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10 The Female Labor Force and American Economic Growth, 1890–1980

Claudia Goldin

10.1 Introduction

When the labor force participation of a nation increases, measured national income per capita also rises. In the history of the American economy, as in other Western nations, the labor force participation rate has increased because the participation of prime-aged women has increased. Most other changes in the labor force have decreased this rate, most notably the decline in the age of retirement and the increase in age at which work begins.

By the definitions of the United States Population Census, the labor force participation rate of prime-aged females (15–64 years old) rose from 19.6% in 1890 to 59.9% in 1980, and the female component of the labor force increased from 17% to 43%.[1] Not only did the labor force participation rate of women expand, but the ratio of female to male full-time earnings increased as well, from 0.46 to 0.60 over the last century.

The expansion of the female labor force as conventionally measured and the rise in the female/male earnings ratio were associated with a growth of national income per capita that exceeded the growth in male earnings by 28%. Had the female labor force not expanded over this period, national income per capita would probably have been at least 14% lower than it actually was.

The labor force data underlying these calculations have been the subjects of substantial debate, and the degree to which the female labor

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force actually increased over this century depends on the accuracy of the data for the period from 1890 to 1910.[2] Many have argued that the female labor force was severely undercounted in these censuses, although the goods and services it produced were incorporated into subsequent national income estimates. Alternatively, because of the change in the official labor force concept in 1940, others have argued that the female labor force may have been overstated in the earlier period.

The measurement of the female labor force raises fundamental problems in national income accounting procedures. As the market expands, goods and services once produced in the home are purchased in the marketplace. If women have traditionally produced such goods, then their later emergence in the paid labor force would increase economic well-being far less than measured national income.[3]

Different conclusions regarding the role of women in economic growth would emerge if the labor force data are inaccurate or if the theories underlying the calculations are mistaken. Revisions to the female labor force data for the period around 1890, in section 10.3, suggest that shifts in the locus of production across the twentieth century may produce a misleading picture of change in the economic role of women. These revised labor force estimates tend to support Durand's (1975) hypothesis that the labor force participation rate of married white women first shrinks and later expands as production moves from the home and the family farm to the more centralized marketplace. Thus the relationship between female labor force participation and economic development may be U-shaped.

Despite the substantial revisions to the female labor force data for the early period, the census statistics document an important trend. The emergence of a modern female labor force, with substantial life-cycle labor force participation, was a product of the movement of women out of the home and family farm and into the marketplace. Further, change in the economic marketplace flows into other spheres. As Carl Degler (1980, p. 362) observed, "Work for money as opposed to work for family generates different attitudes and relationships among family members."

The earnings data indicate that the ratio of female to male earnings rose from at least 1890 to 1950. This ratio, commonly called the "gender gap," has remained remarkably constant at about 0.60 from 1950 to 1980, that is, since the time the Current Population Reports with their detailed income data have been published. The relative constancy of this ratio over that period of time has prompted many to claim that it must have been constant over a much longer period. But for most of American history the ratio of female to male earnings has risen, and the relative constancy of the ratio over only these three decades is more easily understood in light of its movement across a longer period of time.[4]

10.2 The Dimensions of Change in Female Labor Force Participation

The potential importance of the female labor force to understanding economic growth estimates is clear, but the accuracy and meaning of the labor force data must be explored. A brief review of labor force participation rates over the last century will stress the notion that while substantial change in the conventionally measured female labor force has only recently surfaced, it has been rooted in a longer history and has been determined by more distant factors. This point is more fully developed in Goldin (1983a).

Readily available labor force data dictate that the period under study begin with 1890. Data on the occupations of women were first collected in 1860, but the printed tabulations were aggregated at the state level and give little variation by age and other characteristics. Marital status was not requested until 1880.

The printed version of the 1890 Population Census (United States Census Office 1897) provides a fine start for a labor force series, with the data detailed by age, marital status, race, nativity, and region. The period from 1890 to the 1920s together with part of the earlier, less charted century witnessed the expansion in the market employment of the unmarried, particularly young single women. Similarly, the period beginning with the 1920s marks the expansion in the market role of married women.

10.2.1 Female Labor Force Participation Rates, 1890–1980

Labor force data for the aggregate female population, together with those by race, marital status, and nativity, are given in table 10.1. The overall trend for the aggregate from 1890 to 1980 is upward, but most of the movement comes from increases in the participation rate of married women, particularly after 1950. This increase is most apparent for white married women, but the aggregate nature of these data necessarily hides the most revealing trends. I turn therefore to a more detailed exploration of the data for white women, both single and married.

Changes in the Labor Force Participation Rate of Unmarried Women

The trend in the labor force participation rates of white single women across the entire United States, given in table 10.2 to 1970, suggests that the period should be divided at 1920. Participation rates for those 15–24 years old rise until 1920 when they reach a virtual plateau at about the 0.40 level. The data in table 10.2 have been disaggregated by nativity to point out substantial differences among these groups. Differences arise, in part, from the geographic location and age distribution of the groups. Accounting for the differences requires a decomposition by urbanization for the years before 1920, but this can only

Table 10.1 **Female Labor Force Participation Rates by Marital Status, Race, and Nativity, 1890–1980**

	≥ 16 Years Old				≥ 15 Years Old			≥ 16 Years Old	
	1890	1900[a]	1920	1930	1940	1950	1960	1970	1980
Total	18.9	20.6	23.7	24.8	25.8	29.0	34.5	42.6	51.5 (49.9)
Total[b]	19.0								55.4
Married	4.6	5.6	9.0	11.7	13.8	21.6	30.7	40.8	50.1 (49.2)
Single	40.5	43.5	46.4	50.5	45.5	46.3	42.9	53.0	61.5
White	16.3	17.9	21.6	23.7	24.5	28.1	33.7	41.9	(49.4)
Married	2.5	3.2	6.5	9.8	12.5	20.7	29.8	39.7	49.3 (48.1)
Single	38.4	41.5	45.0	48.7	45.9	47.5	43.9	54.5	64.2
Nonwhite	39.7	43.2	43.1	43.3	37.6	37.1	41.7	48.5	(53.3)
Married	22.5	26.0	32.5	33.2	27.3	31.8	40.6	52.5	59.0 (60.5)
Single	59.5	60.5	58.8	52.1	41.9	36.1	35.8	43.6	49.4
Foreign-born	19.8			19.1					
Married	3.0			8.5					
Single	70.8			73.8					

Source: Goldin (1977). The 1980 data are from United States Department of Labor (1982) and are the Current Population Survey figures. Those in parentheses are from United States Bureau of the Census (1983) and are the population census figures.

[a]The 1910 labor force figures have been omitted. See text for a discussion of the overcount of the agricultural labor force in that year.

[b]Adjusted for unemployment, by subtracting out the unemployed, and calculated for 15–64-year-olds for 1890 and 16–64-year-olds for 1980.

Table 10.2 **Female Labor Force Participation 1890–1980 by Age, Marital Status, and Nativity for White Women in the Entire United States**

Year	NN	NF	F	NN	NF	F
	Never Married (Single)					
	Age = 15–24			Age = 25–34		
1890	24.0	41.9	71.1	42.3	55.7	78.9
1900	27.5	45.7	70.6	47.0	59.1	81.5
1910	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1920	38.8	57.8	70.0	(65.4)	(64.9)	(84.8)
	NN + NF			NN + NF		
1930	41.2		71.4	77.6		94.1
	NN + NF + F			NN + NF + F		
1940	40.8			79.4		
1950	42.9			80.6		
1960	40.0			81.8		
1970	51.8			83.4		
	Currently Married					
	Age = 15–24			Age = 25–34		
1890	2.5	3.1	4.7	2.4	2.6	3.4
1900	2.7	3.1	4.4	3.0	3.2	3.4
1910	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1920	7.7	9.2	9.8	6.6	6.7	8.3
1930	13.2		14.9	11.5		11.6
1940	14.7			16.7		
1950	24.9			21.0		
1960	30.0			26.7		
1970	44.1			36.2		
1980	60.1			56.0		

(*continued*)

Table 10.2 (continued)

	Age = 35–44			Age = 45–54			Age = 55–64		
1890	2.3	2.6	3.1	2.1	2.5	2.5	1.7	2.2	1.9
1900	3.3	3.4	3.3	2.4	3.0	2.8	1.9	2.3	2.0
1910	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1920	6.6	6.3	8.1			(5.0) (4.7)	(5.0)[b]		
1930	9.8		10.0	8.2		6.5	5.4		4.1
1940	13.8			10.1			6.4		
1950	25.3			22.2			12.6		
1960	35.4			38.6			24.6		
1970	44.4			46.7			34.1		
1980	59.1			53.4			36.8		

	Widowed and Divorced					
	Age = 15–24			Age = 25–34		
1890	32.6	40.5	51.3	42.2	46.1	53.6
1900	29.3	37.8	47.5	51.8	58.2	53.6
1910	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1920	41.1	81.2[a]	31.1	(56.0)	(93.3)	(54.9)
1930	56.4		65.7	71.9		(59.5)
1940	49.3			63.2		
1950	52.0			60.9		
1960	49.5			60.7		
1970	58.5			66.8		
1980	73.2			77.2		

	Age = 35–44			Age = 45–54			Age = 55–64		
1890	42.4	40.6	42.4	33.4	28.7	27.8	22.6	20.4	18.0
1900	54.0	53.2	53.8	42.0	36.5	31.8	26.8	23.1	18.9
1910	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1920	(56.0)	(93.3)	(54.9)			(17.8) (28.9)	(15.4)[b]		
1930	60.2		(59.5)	47.2		38.4	26.9		18.9
1940	59.3			44.1			25.2		
1950	65.2			55.7			35.4		
1960	68.4			57.1			47.8		
1970	71.0			71.5			54.9		
1980	77.7			73.8			54.0		

Sources: Derived from United States Bureau of the Census and United States Census Office, Population Censuses, 1890–1970; United States Department of Labor, Bureau of Labor Statistics (1971) for widowed and divorced, 1970; and United States Department of Labor, Bureau of Labor Statistics, (1981) for 1980.

Notes:

NN = native-born white with native-born white parents.

NF = native-born white with at least one foreign-born parent.

F = foreign born.

Single includes unknown marital status for 1890, 1900, and 1920.

Widowed and divorced includes only widowed for 1890 and 1900; unknown and widowed and divorced for 1920 and 1930; and widowed and divorced and other for 1940, 1950, and 1960.

1920 figures in parentheses refer to 25–44-year-olds for single and married groups; 1920 figures in parentheses for widowed and divorced refer to 25–44-year-olds in 24–35 and 35–44 categories and 45 + in 45–54 and 55–64 categories.

1930 figures in parentheses for widowed and divorced refer to 25–44-year-olds in 24–35 and 35–44 categories.

1970 figure for single women 15–24 may reflect a change in definition.

Married spouse present for 1940–80.

[a]The NF figures derived from the 1920 census appear too high and may be the result of the statistical procedure employed.

