Volume Title: Wages and Labor Markets in the United States, 1820-1860

Volume Author/Editor: Robert A. Margo

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-50507-3

Volume URL: http://www.nber.org/books/marg00-1

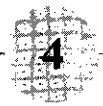
Publication Date: January 2000

Chapter Title: Intersectoral Efficiency: Farm-Nonfarm Wage Gaps

Chapter Author: Robert A. Margo

Chapter URL: http://www.nber.org/chapters/c11512

Chapter pages in book: (p. 76 - 94)



Intersectoral Efficiency
Farm-Nonfarm Wage Gaps

The next three chapters examine various aspects of the allocative efficiency of antebellum labor markets. This chapter studies so-called wage gaps between farm and nonfarm labor. Although earlier work by Lebergott (1964) showed that labor shifted out of agriculture before the Civil War at an impressive pace, recent revisions to the underlying data suggest both a slower rate of exit and a higher share of the labor force in farming on the eve of the Civil War (Weiss 1992), prompting some scholars to question whether the United States industrialized too slowly (Atack and Bateman 1991). If this were the case, wage gaps in favor of nonfarm labor should be apparent as well as persistent (Williamson 1991, 45). On the other hand, the *absence* of wage gaps could be taken as evidence that the allocation of labor between the farm and the nonfarm sectors was efficient, in which case it would be reasonable to conclude that real wage gains experienced by nonfarm labor "trickled down" to farm labor, the dominant economic activity before the Civil War.

Previous work on antebellum wage gaps has been hampered by sketchy or inappropriately analyzed evidence (see sec. 4.1). This chapter uses samples drawn from the manuscript Censuses of Social Statistics in 1850 and 1860, which permit an investigation of wage gaps in small areas (counties) as well as in the aggregate.

4.1 Theoretical and Historical Background

Modern economic growth is often defined by the shift of labor out of agriculture (Kuznets 1966). Consider a simple, general equilibrium model with two sectors (farm and nonfarm). There is a specific factor in each

sector (e.g., land in agriculture) and a single, mobile factor (labor). All labor is assumed to be homogenous in quality.

Efficiency requires that the value of the marginal product (VMP) of labor be the same in both the farm and the nonfarm sectors.[1] Imagine an improvement in technology that raises the value of the marginal product of labor in the nonfarm sector. The nonfarm VMP curve shifts outward, and, to maintain efficiency, labor should be reallocated from the farm to the nonfarm sector.[2]

Labor could also shift out of agriculture if the VMP curve in agriculture shifts inward. In such a case, labor is said to be "pushed" out of agriculture. Because technical regress is unusual, even in less-developed economies, such downward shifts occur primarily because of adverse weather or price shocks. For example, a decline in the farm VMP could easily occur in a single local economy as a consequence of regional specialization. Suppose that improvements in transportation permit local economy X to specialize in agricultural production. It is possible that the delivered price of the agricultural good to local economy Y located in a settled region would be lower than the cost of agricultural production in Y. This causes the VMP of agricultural labor in Y to decline and labor to be pushed out of agriculture.

In the model, efficiency is maintained by a competitive labor market. Labor is a mobile factor, deciding in which sector to be employed on the basis of the wage, which, under competition, equals the value of the marginal product. Thus, when one or the other VMP curves shifts, wages adjust so as to maintain labor market equilibrium.

For various reasons, equalization of marginal value products might not obtain. The adjustment to the new equilibrium might be protracted, in which case the disequilibrium would persist for some time. In developing countries today, wages in the nonfarm sector are artificially boosted by the imposition of minimum wages. A minimum wage set above the equilibrium wage will cause the quantity of labor demanded in the nonfarm sector to decline while simultaneously increasing the quantity of labor supplied in the nonfarm sector. Labor that fails to find a job in the so-called formal sector will be shunted into the informal sector, where wages are free to adjust downward, or will remain unemployed for some time, until a job opens up in the formal sector.[3]

In most historical economies, such as the antebellum United States, the minimum wage is not relevant. However, there can still be short- or medium-run barriers to the reallocation of labor from the farm to the nonfarm sectors. For example, the demand for nonfarm labor may be concentrated geographically at a distance from the supply of farm labor. The costs of adjustment—namely, migration—include not only time and money costs but also the psychic costs of broken ties with family and

friends. Farm labor may also need time to adjust to the different pace of life and the intensity of work in nonfarm employment. For these various reasons, much rural-to-urban migration in the past took place in a circular or stages manner. Whatever the cause, the end product will be a wage gap—that is, a difference in the wage between (homogenous) labor employed in the nonfarm and labor employed in the farm sector.

There is much evidence in historical and developing economies of *average* productivity gaps—output per worker in agriculture generally is much less than output per worker in the nonfarm sector (David 1967; Crafts 1985). Indeed, a key aspect of modern economic growth is the eventual convergence of average labor productivity across sectors, all the while labor is shifting out of agriculture (Maddison 1987). Productivity gaps are often said to provide a "free lunch" to an industrializing economy—that is, an extra boost in output if labor shifts from the low-productivity (farm) sector to the high-productivity (nonfarm) sector (David 1967; Crafts 1985; Maddison 1987). The basis of this argument is the following algebraic identity:

$$q = q_f s_f + q_n s_n,$$

where q = aggregate labor productivity; q_i = labor productivity in sector i, $i = f$ (farm), n (nonfarm); and s_i is the share of the labor force in sector i. If $q_f < q_n$, then an increase in s_n mechanically increases aggregate output.

