1,724	2,054	2,410	2,842	2,913	3,480	4,180
Ohio	113	550	1,440	2,386	4,088	5,831	6,907
Oregon						49	185
Pennsylvania	1,606	2,140	2,835	3,806	4,956	7,170	9,166
Rhode Island	214	248	271	335	395	565	685
South Carolina	1,498	1,873	2,287	2,761	2,847	3,307	3,564
Tennessee	294	778	1,277	2,147	2,677	3,450	4,024
Texas						833	2,431
Utah						33	94
Vermont	371	532	636	780	851	1,019	1,010
Virginia	3,426	3,860	4,257	4,802	4,939	5,632	6,427
Washington							61
Wisconsin					123	891	2,356
United States	17,125	23,374	31,499	42,718	57,781	81,925	112,901

Source: See the text for details.

bellum participation rates that pertained to the entire population in the age-sex category. They were adjusted to reflect the fact that the antebellum work force was almost entirely white, and that the foreign-born share of the white population was lower in the years before 1860 than in the postbellum period.

Additional evidence existed for some of the antebellum years, specifically 1820, 1840, 1850, and 1860. The evidence for the first two years did not permit useful disaggregation by age and sex. The latter two, however, did provide valuable information, especially on the numerically largest group, males aged 16 and over. With some adjustments, this evidence enabled me to obtain the adult male work force in 1850 and 1860. The implied participation rates were combined with the postbellum data to give additional observations on this important group. Perhaps most noteworthy, these antebellum rates confirmed that there was no trend in the adult male participation rate, and indicated as well that the changing share of the foreign-born had virtually no effect on the particular group's participation rate.⁴⁷

Males Aged 16 and Over

The antebellum participation rates for males aged 16 and over were derived in two categories. The first comprises the rates derived from the census data for 1850 and 1860. The census reported some labor force figures in each of those years, and for almost all states the rates implicit in the reported evidence seem reliable. An adjustment was made to the original census figures of several states, as explained below, but for the most part the individual state rates in these two census years were obtained from the reported statistics. In the other category, rates for 1800 through 1840, the value for each state was assumed to equal the mean of the rate for the years 1850 through 1920. As already indicated, the postbellum evidence did not reveal a trend in the adult male participation rate, so it seemed reasonable to assume there was none in the antebellum period either. The evidence for 1850 and 1860 confirmed the absence of any trend for part of the antebellum period, which enhances our confidence in the assumption for the other years.

The census evidence for 1850 and 1860 had to be adjusted in order to obtain the specific age coverage desired, and in a few states the figures were corrected for enumeration errors.⁴⁸ The number of 15-year-old workers was deducted in order to obtain a count of free workers aged 16 and over. The deduction was made by multiplying the estimated population 15 years of age by the participation rate of 15-year-olds reported for 1900. The 15-year-old popula-

47. Of course the changing importance of the foreign-born had an impact on the overall participation rate through its effects on the age-sex composition of the population.

48. The assessments of the 1850 and 1860 census data were based on the behavior of the labor force statistics relative to the population, and proceeded on the assumption that the census counts of population are accurate, or at least equally reliable at the various census dates. There is evidence that the census underenumerated the population in some locations in some antebellum years, but it is not known whether the entire census in any year was in error (see Steckel 1988).

tion was estimated as a fraction of those aged 10 to 14 years, the fraction being the average for each state for the years 1870 to 1920.

The revised rates in both years are very close to each state's mean for the years 1870 through 1920, with the consequence that the inclusion or exclusion of these antebellum values has little effect on the overall mean (see table 1A.2). The participation rates assumed for the years 1800 to 1840 are the means based on all eight census years 1850 through 1920; the larger number of observations being presumed to increase the reliability of the estimates.

The adjustments made to the 1850 and 1860 figures were straightforward, and for 1850 quite small.⁴⁹ The 1850 census covered free males aged 15 and over and was adjusted primarily to obtain a figure covering only those aged 16 and above. Beyond this the figures were examined for possible deficiencies, and necessary corrections were made in eleven states, changing the U.S. labor force figure by a little less than 17,000 workers, or less than 1 percent. This small revision for the nation reflects offsetting changes in some states, so the adjustments at the state and regional levels were larger (see table 1A.3).

The 1860 census reported a combined figure for free male and female workers aged 15 and over, and required greater adjustment. In addition to converting from a coverage of those 15 and over to those 16 and over, the census counts of adult male workers in some states had to be adjusted for obvious deficiencies. Samples of evidence taken from the manuscript schedules suggest that the published figures include a fairly reliable count of female workers, implying participation rates that were approximately equal to those of the postbellum period. It seems certain that the rates were low in all years, but at least there was consistency over time. The male participation rates in some states, however, were low in comparison with the postbellum figures, indicating an undercount of workers. My corrections of the 1860 figures amounted to 3.4 percent. The number of adult male workers implicit in the census count, my adjustments, and the revised figures are shown in table 1A.4.

The mean participation rates calculated from the observations for 1850 through 1920 pertain to the entire free male work force aged 16 and over, and make no distinction between blacks and whites, or native and foreign-born. The reason is simply that the limited evidence available does not indicate any differences in the participation rates of these groups for males aged 16 and over. In 1890 and 1900, when comparative data are available, the participation rate for white males aged 16 and over was virtually identical to that for whites and blacks together.⁵⁰ This was true not only at the national or regional level, but in each state as well (see table 1A.5). Thus, even though the free work

49. Additional details of the assessment of and adjustments to the 1850 and 1860 census data can be found in Weiss (1986a).

50. The 1900 figures are reported by state in table 1A.5. For 1890 only national figures are available. The white rate for males aged 15 and over was 0.882 in 1890, very close to the 0.887 rate for all males that age. An allowance for those 15 years of age would push the rates even closer (U.S. Bureau of the Census 1890, part 2, cxxii.)

Table 1A.2

Participation Rates of Free Males Aged 16 and Over

	Mean 1850 to 1920			Revised Rates	
	Including 1860	Excluding 1860	Mean 1870 to 1920	1850	1860
Alabama	.921	.920	.931	.853	.931
Arkansas	.901	.904	.904	.904	.883
California	.906	.907	.901	.944	.900
Colorado	.919	.919	.919		.919
Connecticut	.902	.904	.908	.885	.881
Dakotas	.899	.899	.899		.899
Delaware	.907	.906	.912	.872	.912
District of Columbia	.887	.887	.892	.853	.892
Florida	.904	.909	.914	.881	.871
Georgia	.919	.917	.926	.868	.926
Illinois	.890	.889	.892	.875	.892
Indiana	.893	.893	.889	.918	.889
Iowa	.884	.883	.876	.926	.895
Kansas	.883	.889	.889		.845
Kentucky	.900	.903	.908	.872	.884
Louisiana	.913	.912	.922	.853	.922
Maine	.891	.887	.886	.899	.918
Maryland	.907	.911	.913	.904	.875
Massachusetts	.909	.911	.913	.900	.895
Michigan	.902	.905	.906	.900	.881
Minnesota	.896	.893	.890	.911	.919
Mississippi	.916	.915	.922	.872	.922
Missouri	.893	.897	.898	.890	.869
Nebraska	.892	.892	.892		.892
Nevada	.927	.920	.920		.968
New Hampshire	.900	.903	.901	.912	.885
New Jersey	.904	.906	.912	.869	.889
New Mexico	.910	.910	.908	.925	.908
New York	.907	.904	.905	.897	.933
North Carolina	.910	.907	.911	.878	.936
Ohio	.899	.900	.895	.927	.895
Oregon	.897	.894	.897	.880	.915
Pennsylvania	.905	.902	.899	.921	.927
Rhode Island	.920	.920	.922	.908	.922
South Carolina	.913	.912	.922	.851	.920
Tennessee	.880	.882	.888	.846	.860
Texas	.901	.900	.903	.886	.903
Utah	.893	.893	.892	.902	.892
Vermont	.884	.887	.885	.902	.859
Virginia	.901	.900	.908	.853	.908
Washington	.918	.921	.921		.902
Wisconsin	.912	.909	.920	.842	.928
United States	.902	.903	.903	.894	.905

Sources: The mean rates for 1870 to 1920 come from Miller and Brainerd (1957, table L-3). I corrected their 1910 figures to account for the census overcount (see Weiss 1985). The means for 1850 to 1920 use the 1870-1920 figures plus the rates implicit in the census labor force counts for 1850 and 1860 (see tables 1A.3, 1A.4). The revised figures come from tables 1A.3 and 1A.4.

Table 1A.3 Estimates of Male Workers Aged 16 and Over, 1850

	Participation Rates			Gainful Workers	
	Original Census		Revised 16 +	Adjustment to Census	Revised Count
	15 +	16 +			
Alabama	.824	.830	.853	2,637	97,534
Arkansas	.892	.904	.904		39,283
California	.943	.944	.944		77,567
Connecticut	.774	.781	.885	12,531	106,251
Delaware	.836	.850	.872	542	21,712
District of Columbia	.805	.825	.853	373	11,283
Florida	.866	.881	.881		12,793
Georgia	.855	.868	.868		117,578
Illinois	.857	.875	.875		209,754
Indiana	.894	.918	.918		242,656
Iowa	.904	.926	.926		48,252
Kentucky	.859	.872	.872		184,099
Louisiana	.802	.812	.853	3,840	79,307
Maine	.878	.899	.899		159,738
Maryland	.836	.850	.904	7,729	129,110
Massachusetts	.887	.900	.900		288,274
Michigan	.882	.900	.900		106,628
Minnesota	.899	.911	.911		2,315
Mississippi	.861	.872	.872		70,785
Missouri	.722	.732	.890	26,597	150,127
New Hampshire	.895	.912	.912		92,342
New Jersey	.858	.869	.869		124,796
New Mexico	.908	.925	.925		17,214
New York	.884	.897	.897		869,533
North Carolina	.870	.878	.878		132,938
Ohio	.906	.927	.927		517,629
Oregon	.700	.710	.880	915	4,750
Pennsylvania	.980	.996	.921	- 50,042	613,606
Rhode Island	.899	.908	.908		42,123
South Carolina	.841	.851	.851		64,689
Tennessee	.813	.823	.846	4,493	165,255
Texas	.871	.886	.886		41,743
Utah	.881	.902	.902		3,099
Vermont	.886	.902	.902		89,740
Virginia	.829	.842	.853	2,872	221,278
Wisconsin	.785	.796	.842	4,372	80,768
United States	.877	.891	.894	16,859	5,236,550

Sources: U.S. Bureau of the Census 1850, 1860, 1900b; Miller and Brainerd 1957.

Notes: Column 1 figures are based on the original census data.

Column 2 figures are based on the original census data minus an estimate of the 15-year-old males in the labor force and population. The population estimates were made using the mean ratios of 15-year-olds to those aged 10-14 years that prevailed in each state in the period 1870 to 1920. The worker estimates were obtained by applying to these population estimates the participation rate for 15-year-olds obtained from the 1900 census. For the South, the participation rate

(continued)

Table 1A.3 (notes, continued)

for all 15-year-olds was adjusted to a white-only basis using the ratio of the white to total participation rates for those 10–15 years old.

Column 3 figures, the revised participation rates, are the original census values (excluding 15-year-old workers) except in twelve states. Where the original rate was judged too low, the revised figure was set equal to the lower of two values, either the 1850 regional mean (Alabama, District of Columbia, Louisiana, and Virginia) or the lowest rate observed for that state in the 1870–1920 period (Connecticut, Delaware, Maryland, Missouri, Oregon, Tennessee, and Wisconsin). In Pennsylvania, the one state where the original figure was too high, the revised rate was set equal to the highest rate observed in the period 1870–1920.

The revised count (col. 5) is the product of the revised participation rate and the population base of males 16 and over.