[b]Refers to ages ≥ 45.

be computed for 1890. The participation rate in that year for young (15–24 years) single white women in cities with populations over 100,000 was 0.580. Those who were native born and of native parents (NN) had a rate of 0.429, those with foreign-born parents (NF) had a rate of 0.540, and the foreign born (F) had a rate of 0.822. Thus different geographic locations of young women account for some of the variation in their labor force participation rates, particularly between the two native-born groups, but do not account for the entire difference. Even within urban areas participation rates differed across ethnic lines, and evidence from disaggregated sources suggests that while higher family incomes reduced participation in the labor force, ethnicity had a separate influence on the daughters of the foreign born (Goldin 1979). The participation rate of 0.429 for the daughters of native-born parents in urban areas is, nonetheless, almost twice the U.S. aggregate rate in that age and marital status group (0.240).

What these data suggest is that the labor force participation rate for the entire population of young single women converged on that achieved by the urban native-born groups as early as 1890. The participation rate of urban single women, 15–24 years old, of native-born parents in 1890, as noted above, was 0.429; that of the entire population of single women between those ages was 0.408 in 1940, 0.429 in 1950, and 0.400 in 1960.

Despite the apparent stability in the percentage of single urban women in the labor force, there was, over this long time period, substantial variation in the activities of the approximately 60% who were not employed. In 1890 young women not in the labor force were overwhelmingly occupied "at home," ostensibly helping their mothers. Data for 1900 indicate that about two-thirds of the young women not in the labor force were not in school and were listed in the census as being "at home." With the proliferation of high schools in both urban and rural areas, the percentage "at home" dropped rapidly over the early twentieth century to less than one-tenth by 1930.[5] The increase in formal education exactly offset the decline in time devoted to home production by young single women. These changes in turn encouraged increased participation by married women (Goldin 1983a). More education enabled young women to obtain occupations which they would retain when married or reenter later. The decrease in their home production may have altered their preferences when married for work in the market. In this way the occupations of young single women early in this century may have affected those of married women more recently.

Changes in the Labor Force Participation Rates of Married Women

Participation rates of married women did not expand to any great extent until the 1920s, reinforcing the notion that the 1920s were a

turning point for the female labor force. But if the change just after 1920 was an expansion, the change beginning with 1950 was an explosion in employment, first for women over age 35 and later for those under 35 years (Easterlin 1980; Goldin 1983a).

The participation rates for currently married women are disaggregated by nativity in table 10.2, but the variation in their employment is considerably smaller than that for single women. Indeed, the variation in the employment of married women across geographic regions, and particularly with urbanization and industrial development, was for the 1890–1930 period considerably less than it was for single women.

The strength of the demand for female labor determined the participation rate of single women, while the participation rate of married women was far less affected by it. Put another way, the long-run elasticity of supply of single women appears to have been considerably greater than that for married women for the period prior to 1930. Time-series changes in the employment of single women to about 1930 can be explained almost entirely by factors revealed in the cross-sectional analysis (Rotella 1980). The same cannot be said for married women, for whom time-series changes appear to arise from factors other than those varying in cross section.[6] Regional variation in female employment rates was mentioned in Lewis's (1954 [1958]) classic article on unlimited supplies of labor.[7] But while Lewis, referring to the English case, did not distinguish between the "wives and the daughters," such a division appears critical in American history.

The labor force participation rate of married white women may have varied far less by level of urban and industrial development than it did for single and widowed women from 1890 to 1930, but it was higher in cities than it was elsewhere. More significant with regard to the origins of the post–World War II rise in married women's labor force participation is that married women increased their participation rates earlier in urban areas. Participation rates for urban areas, in table 10.3, indicate the degree to which the 1920s shaped the structure of these data and the degree to which the 1930s were a decade of relative stagnation in female labor force participation. Seen in this light, the explosion of participation rates after 1950 becomes a contination of a pattern begun some thirty years before.[8]

Data identical to those in table 10.2 arrayed by birth cohort have been explored in detail elsewhere (Robinson 1980; Goldin 1983a). When arranged in this manner the large increase in the labor force participation of the older age group in the 1950s can be correlated with both economic and demographic circumstances at that time and cohort-specific factors. Cohorts born around 1900 achieved a much higher educational level than did those born before, enabling them to pursue occupations in the clerical and professional sectors (Rotella 1981; Gol-

Table 10.3 **Labor Force Participation by Age and Nativity, for Married White Women in Urban Areas, 1890–1970**

Age	1890			1920			1930	1940	1950	1960	1970
	NN	NF	F	NN	NF	F	NN + NF	All	All	All	All
15–19	4.8	5.5	4.2	15.4	15.5	15.3	17.8	20.1	26.1	33.2	46.8
20–24				12.2	12.9	11.2	20.9		31.2		47.6
25–34	3.8	4.3	3.4	9.6	10.5	8.5	15.8	19.5	23.3	27.3	36.3
35–44	4.0	4.3	3.7	9.0	10.0	7.8	12.8	15.4	27.5	36.5	44.6
45+	3.8	3.8	4.0	6.4	7.3	5.4	8.4	9.2	17.5	29.8	40.4

Notes:

1890–1940: Urban includes cities of over 100,000 population.

1950–70: Urban includes cities of over 2,500 population.

1890–1930: Married is married spouse present or absent.

1940, 1960, 1970: Married is married spouse present.

1950: Married is wife of the head of household.

Procedure used to derive 1890 data: The number of women in the labor force by marital status, age, and nativity had to be constructed from the 1890 data. The original data were aggregated by nativity, age, and marital status separately for cities over 100,000 persons. The number of women in each cell was constructed from the number of women of each nativity under the assumption that the age–marital status distribution was the same as that of the nonagricultural female labor force, which was available from the census.

NN, NF, F defined in table 10.2.

din 1984a). These were the cohorts that later reentered the labor force in the 1950s. Cause and effect of the changes in female occupations, education, and labor force participation are not easily discerned. Evidence from other western nations suggests that changes in the structure of the economy and general educational levels have tended to precede the increase in participation of married women by several decades.[9] The increase in labor force participation rates among young married women in the last two decades can also be correlated with a change in schooling, in this case college education.

The marital composition of the female labor force given in table 10.4 provides further confirmation of the turning point suggested in table 10.2. By 1930 one female labor force participant in four was currently married, even though the participation rate of married white women was only 9.8%. Despite relatively low participation rates, the shift in the percentage of the labor force that was married from just over 10% to one-quarter altered the tone of public policy.[10] Sometime between 1950 and 1960 married white women became over one-half the white female labor force, although recent changes in the marital composition of the population have reversed this trend.

10.3 Some Further Considerations Regarding Female Labor Force Estimates

The labor force participation rates derived from the census for the 1890–1980 period were offered, in section 10.2, with few qualifications. The accuracy of these figures, their consistency over time, and their inclusiveness have been frequently questioned, but no changes of any substantial magnitude have yet been made.[11]

The definition of labor force participation changed in 1940 from the "gainful worker" concept to that of the "labor force," raising the issue of consistency over time. Closely related is the extent of part-time and intermittent work, and the degree to which each could have been differentially treated by the labor force constructs. Women might have been more reluctant to tell census marshals that they had an occupation when it was not the norm to work for pay.

The labor force data for the entire period, 1890–1940, need to be reexamined. Because the data for the earliest period ought to reveal the most severe biases, I have focused only on the interval from 1890 to 1910. Data from turn-of-the-century surveys at the national level provide independent evidence on the reliability and consistency of the census and on the possible omission of boardinghouse keepers and home workers in manufacturing. The censuses from 1890 to 1910 and various time-budget surveys of the 1920s will be used to revise the

Table 10.4 **Marital Composition of the Female Labor Force, 1890–1980, White Women, Entire United States**

	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
					Percentage Single					
NN	69.0	69.1		66.4	61.0					
NF	89.9	86.4		74.3						
F	74.3	71.1		54.1	49.6					
All	76.2	74.7		63.6	59.5	52.3	33.6	24.3 (24.9)[a]	22.5	24.3
					Percentage Married					
NN	10.0	11.3		19.0	24.6					
NF	4.5	5.8		11.6						
F	9.4	11.6		19.8	31.3					
All	8.3	9.7		17.0	25.5	29.2	46.9	56.3 (55.3)[a]	60.0	57.4
					Percentage Other (widowed, divorced, unknown)					
NN	21.0	19.6		14.6	14.4					
NF	5.6	7.8		14.1						
F	16.3	17.3		26.1	19.1					
All	15.5	15.6		19.4	15.0	18.5	19.5	19.4 (19.8)[a]	17.5	18.3

Sources: 1890–1960, United States Bureau of the Census and United States Census Office, Population Censuses; 1970, 1980; United States Department of Labor, Bureau of Labor Statistics (1982).

Notes:

NN = native-born with native parents.

NF = native-born with at least one foreign-born parent.

F = foreign-born.

Percentage married: includes only married spouse present 1940–80.

Percentage single: includes "unknown marital status" 1890–1900.

[a]Figures in parentheses are from the Current Population Reports for comparability with the 1970 and 1980 figures.

female agricultural labor force, and these surveys are also used to construct a value for home production.

The outcome of these corrections is that the "gainful worker" concept does not necessarily overcount, nor does it necessarily undercount, female workers. Evidence on days worked per year suggests that the two concepts may have been very close in empirical fact. The omission of particular female workers did occur in certain areas: The undercount of boardinghouse keepers was severe in cities, family farm laborers were more than often omitted in the cotton South, and casual family farm labor was not often counted in the rest of the country. The aggregate figures could be substantially altered by these corrections, but it is not clear that they all deserve to be incorporated into final time-series estimates of the female labor force.

10.3.1 Definitions of Labor Force Participation

Prior to 1940 the "gainful worker" concept of employment was used by the census, but in that year it was changed to the "labor force" concept we use today. Individuals were counted in the labor force under the gainful worker concept if they claimed to have had an occupation during the census year. The labor force concept includes individuals if they were employed for pay during the survey week, were employed for over 14 hours in unpaid family labor, or were unemployed and searching for work. Durand (1948, 1975) believed that gainful worker estimates, by asking an individual's primary occupation in the previous year, always overstated the labor force figures. For the female population this would imply that the earlier gainful worker estimates are biased upward and that the growth of the labor force is biased downward. There is, however, no simple theoretical relationship between the gainful worker and labor force concepts.

The precise relationship depends on a number of factors, among them the accepted norm for the number of days or weeks worked during the year that constituted having an occupation in the pre-1940 period and the distribution of actual days or weeks worked during the year. The gainful worker concept is an upwardly biased estimate of the labor force only if individuals work a large enough portion of the year to have some notion that they have an occupation. If instead they work only a small part of the year, say 15 weeks, they may not state they have an occupation even though a labor force estimate based on a large sample of such individuals would be at least (15/52), or 29%. The gainful worker criterion in this example would lead to a lower employment figure than the labor force construct.

Under certain circumstances the two definitions produce identical labor force percentages, and there is no particular reason why one definition should result in a higher value than the other. Suppose an

individual in the pre-1940 period considered herself to have an occupation if she was employed for at least half the year, say 26 weeks or more. In the post-1940 period such an individual would stand a 50% chance of being counted in the labor force by census takers who define work as being employed in the survey week.[12] The gainful worker estimate of labor force participation would, in this case, be higher than the labor force concept. If the number of weeks worked were below 26, the labor force concept would result in a higher participation rate than the gainful worker criterion.

The distribution across the population of weeks (or days) worked will, in general, determine the overall labor force participation rate and the biases in using one construct or the other. A uniform or symmetric distribution around 26 weeks, in the example given, will produce similar results for both definitions, and, as a general rule, the concepts will always coincide with a symmetric distribution around the societal norm for time worked to constitute an occupation.

