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CHAPTER 3

Annual Earnings

CLOSE agreement has been found between the over-all increases of the two series on daily wages in manufacturing developed in this study—the one from Aldrich data, the other from the Weeks-Bulletin 18 data. Both series increased much less than those of the other investigators developed from the same materials. The smallness of these increases has been traced to the exclusion of wages in nonmanufacturing industries and to the use of industry-employment weights (from the census) instead of firm-employment weights or no weights at all. It would seem more logical to weight the wage data by industry- instead of by company-employment, since the size of the reporting firm is largely accidental and bears no necessary relation to the importance of its industry. But which yields better measures of final wage behavior? For a test, we turn to the annual earnings from the Census of Manufactures.

Sources and Nature of the Earnings Data

Annual earnings per wage-earner are based on the Censuses of Manufactures for years ending on May 31, 1860, 1870, 1880, and 1890. These censuses have been criticized as lacking in continuity of organization and method. No permanent organization existed until after this period. In 1860 and 1870, the enumerations were made by United States marshals, who were not under the discipline of the directors of the census and were paid at low rates even for those days: in 1870, fifteen cents per factory establishment, with no extra compensation for extra visits. The "marshals did their . . . work as carelessly and hastily as possible," and in both 1860 and 1870 the results were obviously defective, though less defective in the latter than in the former census.¹ In 1880 the census, under Francis Walker, an eminent economist, provided for the appointment of special agents, but they were assigned only to the 279 principal cities and towns, so that the rural areas were not so well enumerated.²

¹ Charles J. Bullock, "Wage Statistics and the Federal Census," *Publications of the American Economic Association*, New Series No. 2, March 1899, pp. 343-346. Approximately one-fifth of the sums of money owing to marshals and their deputies in connection with the enumeration of the 1860 Census was "suspended on account of the presumed or known disloyalty of officers or the existence of some good reason for suspending payments." *Preliminary Report on the Eighth Census*, 1860, H.R. Doc. 116, 37th Congress 2nd Session, p. 1. This statement is partially contradicted on the same page: ". . . the marshals were generally faithful to their trusts and manifested an anxious desire for the proper completion of their duties."

² Bullock, *op.cit.*, p. 347.

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Although in 1890 the census was still more thorough, its director, Carroll D. Wright, issued a warning concerning its misleading character.³ There seemed to be agreement among the late nineteenth century critics of the census that each successive enumeration had improved in accuracy and coverage.⁴

It is possible that the average annual earnings were more accurate than the other data gathered by the Census of Manufactures—say, value of output or horsepower. Average earnings equal the total payroll for the census year, divided by the number of wage-earners employed; omission of an establishment would not affect average earnings as much as the total wage or total employment from which they were derived, since the errors would partially cancel out. Nevertheless, the average earnings materials have been subjected to plenty of criticism as to their meaning, completeness, representativeness, and comparability from one census to the next.

First there was no means of separating earnings of workers of different sex or age, except for 1890, and skill classifications of the workers were usually lacking; thus average annual earnings could vary from census to census merely because the proportion of workers at different earning levels changed, even if none of the levels altered.

Second, no data were available from the census telling directly the number of days worked per year by persons reported as employed in manufacturing establishments. Average annual earnings could change from census to census partly because of changes in the number of days of employment. The same could be said for changes in the length of the workday.

Third, the census of 1890 counted not only wage-earners or "hands," but also higher paid officers and members of firms.⁵ The 1890 average earnings were therefore biased upward; when the non-wage-earners are excluded for comparability with the earlier years, average annual earnings in 1890 are reduced from \$485 to \$445 (Table 14).

Fourth, there was considerable variation in industry coverage. The 1860 census included numerous mining, fishery, agricultural processing, and forestry establishments; the 1870 and 1890 censuses included some manufacturing industries not covered in the other two censuses, for example car and railroad shop construction; and all

³ H. L. Bliss, "Eccentric Official Statistics," *American Journal of Sociology*, Vol. III, July 1897-May 1898, p. 96.

⁴ "Defective as they are, our manufacturing statistics are the best produced in any country . . . since 1860 they have improved steadily from decade to decade." S.N.D. North, "Manufactures in the Federal Census," *Publications of the American Economic Association*, New Series No. 2, 1899, pp. 257-258.