The adjustment (col. 4) is the difference between the original and revised census count.

force in the antebellum years was almost entirely white, there is no reason to adjust the postbellum figure from its basis in the total work force to one covering only white workers.

Likewise there seems little reason to make any adjustment for the declining importance of the foreign-born in the antebellum period. The evidence for 1890 and 1900 does show some small differences between the participation rates of native and foreign-born males, the largest being a 5-percentage-point difference in Massachusetts (see table 1A.5). The more relevant differences, however, those between native whites and all whites, were much smaller. In the Northeast these differences were roughly 1 percentage point, with the largest being 2 percentage points in Massachusetts. Outside the Northeast the differences were less than 1 percentage point everywhere except Michigan and Minnesota, two states of little importance in the antebellum period. Moreover, the foreign-born share of the population remained roughly constant back until 1860, but was smaller in earlier years. In the Northeast, where the foreign-born were of greatest importance, their share of the population in 1850 was only 22 percent compared to 31 percent in 1900. Yet, even though the foreign-born share was substantially less in 1850 than in the postbellum years, the participation rates were very close to the postbellum statistics. This suggests that, in the absence of the foreign-born, native men had a higher participation rate. Given the closeness of the total and native white rates in 1890 and 1900, and the likelihood that the native rate would have adjusted somewhat in the absence of foreign-born workers, I used the mean participation rate for all male workers aged 16 and over, making no adjustment for the changing importance of the foreign-born population.

Females Aged 16 and Over

The postbellum evidence indicated that there was a trend in the adult female participation rate, best captured by an equation of the following form:

$$\ln PR_i = a_i + b_i t$$

Table 1A.4 Estimates of Male Workers Aged 16 and Over, 1860

	Implicit Figures		Revised Participation Rate	Gainful Workers	
	Workers	Participation Rate		Adjustment to Census	Revised Count
Alabama	114,352	0.799	.931	18,910	133,262
Arkansas	77,721	0.883	.883		77,721
California	212,653	0.972	.900	-15,836	196,817
Colorado	26,724	0.835	.919	2,704	29,428
Connecticut	130,540	0.881	.881		130,540
Dakotas	1,481	1.421	.899	-544	937
Delaware	32,004	1.003	.912	-2,900	29,104
District of Columbia	19,970	0.970	.892	-1,597	18,373
Florida	19,787	0.871	.871		19,787
Georgia	131,396	0.821	.926	16,852	148,248
Illinois	348,575	0.677	.892	111,019	459,594
Indiana	307,114	0.804	.889	32,328	339,442
Iowa	172,373	0.895	.895		172,373
Kansas	29,677	0.845	.845		29,677
Kentucky	230,879	0.884	.884		230,879
Louisiana	93,307	0.783	.922	16,546	109,853
Maine	180,296	0.918	.918		180,296
Maryland	150,730	0.875	.875		150,730
Massachusetts	347,113	0.895	.895		347,113
Michigan	207,614	0.881	.881		207,614
Minnesota	48,906	0.919	.919		48,906
Mississippi	77,556	0.763	.922	16,155	93,711
Missouri	273,380	0.869	.869		273,380
Nebraska	11,060	1.018	.892	-1,373	9,687
Nevada	5,638	0.968	.968		5,638
New Hampshire	93,585	0.885	.885		93,585
New Jersey	178,747	0.889	.889		178,747
New Mexico	26,998	1.061	.908	-3,901	23,097
New York	1,112,524	0.933	.933		1,112,524
North Carolina	166,768	0.936	.936		166,768
Ohio	569,800	0.844	.895	34,713	604,513
Oregon	17,880	0.915	.915		17,880
Pennsylvania	773,766	0.927	.927		773,766
Rhode Island	46,041	0.849	.922	3,978	50,019
South Carolina	60,994	0.733	.920	15,590	76,584
Tennessee	196,450	0.860	.860		196,450
Texas	95,443	0.752	.903	19,134	114,577
Utah	7,903	0.824	.892	655	8,558
Vermont	87,260	0.859	.859		87,260
Virginia	258,717	0.846	.908	18,951	277,668
Washington	6,000	0.902	.902		6,000
Wisconsin	211,599	0.928	.928		211,599
United States	7,161,322	0.871	.905	281,384	7,442,705

Sources: U.S. Bureau of the Census 1860, 1900a, 1900b; Bateman and Foust 1973.

Notes: The implicit count of male workers aged 16 and over is the residual number of workers left in the original census figure after deducting an estimate of the number of workers 15 years
(continued)

Table 1A.4 (notes, continued)

of age and female workers aged 16 and over. The implicit participation rate is based on that residual count of workers.

The revised participation rates are the implicit values (col. 2) unless that figure deviated noticeably from the mean value for the years 1850 and 1870 through 1920, the 1850 rate having been revised as explained in table 1A.3. Where the implicit figure is highly deviant, as in Alabama, the revised participation rate is the 1870–1920 mean.

where PR is the participation rate of females aged 16 and over, t is the time trend variable, and i is the state.

This equation was used to derive a set of participation rates for the antebellum years, 1800 through 1860. This basic rate was then adjusted to a white-only basis, to better reflect the demographic makeup of the antebellum free work force. This adjustment was made on an individual-state basis using the ratio of the white to total participation rate that prevailed in 1900. Adjustments were made only in the South, plus Delaware, the District of Columbia, Maryland, and Missouri. In the rest of the country the two participation rates were so close, due to the small numbers of free blacks in the populations of those states, that they were treated as identical. The various 1900 participation rates are presented in table 1A.6.

I made no adjustment for the lesser importance of the foreign-born in the populations of the antebellum years. The limited evidence available, that for 1900, shows that the participation rates for native white, foreign-born, and all white females were close though not identical (see table 1A.6). Thus even though the foreign-born share declined from 29.2 percent in the Northeast in 1900 to 19.8 in 1850, and was yet smaller in earlier years, the change would have virtually no effect on the participation rate.⁵¹

The estimates of the participation rates for free females aged 16 and over are presented in table 1A.7. As can be seen, my estimates show a slow and steady rise from 0.076 in 1800 to 0.113 in 1860.⁵² This trend was continued in the postbellum period when the rate for those 16 and over increased from 0.147 in 1870 to 0.206 in 1910 (U.S. Bureau of the Census 1910, 1870).

Males and Females Aged 10 to 15 Years

The estimates of the participation rates for males and females aged 10–15 years were derived in similar ways. The procedure consisted of estimating the total participation rate in each state, and then adjusting it in some states to

51. For 1840 and earlier years I estimated the share to be around 11 percent. Gemery (1990) shows different values, but nonetheless lower than that for 1850.

52. Lebergott included an independent estimate of adult female workers in each year, which showed that their participation rate varied slightly from year to year rather than rising steadily. It is unclear whether his data pertain to those 16 and over or 10 and over, but the latter seems more likely. Their participation rates implied by Lebergott's estimates are .044 in 1800, .076 in 1810, .06 in 1820, .065 in 1830, .08 in 1840, .097 in 1850, and .096 in 1860.

Table 1A.5 Participation Rates of Males Aged 16 and Over, 1900

	Total	White	Ratio White to Total	Native Whites	Foreign- Born	Foreign- Born Share
<i>Northeastern states</i>						
Connecticut	.909	.908	1.000	.891	.938	.366
Delaware	.908	.909	1.000	.906	.925	.135
District of Columbia	.884	.874	0.988	.887	.794	.146
Maine	.886	.886	1.000	.881	.909	.173
Maryland	.903	.900	0.997	.900	.901	.145
Massachusetts	.898	.898	1.000	.876	.930	.395
New Hampshire	.903	.903	1.000	.891	.935	.264
New Jersey	.919	.919	1.000	.909	.939	.343
New York	.910	.910	0.999	.899	.929	.363
Pennsylvania	.914	.913	1.000	.907	.932	.254
Rhode Island	.919	.919	0.999	.904	.940	.414
Vermont	.887	.887	1.000	.881	.914	.183
<i>Midwestern states</i>						
Illinois	.896	.896	1.000	.888	.913	.310
Indiana	.893	.892	1.000	.893	.883	.092
Iowa	.879	.879	1.000	.879	.880	.223
Kansas	.878	.879	1.001	.877	.890	.147
Michigan	.902	.902	1.000	.889	.929	.338
Minnesota	.900	.900	1.001	.883	.920	.471
Missouri	.901	.901	1.000	.901	.906	.121
Ohio	.896	.896	1.000	.896	.896	.172
Wisconsin	.886	.887	1.000	.884	.891	.406
<i>Southern states</i>						
Alabama	.938	.929	0.991	.929	.935	.030
Arkansas	.930	.925	0.995	.924	.938	.031
Florida	.915	.902	0.986	.901	.915	.112
Georgia	.922	.908	0.985	.907	.923	.020
Kentucky	.905	.905	1.000	.906	.887	.046
Louisiana	.922	.909	0.985	.907	.917	.124
Mississippi	.928	.906	0.976	.906	.932	.026
North Carolina	.920	.916	0.996	.916	.911	.007
South Carolina	.925	.905	0.979	.905	.916	.019
Tennessee	.914	.911	0.997	.911	.916	.022
Texas	.910	.908	0.998	.905	.927	.126
Virginia	.900	.891	0.990	.894	.819	.032
<i>Western states</i>						
California	.899	.893	0.994	.882	.916	.339
Colorado	.899	.900	1.001	.883	.947	.262
Dakotas	.887	.902	1.017	.881	.926	.463
Nevada	.892	.901	1.010	.888	.924	.365
New Mexico	.892	.899	1.008	.892	.940	.130
Oregon	.903	.900	0.996	.890	.935	.218
Utah	.883	.886	1.004	.869	.923	.324
Washington	.919	.918	0.999	.904	.949	.313
United States	.905	.902	0.997	.897	.920	.236

(continued)

Table 1A.5 (notes, continued)

Source: U.S. Bureau of the Census, 1990a.

Notes: The foreign-born share (col. 6) is the share of the white population.

The national figures for 1890 indicate a participation rate of .887 for all males aged 15 and over and .882 for whites, for a ratio of 0.997. The native white rate was .864 and that for foreign-born was .938 (U.S. Bureau of the Census 1890, cxxii). The census reported the figures for those aged 15 and over, and a crude adjustment for those 15 years of age pushes the rates slightly closer. By assuming that the participation rate for 15-year-olds was the same as that for the group aged 15 to 19 years of age, one can obtain an upwardly biased estimate of 15-year-olds in the labor force. Deducting that figure from the census total gives the following rates for males aged 16 and over: all males .896, whites .893, native whites .877, and foreign-born .939.

reflect the different demographic composition of the antebellum population, the components of which exhibited different participation rates.

The basic estimates, the state-specific participation rates for all males or females in this age group, are the means for the years 1870 through 1910. The evidence for 1900 (U.S. Bureau of the Census 1900b) indicated that in some states the participation rates for whites differed noticeably from that for blacks and whites combined, especially in the South. The mean rate for the years 1870 to 1920 was adjusted to a white basis by multiplying it by the 1900 ratio of the white to total participation rate. This adjustment had a noticeable effect only in the South, Delaware, the District of Columbia, and Maryland.

The 1900 evidence also indicated that there were substantial differences between the native and foreign-born white participation rates, the latter being approximately twice the former in the northern regions where the foreign-born population was of greater importance. Thus a further adjustment was made in the northern states to reflect the fact that the foreign-born were a smaller component of the population in the antebellum years. This was done by calculating a weighted average of the native and foreign-born rates, the weights being each group's share in the white population.

The participation rates used to estimate the antebellum work force for these age groups are presented in table 1A.8.

