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Why Do Americans Work So Much More Than Europeans?

Edward C. Prescott

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Changes in Hours Worked, 1950–2000*

Ellen R. McGrattan
Monetary Adviser
Research Department
Federal Reserve Bank of Minneapolis
and Adjunct Professor of Economics
University of Minnesota

Richard Rogerson
Professor of Economics
W.P. Carey School of Business
Arizona State University

Hours of market work per person in the United States have been roughly constant since World War II. However, this relative constancy at the aggregate level masks large and persistent reallocations of hours of work across various groups in the population. Using data from the U.S. Bureau of the Census decennial censuses from 1950 to 1990, McGrattan and Rogerson (1998) document large shifts in hours of work from males to females, from older people to younger people, and from single-person households to married-person households.[1] In this article, we update our report by including data from the 2000 census. Though this adds only one data point relative to the earlier analysis, this extra data point extends the sample period by 10 years. This extension lets us assess the extent to which the changes over the 1950–90 period are continuing, and if so, whether the pace of these changes has slowed or accelerated. Documenting these changes is potentially important. Ultimately, our goal is to understand the key driving forces behind the observed changes in hours of work. Many of the driving forces of interest have distinct time series properties in terms of timing and magnitude. In this regard, knowing when changes begin and end and whether the pace of the changes accelerates or decelerates over time may shed light on which driving forces are most important.

When viewed as a whole, the major changes that we documented over the 1950–90 period are also present over the 1950–2000 period. Specifically, over this 50-year period there has been a large reallocation of working hours from males to females, from older workers to younger workers, and from single-person households to married-person households. However, the pace of these changes has been far from uniform. For example, we document that the decline in hours worked among males is mostly concentrated in the period 1950–70. In contrast, the increase in hours of work among females is mostly concentrated in the period 1960–90 and in fact accelerates throughout the period 1950–90. However, while hours of work for females did increase between 1990 and 2000, the magnitude of the increase is smaller than that of any previous decade.

Similarly, we find that the pace of changes in hours

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[1]Many of the facts documented in McGrattan and Rogerson 1998 can also be found elsewhere. See, for example, Browning, Deaton, and Irish 1985, Smith and Ward 1985, Killingsworth and Heckman 1986, Pencavel 1986, and Coleman and Pencavel (1993a, b).

of work across age groups is also far from uniform. For example, the decline in hours of work among individuals aged 65 and over is concentrated in the period 1950–80 and shows little change subsequently. The increase in hours of work among individuals aged 25–54 is concentrated in the period 1960–90. Note that the age and sex patterns are strongly related. As we document, the decrease in working hours of older individuals is primarily accounted for by a decrease in hours worked by males, whereas the increase in working hours of individuals aged 25–54 is primarily accounted for by an increase in hours worked by females.

Perhaps not surprisingly in view of this last observation, the increase in hours of work among married-person households is concentrated in the 1960–90 period, showing little change in the 1990–2000 period.

We also document some other changes that we think are of interest. Whereas the aggregate employment-to-population ratio increases steadily throughout the period 1950–90, this ratio actually declines marginally during the 1990–2000 period. In contrast, the average number of weekly hours of work per worker exhibits a different pattern over this period. In particular, it exhibits a U-shaped pattern, decreasing from 1950 until 1970 and increasing thereafter. Hence, during the 1990s average weekly hours per worker increase at the same time that the fraction of the population employed decreases. Interestingly, the U-shaped pattern of average weekly hours per worker is found for virtually all subgroups among the population. Quantitatively, however, we show that changes in the employment-to-population ratio are more important than are changes in hours per worker in accounting for changes in hours worked per person.

As suggested above, we think that information of the form presented in this article will be useful in attempts to connect theory to data. While we do not attempt here to assess the quantitative importance of the factors which have led to this reallocation of hours worked across groups, we do document changes in several factors that may be relevant. In particular, the labor market in the United States has witnessed large changes along several potentially important dimensions: increases in relative wages of females to males, technological innovations that shift female labor from the home to the market, increases in Social Security benefits to retired workers, and changes in divorce laws and other determinants of family structure. Determining to what extent these (and other) factors are important in accounting for the changes in hours worked will lead to an improved understanding of the determinants of labor supply.

An outline of the article follows. The next section describes our data sources. Then we review the aggregate facts and document the large reallocations of hours worked across demographic groups and how the pace of these reallocations has changed over time. We go on to report changes in several factors that may reasonably be expected to affect hours of work. We finish with some concluding remarks.

Data Details

Our findings are based on data from the decennial censuses from 1950 to 2000. (See U.S. Department of Commerce 1950–2000.) For each of these six censuses, we produce data for 98 groups in the population. The groups are distinguished by three characteristics: sex, age, and marital status—two categories for sex, seven categories for age, and seven categories for marital status. For each group, we know the total number of individuals in the group, the number employed, and the distribution of these individuals across eight intervals of weekly hours worked. (See Appendix A for more details.)

Two advantages of using the decennial censuses are the large sample size and the relatively long coverage. Many data sets involve too few people to disaggregate simultaneously by sex, age, and marital status. For many issues a potential disadvantage of the decennial censuses is the low sampling frequency—observations are 10 years apart. However, given our focus on low frequency changes in hours worked, this is not a problem in our context.

One issue regarding comparability of data over time should be noted. Due to changes in survey questions over time, we cannot produce measures of hours of work based on a single common question for the entire period. In Appendix B we describe the method used to construct the time series reported below and the significance of using information from two different questions. Based on the findings reported in Appendix B, we argue that our time series measures nonetheless provide a good measure of the changes in hours of work over time.

Although the data are only a time series of cross sections, we can construct partial life-cycle profiles of hours worked by cohort. Specifically, we consider age categories that are 10-year intervals (15–24 years, 25–34 years, and so on).

It follows that we generate the life-cycle profile for

average hours worked by, say, females born between 1926 and 1935, by piecing together data on hours of work by females who were aged 15–24 in 1950, 25–34 in 1960, 35–44 in 1970, 45–54 in 1980, 55–64 in 1990, and 65–74 in 2000.[2]

In addition to the census data on hours of work for various subgroups, we also report information about other economic variables from other sources. Sources for all data and details on series construction are given in Appendix A.

Documentation

Aggregate Facts

In the opening sentence of this article, we asserted that the number of weekly hours of market work per person has changed very little over the post–World War II period. Most readers will readily accept this as one aspect of the so-called balanced growth facts. Nonetheless, for completeness we think it is important to begin our analysis with a look at the time series behavior of this statistic.

Table 1 shows the aggregate number of weekly hours worked per person over the age of 15 during the period 1950–2000. We note that this statistic reflects the average hours of work in the population taking into account the fact that many individuals have zero hours of work.