While the algebra of this argument is unassailable, the economics is less clear-cut. As already noted, output will be maximized when the VMP of labor is equalized, not when the average products are equalized. Indeed, there is *no* necessary relation between the two types of gaps. To see this, imagine that the production functions in the two sectors are Cobb-Douglas. Equilibrium in the labor market requires that wages be equalized, or

$$\alpha_f p_f q_f / L_f = \alpha_n p_n q_n / L_n,$$

where the α's are the output elasticities of labor, and the L's are the labor demands in the two sectors. This can be rewritten as

$$\alpha_f \mathrm{AP}_f = \alpha_n \mathrm{AP}_n,$$

where AP = average product. Clearly, the average product of labor could be higher in the nonfarm sector yet wages be equalized—or a wage gap could exist yet average products be the same in the two sectors. Despite this theoretical point, it is widely believed that average productivity gaps are evidence of some type of factor market failure in the allocation of either labor or capital.

4.1.1 Wage Gaps and Antebellum Economic Development

Wage gaps are relevant to three strands of the literature on antebellum economic development. The first, and perhaps most important, concerns the proper interpretation of the so-called sectoral shift in Paul David's (1967) conjectural estimates of antebellum per capita income prior to 1840. David called his estimates *conjectural* because they were derived from the algebraic approach discussed previously rather than from actual data on output. Output per worker in the nonfarm sector exceeded output per worker in the farm sector in 1840, and it is reasonable to assume that the same held true at earlier census dates. According to David's estimates, the shift of labor out of agriculture—the sectoral shift—accounts for approximately one-third of per capita income growth over the period 1800–1860.

Clearly, the sectoral shift was *correlated* with antebellum income growth. However, whether it truly was a cause depends on the existence of a wage gap. If there was a wage gap, then, as discussed earlier, the sectoral shift produced an added boost to per capita income—in effect, a free lunch. If there was no wage gap, however, the sectoral shift was not an independent factor, and growth in antebellum per capita income must be attributed to more fundamental causes—for example, technical progress and factor accumulation.

Related to the controversy over the sectoral shift term in David's calculation is a recent debate over the pace of antebellum industrialization. Traditionally, American economic historians have not questioned whether the pace at which labor shifted out of agriculture was too slow by some metric. Estimates of agriculture's share of the labor force prepared by Stanley Lebergott (1964) are the basis for the belief that few, if any, impediments to intersectoral mobility existed prior to the Civil War. Lebergott's estimates show that 83.3 percent of the labor force was engaged in agriculture in 1800. The rate had declined a scant 4 percentage points by 1820, to about 79 percent. Between 1820 and 1860, however, labor shifted out of agriculture at a rapid pace, with the proportion in farming falling to slightly more than half (53 percent) on the eve of the Civil War. Indeed, as measured by the nonfarm share of the labor force, the pace of industrialization was more rapid in the four decades *before* the Civil War than after. According to Lebergott's (1964, 510) estimates, 40 percent of the labor force was engaged in farming in 1900—a decline of 13 percentage points compared with 1860, whereas the 1860 figure was nearly 26 percentage points lower than the 1820 figure. Given the rapid advances in manufacturing technology after the Civil War compared with the antebellum period, one would be hard-pressed to conclude, on the basis of Lebergott's figures, that antebellum industrialization was a stagnant affair.

New estimates of the antebellum labor force prepared by Thomas Weiss

(1992) have substantially revised the pattern of change in the farm share. For my purposes, the key revisions are to the figures for 1820 and for 1860. According to Weiss (1992, 22), the farm share was 71.4 percent in 1820, compared with 55.8 percent in 1860.

Although most commentary on Weiss's work has focused on its implications for slower per capita income growth before 1800 and for the process by which nonfarm jobs were created (Goldin 1992, 76, 78), his figures also have important implications for understanding the pace of antebellum industrialization. If Weiss's revisions are accepted, industrialization proceeded at about half the pace estimated by Lebergott between 1820 and 1860.[4]

If industrialization proceeded too slowly during the antebellum period, an imprint could have been left in the form of a wage gap in favor of nonfarm labor. In terms of the model, too much labor was employed in agriculture and too little in the nonfarm sector; the farm VMP exceeds the nonfarm VMP, producing a wage gap.

Labor might not have been the only factor misallocated between the farm and the nonfarm sectors. According to Bateman and Weiss (1981), the average return to capital in manufacturing was approximately 20 percent in 1860, compared with 8–12 percent in agriculture (Atack and Bateman 1987). Although there are many possible explanations of the profit gap (e.g., differences in risk), the gap is consistent with the misallocation of capital—too little in the nonfarm sector, too much in the farm sector.