Slaves

The participation rate for slaves aged 10 and over was assumed to be 90 percent. It was further assumed that those under the age of 10 did not work. Lebergott (1966) made the case for the constant 90 percent figure, although the description of his procedures suggested that he had used 90 percent in some years (1810, 1830, and 1850) and 87 percent in others. In fact, he used 90 percent in all years except 1860, in which he used the 1850 rate for free white males in the South (approximately 86 percent). Since that rate was not judged appropriate for 1850, it seemed inconsistent to use it for 1860, so I used the 90 percent figure in all years.

Table IA.6 Participation Rates of Females Aged 16 and Over, 1900

	Total	White	Ratio White to Total	Native Whites	Foreign Born	Foreign- Born Share
Alabama	.304	.134	.440	.134	.108	.018
Arkansas	.177	.104	.586	.103	.126	.020
California	.188	.186	.991	.191	.173	.268
Colorado	.173	.168	.970	.168	.165	.214
Connecticut	.263	.258	.983	.263	.247	.340
Dakotas	.158	.156	.990	.179	.126	.439
Delaware	.198	.166	.836	.164	.176	.116
District of Columbia	.370	.239	.645	.241	.226	.123
Florida	.228	.118	.517	.114	.163	.085
Georgia	.288	.134	.466	.134	.137	.013
Illinois	.182	.179	.984	.185	.165	.286
Indiana	.138	.133	.963	.135	.113	.078
Iowa	.151	.150	.996	.160	.109	.193
Kansas	.123	.118	.956	.121	.094	.125
Kentucky	.155	.116	.751	.115	.129	.042
Louisiana	.278	.127	.456	.127	.121	.102
Maine	.205	.204	.998	.192	.268	.164
Maryland	.464	.458	.986	.673	.319	.609
Massachusetts	.120	.081	.677	.078	.153	.039
Michigan	.165	.164	.994	.177	.135	.302
Minnesota	.187	.186	.996	.220	.141	.428
Mississippi	.335	.131	.390	.130	.156	.014
Missouri	.154	.141	.912	.140	.141	.105
Nevada	.162	.158	.978	.166	.137	.265
New Hampshire	.266	.266	.998	.236	.353	.256
New Jersey	.224	.213	.950	.214	.211	.316
New Mexico	.102	.101	.989	.102	.095	.091
New York	.250	.245	.980	.244	.248	.349
North Carolina	.233	.155	.663	.155	.147	.004
Ohio	.169	.166	.980	.171	.136	.150
Oregon	.157	.157	.996	.159	.145	.169
Pennsylvania	.195	.189	.967	.195	.165	.204
Rhode Island	.314	.308	.984	.313	.302	.411
South Carolina	.379	.201	.530	.202	.165	.013
Tennessee	.175	.102	.583	.102	.125	.015
Texas	.151	.099	.655	.095	.132	.107
Utah	.137	.136	.994	.139	.129	.332
Vermont	.184	.184	.997	.187	.166	.155
Virginia	.206	.117	.567	.117	.141	.018
Washington	.152	.151	.993	.156	.136	.256
Wisconsin	.174	.174	.998	.210	.111	.365
United States	.206	.178	.864	.175	.191	.212

Source: U.S. Bureau of the Census 1900a.

Table 1A.7 Participation Rate Estimates, 1800 to 1860 (free females aged 16 and over)

	1800	1810	1820	1830	1840	1850	1860
Alabama			.107	.109	.111	.113	.116
Arkansas			.030	.035	.041	.047	.054
California						.084	.099
Colorado							.055
Connecticut	.083	.093	.104	.117	.131	.146	.164
Dakotas							.068
Delaware	.046	.053	.060	.068	.077	.087	.099
District of Columbia	.091	.100	.111	.123	.136	.150	.166
Florida				.063	.069	.076	.083
Georgia	.101	.104	.107	.110	.113	.116	.120
Illinois		.027	.033	.041	.050	.062	.076
Indiana	.016	.020	.024	.030	.037	.045	.056
Iowa					.047	.056	.068
Kansas							.057
Kentucky	.040	.045	.049	.055	.061	.068	.075
Louisiana		.114	.115	.117	.118	.119	.121
Maine	.050	.057	.066	.075	.086	.099	.114
Maryland	.064	.071	.079	.088	.098	.109	.121
Massachusetts	.132	.144	.156	.170	.185	.202	.220
Michigan		.076	.083	.091	.099	.108	.118
Minnesota						.072	.086
Mississippi	.116	.117	.118	.119	.120	.121	.122
Missouri			.028	.034	.041	.050	.061
Nebraska							.061
Nevada							.072
New Hampshire	.107	.117	.128	.141	.154	.169	.185
New Jersey	.061	.070	.079	.090	.103	.117	.133
New Mexico						.062	.070
New York	.074	.083	.094	.106	.120	.136	.153
North Carolina	.048	.054	.061	.068	.076	.084	.094
Ohio	.032	.038	.044	.052	.062	.072	.085
Oregon						.022	.032
Pennsylvania	.048	.055	.063	.073	.084	.096	.110
Rhode Island	.154	.166	.178	.191	.206	.221	.237
South Carolina	.152	.156	.160	.164	.168	.172	.176
Tennessee	.021	.025	.029	.033	.039	.045	.052
Texas						.059	.066
Utah						.028	.038
Vermont	.046	.053	.061	.070	.080	.092	.105
Virginia	.062	.066	.071	.077	.082	.089	.095
Washington							.038
Wisconsin					.055	.066	.080
United States	.076	.079	.083	.090	.096	.105	.113

Source: See the text for an explanation of the estimates.

Table 1A.8 **Antebellum Participation Rate Estimates**

	Males Aged 10–15			Females Aged 10–15		
	1860	1850	1800–1840	1860	1850	1800–1840
Alabama	.534	.534	.534	.155	.155	.155
Arkansas	.414	.414	.414	.076	.076	.076
California	.076	.076	.076	.025	.025	.025
Colorado	.104	.104	.104	.024	.024	.024
Connecticut	.134	.128	.124	.088	.082	.078
Dakotas	.109	.109	.109	.030	.030	.030
Delaware	.231	.230	.228	.081	.080	.079
District of Columbia	.078	.076	.073	.037	.034	.033
Florida	.272	.272	.272	.055	.055	.055
Georgia	.446	.446	.446	.137	.137	.137
Illinois	.154	.154	.154	.044	.044	.044
Indiana	.172	.172	.172	.029	.029	.029
Iowa	.154	.154	.154	.025	.025	.025
Kansas	.140	.140	.140	.018	.018	.018
Kentucky	.333	.333	.333	.051	.051	.051
Louisiana	.243	.243	.243	.074	.074	.074
Maine	.092	.092	.087	.037	.036	.032
Maryland	.184	.183	.181	.087	.086	.084
Massachusetts	.120	.117	.112	.077	.073	.067
Michigan	.108	.108	.108	.038	.038	.038
Minnesota	.109	.109	.109	.037	.037	.037
Mississippi	.407	.407	.407	.098	.098	.098
Missouri	.211	.211	.211	.038	.038	.038
Nebraska	.116	.116	.116	.025	.025	.025
Nevada	.062	.062	.062	.014	.014	.014
New Hampshire	.098	.097	.091	.059	.054	.051
New Jersey	.141	.139	.136	.080	.077	.074
New Mexico	.215	.215	.215	.040	.040	.040
New York	.123	.121	.117	.075	.072	.067
North Carolina	.506	.506	.506	.166	.166	.166
Ohio	.144	.144	.144	.039	.039	.039
Oregon	.083	.083	.083	.013	.013	.013
Pennsylvania	.177	.177	.173	.070	.069	.067
Rhode Island	.225	.218	.210	.162	.154	.143
South Carolina	.395	.395	.395	.220	.220	.220
Tennessee	.388	.388	.388	.049	.049	.049
Texas	.290	.290	.290	.073	.073	.073
Utah	.138	.138	.138	.026	.026	.026
Vermont	.112	.112	.109	.046	.046	.044
Virginia	.292	.292	.292	.050	.050	.050
Washington	.066	.066	.066	.017	.017	.017
Wisconsin	.117	.117	.117	.045	.045	.045
United States	.210	.214	.213	.066	.068	.068

Sources: U.S. Bureau of the Census 1870, 1880, 1890, 1900a, 1900b. See the text for details.

Notes: These rates are for white males and females. For each state the estimate was obtained by multiplying the postbellum mean participation rate for whites and blacks in this age group by the 1900 ratio of the white to black participation rate. Since the native white and foreign-born rates differed, the rates in some states varied across time to reflect the changing proportions of the foreign-born in the population.

The national figure varied slightly in the years 1800 to 1840 as the importance of different states' population and labor force changed.

David (1967) revised Lebergott's figures to remove the alleged anomaly of an 87 percent rate in alternate years. Since Lebergott had in fact used 90 percent, the revision had the effect of creating a pattern of variation where there had been none.

The Agricultural Labor Force

The estimates of the antebellum agricultural labor force were based as much as possible on the existing census statistics. The census accounts are not flawless, suffering from ambiguities regarding coverage and classification, and some apparent measurement errors. On the other hand, they were collected at specific dates during the antebellum period, so do represent the contemporary state of affairs and capture some of the economic realities of the time. Moreover, the more egregious errors are quite apparent and can be readily corrected. Following the lead of previous researchers, I examined and assessed the census data for 1820, 1840, 1850, and 1860 and made revisions where called for. Since the assessments and revisions of the earlier censuses made use of the evidence in the later ones, the presentation of my estimates proceeds backward in time. The revised estimates of the agricultural labor force are summarized in table 1A.9.

Estimates for 1850 and 1860

In both 1850 and 1860, the agricultural labor force is the sum of the slave and free farm work force estimates, covering those aged 10 and over. The free farm total is the sum of four components in 1860 and five in 1850. In both years the sum includes the original census count, my revisions to that count, the number of "laborers, not otherwise specified" allocated to farming, and an estimate of males aged 10 to 15 in farming. For 1850, a fifth component, an estimate of the number of female farm workers aged 16 and over was added (see tables 1A.10 and 1A.11).

The original census count in 1860 covered the free population (male and female) aged 15 and over, while the 1850 figure pertained to only males aged 15 and over. In both years, the census figures were adjusted from the coverage of those aged 15 and over to those aged 16 and over. The census counts were also adjusted for flaws found in some states (Weiss 1986a). The net effect was to adjust the census counts of farm workers aged 16 and over downward by 38,000 workers in 1850 and upward by 71,000 in 1860. The reduction in 1850 reflects the net outcome of the removal of 55,000 workers 15 years of age and the addition of 17,000 workers to correct for undercounting in eleven states. Most of the upward adjustment in 1860 was made to correct the Illinois figure. After deducting an estimate of the number of females included in that state's count, the residual implied that only 68 percent of the males aged 16 and over

Table IA.9 Revised Estimates of the Farm Labor Force, 1800 to 1860 (hundreds of workers aged 10 and over)

	1800	1810	1820	1830	1840	1850	1860
Alabama			470	996	1,973	2,619	3,388
Arkansas			40	84	283	637	1,304
California						43	531
Colorado							8
Connecticut	504	493	515	559	570	514	518
Dakotas							8
Delaware	151	161	143	173	160	155	168
District of Columbia	7	10	10	9	10	10	13
Florida				128	200	295	448
Georgia	512	835	1,164	1,687	2,264	2,953	3,484
Illinois		30	124	331	1,054	1,737	3,173
Indiana	15	52	309	725	1,444	2,013	2,596
Iowa					105	392	1,318
Kansas							217
Kentucky	549	1,022	1,462	1,849	2,099	2,555	2,929
Louisiana		289	528	729	1,057	1,568	2,233
Maine	262	391	579	799	976	932	922
Maryland	886	924	888	937	831	975	1,043
Massachusetts	732	725	734	785	879	808	777
Michigan		13	19	83	542	801	1,447
Minnesota						12	333
Mississippi	31	147	267	492	1,436	2,197	3,139
Missouri			160	343	924	1,471	2,484
Nebraska							55
Nevada							7
New Hampshire	364	423	535	93	623	582	509
New Jersey	476	518	477	525	587	640	674
New Mexico						151	169
New York	1,118	1,701	2,560	3,563	4,560	4,371	4,491
North Carolina	1,390	1,656	1,942	2,249	2,315	2,669	3,035
Ohio	97	456	1,111	1,823	2,896	3,574	3,841
Oregon						23	110
Pennsylvania	1,126	1,410	1,649	1,952	2,390	2,963	3,290
Rhode Island	115	119	128	140	143	124	133
South Carolina	1,107	1,392	1,891	2,082	2,138	2,417	2,650
Tennessee	247	652	1,065	1,772	2,223	2,749	3,047
Texas						627	1,830
Utah						23	62
Vermont	304	426	543	662	700	714	622
Virginia	2,740	3,057	3,175	3,748	3,367	4,018	4,484
Washington							27
Wisconsin					70	551	1,470
United States	12,735	16,902	22,489	29,820	38,819	48,885	62,989

Note: See the text for the details of estimation.