Table 1

A Look Behind an Aggregate Fact

In the United States, 1950–2000

Year	Average Weekly Hours Worked		Employment-to-Population Ratio, in %
	Per Person	Per Worker	
1950	22.34	42.40	52.69
1960	21.55	40.24	53.55
1970	21.15	38.83	54.47
1980	22.07	39.01	56.59
1990	23.86	39.74	60.04
2000	23.94	40.46	59.17
% Change 1950–2000	7.18	−4.56	12.30

Source: U.S. Department of Commerce, Bureau of the Census

Hours per person have changed relatively little over the postwar period—they decreased from 1950 to 1970, increased from 1970 to 1990, and stayed flat from 1990 to 2000. Overall, the 2000 level is about 7 percent higher than the 1950 value.

Table 1 also provides a decomposition of hours worked per person into weekly hours worked per worker (what economists call the *intensive margin*) and the percentage of the population aged 15 and over employed (the *extensive margin*).[3] Note that average weekly hours worked per worker are not necessarily the same as the average length of the workweek across jobs. That's because many individuals hold multiple jobs, and average weekly hours aggregate these hours across jobs. For example, if a worker has two jobs, each of which has a workweek of 20 hours, then that worker reports weekly hours of 40, and not the workweek of the individual jobs.

Looking at the decomposition of hours per person into the two components, we see that the number of weekly hours worked per worker has declined about 5 percent since 1950, while the employment-to-population ratio has risen by 12 percent.

Note that after rising steadily between 1950 and 1990, the employment-to-population ratio actually falls between 1990 and 2000.[4] Weekly hours per worker follow quite a different pattern. They decrease between 1950 and 1970 but have increased steadily since, and this increasing pattern has continued in the 1990s. In fact, the overall effect of the decrease in the employment-to-population ratio in the 1990s and the slight increase in the hours worked per worker between 1990 and 2000 is a negligible change in average hours per person.

Disaggregate Facts

Now we examine how the number of hours worked has changed over time among various subgroups in the

[2]Because of immigration and death, there is not an exact correspondence between women aged 25–34 in 1960 and women aged 35–44 in 1970. Immigration accounts for a relatively small percentage of the total population and, hence, should not be a major quantitative factor. For most age categories, death rates are also not likely to be important quantitatively.

[3]In Appendix C, we discuss some aggregation issues that arise when constructing our measure of hours per person.

[4]See the work of Clark et al. (2003) for a comparison of employment-to-population ratios calculated from censuses and Current Population Surveys. They find lower ratios in censuses than in the CPS in the period 1950–2000, but the differences are largest for 2000. They attribute some, but not all, of the increase in the gap to anomalous data for individuals in group quarters. They note that another project is under way to compare 2000 census and April 2000 CPS survey results for the same individuals.

population. First we look at the time series of cross-sectional distributions with regard to several demographic attributes. Later we construct life-cycle hours of work for several consecutive cohorts.

☐ *Cross-Sectional Time Series*

The cross-sectional distribution of hours worked across various subgroups in the population has changed significantly over time. Since 1950, large numbers of weekly work hours have shifted from males to females, from older people to younger people, and from those previously married or married with a spouse absent to those currently married with a spouse present. However, we will see that most of the shifts occur between 1950 and 1990, with the 2000 census revealing a slowing, or in some cases even a reversal, in the trends occurring between 1950 and 1990.

First, let's consider changes in weekly hours worked when the data are disaggregated by sex. The top panel of Table 2 presents data for males and females along with, for reference, average hours for the total population. The male and female columns display markedly different behavior. The data for males show a 17 percent decrease in hours per person, and the data for females show an 82 percent increase. However, there are important differences in the timing of these changes. Most of the drop in male hours occurred during the 1950–70 period. In contrast, females have seen accelerating increases from 1950 to 1990, and although the 1990s also witnessed an increase in the average hours worked by females, the increase was smaller than that in any other decade. In the middle and bottom panels of Table 2, we decompose the average hours disaggregated by sex into hours per worker and the percentage employed. Here, we see that almost all of the change in male and female average hours is due to the changes in the fractions of these populations that are employed, with females becoming employed more and males becoming employed less. In contrast to the different behavior of employment-to-population ratios for males and females, note that the two series for hours per worker exhibit almost identical behavior. In particular, both exhibit a U-shaped pattern that reaches its minimum in 1970. A key difference in this regard is that the number of weekly hours per worker is only about 85 percent as large for females as it is for males. Interestingly, this ratio has stayed relatively constant at the same time that employment-to-population ratios have narrowed considerably.

Table 2

Distributions of Hours Worked by Sex

Average Weekly Hours Worked per Person and per Worker and the Employment-to-Population Ratio in the United States, 1950–2000

	Hours Worked per Person		
		Sex	
Year	Total Population	Males	Females
1950	22.34	34.18	10.87
1960	21.55	31.93	11.84
1970	21.15	29.75	13.38
1980	22.07	28.70	16.02
1990	23.86	29.11	19.03
2000	23.94	28.34	19.78
% Change 1950–2000	7.18	–17.09	81.98

	Hours Worked per Worker		
		Sex	
Year	Total Population	Males	Females
1950	42.40	44.00	38.19
1960	40.24	42.45	35.67
1970	38.83	41.33	34.70
1980	39.01	41.84	35.10
1990	39.74	42.59	36.30
2000	40.46	43.27	37.15
% Change 1950–2000	–4.56	–1.65	–2.73

	Employment-to-Population Ratio, in %		
		Sex	
Year	Total Population	Males	Females
1950	52.69	77.69	28.46
1960	53.55	75.22	33.20
1970	54.47	71.98	38.55
1980	56.59	68.60	45.64
1990	60.04	68.35	52.42
2000	59.17	65.49	53.25
% Change 1950–2000	12.30	–15.70	87.10

Source: U.S. Department of Commerce, Bureau of the Census

An important issue in labor economics is to understand the underlying sources of these large shifts in hours of work. There are many candidates, and recent work has been making important advances in assessing the quantitative significance of some of them. We discuss these in greater detail later in the article.