⁵ The census of 1880 probably lumped some of these persons in the employment data, but did not include their salaries "except in exceedingly few cases." Bliss, *op.cit.*, pp. 360-361.

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four censuses included varying numbers of construction and other hand-trade establishments which tend to employ mainly adult males in skilled occupations—painters, paperhangers, carpenters, blacksmiths, wheelwrights, and others. These skilled workers often had relatively high earnings, so that an enumeration (such as the 1890 census) which included many of them in relation to previous censuses would be biased upward in its average annual earnings. There is logical force in the position of a census official that hand trades do not belong with manufacturing anyway. “Many handicraftsmen carry on business without any shop or paraphernalia which can be identified or enumerated as a manufacturing establishment. It would seem to be plain than industrialism pursued under such conditions ought not to be confused, for census purposes, with factory manufacture, and that the two classes of data cannot be mingled and combined, in the consolidation of manufacturing statistics, without affecting the exactness of the results.”⁶

In addition to the pure hand trades, large numbers of custom and repair shops were included in two manufacturing industries: boots and shoes, and men’s clothing.⁷ These were not separated in the statistics from the factories. Comparability was best served by excluding these two industries altogether.

Deduction of the nonmanufacturing industries, the hand trades, the intermittently covered industries, and the industries biased with repair shops, has the effect of raising the annual earnings of the average worker by \$8 in 1860 and \$6 in 1870, and of lowering them by \$2 in 1880 and \$18 in 1890 (Table 14). The adjusted figures of 1870-90 are very close to those arrived at by Richard A. Easterlin of the University of Pennsylvania, and the adjusted figure for 1890—the only one significantly altered—is close to both his estimate and that of William M. Stuart, an official of the 1890 census:

	1860	1870	1880	1890
Reported by the census	289	378	347	445
Adjusted in this study	297	384	345	427
Adjusted by Easterlin ^a	-	378	343	425
Estimated by Stuart ^b	-	-	-	429

^a Computed from Table 3.1, p. 636 on his work cited in Table 14. Easterlin did not construct an estimate for 1860.

^b “Official Statistics,” *American Journal of Sociology*, Vol. 3, July 1897-May 1898, pp. 626-627.

⁶ North, *op.cit.*, p. 271.

⁷ The custom and repair work could be separated for both industries in 1890 and for boots and shoes in 1880, but it could not be separated at all in 1860 or 1870. Some evidence of the inclusion of many small shoe repair and tailoring establishments may be adduced from the fact that these two industries included about 12.5 percent of all establishments listed by the 1860 Census of Manufactures, but had only about 4 percent of the capital. Approximately the same was true for 1870.

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TABLE 14

Adjustments to Data on Wage-Earners and Earnings as Reported by the Census of Manufactures, in Order to Exclude Nonmanufacturing Industries, Hand Trades, and Intermittently Reported Manufacturing Industries, 1860-1890
(number of wage earners in thousands; total earnings in millions of dollars)

	1860		1870		1880		1890	
	<i>Wage- Earners</i>	<i>Earnings</i>	<i>Wage- Earners</i>	<i>Earnings</i>	<i>Wage- Earners</i>	<i>Earnings</i>	<i>Wage- Earners</i>	<i>Earnings</i>
Reported by census	1,311.2	378.9	2,054.0	775.6	2,732.6	948.0	4,251.5	1,891.2
Deduct:								
Mining	107.5	42.3						
Fisheries	30.6	6.1						
Agric. processing	0.4	0.1						
Forestry	1.6	0.5						
Hand trades ^a	35.5	10.7	67.2	12.5	63.5	21.5	147.2	51.8
Boots and shoes, including custom and repair	123.0	30.9	135.9	52.0	133.8	51.0	150.7	68.0
Men's clothing, including custom and repair	114.8	19.9	108.1	30.7	160.8	45.9	217.3	87.7
Building	13.1	5.4	99.7	42.2	104.9	47.5	355.4	220.3
Intermittently reported manufactures:								
Cars and general shop construction (railroad and streetcar)			15.9	9.7			108.6	61.6
Smelting and refining							13.2	6.8
Flax and hemp, dressed			0.8	0.2	1.0	0.3	0.5	0.2
Gas, illuminating and heating			8.7	6.5			13.0	8.5
Grindstones and millstones			0.5	0.3	0.4	0.2	0.1	0.1
Adjusted manufacturing	884.7	263.0	1,617.2	621.5	2,268.2	781.6	3,245.5	1,386.2
AVERAGE ANNUAL EARNINGS								
	1860	1870	1880	1890				
All industries included by census	289	378	347	445				
Hand trades	301	186	339	352				
Building	412	423	453	620				
Adjusted manufacturing	297	384	345	427				

Data are for year ending May 31.