Table 1A.10

Farm Labor Force Estimates, 1860

	Revised Figures	Census Data			Additions to Census		
		Original Count	Revisions	Laborers n.o.s.	Slaves 10+	Female 16+	Males 10-15
Alabama	338,771	86,339	8,690	9,655	211,960	1,907	22,127
Arkansas	130,374	58,389	-1,866	6,631	55,958	1,106	11,261
California	53,144	38,313	-2,881	17,067	0	688	645
Colorado	815	222	22	550	0	15	20
Connecticut	51,772	42,903	-1,029	7,312	0	810	2,585
Dakotas	766	926	-337	153	0	8	24
Delaware	16,805	11,566	-1,212	3,950	929	180	1,572
District of Columbia	1,292	680	-52	137	504	11	23
Florida	44,832	10,565	-213	2,019	30,813	276	1,649
Georgia	348,446	95,192	7,376	9,271	216,796	2,134	19,812
Illinois	317,316	201,981	50,563	48,782	0	5,593	15,989
Indiana	259,586	200,244	14,607	28,460	0	4,730	16,275
Iowa	131,837	116,230	-2,370	11,157	0	2,261	6,819
Kansas	21,708	19,317	-279	1,748	1	341	921
Kentucky	292,885	149,326	-3,950	20,596	105,768	3,233	21,146
Louisiana	223,331	30,933	4,212	11,242	172,466	1,124	4,478
Maine	92,226	81,164	-1,348	9,062	0	1,139	3,347
Maryland	104,369	42,883	-1,101	14,480	42,972	836	5,135
Massachusetts	77,678	65,299	-1,249	10,303	0	1,210	3,325
Michigan	144,748	125,531	-2,407	16,852	0	2,607	4,772
Minnesota	33,345	28,055	-427	4,731	0	559	986
Mississippi	313,852	61,559	8,968	7,400	224,465	1,272	11,460
Missouri	248,417	165,773	-4,022	19,657	53,084	3,269	13,925
Nebraska	5,489	4,499	-579	1,365	10	97	194
Nevada	733	384	0	345	0	6	5
New Hampshire	50,918	45,860	-829	4,382	0	624	1,505
New Jersey	67,360	50,269	-1,438	14,381	0	970	4,148
New Mexico	16,929	12,003	-1,796	5,541	0	303	1,181
New York	449,128	378,196	-8,736	61,767	0	5,195	17,901
North Carolina	303,454	106,280	-3,626	16,723	158,649	2,763	25,428
Ohio	384,057	302,768	9,337	51,623	0	8,065	20,329
Oregon	10,988	9,240	-80	1,576	0	134	252
Pennsylvania	329,040	253,994	-7,094	57,359	0	4,090	24,781
Rhode Island	13,273	10,959	359	1,088	0	156	867
South Carolina	264,959	46,849	7,469	5,690	196,302	1,195	8,649
Tennessee	304,679	131,918	-3,934	21,397	130,490	3,145	24,807
Texas	182,963	63,640	10,263	89,514	10,743	1,368	8,803
Utah	6,207	4,596	277	1,018	16	118	300
Vermont	62,232	53,113	-1,051	7,918	0	690	2,252
Virginia	448,429	145,517	5,935	38,323	236,436	4,178	22,218
Washington	2,670	1,958	-6	693	0	21	26
Wisconsin	147,037	126,069	-2,935	18,590	0	2,505	5,313
United States	6,298,859	3,381,502	71,233	581,735	1,927,133	70,934	337,257

Note: The revised figures are the sums of the original count, the revisions to the census data, the allocation of laborers not otherwise specified (n.o.s.), and the additions to the census of estimates of those not included in the original count, slave workers aged 10 and over and males aged 10 to 15. The figure for females aged 16 and over is an estimate of the number implicit in the original census count. See the text for details.

Table 1A.11 Farm Labor Force Estimates, 1850

	Census Data				Additions to Census		
	Revised Figures	Original Count	Revisions	Laborers n.o.s	Slaves 10+	Female 16+	Males 10-15
Alabama	261,874	70,490	-477	6,365	166,084	1,511	17,901
Arkansas	63,650	29,199	-862	5,440	23,582	539	5,752
California	4,253	2,124	-2	1,979	0	57	95
Colorado	0	0	0	0	0	0	0
Connecticut	51,371	32,050	3,515	12,541	0	736	2,530
Dakotas	0	0	0	0	0	0	0
Delaware	15,457	7,895	6	4,939	1,130	149	1,337
District of Columbia	1,040	453	10	90	453	17	17
Florida	29,545	6,111	-102	2,495	19,888	166	987
Georgia	295,257	85,533	-2,404	9,102	182,701	1,874	18,451
Illinois	173,704	141,167	-3,224	23,063	0	2,841	9,857
Indiana	201,341	163,263	-3,246	24,464	0	3,435	13,426
Iowa	39,206	32,778	-662	4,175	0	637	2,278
Kansas	0	0	0	0	0	0	0
Kentucky	255,496	115,393	-3,030	22,897	98,738	2,700	18,798
Louisiana	156,820	20,878	746	8,396	122,836	777	3,187
Maine	93,247	77,163	-1,086	12,692	0	1,027	3,452
Maryland	97,466	29,396	1,218	17,318	43,698	1,464	4,372
Massachusetts	80,796	56,525	-851	20,553	0	1,175	3,394
Michigan	80,098	65,829	-1,163	11,014	0	1,402	3,015
Minnesota	1,210	564	-5	594	0	18	39
Mississippi	219,673	52,623	-1,453	4,900	152,787	998	9,818
Missouri	147,107	65,717	11,942	17,977	40,730	1,858	8,883
Nebraska	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0
New Hampshire	58,156	47,564	-645	8,940	0	630	1,667
New Jersey	64,006	32,971	-767	26,953	0	837	4,012
New Mexico	15,145	7,963	1,814	4,280	0	235	853
New York	437,124	315,487	-5,661	104,854	0	4,726	17,718
North Carolina	266,933	82,983	-2,632	25,857	135,636	2,413	22,676
Ohio	357,418	270,832	-4,883	65,272	0	6,832	19,365
Oregon	2,311	1,706	-26	527	0	34	71
Pennsylvania	296,275	209,044	-19,712	80,919	0	3,498	22,526
Rhode Island	12,358	8,826	-192	2,697	0	155	872
South Carolina	241,727	43,167	-1,213	6,516	183,887	1,088	8,283
Tennessee	274,940	119,633	-2,155	15,778	114,486	2,863	24,335
Texas	62,745	25,652	-163	4,964	28,430	489	3,372
Utah	2,341	1,583	-18	610	13	41	111
Vermont	71,447	48,390	-780	20,757	0	657	2,422
Virginia	401,845	112,178	-1,240	40,651	226,238	3,678	20,340
Washington	0	0	0	0	0	0	0
Wisconsin	55,141	41,003	1,537	9,366	0	1,025	2,209
United States	4,888,524	2,424,133	-37,865	629,935	1,541,315	52,584	278,422

Note: The revised figures are the sums of the figures in the other six columns, including the estimate of females aged 16 and over.

were in the work force. My adjustment of 51,000 farm workers makes up about 23 percent of the revised state figure.

The farm work force was made up primarily of workers with occupations that were readily identified with the industry.⁵³ In addition to those occupations there were others that were found in more than one industry. The chief such occupation was "laborers, not otherwise specified," for which there were nearly one million workers reported for the United States in 1850 and 1860: 909,786 in 1850 and 969,301 in 1860. I distributed these between farm and nonfarm industries in each state on the basis of the division that existed in a base year (1910) adjusted to reflect the change in urbanization that had occurred over time (see Weiss 1987c). This allocation of laborers raised the census count in farming by 629,935 in 1850 (26 percent) and 581,735 in 1860 (17.2 percent).⁵⁴

The number of males aged 10 to 15 in farming was taken to be the number of males that age in the *rural* labor force, which is equal to the number of males 10 to 15 years in the rural population times the state-specific participation rate for that age-sex group. Since the rural share of the population declined over time, the farm share of these workers also declined, from 96 percent in 1800 to 84 percent in 1860.

For 1850, the number of females aged 16 and over in farming was estimated to be equal to 1.5 percent of the free females of that age in the South and North Central states, and 0.7 percent of those in the Northeast. The percentages were derived from the Bateman-Foust sample of rural northern households in 1860 (Bateman and Foust 1973). Since there was a slight trend in the overall participation rate for females aged 16 and over, the constancy in the percentage engaged in farming means that the share of the adult female labor force in farming declined over time, falling from 12.6 percent in 1800 to 8.1 percent in 1860.⁵⁵

To this free farm work force I added, in both 1850 and 1860, estimates of the number of slaves engaged in agriculture. In both years the slave figures were estimated as 74 percent of the rural slave population aged 10 and over.⁵⁶

53. The assignment of occupations to industries was done according to the classification used by Miller and Brainerd (1957, 382), which followed closely that of Edwards (1940).

54. Lebergott chose not to allocate any unclassified laborers to farming in either 1850 or 1860 (1966, 152-53).

55. No estimate of females in farming was necessary for 1860 because they were included in the census count. I estimate that the implicit number of such workers was 70,934.

56. It was necessary to estimate the age distribution of the rural slaves because the census did not provide the breakdowns by residence. The census did provide the age breakdown for all slaves, and since most lived in rural areas, the distribution there must have been very similar. The 1840 age distribution of rural slaves confirms that the total and rural distributions were very close. Whichever distribution is used, the total slave population for the respective years or the 1840 rural distribution, the farm labor force estimates are within 0.4 percent of each other in 1860 and 0.2 percent in 1850.

The percentage was the coefficient obtained from a regression equation fitted to the 1840 data for 488 counties (see the 1840 section, which follows).

Estimates for 1840

The estimates of the agricultural work force for 1840 are based almost entirely on the census statistics. The census of 1840 collected and reported some employment statistics, but unfortunately, the figures did not cover all industries, and the census did not specify which portions of the population were counted in those industries that were included. There is no reason to think that the census intended to neglect any free workers regardless of sex or age, because the census takers were directed to collect the number of persons in each family employed in the covered industries (Wright, 1900, 33, 143). The exact demographic coverage, however, was not spelled out precisely, and whatever the intention of the Census Bureau the report appears to have varied from one census district to another.