The distribution of days worked, however, was not symmetric, but had a long left tail and a substantial mass near the maximum days worked. A large-scale survey of women working in manufacturing in 1907, *U.S. Senate Report on the Condition of Child and Woman Wage-Earners* (United States Senate Documents 1910/11), hereafter the 1907 Senate Report, indicates that the mean number of days worked by single women over 15 years old was 249. Therefore approximately 83% (249/300) of those employed at all during the year would have been counted under the labor force definition. The "gainful worker" definition will depend on the societal norm for days worked during the year. If the norm were half the full year, or 150 days, 92% of these women would have been counted, and the two definitions would coincide if the societal norm were 200 days, or 67% of a full year.

The same report also surveyed married women, working primarily, but not exclusively, as manufacturing laborers in factories and in their homes. The mean for the entire group was 212 days, somewhat lower than that for single women. The labor force definition would have counted as employed 71% of this group. If the "gainful worker" definition held for those working over 150 days, 73% would have been counted, and the results of the two definitions would have coincided at 175 days, or 58% of a full year. Thus it does not appear that these two definitions would have produced very different labor force results for either single or married women.

10.3.2 Part-Time, Intermittent, and Home Work

Closely related to the issue of the changing definition of labor force participation is the possibility that a large fraction of married women

felt reluctant to report their occupation early in this century. Those who question the census data hypothesize that such women may have been more hesitant to admit they worked when the work was done at home, regardless of the amount of time devoted to paid labors. Alternatively, and more probably, they may not have claimed they had an occupation when the work was done part-time or intermittently through the year, at home or away from home. Thus the issue is whether they were actually working a sufficient number of hours or days to have considered themselves to be gainful workers, and if not, what the implicit labor force estimate would have been.

Two surveys exist to address these issues. The *Sixth and Seventh Annual Reports of the Commissioner of Labor* (United States Commissioner of Labor 1890, 1891), hereafter the 1890/91 Report, were surveys of industrial families listing the income earned by all family members, including the wife plus payments from boarders.[13] The 1907 Senate Report contained a survey of married women working in manufacturing both within factories and in their own homes.

Data from the 1890/91 Report lend support to the census labor force data for married women in industrial areas. Even if census takers had counted in the labor force *all* women who earned *any* positive amount over the year, the percentage of married women (husband present) in the labor force would still have been quite small. In the glass industry, for example, only 2.2% of all wives reported positive earnings; in heavy industries only 1.3% did; and in textiles 12.1% did. These statistics are not surprising given the nature of the industrial settings and the available work for women. What is surprising is that among women who did earn income, earnings were on average one-half those of full-time, year-round single women working in industry in 1890. Although there were few married women who worked in industry at that time, these data suggest that those who did worked more than half the year.[14]

The data in the 1907 Senate Report, reported above, also bear on the issue of intermittent and part-time work.[15] The proportion of a year worked for the average married women was sufficiently high (212/300 = 71%) and the distribution tight enough that the gainful worker definition should have produced an unbiased estimate of the labor force.

Not only did the married women in this sample who worked in industry labor almost full time, but those working at home tended to work an even greater number of days per year than did those in the factories. Those working at home labored for 216 days on average, while those in factories worked 210 days. The work of the industrial home workers was apparently more regular than previously believed. The incomes of industrial home workers, however, were 49% less than those of women working in factories. The large difference could be

due to a compensating differential, a lower intensity of work, a greater intermittency of work within the day, or to less on-the-job training, as was suggested by government investigators at the time.

The 1907 Senate Report also surveyed the extent to which home workers, typically finishers in men's ready-made clothing, were helped by family members and friends (United States Senate Documents 1910/11, vol. 2). Of the 674 home workers interviewed, 176, or 24%, had helpers "with more or less regularity." These helpers were typically young children and, less frequently, the woman's husband. In 36% of the cases this work involved another adult woman ($\geq$ 18 years), but in only 19% of these cases did it involve another married or widowed woman. Thus the regularity of industrial home work for these women indicates that the census probably did not undercount them, and the nature of their helpers suggests that other adult women were not omitted to any great extent. Further, because home workers were typically of foreign birth, the time series on native-born white women should not be affected.

10.3.2 Undercounts of Female Laborers in Particular Occupations and Sectors

It has been frequently claimed that women have been undercounted in certain occupations, particularly those that were performed in the home or on the family farm, and in certain sectors. Married women comprised the majority of boardinghouse keepers and unpaid family farm workers. Adjustments to cotton farm workers and to those in manufacturing are for the entire female labor force.

Boardinghouse Keepers

An undercount of boardinghouse keepers in the late nineteenth century is suggested by the fact that 14% of all white households in 1880 Philadelphia had boarders (Goldin 1979), but fewer than 1% of all dwellings in Philadelphia were enumerated in the 1880 United States Population Census as having a female boardinghouse keeper.

Data on income from boarders, as well as the number of boarders, are included in the 1890/91 Report on industrial families. Because the data are presumably gross, and not net, the following procedure was used to form the estimate of labor force participation:

a) About 23% of all husband-wife families in the industrial communities surveyed in the 1890/91 Report had at least one boarder or nonnuclear family member (the two were grouped together), and about 16% of all husband-wife families received income from boarders, a figure that is almost identical to that inferred from 1880 United States Population Census data for Philadelphia (Goldin 1979). Boarding varied by industry, with textile families having the highest percentage with income from boarders. Income from boarding was $201 per year on

average across all husband-wife families having positive earnings from boarders.

b) The gross income figure must be adjusted for the additional costs of running a household with boarders. An equation regressing total rent paid on the number and composition of household members yielded a mere $2.70 for each additional boarder, only 3.4% of the total rent. Rent, it appears, was invariant to the presence of boarders. Food expenditures, however, were about 29% of average boarding income ($29 per boarder × 2, average number of boarders/$201, average income from boarders).[16] The net income from boarders was about $140 per year for each boarding household, a figure that translates into 47% of expected full-time income for women in comparable geographic areas.[17]

In summary, about 16% of all husband-wife couples and 20% of all female-headed households had income from boarders in industrial areas around 1890, figures that are similar to those from large cities at that time. Each boardinghouse keeper earned approximately half full-time earnings, a figure comparable to the earnings of industrial home workers.

The distribution of net earnings from boarding indicates that about 37% of all boardinghouse keepers should be counted under the gainful worker definition, if having an occupation was construed as earning over 50% full-time yearly income. The current labor force definition counts home workers if they work 15 hours or more during the survey week or 37.5% of a normal 40-hour work week. By applying this criterion, 46% of all boardinghouse keepers should be included in the labor force estimate. The correction for all married women in cities and industrial areas is somewhere between 5.9 and 7.4 percentage points, a substantial addition to the 4.0% labor force figure for married white women in cities in 1890.

It might be claimed, however, that all industrial home workers who logged as many days per year as factory workers but earned only one-half their pay should, on a days-worked-per-year basis, be included in labor force estimates. Using the same logic, all boardinghouse keepers should be included in the labor force as well. Under these conditions the correction for all married women in cities and industrial areas is the full 16%, a substantial addition to the census figure for married white women in cities in 1890.

c) These data must still be translated into aggregate statistics. In 1890, 17% of all dwellings were in cities with 25,000 or more inhabitants. If the data presented above apply only to urban areas, the adjustment is somewhere between 1.0 and 2.7 percentage points for married women and 1.3 to 3.4 percentage points for widows. Boarding must have been extensive on farms and in rural nonfarm areas, but we have no idea how widespread it was. It should be clear, however, that undercounting boardinghouse keepers overstates the later movement of married women

into the labor force particularly in cities, and understates their participation in the economy of the nineteenth century.

Agricultural Workers

The understatement of female agricultural workers concerns the casual unpaid labor of farm family members. Those who designed the 1910 census were aware of this problem and instructed enumerators that "a woman working regularly at outdoor farm work, even though she works on the home farm for her husband, son, or other relative and does not receive money wages, should be returned . . . as a *farm laborer.*"[18] These instructions produced an acknowledged overstatement of the female labor force and have led to the wholesale abandonment of the 1910 census as a source of occupational and labor force data.

The 1910 census may be a poor source for accurate labor force estimates, but it provides superb data to produce an upper-bound estimate of female employment in the agricultural sector. These data yield a measure of the excess number of female agricultural laborers in 1910 compared with previous censuses and an upper bound to that figure for 1890 and 1900. Two different, but complementary, procedures have been employed here, and they are in agreement that the number of female farm laborers would have been half the 1910 census estimate had previous survey procedures been used.

The overcount of agricultural workers was almost entirely concentrated in the category of unpaid family farm labor, and only the major cotton-producing states were affected.[19] White families tended to underreport their unpaid family labor far more than did black families, whose wives and daughters frequently were part of the paid labor force. In the first of the two procedures, the ratio of unpaid female family farm workers to all females in the population in 1910 is compared to that for 1900. The difference between these two figures is construed as the maximum shortfall in 1900. In 1910 the ratio was 0.063 for white women over 15 years old. Data from a special report of the 1900 census on working women indicate that only one-fourth of these women had been counted as unpaid family workers in that year.[20] Thus the undercount is 4.7 percentage points.

The second procedure computes the percentage of women who were working in agriculture in 1910 and compares it with the figure for 1890, adjusted for the relative decline that sector experienced over the twenty intervening years. In 1890, 8.4% of the white female labor force ($\geq$ 15 years) was employed in agriculture; the 1910 census reported 10.5% of the white female labor force ($\geq$ 16 years) employed in agriculture. The 1910 figure would have been 5.6% had the relative decline in the male agricultural labor force applied as well to females.[21] The difference

between the figure for 1910 and the adjusted figure, 4.9 percentage points, is the shortfall.

The two procedures give almost identical results, a 4 to 5 percentage point shortfall in the labor force participation rate computed for white women over 15 years old in either 1890 or 1900. Using the entire shortfall as the adjustment assumes that all individuals who worked on family farms in 1910 should be included in the labor force estimate. For consistency with both the labor force and the gainful worker concepts the percentage of a full work year spent in family labor is needed to adjust the shortfall. One study of family cotton-farm labor (Allen 1931) gives a value of 3.7 months per year as the time women spent working on the farm for their families.[22] A labor force construct would include 31% (3.7/12) of the total number of women working on cotton farms for their families. The adjusted shortfall in the labor force would be 1.24 percentage points for all white female unpaid laborers in the cotton South.[23]

What of the unpaid farm labor of women on noncotton farms? Data from time-budget surveys of farm women can be used to address this issue. These surveys were conducted in the late 1920s, primarily among western farm families whose daily lives and chores were apparently unchanged in the thirty years that separate them from housewives in 1890. The seven surveys that have been consulted yield an average 9 to 10 hours per week spent by the housewife in unpaid family agricultural labor.[24] If all women performed 10 hours of unpaid work, then none of them would be counted by the "labor force" concept used today.[25] Rather than using either the current concept or that of "gainful worker," an expected value construct might be more appropriate. Given that the average laborer's work week was 50 hours in the 1920s, 20% (10/50) of these women should be included in the labor force. Multiplying by the appropriate percentages yields an undercount of 5.4 percentage points for all married women.[26] It should be noted that even the 1910 census with its vast overcount of unpaid family labor counted very few farm wives outside of the cotton areas in the labor force.