Next we consider changes in hours worked by both sex and age. Tables 3–5 show hours worked per person, hours worked per worker, and the employment-to-population ratio by age for the total population, for males, and for females, respectively. Table 3 shows a shift in hours of work from older people to younger people between 1950 and 2000. Average hours of people aged 25–54 increased more than 20 percent. Average hours

Tables 3–5

Distributions of Hours Worked by Age and by Sex

Table 3 Total Population

	Hours Worked per Person by Age (in Years)						
Year	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1950	18.23	25.48	27.24	26.31	22.16	11.99	3.90
1960	15.50	25.60	27.50	27.76	22.60	8.43	2.99
1970	15.37	27.00	28.61	28.40	23.30	6.95	2.21
1980	17.62	30.03	30.98	28.90	21.06	5.11	1.45
1990	17.35	32.18	33.64	32.15	21.03	5.18	1.24
2000	16.33	31.64	32.62	32.53	22.53	5.72	1.55
% Change 1950–2000	–10.46	24.16	19.73	23.63	1.65	–52.28	–60.22

	Hours Worked per Worker by Age (in Years)						
Year	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1950	39.46	42.89	43.41	43.33	42.76	41.32	38.19
1960	34.62	41.77	41.87	41.61	40.69	36.03	33.69
1970	33.11	40.67	40.95	40.73	39.82	33.34	31.97
1980	34.57	40.65	41.01	40.80	39.58	31.15	29.35
1990	33.32	41.45	41.78	41.70	39.37	31.10	28.12
2000	32.83	42.18	42.52	42.56	40.30	30.56	27.29
% Change 1950–2000	–16.81	–1.65	–2.06	–1.79	–5.75	–26.03	–28.55

	Employment-to-Population Ratio by Age, in % (in Years)						
Year	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1950	46.22	59.41	62.75	60.72	51.83	29.03	10.21
1960	44.77	61.30	65.68	66.71	55.55	23.41	8.88
1970	46.42	66.40	69.86	69.73	58.50	20.84	6.91
1980	50.95	73.88	75.52	70.83	53.22	16.41	4.96
1990	52.09	77.63	80.50	77.10	53.42	16.66	4.39
2000	49.74	75.01	76.71	76.43	55.90	18.73	5.68
% Change 1950–2000	7.62	26.25	22.25	25.88	7.85	–35.48	–44.33

Source: U.S. Department of Commerce, Bureau of the Census

of people aged 65–74 fell 52 percent. Individuals aged 55–64 experienced relatively little overall change between 1950 and 2000. However, the table reveals that these changes seem to have effectively come to an end as of 1990, with the last 10 years actually exhibiting a small reversal of the prior trends.

Note that employment-to-population ratios move in the same direction as hours per person in most cases, whereas hours per worker exhibit the same U-shaped pattern documented earlier for basically all groups.

Tables 4 and 5 reveal that the shift in hours from older people to younger people is primarily due to significant declines in hours of older males. Older males show a decline in hours per worker and a decline in the ratio employed. Older females, in contrast, show a decline in hours per worker that is nearly offset by an increase in the ratio employed.

Understanding the source of these changes in the distribution of hours worked across age groups is also an important issue in labor economics. An obvious can-

Table 4 Males

	Hours Worked per Person by Age (in Years)						
Year	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1950	24.32	39.84	41.82	40.17	35.35	20.74	7.39
1960	20.39	40.01	41.01	39.40	33.65	13.32	5.15
1970	18.46	39.55	40.86	39.19	32.78	10.77	3.65
1980	20.00	37.93	40.18	38.04	28.94	7.65	2.62
1990	19.01	37.96	39.83	38.60	27.06	7.30	2.23
2000	17.74	36.39	37.93	37.19	27.20	7.69	2.70
% Change 1950–2000	–27.05	–8.64	–9.30	–7.41	–23.07	–62.92	–63.50

	Hours Worked per Worker by Age (in Years)						
Year	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1950	40.75	44.51	45.25	45.01	43.99	42.08	38.54
1960	35.65	43.95	44.53	44.00	42.61	37.39	34.07
1970	33.92	43.36	44.12	43.45	42.01	34.69	32.41
1980	36.51	43.48	44.51	43.90	42.23	32.91	30.34
1990	35.29	44.25	45.18	44.80	42.18	32.95	29.38
2000	34.95	44.77	45.80	45.45	43.02	32.56	28.97
% Change 1950–2000	–14.22	0.60	1.20	0.98	–2.19	–22.64	–24.82

	Employment-to-Population Ratio by Age, in % (in Years)						
Year	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1950	59.68	89.50	92.42	89.24	80.37	49.28	19.18
1960	57.21	91.03	92.10	89.53	78.97	35.63	15.11
1970	54.43	91.21	92.61	90.19	78.03	31.05	11.25
1980	54.79	87.24	90.28	86.66	68.54	23.25	8.63
1990	53.88	85.80	88.15	86.17	64.15	22.16	7.59
2000	50.76	81.28	82.83	81.82	63.21	23.62	9.31
% Change 1950–2000	–14.96	–9.18	–10.37	–8.31	–21.35	–52.07	–51.45

Source: U.S. Department of Commerce, Bureau of the Census

Table 5 Females

	Hours Worked per Person by Age (in Years)						
Year	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1950	12.36	11.76	13.07	12.47	8.77	3.82	1.00
1960	10.77	11.90	14.71	16.49	12.31	4.23	1.37
1970	12.39	15.13	17.10	18.46	14.78	3.95	1.27
1980	15.20	22.29	22.13	20.41	14.16	3.17	0.81
1990	15.63	26.41	27.62	26.06	15.67	3.54	0.70
2000	14.84	26.76	27.33	28.00	18.21	4.09	0.88
% Change 1950–2000	20.05	127.58	109.15	124.53	107.52	7.11	–11.83

	Hours Worked per Worker by Age (in Years)						
Year	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1950	37.32	38.38	38.52	38.68	38.38	37.81	36.13
1960	33.06	36.13	36.21	36.95	36.50	32.80	32.63
1970	32.12	35.32	35.30	36.26	36.07	30.77	31.16
1980	32.29	36.63	36.06	36.35	35.57	28.33	27.68
1990	31.10	37.99	37.79	38.02	35.71	28.53	26.17
2000	30.48	38.97	38.66	39.29	37.04	27.87	24.61
% Change 1950–2000	–18.31	1.53	0.39	1.58	–3.49	–26.28	–31.89

	Employment-to-Population Ratio by Age, in % (in Years)						
Year	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1950	33.12	30.63	33.92	32.24	22.86	10.11	2.77
1960	32.59	32.92	40.64	44.63	33.72	12.89	4.21
1970	38.59	42.83	48.43	50.89	40.97	12.83	4.07
1980	47.08	60.85	61.38	56.16	39.80	11.19	2.93
1990	50.24	69.52	73.09	68.56	43.88	12.41	2.67
2000	48.67	68.66	70.68	71.26	49.16	14.69	3.59
% Change 1950–2000	46.97	124.16	108.35	121.04	115.03	45.30	29.45

Source: U.S. Department of Commerce, Bureau of the Census

didate is changes in Social Security benefits for retired workers. We report some data related to this hypothesis in the next section.