The census was also vague about the definitions of the industries that were reported. The Census Bureau published employment statistics for seven industries: mining; agriculture; commerce; manufactures and trades; navigation of the ocean; navigation of canals, lakes, and rivers; and the learned professions and engineers. Which occupations belonged to which industries was apparently left to the discretion of the census marshals. Moreover, the possibility that an industry like manufacturing included fishing and forestry, or that commerce included all professional services, cannot be dismissed.

This double imprecision regarding industrial and demographic coverage made it difficult to decipher exactly which employment statistics were reported. Nonetheless, I think I have been able to determine the age and sex coverage, thereby enhancing the usefulness of the industrial figures that were reported (see Weiss 1987a for details). For the seven industries covered, it appears that the census attempted to count all free workers aged 10 and over and included some, but not all, slaves. Given the incompleteness of the slave enumeration, the reported figures in the South could not be used without adjustment. Outside the South, with some obvious exceptions, the figures appear to be reasonably accurate counts of the number of free workers engaged in the covered industries. While these statistics do not give us the total labor force in each state, they do provide reliable evidence on the bulk of the work force, and especially on the agricultural sector.

In summary, the assessment consisted of adjusting the reported census total to include an estimate of workers employed in those industries that were not covered, primarily personal services, fishing, and forestry. From this revised total I deducted my estimate of the number of female workers aged 16 and over, male and female workers aged 10 to 15, and slave workers aged 10 and over. The residual left after these additions and deductions should be free male

workers aged 16 and over. Since there is very good evidence as to the likely participation rates of adult male workers, I used that to judge the reasonableness of the residual figures. There were some states in which this residual was clearly anomalous, most of which were confined to the South and appear due to the difficulties of counting the number of slave workers. Elsewhere the residuals seemed very reasonable in most states. There were a few extreme deviations (Pennsylvania and New Jersey being much too low, and a few New England states being too high), but for most the residuals were very small. For twelve out of the seventeen nonslave states the residual was within 10 percent of the expected value of the adult male participation rate. The implication of this test is that the residuals were close to the expected values because the census counted all workers, at least all free workers, aged 10 and over. To be sure, there were errors and deficiencies that varied across states, but with a few exceptions the reported statistics outside the South are good measures of the number of all free workers employed in the covered industries.

Revisions for the Free States

In those few northern states where the residual was substantially out of line, I made adjustments on a county-by-county basis. After examining the ratios of the reported number of workers to the population aged 10 and over in each county, I corrected any that were noticeably out of line. Where there was no labor force reported, the revised count was derived by multiplying the population by the mean participation rate for those counties in which there was no suspicion of error (the adjusted state mean). In other counties that had low ratios or unusually high ones, I examined the subdivisions to try to locate the source of the county's deviant statistic. Where the ratios were low in every subdivision, the adjusted state mean participation rate was used to produce corrected figures. In the others where the original ratios were too low or very high, some subdivisions appear to have reliable counts, and their ratios were used to correct the figures in the other subdivisions.

Revisions for the Slave States

The assessment and revision of the census figures for the southern states was not as straightforward, due to the presence of slave workers. Since the slave share of the population varied from state to state, and across counties within states, the overall participation rates varied widely. Moreover, the presence of slave workers may have influenced the participation rates for whites. Unfortunately the census reported only the combined number of free and slave workers, so the components could not be assessed independently.

My assessment consisted of estimating a residual figure for the free work force that could be compared to the free population. The ratio of this residual labor force to the population enabled me to identify counties in which the reported figures seemed reliable, and those in which revisions were needed. The reliable data were used to estimate a regression equation in which the reported labor force was a function of the slave and free populations resident in the county. The equation was then used to estimate the work force in those counties that needed to be revised.⁵⁷

For each state whose census employment figure seemed out of line, the county data on rural employment were assessed in several ways.⁵⁸ The key assessment statistic was the ratio of a residual estimate of the free work force to the free male population aged 10 and over.⁵⁹ The residual was derived by calculating the size of the slave work force, using the county's slave population aged 10 and over and assumptions about their labor force participation rate, and deducting that figure from the census total. The test ratio represents an implicit participation rate for males aged 10 and over. If those ratios fell in line with the expected values of the male participation rates, the census figure from which they were derived must be a reasonable count of the free and slave labor force. If the ratio were out of line, the census statistic is likely in error.

In fact a range of the residual free work force was estimated, and several criteria were used to sort the counties into three categories: those in which the data seemed reliable and were included in the regression sample, those in which the census counts were very deviant and needed to be revised, and those where the counts seemed somewhat high or low and were excluded from the regression sample, but were left unrevised. A minimum residual was derived by assuming that the entire slave work force (90 percent of the slave population aged 10 and over) was included in the industries covered by the 1840 census.⁶⁰ An upper bound to the free residual was obtained by assuming that

57. The coefficient on the slave population variable was also used to estimate the slave work force engaged in farming in 1850 and 1860.

58. This procedure dealt with just the rural data; the cities were excluded and treated separately. There were a few counties in which the reported employment exceeded 90 percent of the entire population aged 10 and over. These counties were not used in estimating the regression equation, and their employment figures were revised downward to equal 90 percent of the population.

59. A similar calculation using the free male and female population was also carried out and yielded identical results. The ratios using the male denominator indicated more obvious discontinuities and thus indicated more clearly which sample of counties had reliable employment figures for purposes of estimating the regression equation. Moreover, the male population seemed like the more appropriate base to use since, outside of New England, female workers were small in number in the antebellum period.

60. While it is true that a few slaves under the age of 10 may have been working, and in any particular county the participation rate of those over 10 could have exceeded 90 percent, the use of that figure should yield the maximum number of slaves in the census enumeration in most counties, and thus the minimum free residual. The number of slaves under the age of 10 that were likely employed made up only a small percentage of the population aged 10 and over. For those

only 70 percent of the rural slaves aged 10 and over were in the covered industries.⁶¹

Where the ratio based on the minimum residual was above the expected value, the county's employment figure must have been too high. Those counties were excluded from the regression sample, but their employment statistics were not revised.⁶² The ratio based on the maximum free residual was used to judge whether the census had underenumerated workers. If a ratio biased upward in this fashion fell below the expected value, the census count must have been too low. These counties were excluded from the regression, and their employment figures were revised.⁶³

With the exclusion of those counties in which the check ratio was too high or too low, a sample of 488 counties was left in which the ratios seemed reasonable. The reasonableness of the ratios implies that the census must have counted quite accurately the number of free and slave workers in those counties. This sample was used to estimate a regression equation with which I could calculate the "true" employment in those counties that had not passed the ratio test. The following equations were estimated for covered and agricultural employment:⁶⁴

$$\text{CoveredLF} = .380 \text{ FreePop10} + .771 \text{ SlavePop10} + R^2 = .97$$

(.007) (.007)

$$\text{AgLF} = .337 \text{ FreePop10} + .741 \text{ SlavePop10} + R^2 = .95$$

(.008) (.008)

aged 10 and over, the ultimate maximum would be 100 percent, so my estimated maximum can be no more than 10 percent too low. Since some of the rural slaves were employed in industries not included in the census count, namely, as domestic servants, the 90 percent figure is likely the maximum value. Moreover, while the actual figure may have varied from county to county, the 90 percent figure is consistent with the estimator used to derive the total slave labor force.

61. The industries covered by the 1840 census included all commodity production, not just agriculture. The use of the 70 percent figure implies that 22 percent of the rural slave work force was engaged in personal service, the chief industry not covered by the 1840 census. Such a share is roughly twice as large as the percentage of slaves estimated to be engaged in domestic service on plantations (Olson 1983, 55–59). Since 70 percent is the lower bound to the slave work force in the covered industries, after subtracting it from the reported census figure the remainder is an upper bound to the number of free workers included in the count.

62. The expected value was the 1860 ratio of the free labor force aged 16 and over to the free male population aged 16 and over for each state. Since the 1860 data include all industries, and since the ratio based on those 16 and over should be higher than that for those aged 10 and over, this should provide a stringent test and result in the exclusion of only the most deviant counties.

63. The 1860 ratio of free agricultural workers aged 16 and over to free males aged 10 and over served as the expected value. This was deemed a lower bound because the numerator was confined to agriculture (excluding the other commodity-producing industries and trades that were included in the 1840 count), and covers only those aged 16 and over, while the denominator includes the population aged 10 and over. In total, 101 counties were judged to have excessively low counts of employment; 49 had negative residuals, 52 residuals between 0 and 0.42.

64. The equations were estimated using weighted least squares to correct for heteroscedasticity, with the weights being values of the free population aged 10 and over. The CoveredLF measures employment in the industries "covered" by the census report. A number of forms of the estimating

The coefficients are highly significant (the standard errors are in parentheses), and perhaps more important, the values for the free population represent very plausible participation rates, giving confidence to the estimates for the slave population. There were three exceptions to this estimating procedure. For Arkansas, Delaware, and Florida, the expected revisions were so small that I simply examined the counties for obvious omissions. In Delaware, this resulted in no revisions, while the figures were revised by 2,173 in Arkansas and 7,876 in Florida.

The employment data in southern cities were assessed separately and were revised in ten places.⁶⁵ The following equation was fit to the data for twenty-two of the remaining cities, and the regression coefficients were used to estimate the revised labor force in the covered industries in the ten cities.⁶⁶

$$LF = .159 \text{ FreePop10} + .881 \text{ MaleSlaves10} \quad R^2 = .997$$

(.004) (.044)

The covered labor force was increased by 8,106 workers, bringing the revised urban count to 77,926. The revisions were distributed among agriculture, manufacturing and trades, commerce, and all other occupations in the same proportion as prevailed in the unadjusted data. In cities where no employment had been reported by the census, the distribution of the sample cities was used to allocate the revised figures.

The adjustments and the revised figures are shown by state in table 1A.12. For the nation, the correction to the census count totaled 202,637 workers (4.2 percent), 160,010 of which were added to agriculture.⁶⁷ Most of the additions were in the South, 147,939 in total, 131,231 in agriculture.

Estimates for 1820

The census of 1820 collected and reported some employment statistics, and like the 1840 census did not cover all industries or spell out the exact demographic coverage. Whatever the intention of the census superintendent, the report appears to have varied from one census district to another.

It is possible that the census tried to record the occupations of all workers

equations were tried, using different combinations of population components, using log and non-log values, with a constant term included and excluded, and with the dependent variable being the number of workers and the participation rate.

65. Eight of these had very low residual ratios, while one (Hagerstown, Maryland) had an extremely high ratio. Georgetown had a residual ratio that was only slightly low, but reported no employment in commerce, so its count was revised.

66. Three cities were excluded from the regression: Augusta, Georgia; Lexington, Kentucky; and St. Louis, Missouri.

67. This revised count is still slightly lower than might be expected on the basis of the average adult male participation rates. My estimate of the full undercount is around 300,000 workers; the conservative revisions made here remove about two-thirds of that deficiency. See Weiss (1987a) for details.