Finally, the existence of a wage gap is relevant to various theories of antebellum industrialization. For example, one interpretation of H. J. Habakkuk's (1962) model of American industrialization is that abundant and fertile land attracted labor into farming, driving up the wage faced by manufacturers, causing them to substitute capital for labor, and perhaps even biasing the direction of technical change toward labor saving (Temin 1971). Although subsequent research has heavily qualified Habakkuk's argument (see, e.g., James and Skinner 1985), all of it is predicated on well-functioning factor markets that respond to shocks to technology or resources by reallocating mobile factors, such as labor.

Alexander Field (1978) developed a labor markets explanation to explain why industrialization first occurred in New England.[5] According to Field, transportation improvements such as the Erie Canal dramatically increased exports of agricultural goods from the Midwest to the Northeast. Increased interregional competition drove down the return to capital in New England agriculture, pushing labor off the farm (recall the theoretical discussion in sec. 4.1). The labor could have migrated to the western frontier but, for various reasons, chose to remain in New England.[6] The supply of labor to the nonfarm sector shifted outward, driving down wages and raising the profitability of further investments in nonfarm capital, such as in the textile industry. Again, while subsequent research has

seriously challenged Field's interpretation, all participants in the debate maintain the assumption that labor markets functioned efficiently, with the result that there were no wage gaps (Goldin and Sokoloff 1984; Simkovich 1993).[7]

4.1.2 Previous Research on the Antebellum Wage Gap

Unfortunately, relatively little prior research has been done to measure the size of the antebellum wage gap systematically.[8] Bidwell and Falconer (1925, 274) argued that "farmers could not pay wages equivalent to those paid by manufacturers," but the evidence they cited is of almost no use in determining the size of the wage gap.[9]

More reliable evidence can be found in Adams (1982). As discussed in chapter 2 above, Adams collected archival data on monthly wages of farm and manufacturing labor in the Brandywine area of Pennsylvania (near Philadelphia). The decadal average of the farm-nonfarm wage ratio was 0.92 in the 1850s, with no visible antebellum trend (calculated from Adams 1982). Although Adams's data suggest little or no wage gap, one must keep in mind that they refer to a single area, one long settled with well-developed product and factor markets.

Somewhat broader geographic evidence on the farm-manufacturing wage gap is presented by Sokoloff and Villaflor (1992, 40). Sokoloff and Villaflor compare estimates of the average annual nominal wages of adult males in Northeastern manufacturing for three years (1820, 1832, and 1850) to estimates of average annual nominal wages in Massachusetts agriculture, drawing on Rothenberg (1988). Although differences in sample geographic coverage make comparisons of the two series somewhat problematic, in no year is the wage gap greater than 10 percent, and, moreover, wages in the two sectors clearly moved together over the period.

From a geographic point of view, the most extensive previous analysis of antebellum wage gaps was conducted by Williamson and Lindert (1980, 71–73). Williamson and Lindert examined two pieces of evidence. The first pertained to wage gaps in antebellum Vermont and Massachusetts, drawing on data collected by, respectively, T. M. Adams (1939) and Carroll Wright (1989). In the case of Vermont, Williamson and Lindert compared nominal daily farm wages (from Adams) to an urban nominal daily wage for common labor. The nonfarm wage exceeded the farm wage in Vermont by about 34 percent in the mid-1830s, but the difference fell to 26 percent in the early 1850s and to a mere 8.4 percent during the Civil War (Williamson and Lindert 1980, 313).[10] In the case of Massachusetts, Williamson and Lindert again used nominal daily rates, comparing median farm to urban nonfarm wages. The decadal average of the farm-nonfarm ratio in the 1850s was 0.965, with little or no trend between 1820 and 1860 (Williamson and Lindert 1980, 313).[11]

Williamson and Lindert's second piece of evidence is especially perti-

nent because it is based on average nominal wages for 1850 that are precisely the published counterpart of the 1850 manuscript census data examined in this chapter (see sec. 4.2). Using the published data, Williamson and Lindert (1980, 73) compute estimates of nominal daily wages of farm and common labor in 1850 by census region and for various states within census regions. The farm-nonfarm wage ratios range from a low of 0.88 in New Hampshire to a high of 1.10 in Connecticut; the unweighted average of the ratios "for the North and for the United States as a whole [was] 0.99" (p. 72). On the basis of both pieces of evidence, Williamson and Lindert argue that farm-nonfarm wage gaps "were trivial in late antebellum America. . . . no region exhibited pronounced . . . wage gaps for labor of comparable skill" (p. 71).[12]

4.2 Wage Gap Estimates

To develop new estimates of the antebellum wage gap, I make use of the samples drawn from the manuscript Censuses of Social Statistics of 1850 and 1860 (for a discussion of these samples, see chap. 2). Recall that the Census of Social Statistics reported wage data for a variety of occupations as well as the weekly cost of board ("to laboring men"). This chapter uses the data on board and that from two wage categories—average monthly wages of farm labor with board and average daily wages of common labor without board.

My use of the wage data from the Censuses of Social Statistics is directed at answering the question, Was the antebellum market for unskilled labor common to both the farm and the nonfarm sectors? Of course, virtually no labor is ever truly unskilled, but that is not the issue. What is meant by *common to both sectors* is whether the tasks to be expected of hired hands on the farm *could* have been performed by the typical nonfarm laborer (and vice versa) and whether the market mechanism worked sufficiently well to equalize the returns to unskilled labor in both sectors.