To examine the patterns of change more completely, we next present hours of work per person data disaggregated by all three of the categories that we consider—sex, age, and marital status. We provide this breakdown in Tables 6 and 7.[5] The most striking pattern, once we consider marital status, is the large increase in hours worked by married females with a spouse present. The group of married females with the largest increase is those between the ages of 25 and 54 with the youngest child under 6 years old.

In contrast, weekly hours worked per person for single females in most age groups have remained

[5]At the Minneapolis Fed's Web site, we provide the same details for hours per worker and employment-to-population ratios. Go to http://minneapolisfed.org.

Tables 6–7 A More Comprehensive Distribution of Hours Worked*

Average Weekly Hours Worked per Person
for Sets of Demographic Categories in the United States, 1950–2000

Table 6 Married . . .

Status		Sex	Year	Weekly Hours Worked per Person by Age (in Years) 15–24	25–34	35–44	45–54	55–64	65–74	75–99
Spouse Present	*Total*	Males	1950	39.68	42.20	43.46	42.06	37.62	23.39	9.74
			1960	39.50	42.33	42.77	41.21	35.77	14.74	6.23
			1970	37.18	41.86	42.58	40.88	34.73	11.65	4.31
			1980	37.80	41.00	42.01	39.79	30.53	8.15	3.07
			1990	38.75	42.52	42.88	40.88	28.68	7.69	2.56
			2000	37.17	40.99	41.88	40.39	29.17	8.15	3.06
		% Change	1950–2000	–6.34	–2.85	–3.64	–3.98	–22.47	–65.17	–68.54
		Females	1950	9.03	7.93	9.43	8.43	4.42	1.67	.52
			1960	10.00	9.10	12.35	13.56	8.66	2.27	. 98
			1970	14.72	12.31	15.07	16.29	11.81	2.56	1.24
			1980	18.95	19.25	20.13	18.61	12.19	2.44	.79
			1990	21.75	24.36	25.95	24.51	14.00	2.84	.70
			2000	20.49	24.49	26.03	27.27	16.99	3.38	1.02
		% Change	1950–2000	126.90	208.72	175.91	223.61	284.91	101.90	97.71
	*Youngest Child Under 6 Years Old***	Females	1950	3.56	3.66	3.84	3.73	5.07	1.24	.00
			1960	5.74	5.78	6.04	7.55	6.79	2.73	5.99
			1970	9.01	8.41	8.58	9.18	9.82	6.41	7.64
			1980	12.20	13.92	13.21	12.47	10.56	6.77	14.26
			1990	16.03	19.78	19.94	18.91	13.32	7.31	9.27
			2000	15.96	20.10	20.63	20.48	14.62	3.62	3.50
		% Change	1950–2000	348.79	449.20	437.30	448.57	188.44	191.87	Infinity
	*Youngest Child 6–17 Years Old***	Females	1950	10.25	10.45	9.50	6.79	4.07	3.49	15.30
			1960	12.33	13.41	13.74	11.91	9.15	4.00	14.10
			1970	16.01	16.02	16.04	14.66	11.53	8.88	17.71
			1980	20.04	21.46	20.60	17.32	12.46	5.01	9.17
			1990	23.98	25.49	26.33	23.52	15.47	6.20	10.78
			2000	21.98	25.77	26.83	26.50	18.95	5.97	2.58
		% Change	1950–2000	114.37	146.71	182.49	290.48	365.98	71.14	–83.16
Spouse Absent	*Total*	Males	1950	28.49	32.06	33.19	31.44	27.04	17.25	6.04
			1960	28.01	31.05	30.63	29.92	24.61	9.61	3.54
			1970	29.06	32.10	32.53	30.62	25.02	8.73	2.80
			1980	27.41	31.22	32.81	30.27	21.79	6.20	1.82
			1990	26.51	30.61	31.10	31.22	22.24	6.43	1.55
			2000	13.50	23.33	24.44	25.71	19.31	6.40	1.47
		% Change	1950–2000	–52.60	–27.22	–26.39	–18.23	–28.56	–62.88	–75.71
		Females	1950	15.22	19.46	21.73	19.32	14.22	4.71	1.07
			1960	14.59	17.75	20.72	20.83	15.83	4.50	1.65
			1970	16.47	18.51	20.68	21.38	16.93	5.11	1.74
			1980	17.30	22.65	23.46	21.71	15.67	3.67	.67
			1990	16.85	23.35	26.46	25.37	16.23	4.20	.89
			2000	13.13	23.62	24.95	24.20	15.77	3.80	.43
		% Change	1950–2000	–13.75	21.40	14.85	25.26	10.87	–19.25	–60.25

*See the Minneapolis Fed's Web site for a decomposition of hours worked per person into hours worked per worker and employment-to-population ratio.

**In the older age categories, sample sizes are small. For information on populations in each cell, see the Minneapolis Fed's Web site.