Manufacturing Workers

A divergence between the late nineteenth-century manufacturing labor force estimates derived from two census sources, that of population and that of manufacturing, was noted by Abbott (1910), Rubinow (1907), and Smuts (1960). The problem, quite simply, is that the two numbers differ and differ most severely for women and children. Abbott (1910) conjectured that part of the difference was due to the definitions of the labor force used in compiling the two censuses. The two definitions differ in exactly the same way that the gainful worker concept differs

from that of the labor force. The labor force, as defined in the manufacturing census, was a full-time equivalent concept. Given the data above on the distribution of days worked in manufacturing, there can be no presumption as to which definition will produce the upper bound, and the two should have produced nearly similar labor force estimates.

The problem, then, must be traced back to two aspects of coverage. The manufacturing census did not survey many of the smaller shops and businesses that employed women in the production of clothing and hats. It is also likely that the population census undercounted women working in the larger manufacturing firms. The adjustment that will be made to the population census will assume that the population census data on women working as dressmakers and milliners are correct, but that the manufacturing census more accurately counted women working in the larger manufacturing firms.

There were 839,952 females $\geq$ 10 years old working in manufacturing in 1890 (excluding officers, firm members, and clerical workers), according to the manufacturing census (United States Census Office 1895a). The population census yields 1,027,242 (United States Office 1897). Note that the employment of women in manufacturing in 1890 accounted for almost one-third of all women in the labor force. There were, however, 602,677 females in the population census who had occupations in the making of clothing or hats, while the manufacturing census listed only 294,194. Given the assumption that the population census is more accurate for these occupations but that manufacturing is more accurate for the rest, the population census has a shortfall of 121,193 females working in larger manufacturing firms.[27] If correct, this number would translate into an increase of 3.1% in the female labor force ($\geq$ 10 years old) in 1890, raising the population census estimate by 0.5 percentage points.

Household Production

Perhaps the most difficult of the necessary adjustments is the computation of the time spent by women in the household production of goods that were later supplied by the market. Of the various goods produced in the home around 1890 that later shifted at least in part to the market, clothing, meals, and baked items seem the most important.[28] Time budgets indicate that about 5 hours per week were spent in the production of clothing by farm wives around the 1920s and 2.5 hours, at a maximum, were devoted to baking. Total time spent in food preparation and cleanup dominated the time budgets, accounting for 35% on average. This figure is now 23% for full-time housewives, and 16% of the total eating time of all family members is spent consuming restaurant meals (Szalai 1972, p. 576). Had relative prices enticed families in 1890 to consume the same proportion of their meal time in

restaurants as we do, they would have saved about 4 hours of meal preparation and clean-up time per week, given the 65-hour work week of the 1920 farm housewives.

It seems reasonable to assume that 5 hours is the combined net addition to household production of clothing and baked goods in 1890, compared to 1980, and that 4 hours is the saving from restaurant meals.[29] Thus (9/65), or 14% of the time of 1890 wives should be allotted to household production of goods that the market later supplied. This figure of 14% will be used to adjust the income figures in the growth calculation below.

Summary of Adjustments to the 1890 Estimate

Table 10.5 summarizes the various corrections that have been noted in this section. For some we are on rather firm footing, such as the adjustment to the estimate of boardinghouse keepers. But for others, the adjustments are no more than educated guesses, as is the case for the estimate of unpaid family farm laborers outside the cotton South. The addition of these percentage points to the official census labor force estimates requires further thought in all cases, and only under certain assumptions would it be correct to use them to augment the original data.

Table 10.5 **Summary of Adjustments to the Female Labor Force Participation Rate, 1890**

	Percentage Point Adjustments to the 1890 Census Female Labor Force Participation Rates for		
Corrections owing to	Married[a]	Widowed	All[b]
A. Change in definition[c]	No correction needed		
B. Omission of workers			
(1) Boardinghouse keepers	1.0–2.7	1.3–3.4	0.69–1.84
(2) Agricultural laborers, unpaid family farm			
Cotton	1.33		1.24
All other	5.40		3.14
(3) Manufacturing workers	0		0.50
Total omission of workers	7.73–9.43		5.57–6.72
C. Omission of household production from national income	14% of 1890 household production value to be added to 1890 market production of females		

[a]The figure of cotton workers is adjusted for white women only; all others are implicitly for all races.

[b]"All" refers to 15–64-year-olds.

[c]The change in definition refers to that from "gainful worker" in the pre-1940 period to the "labor force" definition. See text.

10.4 Earnings of Females Relative to Those of Males: A Long-Term View

Full-time earnings for females and males are given in table 10.6 for six major occupational groupings for three benchmark years, 1890, 1930, and 1970. Average earnings are constructed by weighting them by the occupational distributions.

The ratio of female to male full-time earnings for the entire population increased from 0.463 to 0.603 from 1890 to 1970. The latter figure is unadjusted for differences in average hours per day for men and women working full-time and increases to 0.657 when the implied earnings per hour are used.[30] The rise in relative earnings from 1890 to 1970 would understate the true rise, corrected for hours, if the hours worked by males and females per week differed more in 1970 than in the two earlier years. One late nineteenth-century study that distinguished between male and female hours indicated that the ratio of male to female weekly hours was 1.076 in 1895/96 (United States Commissioner of Labor 1897). The ratio was 1.0893 in 1980. The adjustment for hours worked would increase the 1890 ratio to 0.498 (to be compared with the hours constant ratio of 0.657 in 1970), yielding an increase of 32%, rather than the uncorrected figure of 30%.

In part B the ratios of female to male earnings within each occupation are given and indicate a rise over time, particularly in the period from 1890 to 1930. Part C constructs the earnings data for each year using the earnings and occupational weights of that year. Average earnings data using the earnings of a particular year but the occupational weights of another year are also given. Part D uses these data to construct a matrix of female to male earnings ratios in which the occupational structure varies across the columns and the earnings data vary down the rows.

The matrix of part D suggests that the increase over time in relative earnings of females was due far more to changes in relative earnings within occupations than it was to changes in the distribution of occupations between men and women. The narrowing of skill premia from 1890 to 1930 with the increase in schooling levels raised relative earnings for women more than did any other single factor (Goldin 1984a,b). This finding is particularly noteworthy since it is generally presumed that the occupational distribution is the primary determinant of relative wages.

If women had the occupational distribution of the male labor force would their average earnings been substantially greater? The answer is no. Had females in 1890 the male occupational distribution given in the table for 1890, the ratio of female to male earnings would have been 0.473, but it was actually 0.463; had females in 1970 the male occu-

pational distribution for 1970, the ratio would have been 0.629, but it was 0.603. While these findings hold for the limited number of occupations in table 10.6, there is reason to believe that they would hold as well for far more numerous occupational classifications.[31]

While the occupational distribution mattered far less than did earnings within occupations in determining the overall earnings ratio of females to males, the structure of occupations did experience considerable change. Over the first half of the 80-year period under consideration, the female labor force shifted relatively out of service and manufacturing jobs and into the clerical sector and, to a lesser degree, professional activities. The percentage of the total female labor force in the clerical sector rose from 4 to 21 and that in professional jobs increased from just under 10 to just over 16; in manufacturing it dropped from 28% to 20%, and the percentage working on farms was more than halved. The male labor force experienced somewhat similar shifts, although not nearly as extensive. In general, male laborers moved out of farm activities and into all other sectors.

The ratio of female to male earnings rose from 0.463 to 0.556 over the first 40-year period. Had the earnings figures by occupation remained at their 1890 levels but had the structure of occupations changed, the ratio would have increased from 0.463 to 0.489 (row 2, pt.D). Part of the remaining seven-tenths of the difference in relative earnings was due to changes in the structure of earnings, both between the sexes and across all occupations. Similar findings result from holding the structure of earnings at the 1930 and 1970 levels (rows 3 and 4, pt. D).

Over the last period, 1930–70, the male labor force moved relatively into the high-paying positions, out of the farm sector and into professional activities. The share of the male labor force in the professional category increased from 14% to 25%; that for females increased only from 17% to 19%, but the proportion of female employment in the clerical sector continued to expand. As in the previous 40 years, the ratio of female to male earnings rose during the 1930–70 period, from 0.556 to 0.603. But had the earnings figures remained at their 1930 levels, this ratio would have declined, from 0.556 to 0.507. Alternatively, had the 1970 earnings prevailed, the ratio would have been 0.610 in 1930 but would have declined to 0.603 by 1970. Thus the relative shift of both males and females across sectors from 1930 to 1970 reduced the relative earnings of women. That the aggregate ratio increased at all was due to the increase in the ratio of female to male earnings for professionals and to the reduction of skill differentials for men (Keat 1960; Lindert and Williamson 1980). Over the last 10 years (not in table 10.6) the average earnings of women relative to those of men have risen precisely because women have progressively shifted into the profes-

Table 10.6 **Full-Time Earnings and Occupational Distributions of the Female and Male Labor Forces, 1890, 1930, and 1970**

A. Full-Time Earnings and Occupational Distributions

	1890				1930				1970			
	Male		Female		Male		Female		Male		Female	
	$	%	$	%	$	%	$	%	$	%	$	%
Professional	1391	10.2	366	9.6	3713	13.6	1428	16.5	12250	24.9	8700	18.9
Clerical	943	2.8	459	4.0	1566	5.5	1105	20.9	8750	7.6	6000	34.5
Sales	766	4.6	456	4.3	1580	6.1	959	6.8	10150	6.8	4450	7.4
Manual	587	37.6	314	27.7	1532	45.2	881	19.8	8891	48.1	4950	17.9
Craft, supervisory		(12.6)		(1.4)		(16.2)		(1.0)		(21.3)		(1.8)
Operative, laborer		(25.0)		(26.3)		(29.0)		(18.8)		(26.8)		(16.1)
Service	445	3.1	236	35.5	1220	4.8	730	27.5	7100	8.2	3965	20.5
Farm	445	41.7	236	19.0	1220	24.8	730	8.4	7050	4.5	4151	0.8

B. Ratio of Female to Male Earnings within Each Occupation

	1890	1930	1970
Professional	0.263	0.385	0.710
Clerical	0.487	0.706	0.686
Sales	0.595	0.607	0.438
Manual	0.535	0.575	0.557
Service	0.530	0.598	0.558
Farm	0.530	0.598	0.589

C. Male and Female Earnings in Current Dollars (θ = Occupational Share)

	1890		1930		1970	
	Male	Female	Male	Female	Male	Female
$\Sigma\ \theta_i w_i$	624	275	1741	968	9581	5776
$\Sigma\ \theta_i w_{1890}$	624	289	683	325	809	368
$\Sigma\ \theta_i w_{1930}$	1618	864	1741	968	2043	1035
$\Sigma\ \theta_i w_{1970}$	8306	4834	8874	5411	9581	5776

D. Ratios of Female to Male Earnings (θ Varies across the Columns)

	1890	1930	1970
(1) $[w_{fi}/w_{mi}]$	0.463	0.556	0.603
(2) $[w_f/w_m]_{1890}$	0.463	0.489	0.455
(3) $[w_f/w_m]_{1930}$	0.534	0.556	0.507
(4) $[w_f/w_m]_{1970}$	0.571	0.610	0.603

E. Partitioning Change in the Ratio of the Log of Female to Male Earnings, (Average Earnings Are Geometrically Weighted Averages of the Six Occupations)[a]

	1890 Weights	1970 Weights
1. $\Sigma\theta_f(R^1 - R^0)$	+0.1452	+0.3018
2. $\Sigma R(\theta_f{}^1 - \theta_f{}^0)$	−0.0880	+0.0687
3. $\Sigma a(W_m{}^1 - W_m{}^0)$	+0.0071	−0.0981
4. $\Sigma W_m(a^1 - a^0)$	+0.0679	−0.0373
5. $\Sigma(R^1 - R^0)\ (\theta_f{}^1 - \theta_f{}^0)$	+0.1567	−0.1567
6. $\Sigma(W_m{}^1 - W_m{}^0)\ (a^1 - a^0)$	−0.1052	+0.1052
Total change	+0.1836	+0.1836

(*continued*)

Table 10.6 (continued)

[a]Where $w = \Sigma w_i\theta_i$, for males and females. A geometrically weighted average enables a partitioning of the various factors accounting for change in the ratio of female to male earnings. $W = \log(w)$: $R = (W_f - W_m)$: $a = (\theta_f - \theta_m)$: 1 = 1970: 0 = 1890. Note that the total change in the ratio when earnings are a geometrically weighted average is considerably less than when average earnings are the arithmetic mean. The geometrically weighted results are: $(w_f/w_m) = 0.487$, but 0.463 for the arithmetic mean in 1890: the results for 1970 are 0.586 for the geometric weights, but 0.603 for the arithmetic means. Therefore the geometrically weighted averages understate the total increase. Columns may not add up owing to rounding error.