Table 1A.12

Revised and Census Counts of Workers, 1840

	Covered Industries			Agriculture		
	Revised Count	Original Census	Adjustment	Revised Count	Original Census	Adjustment
Alabama	210,688	189,470	21,218	197,330	177,439	19,891
Arkansas	30,300	28,127	2,173	28,300	26,355	1,945
California		0				0
Colorado		0				0
Connecticut	92,751	92,609	142	56,955	56,955	0
Dakotas		0				0
Delaware	21,382	21,382	0	16,015	16,015	0
District of Columbia	4,937	1,790	3,147	1,045	110	935
Florida	22,409	14,533	7,876	19,993	12,117	7,876
Georgia	242,715	222,233	20,482	226,426	209,383	17,043
Illinois	124,494	124,204	290	105,419	105,337	82
Indiana	170,505	175,678	-5,173	144,424	148,806	-4,382
Iowa	13,126	13,126	0	10,469	10,469	0
Kansas		0				0
Kentucky	240,017	228,233	11,784	209,888	197,738	12,150
Louisiana	125,605	98,405	27,200	105,716	79,289	26,427
Maine	132,856	141,040	-8,184	97,591	103,603	-6,012
Maryland	113,043	101,087	11,956	83,075	72,046	11,029
Massachusetts	213,372	212,904	468	87,879	87,837	42
Michigan	64,020	65,273	-1,253	54,232	56,521	-2,289
Minnesota		0				0
Mississippi	150,891	146,831	4,060	143,591	139,724	3,867
Missouri	110,165	110,165	0	92,408	92,408	0
Nebraska		0				0
Nevada		0				0
New Hampshire	84,216	99,457	-15,241	62,328	77,949	-15,621
New Jersey	93,831	90,649	3,182	58,691	56,701	1,990
New Mexico		0				0
New York	692,446	689,302	3,144	456,010	455,954	56
North Carolina	251,289	235,532	15,757	231,461	217,095	14,366
Ohio	380,738	357,947	22,791	289,568	272,579	16,989
Oregon		0				0
Pennsylvania	396,156	345,829	50,327	238,939	207,533	31,406
Rhode Island	34,337	41,673	-7,336	14,304	16,617	-2,313
South Carolina	233,408	212,907	20,501	213,849	198,363	15,486
Tennessee	244,385	250,273	-5,888	222,294	227,739	-5,445
Texas		0				0
Utah		0				0
Vermont	85,892	89,454	-3,562	70,017	73,150	-3,133
Virginia	412,971	390,195	22,776	336,670	319,045	17,625
Washington		0				0
Wisconsin	10,616	10,616	0	7,047	7,047	0
United States	5,003,561	4,800,924	202,637	3,881,934	3,721,924	160,010

Sources: U.S. Bureau of the Census 1840; Weiss 1987a.

Notes: The "covered industries" are those for which the 1840 census reported employment. See the text and Weiss (1987a) for details. The procedures adopted to revise the census figures produced covered totals for Indiana and Michigan that exceeded the independently estimated total labor force. Each of the revised industry figures in those states was reduced proportionally so that their sum equaled the independent total. The adjustments indicated in this table represent the net change to the figures for those two states.

according to the instruction that “assistants may select the column of occupation to which each individual may be set down” (U.S. Bureau of the Census 1979, 11; Wright 1900, 33, 135). The occupational data, however, were recorded after the enumeration of free white persons but before that of slaves and free blacks (U.S. Bureau of the Census 1820), so it is possible that enumerators excluded these latter persons from the occupational count. Moreover, the social mores of the time might have resulted in the enumerators making a complete count of adult males, but being lax about the inclusion of females or youths.⁶⁸ Finally, these instructions did not specify any minimum age at which workers were to be counted.

The census was also vague about the definitions of the industries—agriculture, commerce, and manufacturing—that were reported. It is conceivable that the three were to be exhaustive. As noted above, the assistant could select a column in which to put each individual, and the instructions discussed the difficulties of placing people in categories. A major concern, however, was to avoid duplication: “no individual should be placed in more than one of” the occupations (U.S. Bureau of the Census 1979, 11; Wright 1900, 135). Moreover, there was no statement compelling the enumerators to place each individual in at least one, and the three occupational categories were referred to as “the three principal walks of life” (U.S. Bureau of the Census 1979, 11), clearly leaving room for the exclusion of some workers and occupations that belonged to lesser lines of activity.

Census marshals apparently had some discretion in deciding which occupations belonged to which industries. It was believed that there would be little problem with agriculture and commerce. “[Of] those whose occupations are exclusively agricultural or commercial there can seldom arise a question” (U.S. Bureau of the Census 1979, 11). No details of the classification principles or scheme were given, however. On the other hand, manufacturing was to include “all those artificers, handicraftsmen, and mechanics, whose labor is preeminently of the hand, and not upon the field” (Wright 1900, 135). Of course, in order for the list to be exhaustive, “commerce” must have included, in addition to wholesale and retail trade, all professional and personal services, as well as any occupation, such as those in fishing and forestry, that was not obviously placed in the other two great categories.

My assessment of the data is that the industrial coverage was not exhaustive, but for the industries covered, the census attempted to enumerate all free and slave workers aged 10 and over (see Weiss 1988 for details). The counts are incomplete, however, so could not be used without adjustment. While the undercounts were most pronounced in the slave states, the figures for some nonslave states also required revision. It appears, as well, that the extent to which workers aged 10 to 15 were counted varied from county to county, and state to state. Overall, the census appears to have enumerated quite accurately

68. Abel and Folbre (1990) make this point about women. More generally, the enumerators may have simply focused on the head of household, thereby ignoring women and youths.

the number of workers engaged in agriculture (and presumably the other covered industries) in about half the states and in a number of counties in every state.⁶⁹ This subset of reliable statistics provided a solid base of evidence, especially for the agricultural sector, with which to adjust the evidence where it appears the census miscounted.

It was impossible to determine for sure which industries (or occupations) were covered and which population groups were included in the 1820 count, given the broad scope of the industrial categories and the ambiguity in their definitions. In order to determine which states' figures were in need of adjustment, I circumvented these definitional problems by examining only the agricultural statistics and focusing on the rural areas. The key statistic used in this assessment was the ratio of the farm labor force to the *rural* population, which remained at least constant, and more likely declined, over time. Thus the 1820 ratios should have been close to or slightly above the 1840 ratio, but in fact were below in almost every state, indicating an undercount. This could have occurred because there was a general undercount or because the census excluded specific population components.⁷⁰

Attempts to correct the census by making a uniform adjustment across all states for the population groups likely to have been excluded—slaves and males aged 10 to 15—improved the count in some states but worsened it in others. It seems that these workers were included to some extent in almost every state, but the accuracy of that count varied by state and region. The assessment indicated that the underenumeration of agricultural workers was concentrated in the South, but some free states' figures seemed low as well. I carried out a more detailed examination of the county data in each state, including the free ones, to determine more precisely where the errors occurred and where the census figures needed to be revised. These more detailed assessments and revisions were carried out separately for free and slave states, and for rural and urban areas.

Revisions for the Free States

For rural counties in the free states the assessment statistic was the ratio of census employment in agriculture, manufacturing, and commerce to the free male population aged 16 and over. These three industries might have been so broadly conceived by the census that they employed virtually all adult male workers. If so, this ratio would be at least equal to the adult male participation

69. This assessment refers to the set of corrected census data, which incorporates various revisions made in later censuses, and correction of other arithmetical errors. The most noteworthy change is a correction to the Indiana count. The original census figures, which appear to have been carried through subsequent censuses, contained a substantial error in addition in the agricultural total. The original figure of 61,315 is nearly double the correct amount of 31,074.

70. It is possible, but unlikely, that the 1840 ratio is too high. In any case the results reported here would be the same if I used the average ratio for the years 1840 to 1860, or either of the years 1850 and 1860.

rate (approximately 0.9). Since the 1820 census was to have counted female workers and males aged 10 to 15, the ratio should be even higher. The 1840 ratio, 1.07 in the rural areas of northern states, indicates that the 1820 figure should in fact have been well above 0.9. The implication of a lower value is that either these other groups were not counted, or they and some adult males were employed in those industries not covered by the census. In urban areas nonfarm employment might have been possible, but in rural areas the alternatives must have been quite limited, so any ratio below 0.9 was suspect.

In some counties this test ratio was extremely low, implying that the census must have undercounted workers generally, and thus missed some free males aged 16 and over, as well as having failed to count properly female workers and males aged 10 to 15. A ratio as low as 0.72, for example, implies that the census failed to count any female or young male workers and that the industries covered by the census employed only 80 percent of the adult male workers. Again, because the labor force figures were to have included some females over 10 and males aged 10 to 15, the ratios, and the implied shares of adult males employed in those industries, should be higher.

The 1840 evidence for rural areas indicates that the three industries employed at least 80 percent of the male workers aged 16 and over. We do not know the age-sex breakdown of each industry, but agriculture, the chief component of the census labor force count, employed 76 percent of the male workers aged 16 and over in rural areas in 1840. If all rural workers in manufacturing and commerce in 1840 were males over 16, then the three industries would have employed 98 percent of the adult male workers. Since adult males made up the bulk of the total labor force, the share engaged in the three industries must have been fairly constant over time in the rural areas. Thus in those counties where the 1820 ratio falls below 0.72, the employment figures must be way too low.

Where the 1820 ratio was extremely low, I increased the county's employment in order to achieve a 0.72 ratio. These additions were taken to be males aged 16 and over. In those counties, as well as those in which the assessment ratio fell between 0.72 and 0.9, I assumed that the census failed to count males aged 10 to 15 and added an estimate of such workers. The estimate was equal to the number of workers that age in the rural labor force in that county. Given that these adjustments were carried out for the rural areas, the added workers were all allocated to agriculture.

The city data were assembled separately and assessed by comparing the 1820 data for each city with that for 1840. I assumed that the urban ratios of agricultural, manufacturing, and commerce workers to the male population aged 16 and over did not change much between 1820 and 1840, and used the 1840 ratios to judge whether the 1820 counts in individual cities were deviant and in need of revision. The evidence indicated that the coverage varied, either industrially or by demographic coverage, but in eighteen cities the counts were unexplainably low. The figures for these cities were revised by

increasing the labor force count so that the 1820 ratio of workers in agriculture, manufacturing, and commerce to males 16 and over equaled that for 1840.⁷¹

Revisions for the Slave States

As was the case for 1840, the assessment and revision of the slave states' figures was not as straightforward due to the presence of slave workers. My assessment consisted of deriving a residual estimate of the free work force, which was compared to the free male population in order to identify counties in which the reported figures seemed reliable, as well as those in which revisions were needed. The calculations were carried out for only the rural population in each county; the cities were excluded and treated separately. Where the county figures were reliable, they were used to estimate a regression equation that was subsequently used to correct the work force in those counties where the census had undercounted workers.

To obtain the free residual I assumed an agricultural participation rate for slaves, used it to estimate the slave work force in each county, and deducted that figure from the reported labor force. In fact a range of the residual free work force was estimated, and several criteria were used to sort the counties into three categories: those for which the data were judged reliable and could be used in the regression estimation, those in which the census counts were very deviant and needed to be revised, and those where the counts seemed somewhat high or low and so were excluded from the regression estimation but were left unrevised. A minimum residual was derived by assuming that the entire slave work force (90 percent of the slave population aged 10 and over) was counted in agriculture in the 1820 census. An upper bound to the free residual was obtained by assuming that only 70 percent of the rural slaves aged 10 and over were in agriculture.⁷²

The minimum residual was used to identify counties in which the employment figures were too high. These counties were excluded from the regression sample, and their employment count was reduced to assure a 0.9 ratio of agricultural workers to the male population aged 10 and over.⁷³

71. For those cities where the 1840 value is questionable, the 1820 count was revised so that the city ratio equaled the 1840 state average for urban areas.

72. The 70 percent figure implies that 22 percent of the rural slave work force was engaged in industries not covered by the 1820 census, chief of which must have been personal service. Such a share is roughly twice as large as the percentage of slaves estimated to be engaged in domestic service on plantations (Olson 1983, 55–59). Since 70 percent is the lower bound to the slave work force in agriculture, its subtraction from the reported census figure yields an upper bound to the number of free workers in agriculture. The list of deviant counties is not sensitive to the choice of the slave participation rate. If a 60 percent figure were used, the list would be the same.

73. The 0.9 ratio implies that all males aged 10 and over were engaged in agriculture. Since the average participation rate for males aged 16 and over was approximately .9, and that for males aged 10 to 15 was around .4 in the South, the weighted average for males 10 and over had to be below .9. Thus the revised figures in these counties may still be slightly high, or can be thought of as including female farm workers.