Table 7 . . . And Not Married

Status	Sex	Year	Weekly Hours Worked per Person by Age (in Years) 15–24	25–34	35–44	45–54	55–64	65–74	75–99
Single	Males	1950	20.02	32.81	34.14	32.07	27.19	15.44	6.00
		1960	14.92	31.99	30.78	29.19	24.35	9.74	5.07
		1970	13.37	30.86	30.21	28.08	22.28	8.74	4.25
		1980	16.58	31.80	30.26	27.21	19.90	6.12	2.30
		1990	16.75	32.86	30.88	27.25	18.18	5.99	2.21
		2000	16.25	33.29	30.68	27.81	19.12	6.42	3.63
	% Change	1950–2000	–18.80	1.48	–10.15	–13.28	–26.69	–58.42	–39.54
	Females	1950	14.25	30.64	30.53	28.61	22.72	10.31	3.14
		1960	10.76	29.46	29.49	29.07	24.40	10.62	3.40
		1970	10.66	28.76	27.69	27.63	24.30	8.34	3.11
		1980	13.54	30.28	28.89	26.73	20.60	5.20	1.36
		1990	14.17	30.75	30.99	28.30	19.11	5.23	1.17
		2000	13.86	30.52	29.56	28.53	19.67	5.43	1.51
	% Change	1950–2000	–2.76	–.39	–3.17	–.27	–13.41	–47.36	–51.83
Widowed	Males	1950	21.14	34.11	36.28	34.18	29.13	14.94	4.61
		1960	24.38	32.76	31.81	32.16	25.98	9.24	3.58
		1970	22.11	33.09	33.45	31.81	25.19	7.57	2.16
		1980	22.86	28.58	31.44	30.14	21.16	5.17	1.70
		1990	16.75	28.14	29.93	29.64	18.63	5.06	1.43
		2000	6.54	16.76	24.76	27.43	18.46	5.10	1.66
	% Change	1950–2000	–69.06	–50.87	–31.76	–19.75	–36.63	–65.85	–63.95
	Females	1950	17.15	21.68	23.89	20.09	12.93	4.29	.83
		1960	15.65	17.65	22.82	23.36	15.71	4.72	1.18
		1970	20.03	22.58	21.89	23.49	18.01	4.14	.97
		1980	14.31	18.35	21.43	21.99	15.86	3.34	.73
		1990	10.31	19.35	24.83	25.23	15.48	3.64	.60
		2000	8.65	18.20	23.40	24.71	16.02	3.99	.74
	% Change	1950–2000	–49.57	–16.09	–2.04	22.98	23.87	–6.93	–11.43
Divorced	Males	1950	33.24	35.49	35.62	32.93	28.73	15.72	11.56
		1960	31.00	32.98	32.73	29.77	25.83	9.78	4.95
		1970	29.88	34.81	33.65	31.20	24.34	8.36	5.17
		1980	31.63	34.96	35.83	32.15	22.60	6.55	2.79
		1990	32.37	35.76	35.36	33.61	22.62	6.93	2.55
		2000	30.29	36.10	35.44	32.86	23.67	7.60	3.40
	% Change	1950–2000	–8.88	1.73	–.51	–.23	–17.60	–51.62	–70.61
	Females	1950	25.56	28.71	30.66	27.32	21.99	10.07	1.94
		1960	24.23	27.75	29.90	29.54	24.10	9.18	2.48
		1970	26.57	27.32	29.81	29.68	24.90	8.26	2.52
		1980	25.05	30.05	31.37	29.81	23.16	5.85	1.59
		1990	24.21	30.18	33.76	32.65	24.21	6.71	1.54
		2000	25.70	30.94	32.24	32.03	24.62	7.46	1.98
	% Change	1950–2000	.56	7.74	5.14	17.23	11.95	–25.97	2.10

Source: U.S. Department of Commerce, Bureau of the Census

roughly constant between 1950 and 2000. There is a broad similarity in the pattern of hours worked by single females and single males. Thus, with the large rise in married female hours, there has been a reallocation of hours from single-person households to married-person households.

Life-Cycle Profiles

As noted, one way to view the data we have gathered from the six U.S. censuses is that they provide partial work life-cycle histories for many cohorts. Those individuals who are, for example, between 25 and 34 years old in the 1950 census are the same individuals who are between 35 and 44 years old in the 1960 census, between 45 and 54 years old in the 1970 census, and so on.[6]

Table 8 presents some of the census data in a manner consistent with this view. First consider the shaded area of the table, which presents average weekly hours worked per person for the total population in different age cohorts taken from the six censuses. The first entry in the shaded area for each column represents data taken from the 1950 census. The last entry in the shaded area in each column represents data taken from the 2000 census. Those in between are taken from the intermediate censuses. For example, those aged 15–24 during the 1950 survey were born between 1926 and 1935, those aged 15–24 during the 1960 survey were born between 1936 and 1945, and so on. Each row in the table corresponds to a different cohort. For example, the cohort born between 1926 and 1935 had a life-cycle pattern of hours of 18.23, 25.60, 28.61, 28.90, 21.03, and 5.72—which is the typical hump-shaped pattern.

Given that in the aggregate work hours per person have remained relatively constant since World War II, we might expect that life-cycle patterns have also not changed much across generations. To check this, we need complete life-cycle data for the individual cohorts. We have six observations for several cohorts, but fewer for others. Therefore, we extrapolated the census data in both directions in order to construct complete life-cycle profiles for several consecutive cohorts.[7] We extrapolated for three groups—total population, males, and females. Since marital status changes over the life cycle, we do not carry out any calculations for groups based on marital status. The results of the extrapolation are shown in Tables 8–10, outside of the shaded areas. Charts 1–3 show both the data and the extrapolations.

These extrapolated profiles represent how the life-cycle hours profiles would look if the trends present during 1950–2000 were to continue for a much longer time.[8]

Clearly, the data suggest that if trends continue, the shifts in life-cycle profiles will be dramatic, especially for middle-aged females and older males. For example, over the century, hours for females aged 35–44 will increase from about 3 to about 34—more than tenfold. At the same time, hours for males aged 65–74 will fall from about 25 to 5. These are very large reallocations of hours worked.

Changes in Relevant Factors

We have demonstrated that there are large reallocations of hours from males to females, from older people to younger people, and from single-person households to married-person households. Here, we discuss some factors that may be relevant to these reallocations.[9]

One factor relevant to the reallocation of hours from males to females is the narrowing of the gap between female and male wages. In Chart 4, we plot the ratio of female to male before-tax earnings for full-time workers in manufacturing between 1820 and 1930 and in all sectors between 1900 and 1992. The source of these data is Goldin 1994. As the chart shows, the gap has narrowed considerably. This could be the consequence of less gender discrimination or increased relative productivity of females as the importance of physical strength to work has waned. If we take into account changes in U.S. tax policy that led to lower effective marginal tax rates on wives, then we find a further narrowing of the gender wage gap. Jones, Manuelli, and McGrattan (2003) argue that observed changes in the gender wage gap can explain simultaneously the significant increases in average hours worked by married women and the relative constancy in the hours worked by single women, single men, and married men.

Another factor relevant to the reallocation of hours from males to females is innovation in home technol-

[6] This, of course, is subject to the qualification mentioned earlier about immigration and death.

[7] The details of our extrapolation procedure are discussed in Appendix D. We used several procedures for the extrapolation and found that the results were similar for the statistics on which we focus.

[8] Our procedure also extrapolates backward in time and may not generate good predictions of how much work young people did in 1900. This would simply indicate that the trends present from 1950 to 1990 are different from those from 1900 to 1950.

[9] See Appendix A for details on the data.