Notes and Sources:

OCCUPATIONAL DISTRIBUTION

Historical Statistics, ser. D 182–232, pp. 139–40. The 1900 occupational distribution was used for 1890. The professional category includes professional, technical, and kindred workers, and managers, officials and proprietors (lines 218 + 219).

EARNINGS. All earnings are annual, full time, and in current dollars.

1890, Male, Professional: Weighted average of professional (34%) and managerial (66%) workers. Professional earnings for six categories, representing over 75% of all professionals, were obtained from the following: Lebergott (1964, p. 500) gives $1.662 for first- to third-class postal workers (government officials); *Historical Statistics,* ser. D 793, p. 168, gives $731 for ministers (clergy); a value of $460 for male teachers was derived from *Historical Statistics* ser. D 763, p. 167, given the assumption that the ratio of female to male teacher salaries was 0.8 and given a value of $1,505 for the 5% who were college teachers: the figures for physicians ($2,540), lawyers ($2,691), engineers ($2,108), and college teachers ($1,505) were derived from *Historical Statistics,* ser. D 913–20, p. 176 for 1929, extrapolated back to 1900 on federal employee earnings. *Historical Statistics,* ser. D 764, p. 167. Managerial earnings were derived from United States Census Office (1895b), table 6, using the category "officers or firm members actively engaged in the industry or in supervision." A figure of $1,264 was converted into a 1900 figure of $1,285, based on nonfarm money (when employed) earnings. *Historical Statistics,* ser. D 735, p. 165. The final estimate of $1,391 ($1,414, for 1900) was constructed by weighting by the actual occupational distribution, and it is consistent with the notion that the ratio of full-time earnings in manufacturing jobs to those in professional occupations must have been smaller in 1890 than it was in 1930 (Lindert and Williamson 1980).

Clerical: United States Census Office (1895b, p. 10) yields data for urban clerical workers excluding salaried personnel.

Sales: Data for drygoods salesmen in United States Commissioner of Labor (1897) for 11 states yield a mean of $13.58/week or $706/year for 1895, and conversion to 1890 based on nonfarm money (when employed) earnings gives $766.

Manual: Brissenden's (1929, p. 94) full-time manufacturing earnings are used. Although these are given for 1899, the accompanying actual figures are identical to those for 1890. See also Rotella (1981, pp. 197–212), app. B, on the 1890 figures. The implied ratio of full-time to actual earnings is 1.18.

Service and farm: Lebergott's (1964) common laborer's wage × 310 days. The figure for service is almost identical to that in Salmon (1897, p. 96) of $6.93/week, given 52 weeks and $100/year board. Conversion was made to 1890 based on full-time annual earnings. The farm figure poses problems because no data exist for owner-operator farmers in 1890, and those for more recent periods indicate lower earnings for operators than for farm laborers. Farm wage laborers received less than the wage for common laborers, but owner operators earned far more. The ratio of female to male farm wages for yearly contracts in 1909 was 0.578 and those for seasonal contracts (with board) was 0.538 (Holmes 1912), therefore the relationship between male and female earnings on farms does not differ significantly from that given by the rate for farm wage laborers.

1890, Female, Professional: Historical Statistics, ser. D 760, 763, p. 167, for 1900.

Clerical: Rotella (1981, pp. 197–212), app. B.

Sales: See source for male earnings. The 1895 figure is $421.

Manufacturing: United States Census Office (1895a).

Service: Historical Statistics, ser. D 758, p. 167, for 1900. Salmon (1897) gives an average of $3.23/week or $268/year, including $100 board. Lebergott's (1964, p. 542) estimate is $3.14/week in 1900.

1930, Male, Professional: A weighted average of the earnings of lawyers, physicians, engineers, and dentists (Friedman and Kuznets 1945), semiprofessionals, clergy, professors, and teachers (*Historical Statistics,* ser. D 793, D 792, D 913), $4,099. The earnings of proprietors, managers and officials are from United States Bureau of the Census (1943, p. 121) for males who worked 12 months in 1939, adjusted to 1929 dollars, $3,500.

Clerical: Rotella (1981, pp. 197–212), app. B.

Sales: United States Bureau of the Census (1943, p. 121), for males who worked 12 months in 1939, adjusted to 1929 dollars.

Manual: The weekly full-time wage from Beney (1936) for 50 weeks; also in *Historical Statistics,* ser. D 835, p. 172. The Beney data imply a ratio of female to male earnings for manufacturing workers of 0.575 in 1929 which might be too high in light of Brissenden's (1929) ratios for the 1920s which are lower than Beney's for the same period.

Service and farm: Unskilled manufacturing laborers, *Historical Statistics,* ser. D 841, p. 172, × 50 weeks.

1930, Females, Professional: A weighted average of professors, teachers, nurses, and attendants from *Historical Statistics,* ser. D 763, p. 167, and Department of Labor, Women's Bureau (1934a).

Clerical and manual: The weekly full-time wage from Beney (1936) for 50 weeks; Rotella (1981, pp. 197–212), app. B gives 868. Department of Labor, Women's Bureau (1934b), gives median clerical earnings for 1931 of between $1,044 and $1,308.

Sales: United States Bureau of the Census (1943, p. 125); see 1930, males, above.

Service: Historical Statistics, ser. D 758, p. 167, for 1929.

1970, Male and Female, All Sectors: United States Department of Labor, Bureau of Labor Statistics (1982, p. 732), table C-23. Median, full-time, weekly earnings for each sex-occupational group. The manufacturing group for males and the service group for females are weighted averages of subgroups. Earnings for the farm sector are those of nonfarm laborers. Annual wages are weekly × 50 weeks.

sional sector, a move previously accomplished by males from 1950 to 1970.

The matrix of table 10.6, part C provides a convenient way of tracking the impact of changes in earnings and occupational structure on the relative earnings of females to males, but it is not a complete partitioning of the two factors. A full partitioning must use a geometrically weighted average of earnings by occupation for each of the three benchmark years. The use of the geometric mean can be defended on the grounds that the underlying structure of earnings is a function of its log (Mincer 1974). But it is used here out of necessity, even though the geometric means are not entirely good substitutes for their arithmetic counterparts. The implied ratio of female to male earnings using the geometric means is 0.487 in 1890, rising to 0.586 in 1970, while the arithmetic means are 0.463 and 0.603.

There are six terms in the partitioning of table 10.6, part E. The first and the third are the change in relative earnings and in male earnings, given the structure and relative structure of occupations, using either 1890 or 1970 weights. The second and the fourth are the change in the structure of occupations and the change in the relative structure, given the relative earnings and male earnings for either of the two years. The last two terms are interactions.

This partitioning of the change in the relative earnings of females to males reinforces the results of the matrix of part D. Over the entire period 1890–1970, the change in relative earnings (terms 1 and 3) encompassed 83% to 111% of the entire change, while the change in structure (terms 2 and 4) encompassed only −11% to 17%, with the interaction terms adding the remainder.

The largest of the first four terms, the first, demonstrates that the rise in relative earnings of females to males within occupations greatly increased the overall ratio. The effect is greater given the structure of female occupations in 1970 than it is for the 1890 structure. The second, third, and fourth terms, while relatively small, change signs depending on the year chosen for the weights. The second term weights the change in the structure of female occupations by the ratio of female to male earnings. Females moved relatively into their more highly paying pursuits, thus the 1970 weights yield a positive effect and the 1890 weights a negative one. The same logic holds for the fourth term, which weights the relative occupational shift of females to males by male earnings. Females moved into those occupations which were high paying within the male earnings distribution. The third term, negative for the 1970 structure while small but positive for 1890, indicates for the 1970 weights male earnings increased relatively more in occupations that contained more males. In this manner it serves to diminish the effect of the first term.

Both the complete partitioning and the matrix demonstrate that the change in relative earnings within occupations was of greater importance in altering the overall earnings ratio than was the change in occupational structure between males and females.

10.5. The Role of Women in Economic Growth

Increases in the female labor force participation rate and in the ratio of female to male earnings from 1890 to the present served to increase national income per capita, but by how much in comparison with the increase in male earnings alone? Put somewhat differently, in terms of a counterfactual conjecture: Had the female labor force participation rate remained at its 1890 level, how much lower would income per capita have been in 1980? It is far simpler to answer the first question than it will be to answer the second.

The answer to the first question can be treated in a straightforward manner using the accounting identity:

$$(1) \qquad (LY/P) \equiv w_m(\ell_m + \alpha\ell_f)\beta/2,$$

where LY = labor income; P = total population; w_m = average annual earnings per male worker; $0 < \alpha \leq 1$ is such that $w_f = \alpha w_m$; ℓ_f, ℓ_m are the labor force participation rates of adult ($\geq$ 15 or 16–64 years old) females and males; β = the proportion of the total population who are adults (15–64 years old); P_a/P, where $P_a = P_m + P_f$; and $P_m = P_f$ by assumption.

From 1890 to 1980 α rose from about 0.463 to about 0.603; β fell slightly from 0.624 in 1890 to 0.616 in 1980;[32] ℓ_m has been roughly stable at about 0.80; and P_f has been approximately equal to P_m. Therefore the growth of (LY/P) from 1890 = 0 to 1980 = 1 may be simply stated as[33]

$$(2) \quad (LY/P)_1/(LY/P)_0 = (w_{m1}/w_{m0})\,[(0.8 + 0.603\,\ell_{f1})/(0.8 + 0.463\,\ell_{f0})]$$

With $\ell_{f1} = 0.554$ and $\ell_{f0} = 0.188$,[34] the degree to which growth in per capita labor income exceeded growth in per capita male earnings is 1.28. Because labor income (LY) has remained a relatively constant fraction of national income (NY), $LY = (0.70)NY$,[35] these conclusions should hold for national income as well.