^a Exclusive of construction and of custom and repair shops in men's clothing and boots and shoes.

Source: For 1860 and 1870, Census of 1870, *Manufacturing*, Vol. 3, pp. 394-405; 1880 and 1890, Census of 1890, *Report on Manufacturing Industries in the U.S.*, Part 1, Tables 2, 5. For suggestions concerning adjustments during 1870-90 the author is indebted to Richard A. Easterlin (see his "Estimates of Manufacturing Activity," *Population Redistribution and Economic Growth, United States, 1870-1950*, American Philosophical Society, 1957). For suggestions concerning adjustments in 1860, I am indebted to Robert Gallman.

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The shortcomings of the census earnings data ought not be taken lightly. Even present-day censuses—conducted at great expense and after long preparation, with modern methods, ingenious equipment, trained personnel, and carefully devised mailing texts—are plagued with undercounts and incomparabilities. The earlier censuses must have been still less satisfactory, from every point of view.

On the other hand, the shortcomings need not be critical for this investigation. The objection that separate earnings are not provided for persons of different age, sex, and job classification would be serious only if the census earnings were the sole source of information about wages. Since rather detailed wage-rate classifications are available from the other sources, we need the census earnings mainly to test the over-all accuracy and comprehensiveness of the average wage of all workers. This service the census earnings provide, for the numbers of establishments and employees represented in these statistics, if not complete, are very great, and the census earnings cover an entire twelve months, whereas the wage data usually refer to one or two dates that might not be representative of the other seasons of the year, especially if economic conditions change rapidly.

In sum, the census earnings must be judged by their accuracy and completeness relative to other wage information. None of the statistics were reliable enough to stand alone. But if very different data show basic agreement, we should have much more confidence in our results than if we relied on one set alone.

Comparison of Census Average Annual Earnings and the Daily Wage Data of the Aldrich and Weeks Reports

Which estimates find strongest support from the census data on annual earnings—the wage series of this study, manifesting increases between 1860 and 1890 of 48 to 50 percent, or those of other investigators, suggesting increases of 58 to 74 percent? We seek the answer in the comparison in Table 15. Three features are worth noting.

First, the census earnings do not support the larger increases shown by the other studies. They do confirm the indications in the foregoing chapter that wages did not rise more than 50 percent during the thirty-year period and suggest that, if anything, they rose less than 50 percent.

Second, the census earnings do not move closely with the daily wage data so far as the increases to 1870 or to 1880 are concerned, but the disparities of movement give no support to the other investigations, since annual earnings rise even less than daily wages during intervening decades.

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TABLE 15

Index of Average Annual Earnings in Manufacturing from the Census
Compared with Wage Indexes for Manufacturing Computed in This
Study and with Wage Indexes for Mixed Industries by Other Investigators:
1860-1890

	1860	1870	1880	1890
AVERAGE ANNUAL EARNINGS (CENSUS)				
All manufacturing industries ^a	100	129	116	144
17 manufacturing industries ^b	100	131	117	149
AVERAGE DAILY WAGES ^c				
This study				
Aldrich Report	100	151	130	148
Weeks-Bulletin 18 Reports	100	146	134	150
Mitchell				
Aldrich Report, 21 industries	100	180	143	158
Weeks Report, 30 industries	100	155	138	-
Falkner				
Aldrich Report, 17 industries	100	167	143	168
Hansen				
Aldrich Report; Series A ^d	100	179	140	157
Phelps Brown				
Aldrich Report	100	182	151	174

^a Computed from Table 14, adjusted manufacturing.