I focus on common labor as the comparison group with farm labor because qualitative accounts suggest that there were important similarities in skills demanded of unskilled laborers in the farm and nonfarm sectors (Stone 1909; Schob 1975).[13] Contracts for monthly farm labor generally left the tasks demanded unspecified—more or less, whatever the farmer needed done. Although *whatever the farmer needed done* included many tasks specific to agriculture—planting, plowing, weeding, harvesting, taking care of animals, and so on—other tasks were more generic. Farmhands, for example, could expect to chop wood and clear brush, dig cellars and drains and help out with other construction projects, load and unload wagons, and perhaps transport goods to town. With respect to these generic tasks, the necessary skills were minimal and could be learned quickly.

What was valuable were not skills per se but physical dexterity, ruggedness, stamina, reliability, and willingness to follow directions.

The ability to perform these generic tasks was also demanded of common laborers in the nonfarm sector. For example, during the antebellum period, common labor was widely employed in road and canal construction to perform tasks, such as digging and hauling dirt, that were qualitatively similar to tasks occasionally demanded of hired hands on farms (Stone 1909, 143; Lebergott 1964; Schob 1975). Chopping wood was another task common to both unskilled nonfarm laborers and farmhands (Schob 1975, 20).

However, even if some of the tasks demanded of farm and common laborers were sufficiently similar that (from the standpoint of workers and employers) the two types of labor were essentially the same, there could be impediments to the equalization of wages between the two sectors. Labor demand in the farm sector was seasonal. The great bulk of farmhands appeared to have been hired on contracts of six to eight months' duration (Schob 1975; Rothenberg 1992). If a farmhand remained employed on the farm during the winter months, it might be at a reduced money wage or solely for room and board (Schob 1975, 230). Faced with the prospect of seasonal unemployment, some farmhands apparently wintered in nearby towns, consuming their savings in the process. But others attempted to find work in the nonfarm economy, apparently at the very jobs that were common to both, such as chopping wood or hauling (Schob 1975). Further, while there was some complementary meshing of tasks across the seasons, much nonfarm work was done at precisely the same time as farm work. Thus, by itself, seasonality in agricultural labor demand was not necessarily an impediment to wage equalization per unit of time (such as monthly).

Qualitative evidence also suggests that, within local economies, unskilled labor moved more or less freely between farm and nonfarm jobs.[14] Certainly, farm and nonfarm labor was highly mobile geographically (Schob 1975; Sokoloff and Villaflor 1992). Farmhands (and farmers) occasionally hired themselves out as day laborers or were attracted to short-term work on canal or other construction projects (Schob 1975, 8–9, 62). Even literate young men who worked as common school teachers during the winter months sometimes spent summers working as hired hands on local farms, earning roughly similar amounts per month (Schob 1975, 81).

Although wage equalization might occur within local economies, the same might not be true in the aggregate, particularly for money wages. Specifically, farm labor was concentrated geographically in rural areas, where nominal wages might have been low, while nonfarm labor was geographically concentrated in areas—such as towns and cities—where nominal wages might have been relatively high. Within an area, the wage gap

could have been nonexistent, but, weighted to reflect the geographic distribution of farm and nonfarm labor across areas, the aggregate wage gap might have been substantial. Factor mobility might still equalize *real* wages, but there would have to have been some economic advantage to nonfarm employers to locate where nominal wages were high, such as higher labor productivity.

4.2.1 Calculation of Wage Gaps

My initial estimate of the wage gap proceeds in three stages. First, I calculate an estimate of the full-time monthly wage for farm (f) and common (n) labor in each county (i), as follows:

$$f_i = w_{fbi} + 4.3 \times b_i,$$

$$n_i = 26 \times w_{ndi},$$

where w_{fbi} = the monthly wage of farm labor with board, b_i = the weekly cost of board, and w_{ndi} = the daily wage of common labor without board. The calculation assumes 4.3 weeks of board per month, on average, for farm labor and twenty-six days of employment per month for common labor.[15]

Next, I compute weighted averages of the f's and n's:

$$f = \Sigma\ \alpha_i f_i,$$

$$n = \Sigma\ \beta_i n_i.$$

Ideally, the weights α and β would reflect the actual distribution of hired hands and common laborers across counties. Such data are not available, however, in 1850 and 1860. In their place, I use county-level data on improved acres in agriculture in conjunction with state-level estimates of the farm labor force to estimate the farm labor force and the nonfarm labor force at the county level (for a discussion of the weighting procedure, see app. 4A). The weighting procedure is extremely crude and should be viewed cautiously, particularly for Southern states, where the weights reflect the use of slave as well as free labor.[16] However, some weighting procedure is clearly preferable to none at all (see below), and, while the weighting procedure could no doubt be refined, sensitivity analysis suggests that the substantive results are robust to plausible alternative weighting schemes.[17]

The *aggregate* wage gap (g) is

$$g = f - n.$$

Note that the aggregate gap can be decomposed into the sum of two components:

$$g = \Sigma\beta_i g_i + \Sigma(\alpha_i - \beta_i) f_i,$$

where $g_i = f_i - n_i$. The first term in the decomposition, $\Sigma\beta_i g_i$, is the average *within-county* gap—that is, the portion of the aggregate wage gap that can be attributed, on average, to the wage gap observed within counties. The second term in the decomposition, $\Sigma(\alpha_i - \beta_i) f_i$, is the portion of the aggregate wage gap attributed to the distribution of farm and common labor across counties.