The above calculation has implicitly included in labor income the entire increase in female earnings. Two cases, with reference to figure 10.1, must be considered before accepting the procedure. The line SS in figure 10.1 is the supply of female labor function, in per (female) capita terms, and at some maximum participation rate, given by ℓ_t, the schedule becomes vertical. The participation rate in the base period is ℓ_0 and that in the current period is ℓ_1. The upward

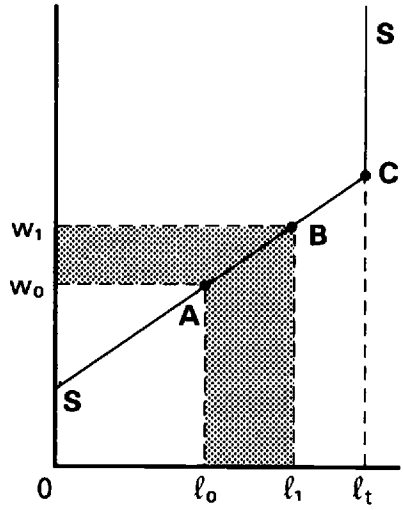

Fig. 10.1 Labor supply and household production.

slope of the supply function could reflect a number of factors, such as diminishing returns to home production or the more classic labor-leisure choice. If it is only the latter, or if home-produced goods are always excluded from measured national income, then one can include the entire shaded area, $[w_0ABw_1 + \ell_0AB\ell_1]$, in the increment to national income associated with changes in the female labor force. The procedure employed above would then be correct, at least in the context of the national income accounts. Two considerations could modify this procedure.

The first, to be called a *type A* error, concerns the inclusion in national income of goods produced by female workers although they are excluded from the aggregate participation rate (e.g., unpaid family farm labor, undercounted manufacturing workers). There are two kinds of type A errors. The simplest is the undercount by the census of women who worked in the marketplace at market wages. The adjustment, in terms of figure 10.1, would be to increase ℓ_0 while keeping w_0 constant, thus by an imagined shift in the supply of labor function. The second is the omission of female laborers who produce goods in the home at wages unobserved in the marketplace. I will assume, in these cases, that the market wage is the correct proxy for the value of these women's marginal product.

The second consideration, to be termed a *type B* error, is the exclusion from national income of goods produced by women at home or on the farm who are, as well, excluded from the labor force estimates. The distinction between type A and type B errors is of less importance

in the calculations that follow than in those that would adjust actual national income figures.

If the elasticity of supply of female labor were not zero, as SS in figure 10.1 to ℓ_t is not, women and their families may have valued their labor within the family unit in terms of its productive capacity, that is, in the base period at a maximum of $[\ell_0 AC\ell_t]$. This productive value of female labor should be restricted to encompass only those goods and services also included in current period national income. The two areas $[0w_0A\ell_0 + \ell_0AC\ell_t]$ compose an upper bound measure of national income derived from female labor in the base period. The latter area is the value of home production, and the former is the value of market production.[36] The full value of home production $[\ell_0AC\ell_t]$ need not be included if only a portion of the home-produced good is included in current period national income.

As the wage rate rises, say from w_0 to w_1, more women enter the market labor force, and their added contribution to national income is imputed at the prevailing market wage. But it would be incorrect to include the entire addition to national income if the value of home production were already included in base period national income. The error arises because the labor force had been understated in the base period. The correction involves more than an addition to the female labor force at market wages. It involves the estimation of the value of goods and services that are not traded at market wages and prices.

The assumption that the labor force data for 1890 and 1980 are correct and comparable and that the value of household production in 1890 was zero enabled the initial calculation of the role of changes in the female labor force on economic growth. The data presented in section 10.3 can now be used to adjust the initial estimate. These corrections will all involve assessing the female labor force and the goods and services produced by it around 1890.

The first errors were type A, those for which the labor force participation rate in the base period was biased downward although national income in the base period includes the productive services of this labor. The computed shortfall of unpaid agricultural workers, primarily on cotton farms, increases the aggregate participation rate for all women 15–64 years old from the initial estimate of 0.188 to 0.202. Adding the less reliable estimate of the labor force of all other married female family farm workers increases the figure to 0.234. Using the lower-bound figure has little impact on the initial calculation, reducing it from 1.28 to 1.27; the upper-bound figure reduces the measure to 1.25. The undercount of manufacturing workers is too small to affect the initial calculation.

Type B errors are of more quantitative importance and involve the understatement of the female labor force and of national income in the

base period. Several adjustments must be made here, and on some we are on rather shaky ground.

One adjustment involves the value of previously home-produced goods now produced by the market and included in national income estimates in the current period. Section 10.3 discussed several of these goods which together comprise as much as 14% of the total time spent in household production. To produce an upper-bound measure of this time would require a value for the area $[\ell_0 AC\ell_t]$ in figure 10.1 and an estimate of the labor supply elasticity.[37] Under rather generous assumptions about the elasticity, the addition to total product of this labor reduces the growth calculation from 1.28 to 1.19.[38]

The shortfall in boardinghouse keepers might be considered in either type A or type B corrections because it is not clear that national income estimates excluded the value of their services. Because boardinghouse keepers earned income, I will impute to them the market wage rate. Using the maximum figure for all women given in table 10.5 of 1.84 percentage points lowers the initial calculation from 1.28 to just under 1.27; the minimum figure of 0.685 lowers the initial calculation to just over 1.27.

Combining the two type B errors with those of type A requires adjustments for consistency. Taking such care results in lowering the initial figure from 1.28 to 1.16 for the upper-bound case and to 1.18 for the lower-bound case.[39] Therefore the growth in the female labor force and the increase in the ratio of female to male earnings were associated with a growth in per capita income that exceeded by 16% to 28% the increase in male earnings.

It would be incorrect, however, to turn this statement around and claim that had the female labor force not expanded, income per capita would have declined by 16% to 28% or by some other percentage based only on these data. To answer the counterfactual conjecture posed above, one needs considerably more information, in particular knowledge of the aggregate production function.

One must also take care to pose the counterfactual as a particular experiment, say one in 1980 that reduces the female labor force to 1890 levels, or equivalently one in 1890 that increases the female labor force to 1980 levels. The fact that the ratio of female to male earnings increased along with the female labor force participation rate suggests that there may have been biased technical change or unbalanced growth at some time from 1890 to 1980 that served to increase female earnings more than it did male earnings. The earnings ratio increased rapidly to 1930, and, at that date, exceeded the 1970 ratio for several occupations (see table 10.6). These facts suggest that there may well have been biased technical change prior to 1930 and that the last 50 years witnessed an expansion of the female labor force in response to higher earnings levels in certain occupations.

In an aggregate production function with constant returns to scale the smaller is the elasticity of substitution between males and females, the larger will be the impact on total product of a reduction (or an increase) in the female labor force. With an elasticity of substitution equal to one, the case is that of the simple Cobb-Douglas. Using an average of the 1890 and 1980 weights and the census labor force data results in a 16.3% figure for the reduction (or increase) in national income had the female labor force in 1980 (1890) been reduced (increased) to that in 1890 (1980). The revised lower bound figure results in a 14.4% reduction and the revised upper-bound figure one of 11.5%.[41] All of these figures might be construed as lower-bound estimates because the elasticity of substitution between males and females was probably less than one.

10.6 Summary Remarks

The motivation for this paper was a desire to have a statistic giving the extent to which the expansion of the female labor force affected growth in real income per capita from 1890 to 1980. The initial calculation indicated a rather hefty effect associated with an increase in female labor force participation and an increase in the ratio of female to male earnings. The growth in per capita income exceeded that in male earnings alone by 1.28; had the female labor force not expanded, national income would have been lower by at least 14%.

But the consistency and completeness of census labor force figures have long been questioned, and the applicability of national income accounting procedures to earlier periods remains a problem. These defects are most apparent in the data for women, whose part-time, intermittent, home work, and unpaid family labors were far more frequent than were those of prime-aged males. Numerous revisions were offered, and several had large impacts on the labor force and underlying national income data. Taken together these corrections lowered the initial calculation of the extent to which the growth in national income per capita exceeded that in male earnings from 1.28 to 1.18.

Revisions to the female labor force figures, particularly those for married women, raise the possibility that participation rates declined sometime in the past. Participation rates on family farms could have been considerably higher than early censuses have recorded. The corrections for both family farm labor and boardinghouse keepers result in an estimate for married women in 1890 of 12.33% to 14.03%, figures that bracket the labor force participation rate for married women as late as 1940 (see tables 10.1 and 10.6). Additional evidence, for a period much earlier in our history, indicates that married women in eighteenth-century cities worked more frequently in small proprietorships with their husbands than was the case later in American history (Goldin

1986). John Durand's (1975) observation that married women's labor force participation rates are U-shaped over the course of economic development may well fit the American case.

The evidence on which many of the revisions rest is meager, but the results seem clear. The change in the locus of production from the family farm and home to the centralized marketplace must certainly have altered the nature of work for married women. Whether or not one chooses to add these figures to those of the census labor force estimates depends on the ultimate question. If one is interested in the role of women in increasing aggregate national income, then it would be correct to use these revised estimates. If, however, interest centers on the evolution of the labor market and on the accumulation of human capital, the original estimates might be more appropriate.

There is, however, another factor to consider in the calculation. If instead of using 1980 as the current year, we use 1950, the initial statistic is lowered to 1.12 and is lowered further with corrections for the various errors. The most substantial component of the century-wide calculation is the increase in labor force participation rate over the past three decades. But the discussion of the labor force data in section 10.2 stressed that the large increase in participation rates from 1950 had its origin in the changes of the previous decades. Indeed the long-run supply function of female labor may well have shifted over the last century, becoming more elastic sometime after 1930.

Shifts in the long-run supply function of labor raise additional problems with the comparability of the calculation over time. Of more importance, however, are the underlying reasons for such shifts. Long-run changes in the structure of the economy and in educational levels affected the participation rates of women decades later (Goldin 1983a, 1983b, 1984a.) The long-run nature of the determinants of female labor force participation supports the time dimension of the initial calculation and, thus, the conclusion—that the increase in the participation of women and in their relative earnings was associated with an increase in national income that was from 16% to 28% higher than was the increase in male earnings alone.

Notes

1. The 1890 figure is from *Historical Statistics* (1975, p. 131), ser. D 29-41, for 15–64-year-olds. The 1980 figure is from United States Department of Labor (1982), tables A-3, A-4, for the civilian labor force 16–64-years-old. Including only employed laborers lowers the 1890 figure to 18.8% and the 1980 figure to 55.4%. The 1890 female unemployment estimate is ser. D 85, under the assumption that unemployment was distributed by sex in proportion to the labor force figures. The 1980 employed figure is from table A-10.

2. Edith Abbott (1910) questioned the occupational information in the late nineteenth-century population censuses; see Rubinow (1907) for a criticism of Abbott. Smuts (1960, p. 71) noted that "the basic criterion, the core of today's labor force concept, was not made explicit until 1910. This is the rule that defines a worker as a person who works for money." He also questioned the 1890 female farm laborer figures (1960, pp. 76–77). Durand, among many others, noted the anomalous 1910 female farm laborer estimates (1948, p. 195). Durand (1948, pp. 197–200) and Bancroft (1958, pp. 183–97) discussed the implications for the early census data of the change in the definition of the labor force in 1940. Jaffe (1956) argued that the growth in the female labor force was vastly overstated because of omissions in the 1890–1900 data. See Lebergott (1964, pp. 57–58), however, for a defense of the census labor force estimates.