^b Computed from sources of Table 14, for the industries listed in Appendix Table C-2.

^c From Tables 3 and 4.

^d Same industries as Mitchell for 1860-80; same industries as Falkner for 1880-90. (unweighted).

Third, the 17 manufacturing industries—conforming as nearly as the data permit to industries drawn from Aldrich and Weeks—moved closely in average annual earnings with *all* manufacturing. The narrower list of industries thus seems reasonably representative of all manufacturing industries during these thirty years.

We now consider some objections to this comparison of over-all movement between annual earnings and daily wages. A minor objection—that boots and shoes and men's clothing ought to have been retained despite the inclusion of custom and repair shops—may be appraised by computing the average earnings with these industries restored. The re-computation yields an increase of 51 percent between 1860 and 1890, which is still very close to the increase in our daily wage series.

A more important objection might be that other differences between 1860 and 1890 could have held down the average earnings increase. We can imagine three such possibilities.

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Did the proportion of women and children differ in such a way that larger increases in wage rates were offset by growing proportions of these persons whose average earnings are always low? Relevant data, for women 16 or older and children under 16, at each of the four censuses are given in Table 16.

TABLE 16
Number of Men, Women, and Children Reported as Wage-Earners to the Census of Manufactures, 1860-1890
(thousands)

	1860 ^a		1870		1880		1890	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Men 16 and older	988	75.4	1,616	78.6	2,019	73.9	3,327	78.3
Women 16 and older	257	19.6	324	15.8	532	19.4	804	18.9
Children under 16	66	5.0	115	5.6	182	6.7	121	2.8
Total	1,311	100.0	2,054	100.0	2,733	100.0	4,252	100.0

^a Estimated.

The comparison shows that the proportion of men—the high earners—was, if anything, greater in 1890.⁸ It certainly does not suggest that the changing age-sex composition could have offset a large basic wage increase over these thirty years.

Theoretically important, in comparing annual earnings with daily wages, is the number of days worked per year. Suppose, purely for illustration, that the average worker was employed fewer days in 1890 than in 1860: this could have offset a higher daily wage rate than was suggested by our figures. Such a hypothetical reduction in average days worked could have been due either to greater unemployment or labor turnover.

However, it does not seem likely that either of the two could have been materially greater in 1890 than in 1860, since both the 1890 and 1860 censuses occurred during business cycle peaks in the Burns-Mitchell chronology. Some difference in unemployment is possible as between two business cycle peaks but even a substantial difference—say, 5 percent of the labor force—would not in itself greatly alter our conclusions.

Concerning labor turnover, there seems no doubt that all four censuses reported more persons on the payroll for the average month than were at work on the average day. (This is true even now of census employment and earnings reporting.) But the four censuses of 1860-90 admittedly varied among each other as to what they

⁸ Even if all the males reported as earners in 1860 were assumed to be 16 and older, the proportion of men in 1860 would have been only slightly above that in 1890.

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included in the employment divisor.⁹ The 1860, 1870, and 1880 censuses requested the average number of hands employed; the 1880 census asked, in addition, the greatest number of hands employed at any one time during the year. The 1890 census asked for the average number employed during the actual time the establishments were reported as being in operation. The first three censuses undoubtedly obtained an employment figure in excess of the average daily number employed throughout the year. The 1890 enumeration was believed by the officials of that census to have come as close as possible to the average number.¹⁰ It is unlikely that all excess reporting could thus have been eliminated, even in 1890.¹¹ But if we assume that there was less excess reporting of employment in 1890 than earlier, the true increase in average earnings over the thirty-year period would have been not greater than our estimates, but less.

There remains the puzzling observation that although daily wages and annual earnings both rose by nearly the same percentage between 1860 and 1890, annual earnings lagged behind daily wages at 1870 and 1880. Why were they depressed by unemployment?

For an answer, two steps are necessary. One is to adjust our two daily wage series for the fact that both are undoubtedly on too high an absolute level, judged by the First Annual Report for 1885, the Dewey-Census report for 1890, and a number of state reports. The Dewey report, based on very large numbers of workers, indicated that the daily wage rates were \$1.53 in 1890, about 13 percent below the \$1.75 estimated from Aldrich data and 23 percent below the \$1.98 estimated from the Weeks-Bulletin 18 data.¹² The wage level of the

⁹ "The total amount of wages paid at each of the periods named is . . . one of the most certain elements of the industrial census, but the average is obtained by dividing the total wages paid by the average number of employees during the year." Carroll Wright, quoted in Bliss, *op.cit.*, p. 362.