As written above, the average within-county gap is produced by weighting each county's gap by β_i. However, the average could also be produced by weighting each county's gap by α_i. Although a theoretical case can be made for weighting by β, neither gap is "correct," and I present both calculations.[18]

Decomposing the aggregate gap into *within* and *between* components is motivated by the two fundamental ways in which unskilled labor might be misallocated, as discussed earlier. First, misallocation might occur within a particular local economy: unskilled labor might be priced higher as common labor, for example, than as farm labor. If this sort of misallocation occurred with some frequency, the average within-county gap should have been positive.

Second, farm labor might be concentrated geographically where money wages, on average, were relatively low, compared with the geographic distribution of common labor. If a mismatch of supply and demand of this sort occurred, the *between* component of the decomposition should have been positive in absolute value; that is, the aggregate gap should have exceeded the within-county gap in absolute value.

As noted earlier, the *between* component of the decomposition is relevant to the distinction between nominal and real wage gaps. Within a local economy, it may be reasonable to assume that cost-of-living differences between nonfarm and farm labor were relatively small, at least compared to the differences that might have existed between, say, the urban Northeast and the rural Midwest. Adjusting for such geographic differences in the cost of living (see below) turns the nominal aggregate gap into a real aggregate gap. Also as previously noted, a small real gap (given a large nominal gap) implies that employers of common laborers who located where money wages were high must have had an incentive to do so, a point to which I return later in the chapter.

In mapping the empirical decomposition into the theoretical constructs of *within* and *between* gaps, the use of county-level data is easily criticized. Counties were not necessarily coterminous with local labor markets. In order to calculate the decomposition, however, it is necessary to have some set of weights to apply to each local economy, whatever the definition of *local* happens to be. As noted above, county-level weights can be readily

constructed from published census data for 1850 and 1860, which is simply not the case for arbitrarily defined local economies.[19]

Caveats aside, panel A of table 4.1 shows the results of my initial calculations, in the rows labeled *unadjusted.* Results are presented for each state as well as by census region.

Among the Northern states in the sample, the aggregate wage gaps were relatively large, averaging 35 percent (= 6.38/18.34) of the mean farm wage in 1850 and 30 percent (= 6.44/21.55) of the mean farm wage in 1860. There was also a tendency for the gaps to be smaller, percentagewise, on the frontier; for example, the Iowa gap was about 20 percent in 1850, compared with 29 percent in Massachusetts.[20] In the Southern sample, the aggregate gaps were somewhat smaller than in the North: on average, the aggregate gap was 26 percent (= 3.80/14.39) of the mean farm wage in 1850 and 18 percent (= 3.78/20.61) of the mean farm wage in 1860.

As noted above, aggregate wage gaps might be expected if nonfarm labor was concentrated where nominal wages were relatively high, compared with farm labor. The decompositions in panel A of table 4.1 demonstrate that this must have been true in 1850 and 1860 because, in the majority of cases, the aggregate gap exceeded the average within-county gap. But the decompositions also demonstrate that the within-county gaps can account for much of the aggregate gap, especially if the within-county gaps are produced using the β (nonfarm) weights.[21]

It is worth emphasizing that the nominal gaps in panel A are different from those that would obtain if the published averages from the 1850 census were used instead. The published averages were evidently unweighted averages of minor civil division figures. As panel B of table 4.1 shows for 1850 (results for 1860 are similar), in every state the nominal wage gap, as calculated from the published figures, was smaller than that shown in panel A. This is primarily a consequence of the weighting procedure; as noted above, nonfarm labor tended to be concentrated in areas (such as towns or cities) where nominal wages were higher. Because the published figures were unweighted averages, they fail to reflect this geographic distribution of common labor and thus understate the nominal wage gap.

Given that manufacturing activity was concentrated more heavily in the North, particularly the Northeast, the initial calculations suggest that labor market imperfections could have impeded antebellum economic growth. There are several reasons to be suspicious, however, that the within-county wage gaps were truly as large, on average, as my initial estimates imply. First, the evidence presented in chapter 3 suggests that laborers hired on a daily basis received a wage premium to compensate for unemployment risk (Lebergott 1964; Margo and Villaflor 1987). Thus, had the census marshals collected data on the *monthly* wage of common laborers, the gap estimates in panel A might be much smaller.