Tables 8–10

Extrapolated Life-Cycle Profiles of Hours Worked

U.S. Census Data Extrapolated as Explained in Appendix D*

Table 8 By Total Population

	Average Weekly Hours Worked per Person by Age (in Years)						
Year Born	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1866–75	23.78	19.93	23.37	23.37	22.27	14.29	3.90
1876–85	22.70	20.94	24.33	24.47	22.53	11.99	2.99
1886–95	21.64	22.07	25.12	25.45	22.16	8.43	2.21
1896–1905	20.79	22.96	26.00	26.31	22.60	6.95	1.45
1906–15	19.47	23.97	27.24	27.76	23.30	5.11	1.24
1916–25	18.44	25.48	27.50	28.40	21.06	5.18	1.55
1926–35	18.23	25.60	28.61	28.90	21.03	5.72	1.33
1936–45	15.50	27.00	30.98	32.15	22.53	5.32	1.29
1946–55	15.37	30.03	33.64	32.53	22.27	5.39	1.31
1956–65	17.62	32.18	32.62	33.90	22.67	5.45	1.23
1966–75	17.35	31.64	33.95	35.57	23.22	5.36	1.19
1976–85	16.33	33.19	34.94	36.71	23.46	5.38	1.16

Table 9 By Males

	Average Weekly Hours Worked per Person by Age (in Years)						
Year Born	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1866–75	37.73	41.75	44.05	42.12	39.06	25.10	7.39
1876–85	35.34	41.43	43.49	41.44	37.49	20.74	5.15
1886–95	32.95	41.03	42.87	40.88	35.35	13.32	3.65
1896–1905	30.79	40.78	42.37	40.17	33.65	10.77	2.62
1906–15	28.19	40.47	41.82	39.40	32.78	7.65	2.23
1916–25	25.76	39.84	41.01	39.19	28.94	7.30	2.70
1926–35	24.32	40.01	40.86	38.04	27.06	7.69	2.38
1936–45	20.39	39.55	40.18	38.60	27.20	6.66	2.30
1946–55	18.46	37.93	39.83	37.19	25.33	6.33	2.33
1956–65	20.00	37.96	37.93	36.52	24.13	6.01	2.20
1966–75	19.01	36.39	36.96	36.01	23.16	5.45	2.14
1976–85	17.74	35.34	35.88	35.15	21.81	5.05	2.09

*Highlighted areas indicate actual U.S. Census data. The other data are extrapolated.

Table 10 By Females

	Average Weekly Hours Worked per Person by Age (in Years)						
Year Born	15–24	25–34	35–44	45–54	55–64	65–74	75–99
1866–75	10.42	.00	2.78	3.76	4.38	4.04	1.00
1876–85	10.59	1.38	5.35	6.95	6.98	3.82	1.37
1886–95	10.79	3.97	7.69	9.82	8.77	4.23	1.27
1896–1905	11.18	5.95	10.04	12.47	12.31	3.95	.81
1906–15	11.08	8.25	13.07	16.49	14.78	3.17	.70
1916–25	11.41	11.76	14.71	18.46	14.16	3.54	.88
1926–35	12.36	11.90	17.10	20.41	15.67	4.09	.76
1936–45	10.77	15.13	22.13	26.06	18.21	4.14	.74
1946–55	12.39	22.29	27.62	28.00	19.35	4.47	.75
1956–65	15.20	26.41	27.33	31.18	21.08	4.78	.70
1966–75	15.63	26.76	30.74	34.77	22.89	5.00	.69
1976–85	14.84	30.63	33.61	37.67	24.45	5.29	.67

Source: U.S. Department of Commerce, Bureau of the Census

ogy that frees up time for market work. In Chart 5, we plot the quality-adjusted price index for eight home appliances (taken from Gordon 1990) relative to the price deflator for the gross domestic product (GDP deflator). This series falls at a rate of 8.5 percent per year, due in large part to technological advancement in the production of home capital. Greenwood, Seshadri, and Yorukoglu (forthcoming) argue that this technological advancement, which freed up time from household chores, can explain the dramatic rise in female labor force participation during the twentieth century.

Technological innovations in contraception may also be a relevant factor in the shift of female hours from the home to the market. Goldin and Katz (2002) argue that the availability of birth control pills effectively lowered the costs to women of pursuing professional degrees and subsequent careers, and also raised the age of first marriage. Between 1950 and 2000, there has been a large increase in female attendance in four-year colleges and professional schools. Goldin and Katz (2002) report, for example, that the fraction of females in medical and law schools rose from under 10 percent in the 1960s to close to 50 percent by 2000.

According to Olivetti (2002), changes in the workplace have led to increased returns to experience, with larger increases for females. She argues that this has altered the career paths for married women with children by making it more costly for them to withdraw from the labor market to care for young children.

Another possibility is that social norms have changed. Fernandez, Fogli, and Olivetti (2002) argue that the shift of females into the workplace has led to less discriminatory attitudes of males.

Finally, we note that the total fertility rate has changed dramatically over the period we study.[10] Between 1950 and 2000, the fertility rate declined 36 percent, falling from 3,337 to 2,130.[11] Of course, some care need be taken in assessing the link between fertility and hours of work by females, since both represent choices, at least to some extent. However, greater availability of contraceptives may plausibly be an underlying factor that can account for both trends.

The preceding section documents that another significant reallocation of hours has been from older people to younger people. A potentially relevant factor in this

[10]The total fertility rate for any year is the number of births that 1,000 females would have in their lifetime if, at each age, they experienced births according to that year's birthrate.

[11]See U.S. Department of Commerce 1975, Table 69, and 2002, Table 71.

Charts 1–3

Possible Shifts in Hours Worked

Extrapolated Average Weekly Hours Worked per Person
by Cohorts at Various Ages in the United States