3. Conventional accounting procedures have been criticized on other grounds. Boserup (1970), among others, has claimed that they necessarily bias policy in favor of market (male-produced) goods, particularly in less developed countries. Integrating the female labor force into economic growth calculations provides a response to these critics, but need not produce the results they anticipate. Accurate procedures for incorporating nonmarket production into national income accounts could increase the contribution of women to the base period income figure while reducing their contribution to the augmentation of national income.

4. Goldin and Sokoloff (1982) discuss the increase of this ratio from 1820 to 1850 with industrialization.

5. Approximately 35% of native-born single women of native-born parents between the ages of 16 and 24 were not in the labor force and not at school in 1900 across five cities, Boston, Chicago, New York, Philadelphia, and St. Louis. By 1930 this figure was between 2% and 9%. The 1900 figure was computed from labor force and schooling data in United States Bureau of the Census (1902) and the related volume United States Bureau of the Census (1907). Those for 1930 were computed from labor force and schooling data in United States Bureau of the Census (1933a, 1933b). The lower bound subtracts the entire number of women 16 years and older in school, and the upper bound subtracts only 80% of those 16–20 years old in school and none of those 21 years old and over in school.

6. That is, the labor force participation rate of single women in cross section varied by population density and the structure of demand. As the population became more urbanized and as more families lived closer to industrial areas, the participation rate for single women rose. The participation rate of married women varied far less in cross-section, and therefore the time series cannot be tracked by only these factors. There was, however, variation by wage and by husband's income. See Mincer (1962) for the use of cross-sectional information on income and substitution effects to track time-series changes from 1890 to 1960.

7. "[From] what sectors would additional labour be available if new industries were created offering employment at subsistence wages? . . . First of all there are the wives and daughters of the household. The employment of women outside the household depends upon a great number of factors . . . and is certainly not exclusively a matter of employment opportunities. There are, however, a number of countries where the current limit is for practical purposes only employment opportunities. This is true, for example, even inside the United Kingdom. The proportion of women gainfully employed in the U.K. varies enormously from one region to another according to employment opportunities for women" (Lewis [1954] 1958, pp. 403–4).

8. The role of fertility change in affecting female labor force participation cannot be adequately discussed here and is detailed in Easterlin (1980).

9. The relationship between educational and occupational change is apparent in data for almost all of the 12 countries represented in a conference on long-term trends in female labor force participation. See Layard and Mincer (1985). Goldin (1983b) presents cross-sectional evidence that a woman's occupation early in her life-cycle influences later life-cycle labor force participation.

10. Monographs about working women published in the 1920s differ from previous ones in their concern with married women. While none of them claimed that there was a large percentage of married women in the labor force, they looked to the percentage of the labor force consisting of married women as the basis for action. Note this perception in a 1925 study of mothers in industry: "We have known, vaguely enough, that in the

gray stream of women pouring into our industries at dawn there are many married women, and here and there is a mother of little children" (Hughes 1925, p. xiii).

11. Durand (1948, pp. 199, 207) adjusted the 1940 census data for comparability with both the 1930 "gainful worker" estimates and the Current Population Survey data, but the adjustment ratios for females are not substantial. The "gainful worker" adjustment was based on a special survey of the 1930 census and indicated that the "gainful worker" concept overstated the female workforce in 1930 by 2.72%. Bancroft (1958) also discusses changes in definition and the comparability of the decennial census with the Current Population Survey data. Lebergott (1964, pp. 71–73) summarizes the debate over the accuracy of the labor force estimates of the female population, particularly the doubts of Smuts (1959, 1960), and concludes by accepting the census figures as the proper standard.

12. This calculation assumes that work is done in weekly intervals.

13. See Haines (1979) and Goldin and Parsons (1984) for a discussion of these surveys which include about 6,000 families in industrial areas.

14. They probably worked more than half the year because older women earned somewhat less than did experienced younger women in industry (Goldin 1981), and average earnings for married women includes earnings for women who began work during the year and for whom days worked that year was artifically low.

15. It is not possible to distinguish between part-time and intermittent work in the sense of working part of a day. Part-time work usually refers to that which is done for less than the standard number of hours per week, while intermittent refers to work done for the full number of hours per week but not the full number of weeks per year.

16. Boarders and other family members were grouped together, and the estimate of two boarders per boarding household is based only on the families reporting income from boarding.

17. United States Commissioner of Labor (1889) gives a figure of $300 for full-time earnings in manufacturing.

18. United States Bureau of the Census (1914, p. 27). This volume contains few breakdowns of occupational data by age, marital status, race, and region, and therefore the data cannot be corrected for the overstatement of agricultural labor. Smuts, among others, has called for the inclusion of these women in the labor force. He noted that in 1890 although "there were perhaps 4 million married white women living on farms, the census reported only about 23,000 of them in agricultural occupations. In 1950, when the farm population was much smaller than in 1890, nearly 200,000 married white women were counted as unpaid family farm laborers" (1960, pp. 76–77).

19. The proportion of unpaid family workers among all agricultural workers for white females $\geq$ 15 years old is as follows, by state in 1910: Alabama (0.507), Arkansas (0.433), Florida (0.151), Georgia (0.367), Louisiana (0.165), Mississippi (0.507), North Carolina (0.399), Oklahoma (0.177), South Carolina (0.382), Tennessee (0.191), Texas (0.344), Virginia (0.074). All other states had proportions lower than 0.044 (Wisconsin), and averaged 0.007.

20. United States Bureau of the Census (1907, p. 32), gives 94,601 white female agricultural laborers, of whom 61% were members of the farmer's family. Therefore 57,707 white female family farm workers, or 1.6% of the total female population, were already counted in the 1900 census.

21. The assumption is that the male adult agricultural figures were not affected by the instructions to the enumerators in 1910. The proportion of the male labor force that was in agriculture declined from 0.403 in 1890 to 0.270 in 1920.

22. Ruth Allen (1931) surveyed non-Mexican female cotton farm workers in Texas. The number of women interviewed was 664 and included both the unmarried and married.

23. The 1.24-percentage-point figure is: $4.5 \times 0.31 \times 0.89$ (percentage white in the adult female population).

24. A listing of these time-budget studies can be found in Vanek (1973). The published reports that were consulted, together with the mean number of hours worked in unpaid family farm labor and the number of observations, are: Idaho, 1927 (9.74; 49); Washington, 1929 (9.9; 137); South Dakota, 1930 (11.55; 100); Montana, 1929–31 (9.12; 48); ington, 1929 (9.9; 137); South Dakota, 1930 (11.55; 100) Montana, 1929–31 (9.12; 48);

Oregon, 1929 (11.3; 288); USDA, primarily California, 1924–28 (8.67; 559). These housewives spent on average 65 hours a week on all work, of which 15% was unpaid dairy, poultry, orchard, and garden labor.

25. Only two of the studies gave the distribution of time worked. Using the 15-hour cutoff yields 12% who would have been counted in Montana and 30% who would have been counted in Oregon.

26. This calculation uses 40% of the population living on farms and 68% of all farms outside the South.

27. The 121,193 figure assumes that 30% of all children working in manufacturing in 1890 were female. It is derived as a residual. There were 545,758 (839,952 − 294,194) women enumerated in the manufacturing census after those in clothing production are netted out; equivalently 424,565 (1,027,242 − 602,677) remain in the population census after women in clothing production are subtracted. The difference between these figures, 545,758 − 424,565 = 121,193, is then the shortfall in the population census of women working in the larger manufacturing firms. It should be noted that it would be incorrect to adjust or compare the manufacturing employment figures from the two censuses on an industry by industry basis, as Smuts (1960) did. The population census listed workers in general classifications, such as "operatives," not necessarily associated with a particular industry.

28. With the exception of meals, these were several of the items for which Gallman (1966) computed value added to augment the pre-1890 national income estimates.

29. The assumption made in this calculation is that married women currently spend about 2.5 hours per week in the household maintenance and production of clothing and the baking of foods.

30. O'Neill and Braun (1981, p. 60) give a value of 1.0893 for the ratio of weekly work hours of full-time male to female workers in 1980.

31. See Polachek (1984) who finds a similar result for recent data and who notes that the aggregation of occupations would have to be considerably smaller to overturn the conclusion that changes in occupational structure matter less than changes in relative wages within occupations.

32. *Historical Statistics* (1975, p. 15), all races, ser. A 19.

33. *Historical Statistics* (1975, p. 132), ser. D 30, for the 1890 figure and United States Department of Labor (1982) for the 1980 figure. The participation rate of adult males (16–64 years) was 0.853 in 1890 and 0.845 in 1980. Adjusting for unemployment lowers the 1890 figure to 0.817 and that for 1980 to 0.781.

34. The labor force participation rates adjusted for unemployment are used. See 1 above.

35. Estimates in Denison (1962) for the share of property income in national income range between 0.305 for 1909–13 to 0.270 for 1929–58. Budd's (1960) estimates for the earlier period indicate a rather constant share of about 0.36 from 1870 to 1910 broken only by a sharp decline in 1890.

36. The shaded area below line AB is the value of household production under a set of assumptions detailed in an appendix available upon request from the author.

37. The problem is actually more complicated since the computation is in terms of the ratio of female to male earnings. One needs the value of α when $\ell_t = 1$, that is, the value of time spent at home production for the last hour or last person together with the period of time it would take to achieve that result since the male wage must also be computed. In the absence of such data it is assumed that this value is 0.70.

38. The original calculation had 0.188 proportion of the female labor force earning 0.463 w_m. The addition from household production in the base period assumes that all married women not in the labor market give 14% of their time to the production of goods later valued in the market and that the value of α at maximum labor force participation is 0.70. The value of 0.70 is, in some sense, arbitrary, but was chosen because women have only recently achieved this ratio in the labor market on an hourly basis. It is entirely possible that the value of their time in home production was greater than that ever achieved in the market. In 1890 4.5% of all married women were in the conventionally measured labor force, and all married women were, in that year, 58.2% of the adult (15–64 years old) female population. Thus 95.5% of all married women were out of the labor

force, and each produced: [0.955 × 0.582 × 0.463 × 0.14] + [(0.955 × 0.582 × 0.70 × 0.14)/2] = 0.0633 × w_m, where the division by 2 assumes a linear supply function within that range. The initial calculation is adjusted by adding 0.0633 × w_m to the labor income produced by all female workers.

39. The upper and lower-bound corrections in table 10.5 are used. The female labor force participation rate rises to 0.2572 for the upper-bound case. The value of household production, however, must be lowered because the labor force participation rate of married women rises from 0.045 to 0.1393. For the case of the lower bound, the female labor force participation rate rises to 0.2143 and that for married women rises to 0.0683.

40. See Goldin and Sokoloff (1984) on unbalanced growth from 1820 to 1850 and its impact on the ratio of female to male wages.