Table 4.1 **Nominal Farm-Nonfarm Wage Gaps, 1850 and 1860 ($)**

	A. By State and Region							
	1850				1860			
	w_f	w_c	g	g_c	w_f	w_c	g	g_c
Massachusetts:								
Unadjusted	22.15	28.61	−6.46	−5.27 (−5.07)	25.72	30.97	−5.25	−4.01 (−4.65)
Adjusted	22.15	25.58	−3.43	−2.24 (−2.18)	25.72	27.69	−1.97	−.72 (−1.43)
Pennsylvania:								
Unadjusted	17.38	22.42	−5.04	−3.52 (−3.02)	20.77	27.03	−6.26	−4.33 (−3.58)
Adjusted	17.38	20.05	−2.67	−1.15 (−.86)	20.77	24.16	−3.39	−1.47 (−1.00)
Michigan:								
Unadjusted	18.17	22.69	−4.52	−4.26 (−5.88)	21.36	24.59	−3.23	−2.86 (−3.60)
Adjusted	18.17	20.29	−2.12	−1.89 (−3.32)	21.36	21.99	−.63	−.25 (−.96)
Iowa:								
Unadjusted	18.55	22.19	−3.64	−3.37 (−4.07)	21.36	24.30	−2.94	−3.24 (−3.28)
Adjusted	18.55	19.84	−1.29	−1.02 (−1.67)	21.36	21.72	−.36	−.67 (−.67)
Northern sample:								
Unadjusted	18.34	24.72	−6.38	−4.20 (−3.87)	21.55	27.99	−6.44	−3.96 (−3.64)
Adjusted	18.34	22.10	−3.76	−1.59 (−1.51)	21.55	25.02	−3.47	−1.08 (−.98)
North Carolina:								
Unadjusted	12.81	16.30	−3.49	−2.83 (−1.13)	18.31	22.61	−4.30	−3.02 (−1.73)
Adjusted	12.81	14.57	−1.76	−1.10 (.34)	18.31	20.22	−1.91	−.66 (.40)
Virginia:								
Unadjusted	14.22	18.75	−4.53	−3.51 (−2.33)	20.05	23.63	−3.58	−1.81 (−1.74)
Adjusted	14.22	16.76	−2.54	−1.53 (−.57)	20.05	21.13	−1.08	.69 (.57)
Kentucky:								
Unadjusted	15.83	20.10	−4.27	−2.73 (−2.86)	22.65	26.56	−3.91	−3.46 (−3.84)
Adjusted	15.83	17.97	−2.14	−.59 (−.87)	22.65	23.75	−1.10	−.65 (−1.04)
Tennessee:								
Unadjusted	14.90	16.69	−1.79	−.11 (−.83)	21.68	25.58	−3.90	−1.97 (−1.64)
Adjusted	14.90	14.92	−.02	1.66 (.84)	21.68	22.87	−1.19	.74 (.82)

(continued)

Table 4.1 (continued)

A. By State and Region

	1850				1860			
	w_f	w_c	g	g_c	w_f	w_c	g	g_c
Southern sample:								
Unadjusted	14.39	18.19	−3.80	−2.61 (−1.86)	20.61	24.39	−3.78	−2.42 (−2.19)
Adjusted	14.39	16.26	−1.87	−.68 (−.20)	20.61	21.81	−1.20	.16 (.22)

B. Estimates of g, 1850, Using Published Census of Social Statistics

	g	Difference, Panel A − Panel B
Massachusetts	−5.67	−.79
Pennsylvania	−2.58	−2.46
Michigan	−4.04	−.48
Iowa	−2.99	−.65
North Carolina	−1.11	−2.38
Virginia	−2.06	−2.47
Kentucky	−1.88	−2.39
Tennessee	−.73	−1.06

C. Average Weekly Cost of Board

	1850	1860
Massachusetts	2.15	2.63
Pennsylvania	1.81	2.28
Iowa	1.60	1.99
Michigan	1.51	2.06
Northern Sample	1.86	2.31
North Carolina	1.32	1.90
Virginia	1.48	2.04
Kentucky	1.45	2.06
Tennessee	1.47	2.10
Southern Sample	1.44	2.03

Notes: Panel A: w_f = average monthly wage of farm labor (includes imputed value of board). w_c = average monthly wage of common labor, without board. g_c = outside parentheses, weighted average of wage gap within counties, weight is estimated nonfarm share of county labor force; inside parentheses, weighted average of wage gap within counties, weight is estimated farm share of county labor force (see the text for discussion of weighting procedure). $g = w_f - w_c$. Unadjusted = unadjusted for differences in daily pay between monthly and daily labor; adjusted = adjusted for differences in daily pay between monthly and daily labor (see the text for discussion of adjustment procedure).

Panel B: w_f and w_c computed from published 1850 Census of Social Statistics. w_f = (monthly wage of farm labor with board) + 4.3 × average weekly cost of board. w_c = 26 × daily wage of common labor without board. $g = w_f - w_c$.

Panel C: State estimates: average weekly cost of board is a weighted average of county figures; weights are county population shares. Regional estimates: weighted average of state figures, weights are state population shares.

Second, it is quite likely that laborers hired on a monthly basis with board received additional perquisites not paid to daily labor. For example, a hired hand might have received a place to sleep, the washing and mending of clothes, and feed for his horse (Schob 1975; Rothenberg 1992; Hatton and Williamson 1991). Qualitative evidence strongly suggests that the farm labor market functioned well enough that such perquisites would be reflected in a lower wage, although whether they would be fully reflected is another matter (Schob 1975; Rothenberg 1992).