Chart 1 **Total Population**

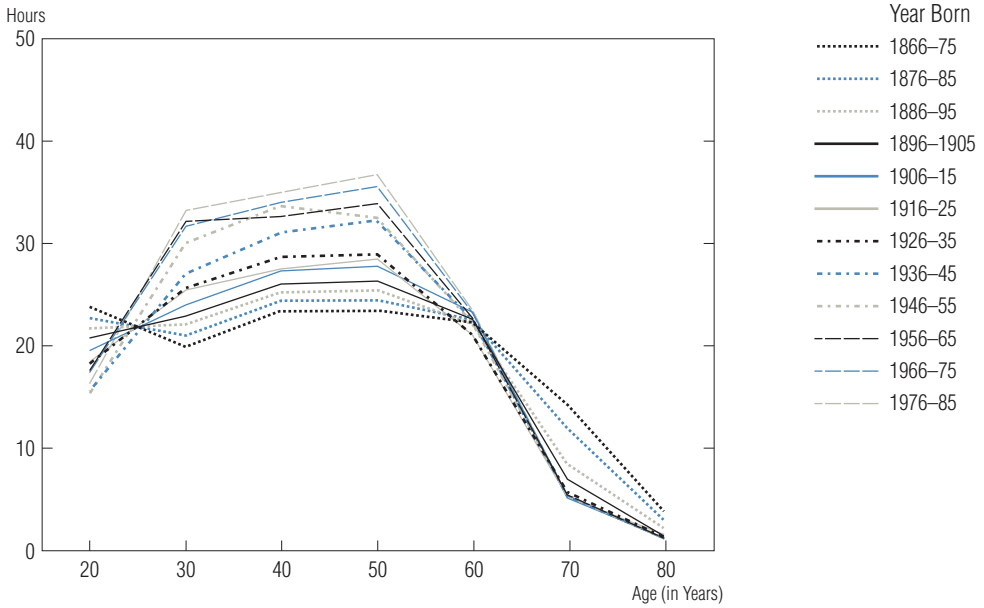


Chart 2 **Males**

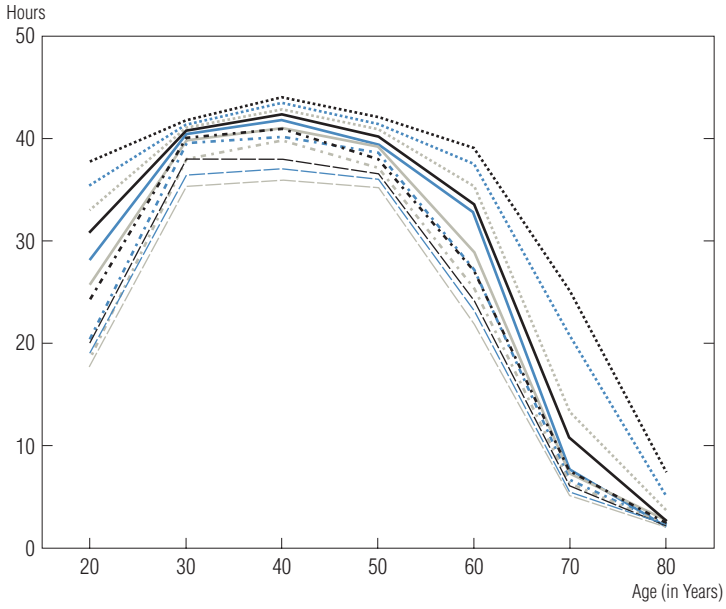
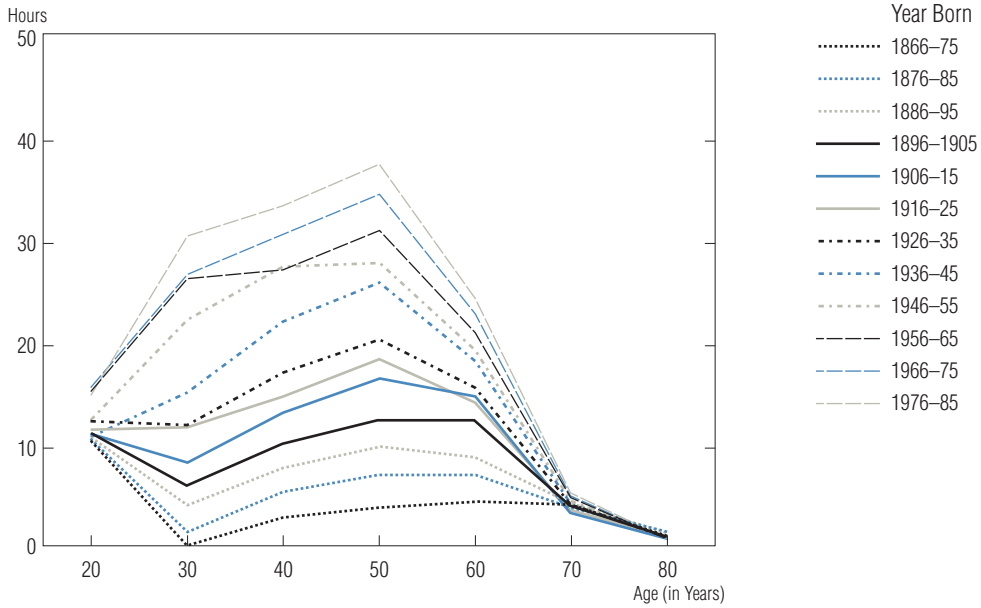


Chart 3 **Females**

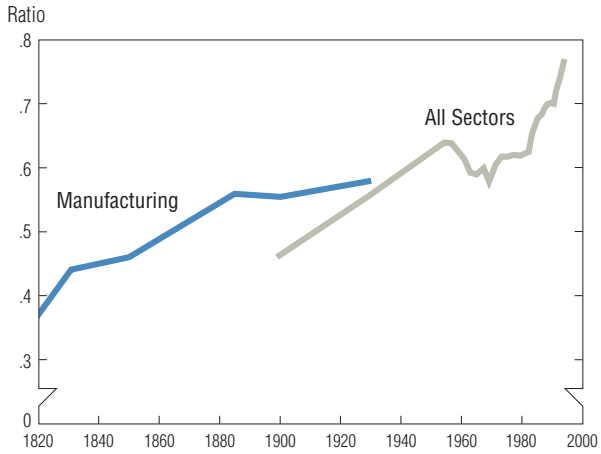


Sources: Tables 8–10

Chart 4

A Narrowing of the Gender Wage Gap

The Ratio of Female to Male Before-Tax Earnings for Full-Time Workers in Manufacturing Between 1820 and 1930 and in All Sectors Between 1900 and 1992, in the United States



Source: Goldin 1994

reallocation is the dramatic increase in U.S. Social Security benefits to retired workers. In Chart 6, we show the average monthly benefits in constant (2000) dollars. Over the 1940–2000 period, these benefits have more than tripled. Since eligibility rates also changed over this period, the tripling of benefits actually understates the economic impact of Social Security. Such changes can be expected to have some impact on retirement and hence on the number of hours that older individuals are willing to work.[12]

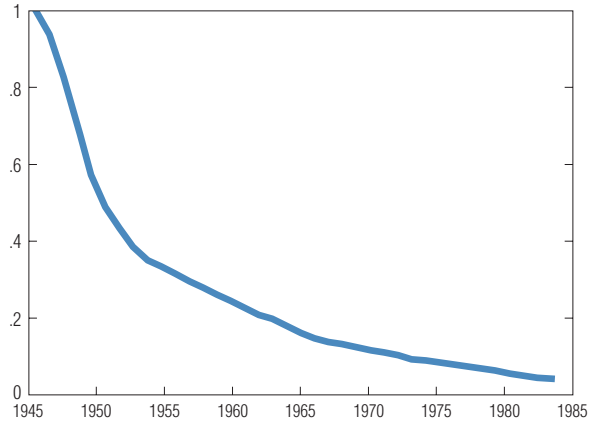
Finally, there has been a shift from single-person household hours to married-person household hours, due in part to policies and regulations (like divorce laws) that affect family structure. To document changes in family structure over the 1950–2000 period, we report in Table 11 what portions of the population (aged 15 and over) have been in each of several marital status categories. The data in Table 11 show major shifts over time: by 2000 a much smaller portion of the population is married with a spouse present and a much larger portion is

[12]See, for example, Lumsdaine, Stock, and Wise 1994 for evidence of how retirement plans influence hours worked for older individuals.