The difference between the revised figure for covered employment and that for agriculture was divided between manufacturing and commerce. In those counties where some employment was reported, the distribution was assumed to be the same as that in the original returns; otherwise the balance was distributed in the same proportion as prevailed in the regression sample counties.⁷⁷

The employment counts in southern cities were revised separately following the same procedure as used for the rural areas, but the specifics differed. The free residual work force used to evaluate each city's figure was derived by deducting an estimate of the covered slave work force equal to 40 percent of the urban male slaves aged 10 and over and 10 percent of the female slaves aged 10 and over. These shares are those found for Charleston in 1848 (see Goldin 1976, table 2, 14–15). These residuals were used to derive ratios of the free work force to free males aged 10 and over, and the reasonableness of the ratios was judged by comparison with the ratios for 1840 for each city.

Virtually every southern city was in need of revision; the census figures were accepted in only three cities. The revisions were based on the 1840 data. Where the 1840 ratio seemed reasonable, it was used to revise the 1820 statistic. If the 1840 figure for a specific city seemed low, the average for the Middle Atlantic cities was used to revise the 1820 census data. The covered labor force was increased by a total of 10,504 workers, bringing the revised urban count to 35,596. The revisions were distributed among agriculture, manufacturing, and commerce in the same proportion as prevailed in the unadjusted data.⁷⁸ In cities where there was no employment reported in the original, the distribution of the sample cities was used.

The revised *census* employment figure for each state is the sum of the revised rural and urban counts. The adjustments and the revised labor force figures are presented in table 1A.13.

counties in which the ratio of the minimum residual agricultural worker count to male population aged 16 and over fell below the 0.7 cutoff.

77. There were two exceptions to this estimation procedure. Tennessee was assessed and revised in the same fashion as the rest of the slave states, but its counties were not included in the regression sample. For Arkansas, the predicted undercount was too small to justify a detailed examination. Instead, I simply increased the census count by an estimate of the number of agricultural workers aged 10 to 15. That estimate was very nearly equal to the estimated undercount.

78. The census did not report employment data for four cities in North Carolina, so I estimated those figures. The total labor force in each was calculated as the sum of workers in five population groups, where the figure for each group is the product of an age-sex specific participation rate times the relevant population. The total was distributed across industries by assigning the reported county figures for commerce entirely to the cities, and distributing the balance of the urban labor force according to the average distribution for the other southern cities.

For the District of Columbia, in addition to the adjustment of the city's labor force, the rural portion of the labor force was revised by applying the southern regression equations to the rural population.

Table 1A.13 Revised and Census Count of Workers, 1820

	Covered Industries			Agriculture		
	Original Count	Revised Census	Adjustment	Original Count	Revised Census	Adjustment
Alabama	37,445	49,677	12,232	35,359	47,019	11,660
Arkansas	3,871	4,282	411	3,613	4,024	411
California						
Colorado						
Connecticut	71,640	72,667	1,027	50,518	51,545	1,027
Dakotas			0			0
Delaware	16,613	17,627	1,014	13,259	14,273	1,014
District of Columbia	2,109	4,117	2,008	525	1,004	479
Florida			0			0
Georgia	106,881	122,718	15,837	101,185	116,389	15,204
Illinois	13,635	13,635	0	12,395	12,395	0
Indiana	34,702	34,525	-177	31,074	30,897	-177
Iowa		0			0	
Kansas		0			0	
Kentucky	145,557	159,852	14,295	132,161	146,222	14,061
Louisiana	65,233	64,091	-1,142	53,941	52,793	-1,148
Maine	66,971	69,899	2,928	55,031	57,879	2,848
Maryland	102,546	115,347	12,801	79,135	88,785	9,650
Massachusetts	110,225	121,587	11,362	63,460	73,449	9,989
Michigan	2,056	2,597	541	1,468	1,882	414
Minnesota		0			0	
Mississippi	22,977	27,772	4,795	22,033	26,714	4,681
Missouri	16,694	18,532	1,838	14,247	16,039	1,792
Nebraska		0			0	
Nevada		0			0	
New Hampshire	62,151	63,242	1,091	52,384	53,475	1,091
New Jersey	58,583	65,510	6,927	40,812	47,739	6,927
New Mexico		0			0	
New York	315,801	333,710	17,909	246,650	255,993	9,343
North Carolina	188,591	209,056	20,465	174,196	194,212	20,016
Ohio	131,406	132,501	1,095	110,991	111,084	93
Oregon		0			0	
Pennsylvania	208,099	234,673	26,574	140,801	164,890	24,089
Rhode Island	19,812	20,659	847	12,559	12,849	290
South Carolina	176,138	200,603	24,465	166,707	189,135	22,428
Tennessee	110,661	115,220	4,559	101,919	106,461	4,542
Texas		0			0	
Utah		0			0	
Vermont	60,211	63,566	3,355	50,951	54,306	3,355
Virginia	312,832	357,933	45,101	275,062	317,470	42,408
Washington		0			0	
Wisconsin		0			0	
United States	2,463,440	2,695,598	232,158	2,042,436	2,248,923	206,487

Sources: U.S. Bureau of the Census 1820; Weiss 1988.

Note: The "covered industries" are those for which the 1820 census reported employment. See the text and Weiss (1988) for details.

Estimates for 1800, 1810, and 1830

For the remaining antebellum years, 1800, 1810, and 1830, the farm and nonfarm figures were derived as the sum of separate estimates of the workers in urban and rural areas.

For cities, the farm labor force was estimated directly as a small share of the urban labor force, and the nonfarm figure was the residual. The farm share for each of these years was based on the evidence for 1820 and 1840, which indicated that in most states the share was similar in both years. The chief disparities arose because of changes in the set of cities making up the urban total. For the nation the farm share of the urban labor force was 3.9 percent in 1820 and 5.0 in 1840. For 1800 the share in each state was assumed to equal the higher of its 1820 or 1840 figures. The 1810 value was set equal to the mean of the 1800 estimate just derived and the 1820 figure, and the 1830 figure equaled the mean of the 1820 and 1840 values. The results are U.S. averages of 4.3 percent in 1800, 5.0 in 1810, and 4.9 in 1830.

There were four exceptions to this procedure in 1800. In Maine, New Hampshire, and Rhode Island differences in the sets of cities in 1820 and 1840 caused the latter year's farm share to be much higher than the former's. In these cases, I used the 1820 data for those cities that were in existence in both 1820 and 1800. These were Portland, Maine; Portsmouth, New Hampshire; and Newport and Providence in Rhode Island. For Georgia, there was no reported urban farm labor force in 1820, so I used the 1840 figure.

Five states with urban populations in 1810 had none in 1800, so the 1800–1820 mean could not be calculated. For two of these states, New Jersey and Ohio, I used the 1820 figure. For Kentucky and Louisiana I used the U.S. average for 1820, a figure above that for the South Central region and higher than the reported 1820 figure for either state. For Georgia, I used the 1840 figure.

There were four exceptions in 1830. Because there were no 1820 urban statistics in Alabama, Georgia, and Missouri, I used only the 1840 figure. For North Carolina I used the 1840 figure rather than average it with a suspiciously low share reported for 1820.

Rural Estimates

Different procedures were used to estimate the rural labor force in the free and slave states.⁷⁹ In the free states, the nonfarm labor force was estimated directly, and the farm figure was the difference between the total and the nonfarm estimate. For the slave states, just the opposite tack was taken; the farm labor force was estimated directly, and the residual was the nonfarm labor force.

For the free states, the rural nonagricultural labor force was the sum of

79. The slave states include Delaware and Maryland.

estimates for three components: free males 16 years of age and over engaged in four industrial categories—manufacturing and commerce, navigation, fishing and forestry, and mining; free females 16 years of age and over *not* in farming; and free females aged 10 to 15 in the rural labor force.

To obtain the number of rural free males aged 16 and over engaged in each of four categories, I multiplied the number of males of that age in the population by the share engaged in that industry. The estimation shares were derived from the evidence for later census years and are summarized in table 1A.14.

Manufacturing and commerce were the major employers of the free rural nonfarm labor force. Fortunately, the *rural* shares for these two industries could be calculated for each state for both 1820 and 1840. The 1820 shares were below the 1840 ones, and there were regional variations as well as differential changes in the shares over the twenty years. For the nation the 1820 share (17.5) was quite close to and slightly below that for 1840 (18.9).

For each state, the 1800 share was derived by extrapolating an 1820-base-year figure backward on the basis of the percentage change in the *regional* share that had occurred between 1820 and 1840. The appropriate base-year figure was taken to be the mean value for the least industrialized states in each region in 1820. The one exception was the North Central region, where the mean for Illinois and Indiana was used. That region's least industrialized states, Iowa and Wisconsin, had no employment in these industries in 1820. The 1810 value for each state was derived by assuming a constant rate of increase between the estimated 1800 shares and the 1820 figures. The 1830 values were derived in a similar way, assuming a constant rate of increase between 1820 and 1840.

Shares of the male population engaged in navigation in each state could be calculated for the urban and rural labor forces combined in 1860, and separately for 1840. The 1840 evidence indicated that the rural shares were below the statewide figures, by different amounts in the various regions. That evidence also revealed that, outside of New England, inland navigation employed far more men than did ocean navigation. The distinction is important because the 1840 shares of the male population engaged in navigation were higher than the 1860 (2.2 versus 1.4 percent for the nation), suggesting that there may have been a trend that would put the 1800 share above that of 1840. Given that inland navigation was the more important category in 1840, however, the existence of such a trend is unlikely. Except in New England, the figures for 1840 were more likely above those for 1800 because the former include many workers employed on canals and other inland transportation that had not been in operation before 1825.⁸⁰ Thus for the years before 1825 the

80. Before 1817 "there was not, perhaps, 100 miles of canal work finished in the United States." By 1840 there were some 3,000 miles in operation. Abandonment began in the 1840s, and in the 1850s abandoned mileage exceeded new construction (Goodrich 1961, 7). Moreover, the number and tonnage of steamboats operating on western rivers rose from one (371 tons) in 1811, to 69 (14,208 tons) in 1820, to 494 (82,626 tons) in 1840 (Haites, Mak, Walton 1975, 130–31).

Table 1A.14 Shares of Rural Male Population Aged 16 and Over Engaged in Each Nonagricultural Industry

Year	Manufacturing and Commerce	Navigation	Fishing and Forestry	Mining	Total
1800	.107	.0071	.0017	.0027	.1185
1810	.137	.0071	.0017	.0030	.1488
1820	.175	.0089	.0022	.0034	.1895
1830	.182	.0111	.0029	.0038	.1998
1840	.189	.0137	.0037	.0043	.2107

Sources: U.S. Bureau of the Census 1820, 1840, 1860. See also the text.

Notes: The numerator in each industry in 1840 and in manufacturing and commerce in 1820 is the census count, which covered males 10 years of age and over. I have assumed that none of those reported workers were aged 10 to 15 years.

For navigation, the 1840 national share (rural plus urban) was .0222; the 1860 counterpart was .0137. The 1840 share engaged in fishing and forestry calculated from the industrial census count is .0146. For mining, the 1840 national share (rural plus urban) was .0038, compared to .0048 for 1860.

ocean navigation figures were more appropriate. I assumed that for 1800, 1810, and 1820 the share of males engaged in navigation was equal to the 1840 rural figure for ocean navigation.⁸¹ The 1830 figures were derived by assuming a constant rate of growth in the share between 1820 and 1840, where the latter year's figure includes both ocean and inland navigation.