¹⁰ *Census of 1890, Report on Manufacturing Industries in the United States*, Vol. vi, Part I, p. 14.

¹¹ An employment figure in excess of the average daily number at work could still persist even if the 1890 census had succeeded in obtaining the average number employed during the actual time the establishments were reported as being in operation, or even if the establishments were in operation every working day of the year.

¹² The daily average of \$1.53 in 1890 is reasonably close to the estimate of \$1.46 derived by Albert Rees from estimates of annual earnings and days worked. ("Real Wages, 1890-1914," in the Thirty-Eighth Annual Report of the National Bureau of Economic Research, May 1958, pp. 59-60.) It happened to be the same as the median of the average daily wages reported to the labor bureaus of the following six important states for that year. In Maryland, the weighted average daily wage actually earned in 13 important manufacturing industries—including many in our lists from the Aldrich and Weeks Reports—was \$1.58. In Maine, the average for a small number of workers in 12 manufacturing industries was \$1.57. In Iowa, the average for nearly 30,000 workers including females and unskilled wage-earners in over two dozen important manufacturing

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First Annual Report was below the wage levels of the two series by almost exactly the same respective percentage margins. On the rather bold assumption that a relationship which held constant between 1885 and 1890 would hold constant also during the earlier years, we reduce our entire Aldrich daily wage series by 13 percent and our entire Weeks-Bulletin 18 series by 23 percent.

The second step is to compute the average number of days of employment under the business-cycle-peak conditions of 1890, using the census, which gathered information on the number of workers attached to manufacturing industries (excluding hand and construction trades) who had been unemployed for various periods during the census year ended May 31, 1890:

Months	<i>Average assumed by Census</i>	<i>Workers idle</i>		<i>Number unemployed</i>
		<i>Number</i>	<i>Man months</i>	<i>Equivalent full-time years</i>
		000	000	000
1-3	2	268	536	
4-6	5	160	800	
7-12	9.5	50	475	
		478	1811	150

From Census of 1890, *Special Census Report on the Occupations of the Population of the United States*, pp. 25-26.

From this distribution, we estimate that 150,000 persons were unemployed an equivalent full-time year during the census year: 6.6 percent of the 2.3 million persons ten years of age and older reported by the 1890 population census as attached to these industries.¹³ If we assume that a full-time year was 299 days (deducting Sundays and 14 days lost in holidays and illness), the average worker in manufacturing was unemployed 20 days and employed 279

industries was \$1.49. In Wisconsin, the average for over 80,000 workers in over 1,300 factories was \$1.43. In Ohio, the average for over 30,000 employees in 31 manufacturing occupations was \$1.65. And in Missouri, the average for 3,820 workers in 10 manufacturing industries was \$1.35. The median of the six averages, \$1.53, was taken as lying halfway between the third- and fourth-ranking averages, \$1.57 for Maine and \$1.49 for Iowa.

(Sources: *Fourth Biennial Report of the Bureau of Industrial Statistics and Information of Maryland, 1890-91*, pp. 241-258. *Fifth Annual Report of the Bureau of Industrial and Labor Statistics, Maine, 1891*, pp. 122-125. *Fourth Biennial Report of the Bureau of Labor Statistics of Iowa, 1890-1891*, pp. 179-199. *Seventh Biennial Report of the [Wisconsin] Bureau of Labor, Census and Industrial Statistics, 1895-96*, pp. 339-341. *Fourteenth Annual Report of the [Ohio] Bureau of Labor Statistics for the Year 1890*, pp. 113-196. *Twelfth Annual Report, Bureau of Labor Statistics of Missouri, 1890*, pp. 220-394.

¹³ The unemployment rate for gainful workers attached to all industries, computed on the same basis, was 5 percent.