Third, laborers hired on a monthly basis were arguably less skilled than those hired on a daily basis (although whether monthly farm laborers were less skilled than daily nonfarm laborers is unclear). Short-term laborers in agriculture, for example, often specialized in tasks such as prairie breaking or well digging, which required more skills and equipment than general farm labor (Schob 1975). Hired hands were typically younger and more likely to be single than short-term laborers and, for both reasons, might have been less reliable and less productive (Schob 1975; Rothenberg 1992). For all three reasons—unemployment risk, perquisites, and differences in worker characteristics—the within-county wage gaps in panel A are arguably overstated.

Fortunately, some insight into this issue can be gleaned because a few census marshals evidently misunderstood their instructions, reporting the monthly wage of common laborers (instead of the daily wage). I use these misreported observations in the context of a regression of common wages to measure an downward adjustment factor, which is applied to the monthly common wage.[22] While the number of misreported observations is large enough that the estimate of the adjustment factor is reasonably precise, the number of observations is not sufficient to estimate separate adjustment factors at, say, the state level or even for 1850 and 1860.[23] These estimates are shown in the rows labeled *adjusted* in panel A of table 4.1.

The adjusted estimates show dramatically reduced within-county gaps—indeed, in some states, the gaps are now slightly positive, indicating that farm labor was better compensated than common labor. Direct evidence on the cost to workers of switching sectors within counties is nonexistent for the antebellum period. Generically, however, such costs would have included search costs (e.g., trips to town to find work), costs of adjusting personal schedules, and possibly changes in commuting or relocation costs. The adjusted estimates suggest that, if the costs of switching equaled as little as three or four days of labor at the average farm wage, it would not have paid the marginal worker to switch between sectors. But, if the marginal worker was indifferent between sectors (up to the cost of switching), local labor markets were, on average, in equilibrium in 1850 and 1860.

Table 4.2 Real Wage Ratios: w_f/w_c

	1850	1860
Massachusetts	.97	1.01
Pennsylvania	.99	.96
Michigan	.91	1.01
Iowa	.94	.97
North Carolina	.94	.96
Virginia	.90	1.04
Kentucky	.96	1.03
Tennessee	1.08	1.00

Note: *Real* means adjusted for cross-sectional differences in the weekly cost of board within states (see the text).

4.2.2 Real Wage Gaps

A small within-county gap does not imply a small aggregate gap, and, as the estimates in table 4.1 show, an aggregate gap remains even after adjusting monthly wages in the manner described above. By construction, the adjusted aggregate gap is the true nominal gap because no correction has been made for geographic differences in the cost of living. Thus, a large nominal aggregate gap need not imply a large real wage gap—that is, controlling for the cost of living, wages for farm and nonfarm labor might equalize, on average, across counties.

Ideally, we would need comprehensive, county-level indices of the cost of living in 1850 and 1860 to test for real wage equalization. Data to construct such indices do not exist for 1850 and 1860. In their place, I use the weekly cost of board as a proxy for the cost of living.

Although the limitations of board as a proxy for the cost of living are important (see chap. 5), they should not be overemphasized. Food costs loomed very large in antebellum budgets.[24] Moreover, there was considerable variation in the cost of board across counties; in particular, board was more expensive in the Northeast than in the Midwest or the South (see panel C of table 4.1) as well as in urban than in rural counties.[25]

Table 4.2 shows the ratios of farm to nonfarm wages at the state level, after correcting for differences across counties in the cost of board within states. The correction multiplies nominal wages by the county's relative cost of living, where *relative* means the ratio of the county's weekly cost of board to a weighted average across all counties within the state (for a discussion of the correction procedure, see app. 4B). If nonfarm wages were high on average because nonfarm labor was concentrated in counties where the cost of living was high, the gap between the average farm and the average nonfarm wage should decline and possibly vanish.

In fact, once the cost of board is controlled for, the aggregate nominal gap diminishes substantially. In no case does the farm-nonfarm wage ratio fall more than 10 percent below or above perfect equalization—namely,

a ratio of unity. There is also evidence of regression toward the mean—states with ratios below or above unity in 1850 moved closer to wage equalization over the decade. On the basis of table 4.2, there is no reason to suppose that farm and nonfarm laborers were paid a substantially different (monthly) real wage in 1850 or 1860.

4.2.3 Comparison with Williamson and Lindert (1980)

My results suggest that, on average, the antebellum wage gap was small within counties and, adjusted for the cost of living, at the state level. Superficially, these conclusions appear to be the same as those of Williamson and Lindert (1980), as discussed previously. Because of differences in the method of calculation, Williamson and Lindert's gap estimates are not exactly comparable to mine. Conceptually, however, they are closest to the adjusted nominal gaps shown in table 4.1 because Williamson and Lindert use an adjustment factor to convert monthly to daily wages (see below) but do not directly adjust for the cost of living.[26] My results show substantial nominal gaps at the state (or regional) level, contrary to their estimates.

Part of the discrepancy may be attributed to differences in weighting and sample coverage.[27] However, the principal reason for the discrepancy can be traced to a conceptual mistake in Williamson and Lindert's computations.[28] In effect, Williamson and Lindert concluded that aggregate nominal gaps in 1850 were negligible because their computational procedure eliminated them by construction.