41. The average weight is a share value of 0.14 for female labor, given labor's total share of 0.70. Perhaps a more reasonable production function would be one in which labor was produced by a constant elasticity of substitution production function embedded in a Cobb-Douglas. With an elasticity of substitution between male and female labor of 0.5 and an average of the 1890 and 1980 earnings, a reduction in the female labor force from 0.554 to 0.188 would have reduced national income by 42%, a figure much larger than that generated by a simple Cobb-Douglas. All of these calculations imply that the earnings ratio would have risen greatly with the reduction in the female labor force.

Comment

Susan B. Carter

"Indispensable," "crucial," and "revolutionary" are commonly used today to describe the impact of women's work and its reallocation on the larger society. While this consensus is a healthy corrective to an earlier disregrad of women's contributions, it does not rest on any systematic, comparative evaluation of the role of women's work relative to factors such as technological change or increases in the capital/labor ratio. That the Industrial Revolution upon close empirical examination was found not to have made a distinctive contribution to the growth process should make us suspicious of claims for a quantifiable role for the "Subtle Revolution."

Claudia Goldin's paper is a first attempt to determine whether the history of women's work belongs in the chronology of *economic* events. Her conclusion, that "had the female labor force not expanded [between 1890 and 1980] . . . national income per capita would probably have been at least 14% lower than it actually was," implies a significant role for this aspect of labor reallocation, making it comparable to the deepening of capital in explaining twentieth-century economic growth. Quantification also permits her to identify the period 1950–80 as the one in which 90% of women's contribution to the growth process was made.

The conclusion proceeds from an accounting definition in which the growth of labor income per capita is equal to the growth of male earn-

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ings multiplied by a term which is a function of the male and female labor force participation rates and the ratio of female to male earnings in the base and end years. By assuming that changes in the female labor force participation rate do not induce changes in the male wage, and by using growth of labor income as a proxy for the growth of national income, she is able to equate the value of the labor force participation rate/relative earnings term with the contribution of the expansion of the female labor force to the growth in per capita income. The problem therefore breaks down into one of finding values for the female labor force participation rate and the relative earnings rate for the base and end years for which the calculation is made.

A desire for consistency between base- and end-year measures of material well-being dictates three types of adjustments to 1890 census estimates of female labor force participation rates. First, women whose services were included in the 1890 national income measure but who were absent from the 1890 labor force count must be filled in. Goldin's imaginative use of varied data sources to construct reasonable corrections for this undercount, largely of agricultural workers and boardinghouse keepers, is for me one of the most satisfying parts of the paper. Second, to avoid the overstatement of the growth of material well-being which comes about whenever goods formerly produced in the home come to be produced in the market, Goldin identifies the principal products which experienced this transition during the time period under study—baked goods, clothing, and some meal preparation—and includes a measure of the labor time devoted to them in the base year labor force estimate. Third, one service—housecleaning—which had been provided through the market in 1890 essentially reverted back to home production by 1980. For consistency's sake, Goldin removes domestic servants from the 1890 labor force figures.

I will focus my remarks on three steps in the approach: the criterion for selecting activities to be included in the base period measure of national income, the technique for valuing time spent in home production, and the assumption that male wages are unaffected by the growth of the female labor force.

First, the criterion for selecting activities to be included in base period labor force estimates which Goldin uses—include the activity if it was produced in the market in 1980—is not neutral with respect to the calculation of growth in per capita income. It is like the standard index number problem. In this case goods like bakery products and clothing whose production was moved from home to market are those which experienced higher productivity growth rates than the housecleaning or child care whose production processes were not so transformed. The result of the inclusion of only the most rapidly advancing productive uses of female labor is to insert an upward bias in the

calculation of the contribution of the female labor force to material well-being.

I would have preferred to have seen the measure of material well-being defined more broadly still to include all the goods and services provided by women both in and outside of the market. Goldin rejects this as requiring "wholesale revamping of all accounting procedures," but in this case there seem to be both practical and theoretical reasons for using the most inclusive measure possible.

At a practical level, even child care and household maintenance are being rapidly transformed into market-produced services. Between 1960 and 1980 the proportion of mothers with children under six in the paid labor force rose from 18.6% to 45.0%. The increased need for substitute care implied by this trend was met by growing reliance on the market. Between 1958 and 1977 care by nonrelatives outside the child's home rose from 17.2% to 41.2% of all child care arrangements (Hacker 1983, pp. 133, 135). If these trends continue, child care will have to be treated as a market-produced service when the calculations are redone in 1990.

Theoretically the inclusion of child care and household maintenance into an index of material well-being is attractive because together they accounted for a significant share of total consumption, especially in the early years. Moreover, it has been argued that the level and quality of this output was strongly affected by the institutional arrangements under which it was carried out, the nuclear family. There are competing hypotheses about the efficiency of this institution. Feminist reformers such as Charlotte Perkins Gillman have argued that the nuclear family is inefficient, wasteful, and exerts a significant drag on the growth of economic welfare. Goldin's current estimates seem to support this position as women's biggest contribution to the growth process coincides with their wholesale entry into the labor force. Others, however, claim that small nuclear families with full-time homemakers made possible vast improvements in child quality (Lindert 1978). Given the demonstrated importance of human capital formation in economic growth, married, middle-class women's low labor force participation rates up to 1940 may have made a significant, heretofore unappreciated contribution to the growth process. Including the value of child care and household maintenance services in national income estimates could be a first step in assessing this possibility. Exactly how these activities should be valued, however, I do not know.

The second concern I want to raise is with the technique employed for valuing time spent in 1890 home production. Goldin invokes a model in which the allocation of time between home and market is determined by relative productivity in the two sectors. This allows her to equate the market value of the last hour spent in home production with the female wage rate. Finding an objective measure of this time is an

extremely desirable thing to be able to do. Nonetheless the underlying assumption of the model, that the only significant difference between home and market work is the amount of the homogeneous good G which can be produced in each setting, is not consistent with the weight of historical evidence. Cultural values stressing the importance of intimate involvement in one's child's development suggest it would have taken a very high wage to lure mothers away from this responsibility. On the other hand, labor market discrimination, limited availability of part-time work, and cultural values which labeled women's work outside the home incompatible with nineteenth-century ideals of womanhood suggest that women's home production may have been carried on at a point where productivity in the home was well below that in the market. Since a far higher percentage of women's time was devoted to household production in 1890 than in 1980, a female wage greater than the value of household production overstates the level of production in the base year relative to that in the end year and understates the growth in welfare due to the reallocation of women's labor.

My third point concerns the appropriateness of assuming that male earnings are unaffected by changes in the female labor force participation rate. For the short run this assumption may be plausible. Given the strength and prevalence of gender-based occupational segregation, a increase in the supply of women workers would simply increase competition within the female occupations, causing the female wage to fall, leaving the male wage unchanged. But for the 90-year period under study a different pattern for women's labor force entry would surely have meant a different pattern of wage growth for men.

The effect on men would probably have differed by skill type. Unskilled men and women seem to have been close substitutes in nineteenth-century manufacturing occupations. The New England cotton mills, for example, responded to a shortage of female labor and an influx of unskilled Irish men by hiring men into previously female operative categories (Nickless 1979). If, as Piore argues, the supply of unskilled males is perfectly elastic, then a different growth path for the female labor force might have left the wage of unskilled males unchanged (Piore 1979).

The wages of skilled males in blue-collar occupations would probably also have been unaffected by the growth path of the female labor force. Women could not compete directly with men for these jobs since women were denied access to the training necessary for proper performance.

However, in the white-collar occupations, especially those requiring high levels of formal education, a failure of the female labor force to expand might be expected to have dramatically raised the male wage. White-collar occupations were poorly paid relative to skilled blue-collar work in 1900 (Carter and Prus 1982). For example, median weekly

earnings for male teachers were only $11.63 as compared with $27.50 for heaters and $35.00 for rollers in the iron and steel industry. Such low wages meant that boys who had access to training for skilled blue-collar trades opted for that rather than formal schooling. While in 1890 jobs with formal schooling requirements constituted less than 10% of total employment, by 1980 professional and clerical work alone accounted for over a third of all jobs (Collins 1979). White-collar work was over two-thirds of total employment. Such a rapidly growing demand for skills and affective characteristics learned in schools would have been difficult to meet without raising males' wages if it were not for the rapid growth of an educated female labor force.

While the relatively small bonus for schooled over unschooled labor was not sufficient to draw many boys to the schools in 1900, it was adequate for girls. Compared with the $6.50 per week they might average in cotton and woolen mills or $3.50 in candy, the $9.73 average weekly salary for teaching was attractive. Girls went to school to prepare for such occupations, outnumbering boys in the high schools by 50% in the 1890s and remaining in the majority until school attendance through age 16 became compulsory. These educated women then entered the labor force, forming a disproportionate share of the rapidly expanding white-collar work force. Their strong response to opportunities for skilled work actually compressed the wage differential between schooled and unschooled women's occupations between 1890 and 1930 (Rotella 1981).

An important implication of this line of thinking for an understanding of the impact of women's labor on the growth process is that all those developments which relied on a cheap and plentiful supply of educated labor would have had to have been reduced if not eliminated if women's labor force had not grown the way it did. The first to go might have been mass secondary and later higher education, for in the educational production process it is extremely difficult to substitute capital for labor and in the absence of women willing to teach for low wages it is plausible that mass education would have been too costly to have been politically feasible (Fishlow 1966, p. 435). Since the increase in the stock of education per laborer resulting from the expansion of mass education has been found to account for from 12% to 23% of the increase in real national income over this century, the failure of the female labor force to grow would have meant a substantially different character to twentieth-century economic growth. (Denison 1962, pp. 148, 266)

It is fascinating to consider the concrete ways in which a shortage of educated labor might have made itself felt. Since mass secondary education is connected to the rise of vocational education, it is plausible that many of the job-related skills which over the twentieth century have come to be taught in schools would have had to have been trans-

mitted in the workplace. This would have meant substantially higher labor costs. In a study of two New York City department stores which Michael Carter and I just completed we found that the store which used idiosyncratic clerical and accounting procedures which employees had to learn in the store paid wages two-thirds higher than an otherwise similar store which used the standardized bookkeeping, billing, and correspondence techniques taught in commercial schools at the time. Employees in both stores were equally skilled in the sense of being able to get the job done. Wages were higher in the store with idiosyncratic accounting methods because high turnover costs (primarily the cost of in-house training) made the employer anxious to keep employees happy. The store which took advantage of standardized techniques taught in commerical schools had far lower turnover costs and could afford to pay lower wages. Its employees did not leave because they faced stiff competition from other commercial school graduates who were effective substitutes for them (Carter and Carter 1985). Higher costs resulting from the absence of generalized clerical skills might have hindered the development of the large-scale business enterprise which required cheap, effective coordination of its various divisions to maintain a cost advantage over smaller rivals (Chandler 1977). A reduction in the number of highly educated workers also might have slowed the introduction of capital embodying the most up-to-date technology since this capital was complementary with educated labor. In short, many of the characteristic features of twentieth-century economic growth appear to have required the cheap supply of educated labor which the rapid growth of the female labor force made possible.

In summary, I have suggested that some aspects of the estimation procedure may have overstated and others understated the effects of the female labor force on the growth process. On balance the conclusion that without the growth of the female labor force, United States economic growth would have been substantially less spectacular seems well founded. To become more precise about the role of women's labor in the growth process now requires an examination of the specific institutions through which its effects were worked out.

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