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days in 1890.¹⁴ A daily wage of \$1.53 for 279 days would yield annual earnings of \$427 in 1890, the same as our adjusted average annual earnings figure for manufacturing wage-earners in the year ended May 31, 1890. Accordingly we next estimate the number of days worked for the other census years by dividing our adjusted-level daily wage from the Aldrich Report into the census average annual earnings:

	1860	1870	1880	1890
(1) Average daily wages (Aldrich data, corrected for level)	\$1.04	1.56	1.34	1.53
(2) Average annual earnings (census)	\$297	384	345	427
(3) Average employment days (line 1 divided by line 2)	286	246	257	279
(4) Full-employment days assumed	299	299	299	299
(5) Unemployment days (line 4 minus line 3)	13	53	42	20
(6) Percent of assumed full employment	4.3	17.7	14.0	6.6 ^a

^aThe unemployment rate was based on actual census data.

This computation yields an estimated unemployment rate which was somewhat lower in 1860 than the rate computed from census data for 1890. The difference is comparable to economic conditions at the various dates. The 1860 and 1890 censuses were taken in years for which Burns and Mitchell report business-cycle peaks, and the unemployment rates of both years were low enough to be characteristic of years of full employment, considering that the actual peak of business cycle occurred each time one quarter after the end of the census year. Thus the census-year earnings and employment occurred during the expansion phase rather than at the actual peak of the cycle.

¹⁴ This figure of 279 days does not seem to agree closely with the median of 260 days computed from weighted averages for four states. In Maine 462 workers reported an average of forty-eight days lost including illness, unemployment, and "other causes." If this figure is subtracted from 310 days (313 weekdays minus three holidays), the average number of days worked was 262. In Iowa, nearly 20,000 employees in 32 manufacturing occupations lost an average of 2.13 months or fifty-three workdays, from which we estimate an average of 257 days worked. In Maryland, workers in 13 manufacturing industries reported an average of 255 days worked. And in Ohio, over 30,000 employees in 31 manufacturing occupations reported an average of 275 days worked. (See footnote 12 for sources of state data.)

The smaller average for the four states may possibly represent the additional number of days lost by persons who were employed but were absent part of the payroll period because of illness, drunkenness, and "personal reasons," or by persons who joined late or left early in the payroll period. If 260 days should turn out to be the average actually worked by factory wage workers in the United States, dividing this figure into the average annual earnings of \$427 would yield a somewhat higher average daily wage in 1890: \$1.64. However, it would not be safe to rely on four states for an estimate of the national average of days worked.

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The fact that the unemployment rates for 1870 and 1880 were higher than for either 1860 or 1890 was also compatible with the fact that the census year June 1, 1869 to May 31, 1870 occurred during the contraction phase of a cycle that started in the month the year began and reached its trough two quarters after the year was over, and that the census year June 1, 1879 to May 31, 1880 occurred during the expansion phase of a cycle that had reached its trough in early 1879 and was not to reach its peak until three years later. Nevertheless, the unemployment rates seem very much on the high side, even for manufacturing, since economic conditions were far from serious in these two census years.

It is much more likely that the relatively lower average number of days of employment in 1870 and 1880 may be due to the failure of the censuses of 1870 and 1880 to exclude persons who were on payrolls of firms for very short periods, because such persons may have been out of the labor force or on the payroll of another firm during the rest of the year. Overstatement of employment results in understatement of the average number of days employed. Whether this does explain the excessive gap between days employed and assumed days of full employment in 1870 and 1880 cannot be told with certainty from the information that has come down to us.¹⁵

¹⁵ Some recognition should be paid to an apparent discrepancy for 1880 between our average employment of 257 days for the United States and the 296 days of actual working time reported for manufacturing establishments in Massachusetts, the latter tabulated from unpublished data of the 1880 Census of Manufactures. Part of this discrepancy may represent the difference in economic conditions between Massachusetts and the United States as a whole. But there is a better explanation. The average employee works fewer days for a given establishment than the establishment itself operates, because some workers join the payroll after the month begins or leave before it ends, and most workers are ill a few days or stay off the job for personal or family reasons. The number of such absences is probably much greater than the small number of workers, such as watchmen and maintenance staff, who work even though the establishment is closed down. Since the number of days an average establishment operates bears no close relation to the number of days worked by the average employee, these data cannot be used to compute average daily earnings from average annual earnings.