For fishing and forestry I derived shares based on the statistics for 1840 and 1860. In 1840 the census reported an establishment-based employment figure for fishing and forestry, while the 1860 census reported an occupational count in the census of population. The former shows a much higher share of the population so engaged than does the latter. This could represent the fact that the share of the male population engaged in these activities had been declining over time, in which case the appropriate 1800 figure should be above the 1840. On the other hand, the establishment-based figure could be high relative to the 1860 figure because it includes some workers other than males aged 16 and over and double-counts some workers who were employed by two firms. Moreover, the 1840 establishment statistic probably includes some workers who, in the population census, were reported to be engaged in manufacturing or commerce. Since those workers are included in my work force figures for those industries, I would not want to double-count them in these estimates. The 1860 census figures avoid the problems that plague the 1840 ones, but pertain to the total fishing and forestry labor force, not just the rural.

81. Navigation's share of the labor force changed along with the increased importance of cities because large numbers of urban adult males worked in the industry. According to the 1840 census data, 7.6 percent of urban males aged 16 and over were employed in navigation, with the share being nearly 17 percent in New England cities.

The estimation shares used for 1800 were taken from the 1860 evidence. I first ranked the 1860 statewide shares within regions, and used the mean of the bottom half of the ranking for each region as an approximation of the shares for the *rural* population in 1800. In a few states where the ratio fell below this mean I used the specific state's figure. The values for 1810, 1820, and 1830 were derived by assuming a constant rate of growth in the shares between 1800 and 1840.

Statewide shares for mining (urban plus rural) could be derived for 1840 and 1860, while for 1840 the rural and urban shares could be obtained separately as well. The rural and total shares in 1840 were quite close, and there was a general increase between 1840 and 1860, with the shares being higher in 1860 in every region except the South Atlantic. I presumed that the 1800 rural figures would be below those for 1840. For most states, I obtained the 1800 figure by extrapolating the 1840 rural share backward on the rate of change in the regional value that occurred between 1840 and 1860. For three states in the South Atlantic, where the 1840 shares were higher than in 1860, I assumed that the rate of change between 1800 and 1840 equaled that of the South Central region.

The estimate of females aged 16 and over who were *not* in agriculture is the residual difference between the total number of adult women in the rural labor force minus those in farming. The farm figure was estimated using the share of rural women so engaged in 1860 as calculated from the manuscript census sample data. That figure was a mere 0.7 percent for the northern states. The number of free females aged 10 to 15 engaged in nonfarm activities was set equal to the number estimated to have been in the rural labor force.

The rural farm labor force in the nonslave states was then calculated as the difference between the total rural labor force and the sum of the above nonfarm estimates.

For the *slave* states, the farm labor force is the sum of the estimates of farm workers in four groups. The two largest, slaves aged 10 and over and free males aged 16 and over, were estimated using the regression equation derived from the 1820 county-level data. The equation was used in 1800, 1810, and 1830 to estimate this major portion of the farm labor force in each slave state.⁸²

82. Maryland posed a special case. The state was less agriculturally oriented than the rest of the slave states, and as a consequence the regional regression equation produces estimates of the farm labor force that are much too high in comparison with years for which census data are available. The regression equations were useful for estimating the farm labor force in 1820 and 1840 in those few counties that were out of line in those census years, but they gave a much higher farm figure for the state as a whole when applied to all counties. Instead, the 1800, 1810, and 1830 Maryland farm labor force was obtained by using the slave coefficient to estimate the number of slave farm workers, but using the 1820 and 1840 shares of the rural male population aged 16 and over engaged in farming to estimate the number of free male farm workers. Those shares were .572 in 1820 and .544 in 1840. I assumed that the average annual rate of decline in the share that occurred between 1820 and 1840 held back to 1800. The interpolated value for 1830 is .557, and the extrapolated figures for 1800 and 1810 are .601 and .586.

Free female farm workers aged 16 and over were estimated as 1.5 percent of the rural population in that age category, the percentage obtained from the 1860 manuscript census sample. Finally, the number of free males aged 10 to 15 in farming was taken to be all those of that age estimated to be in the rural labor force.

For the slave states, the nonagricultural labor force was obtained by subtracting the agricultural estimate from the total rural labor force.

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Comment Claudia Goldin

Thomas Weiss's estimates of the antebellum labor force suggest a smoother transition from an agricultural to an industrial labor force than that implied by previous research. The Weiss estimates for the proportion of the labor force in

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agriculture are lower by about 10 to 16 percent for 1800, 1810, and 1820 than are those in the works of Stanley Lebergott and Paul David.¹ The Weiss estimate is virtually identical to the Lebergott-David number for 1830, but it is 5 to 10 percent higher for 1840 to 1860. Thus there is a considerably slower decrease in the agricultural labor force in the Weiss data. Although the Lebergott-David numbers reveal a decline in the proportion of labor employed in agriculture of 29.4 percentage points or 55 percent across the entire 1800 to 1860 period, the Weiss data indicate a decrease of only 18.7 percentage points or 34 percent. Most of the revisions in the Weiss data seem sensible, particularly the inclusion in the agricultural work force of individuals listed as “laborers” in the census who resided in rural counties. My comments, therefore, focus on the implications of Thomas Weiss’s estimates.

Because the Weiss estimates place 132,000 fewer workers in agriculture in 1800, 260,000 fewer in 1810, and 251,000 fewer in 1820, and because output per worker was considerably higher outside the agricultural sector than within, one implication is that output per worker was greater than we previously thought. The average worker was now 48 percent more productive in 1800, 34 percent more productive in 1810, and 27 percent more productive in 1820 than in estimates using the Lebergott-David labor force data. And because output per worker rises but participation rates are less affected by the revisions, income per capita also rises.

Income per capita was not just higher given the Weiss revisions, it was substantially higher. All Americans were 26 percent richer in 1800 and 34 percent richer in 1810 than was the case before the Weiss revisions. Because the estimate of income per capita is constrained, using either the Weiss or Lebergott-David numbers, to equal that for 1840 produced by Robert E. Gallman, an income advantage can occur only during the 1800 to 1839 period. Even if the economy had grown at 1 percent average annually, which probably exceeds the rate it did grow at over the period, the increased income implicit in the Weiss labor force revisions amounts to more than twenty-five years’ worth of economic growth. It is not surprising, therefore, that the Lebergott-David estimates of the proportion of the labor force in agriculture imply much higher rates of economic growth than do the Weiss revisions. That is, the Weiss labor force estimates imply that America in 1800 was a considerably richer nation (by almost 30 percent) than those based on Lebergott-David, and thus that the rate of economic growth to 1840 must have been less—by one-half for the 1800 to 1840 period.

But is it economic growth that is of importance or is it income per capita? Although pre-1840 America, according to Weiss, was a considerably richer nation, it grew more slowly and its growth accelerated less over the antebellum decades. Because of the extensive debate over the possibility of a “take

1. Paul David, “The Growth of the Real Product in the United States before 1840: New Evidence, Controlled Conjectures,” *Journal of Economic History* 27 (June 1967): 151–97.

off.” Weiss and others have emphasized the growth of per capita income and not its level. But the Weiss labor force estimates will redirect attention toward the level of per capita income in 1800 and its implications for economic growth in the eighteenth century.

Revisions to the agricultural labor force were undertaken by Weiss because considerable skepticism had been voiced about the Lebergott-David numbers. The most convincing evidence that the agricultural labor force series contained errors was offered by Robert E. Gallman.² Gallman noted that the estimated proportion of the labor force working in agriculture did not correlate well over time with known statistics on the proportion of the population living in rural areas. For some years the two series are not positively correlated, and for others change in one series vastly exceeds change in the other. Weiss, therefore, undertook his project to revise the labor force estimates for the antebellum period.

Now that we have the Weiss revisions, it is instructive to assess how different they are from estimates based on the rural labor force statistics, using a procedure suggested by Gallman. The relationship between the proportion of the population that is rural and the percentage of the labor force in agriculture is not a simple linear one. Assume, instead, that the percentage of the labor force in the agricultural sector divided by the percentage of the population that is rural declines over time at a constant rate, possibly because nonagricultural employments arise in rural areas at about that rate. The rate is taken to be 0.01875, which is the approximate pace at which this occurred (by decade) from 1870 to 1900, a period for which we have data on both series. That is,

$$\text{Simulation of } (L_a/L_t)_{\text{year}} = \{0.66 \times (1.01875)^{(1900-\text{year})/10}\} (P_r/P_t)_{\text{year}}$$

where 0.66 is the approximate ratio $(L_a/L_t)/(P_r/P_t)$ in 1900, L = the labor force, P = population, year = the census year, a = agricultural, r = rural, and t = total. Note that a decline in $(L_a/L_t)/(P_r/P_t)$ implies a decline in $(L_a/P_r)/(L_t/P_t)$. That is, the agricultural labor force as a fraction of the rural population declines relative to the labor force participation rate for the entire nation. Because the aggregate labor force participation rate of the population is relatively constant over this period, most of the movement in the ratio $(L_a/L_t)/(P_r/P_t)$ is coming from change in the fraction of the rural population engaged in agriculture, L_a/P_r . Column 2 of table 1C.1 gives the simulation of L_a/L_t for 1800 to 1900.

The correspondence between the Weiss numbers and the simulation, given by the ratio in column 3, is truly astounding. Only in the case of 1880 is the ratio off by more than 3 percent, and in half of the cases the simple extrapolation is within 1 percent. The Weiss estimates, however, are substantial revi-

2. Robert E. Gallman, “The Agricultural Sector and the Pace of Economic Growth,” in *Essays in Nineteenth Century Economic History*, ed. David C. Klingaman and Richard K. Vedder (Athens: Ohio University Press, 1975).

Table 1C.1 Percentage of the Labor Force in the Agricultural Sector

	Weiss* (1)	Simulation (2)	(1)/(2) (3)	(1)/Lebergott-David (4)
1800	74.4	74.6	0.997	0.901
1810	72.3	72.3	1.00	0.864
1820	71.4	71.1	1.00	0.905
1830	69.8	68.6	1.02	0.989
1840	67.2	65.8	1.02	1.06
1850	59.7	61.3	0.973	1.11
1860	55.8	57.0	0.979	1.05
1870	52.5	51.8	1.01	
1880	51.3	49.2	1.04	
1890	42.7	43.5	0.982	
1900	40.2	39.8	1.01	

*The data from 1870 to 1900 are from Lebergott.

sions of the Lebergott-David numbers, with the exception of the datum for 1830.

There are two ways to interpret the results of this exercise. First, it points to a far simpler manner of deriving the proportion of the labor force in agriculture from known statistics on the rural population. But had Weiss presented this estimation I would have been extremely skeptical. This leads to the second implication. Because we have the hard evidence of the Weiss data and the simple model that could have produced them, we can speculate about the process that led to the decrease in the proportion of the labor force in rural settings. It was, in part, determined by the proportion of the labor force in agriculture, but it was also tempered by the rise of nonagricultural job opportunities in rural areas, which increased at a constant rate. Note that the parameter value, estimated to be 0.01875 from the 1870 to 1900 data, was not produced by a regression of the Weiss data on the proportion of the population residing in rural areas. Such a regression would have produced a series minimizing the sum of squared residuals and would have resulted in an even closer relationship than that given in column 3.

In sum, Weiss has furnished new estimates of the antebellum labor force and of the proportion of the labor force working in agriculture. These estimates appear to have been well crafted, and almost identical ones can be produced from a simple model of the relationship between the proportion of the population that was rural and the proportion of the labor force employed in agriculture. One implication, therefore, concerns the process that created jobs in rural areas that were nonagricultural. Another implication concerns economic growth and the level of incomes in the antebellum period. America, according to the new Weiss estimates, was considerably richer from 1800 to 1839 than we previously thought—at times by more than 30 percent. Thus growth during the eighteenth century has now become more of a possibility.