4.2.4 The Farm-Manufacturing Wage Gap

My use of the census data is based on the assumption that the day wage of common labor is a reliable summary statistic for the nonfarm sector. Given the importance of wage gaps in models of industrialization, and in the light of the earlier work by Adams (1982) and Sokoloff and Villaflor (1992), an additional test for wage equalization would compare the farm wage to wages in manufacturing (i.e., a specific nonfarm sector). The analysis applies to 1860 because published census data on manufacturing wages at the county level were not reported in 1850. Also, I restrict my attention to the two Northeastern states in the sample (Pennsylvania and Massachusetts) as the Northeast was where the bulk of manufacturing labor was employed.

The estimation of the male manufacturing wage proceeds in two steps. The average monthly manufacturing wage, w_m, is

$$w_m = [(\text{annual wage bill})/(\text{number of employees}) \times 11.5],$$

where 11.5 is the average number of months of operation (for justification of this figure, see Sokoloff [1986a]). Included in the wage bill were wages

Table 4.3 **Farm-Manufacturing Wage Gap, 1860: Massachusetts and Pennsylvania**

	Massachusetts	Pennsylvania
Estimated monthly manufacturing wage, nominal ($)	26.67	25.48
Ratio, farm wage/manufacturing wage, nominal	.96	.82
Ratio, farm wage/manufacturing wage, real	1.03	.90

Note: See the text for discussion of estimation of manufacturing wage. *Real* = adjusted for across-county differences in the cost of board (see the text).

paid to female manufacturing workers. Since my farm wage data refer to males, it is important to adjust w_m for the gender composition of the manufacturing labor force; as with the average number of months of operation, the adjustment assumes that the female-male ratio of manufacturing wages was a constant.[29] Because the average number of months of operation and the female-male wage ratio no doubt varied across counties, the results should be viewed cautiously.

Table 4.3 shows comparisons between the manufacturing wage and the farm wage in 1860. On average, the estimated manufacturing wages were quite close to the estimated common wages in nominal terms. In Pennsylvania, the manufacturing wage exceeded the common wage by about 5 percent, while, in Massachusetts, the (adjusted) common wage exceeded the manufacturing wage by about 4 percent. Compared with agricultural wages, there was little or no indication of a wage gap in Massachusetts; in Pennsylvania, there was a small gap (about 10 percent in real terms), but this may be within the margin of measurement error, given the crudeness of the adjustments for days of operation and the gender mix. In sum, it would appear that sectoral wage gaps would remain small if manufacturing wage data were substituted for the common labor wage data.

4.3 Conclusion

This chapter has presented new evidence on farm-nonfarm wage gaps in the United States before the Civil War. Strictly speaking, the findings apply to two years and to a sample of counties that covers only a portion of states. It is possible that data for other years, or a geographically broader sample, would reveal different results. However, the data analyzed here suggest that, properly measured, such gaps were small, on average, within local labor markets, at least on an average monthly basis. Adjusted for geographic differences in the cost of living, the real wages of agricul-

tural and nonfarm workers appear to have been about the same in 1850 and 1860, and this conclusion is not altered (for two states in 1860) by substituting manufacturing wages for common labor.

Appendix 4A

Discussion of Weighting Procedures

This appendix describes the weighting procedures used in the construction of tables 4.1–4.3.

Tables 4.1 and 4.2, State-Level Estimates

The first step is to estimate the total labor force and the farm labor force at the county level and derive the nonfarm labor force as a residual. Total labor force at the county level is estimated by multiplying each county's population by the state's aggregate labor force participation rate (computed from Weiss's [1992] labor force estimates and census population figures). The farm labor force in each county is $\tau \times$ Weiss's estimate of total farm labor in state, with τ = the county's share of total improved acres in the state. The nonfarm labor force is the total labor force less the farm labor force. The weight for the farm wage is the estimated farm labor force; the weight for the common wage is the estimated nonfarm labor force.[30]

Table 4.1, Northern and Southern Sample

Weights are state estimates of farm and nonfarm labor force, as derived from Weiss (1992).

Table 4.3

Weights for farm wage are state estimates of farm labor force, from Weiss (1992); weights for manufacturing wage are reported male employment in manufacturing in the 1860 census.

Appendix 4B

Calculation of Real Wage Estimates

I first compute the average cost of board at the state level, b_s. The state averages are weighted averages of county-level figures on the cost of board; the weights are county population shares: $b_s = \sum p_i b_i$, where p_i is

the county population share, and b_i is the weekly cost of board in county i. The state averages are shown in panel C of table 4.1. Let w_{fi} = the nominal monthly farm wage in county i, w_{ci} = the nominal monthly (adjusted, as in table 4.1) common wage in county i. Real wages are

$$rw_{fi} = (w_{fi}/b_i) \times b_s,$$

$$rw_{ci} = (w_{ci}/b_i) \times b_s.$$

State averages are then computed as described in appendix 4A.

For table 4.3, the same procedure as above is followed, except that the sample is restricted to Massachusetts and Pennsylvania.