Chart 5

Innovating in Home Technology

The Price Index for Eight Home Appliances
Relative to the GDP Deflator, 1947–84

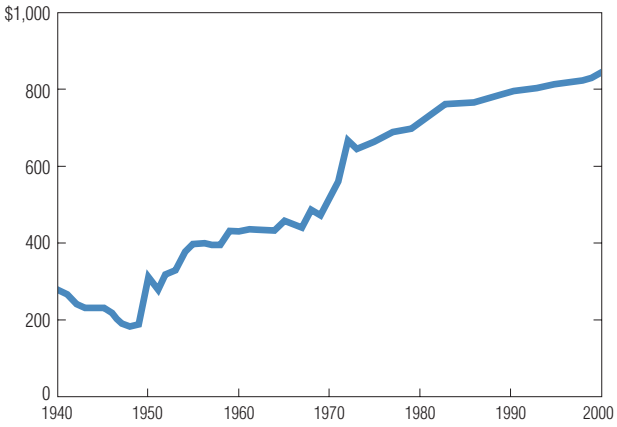


Source: Gordon 1990

Chart 6

Increasing Retirement Benefits

Average Monthly Social Security Benefits to U.S.
Retired Workers in Constant 2000 Dollars, 1940–2000



Source: U.S. Social Security Administration

Table 11

Changes in Family Structure

Percentage of the Population in Each Marital Status Category
In the United States, 1950–2000

	Married With Spouse				
Year	Present	Absent	Single	Widowed	Divorced
1950	64.00	4.43	21.08	8.25	2.24
1960	65.59	3.71	20.12	8.03	2.56
1970	61.42	3.72	23.24	8.19	3.43
1980	56.78	3.43	25.95	7.64	6.19
1990	53.60	4.10	26.43	7.48	8.39
2000	51.26	5.27	27.09	6.63	9.75
% Change 1950–2000	–19.91	18.96	28.51	–19.64	335.27

Source: U.S. Department of Commerce, Bureau of the Census

separated, single, widowed, or divorced. If marital status is a significant determinant of hours of work, these shifts in family structure should imply significant changes in work hours.

Conclusion

We have documented three points concerning hours of work in the United States in the post–World War II period. First, there have been large changes in factors that theory suggests may be relevant to hours of work; in particular, there have been large changes in the gender wage gap, technologies for producing home capital, availability of contraception, Social Security benefits, and family structure. Second, there have been large changes in lifecycle profiles of hours worked for various demographic groups. Third, there has been a negligible change in average hours per person at the aggregate level.

We have updated our findings from McGrattan and Rogerson 1998, which are based on the five U.S. decennial censuses for the period 1950–90, by including data from the 2000 census. Even with the recent data, we continue to find that since 1950, large numbers of weekly work hours have shifted from males to females, from older people to younger people, and from those once-married or married with a spouse absent to those currently married with a spouse present. However, the pace of these changes has changed considerably over time; in particular, it seems to have slowed considerably

during the most recent decade, even reversing itself in some cases. For example, the increase in hours worked by females accelerated throughout the period 1950–90, but slowed dramatically in the 1990s to their lowest rate of increase in the entire postwar period. For older males the decrease in hours worked was largely complete by 1980, and those hours even increased slightly in the most recent decade.

Quantitatively, accounting for both the large reallocations of hours worked and the relative constancy of aggregate hours per person remains an important open issue. This accounting is relevant even for researchers considering the aggregate effects of fiscal and monetary policy changes. Treating all households alike may well lead to inaccurate predictions of the effects of policies that impact some groups in the population and not others.

Finally, while we have focused here on data for the United States, an examination of cross-country data may be useful in understanding which factors have contributed most to changes in hours worked across groups.[13] If these factors have changed in different ways across countries, cross-country data may provide useful information about the importance of each factor.

[13]See Merz 2003 for an analysis of the hours of work of women in Germany.

Appendix A
Data

Here we provide the sources of our data and details on the construction of the data series we use in the preceding paper.

Hours, Employment, and Earnings

The source of our data is survey data from the U.S. Department of Commerce, Bureau of the Census. (See U.S. Department of Commerce 1950–2000.) In particular, we use data from the Integrated Public Use Microdata Series (IPUMS) created at the University of Minnesota (www.ipums.org). The IPUMS consists of samples of the U.S. population drawn from federal censuses. We use 5 percent samples and extract the following variables:

- PERWT: person weight
- AGE: age in years as of the respondent's last birthday prior to or on the day of enumeration
- SEX: sex
- MARST: current marital status
- EMPSTAT: employment status
- HRSWORK2: total number of hours the respondent was at work in the previous week (given in intervals)
- UHRSWORK: number of hours per week usually worked if the respondent worked during the previous year.

From these raw data, we construct 192 records for each decennial year during 1950–2000. Each record contains 15 fields. The fields are as follows:

1. Sex	0 = Total 1 = Males 2 = Females
2. Age	0 = Total (15 years and older) 1 = From 15 to 24 years 2 = From 25 to 34 years 3 = From 35 to 44 years 4 = From 45 to 54 years 5 = From 55 to 64 years 6 = From 65 to 74 years 7 = 75 years and over
3. Marital Status	0 = Total 1 = Single 2 = Married, spouse present 3 = Married, spouse present, youngest child under 6 years (Males have zero in these records.)

4 = Married, spouse present, youngest child from 6 to 17 years (Males have zero in these records.)
5 = Married, spouse absent
6 = Widowed
7 = Divorced

4. Total Population N
5. Number Employed E
6. Total Employed Part-Time E_P
7. Employed 1–14 Hours per Week E_{1-14}
8. Employed 15–29 Hours per Week E_{15-29}
9. Employed 30–34 Hours per Week E_{30-34}
10. Total Employed Full-Time E_F
11. Employed 35–39 Hours per Week E_{35-39}
12. Employed 40 Hours per Week E_{40}
13. Employed 41–48 Hours per Week E_{41-48}
14. Employed 49–59 Hours per Week E_{49-59}
15. Employed 60 or More Hours per Week E_{60+}

From those records, we construct these series:*

1. Number of People Reporting Hours $N_R = E_P + E_F$
2. Hours $H = (7.5E_{1-14} + 22E_{15-29} + 32E_{30-34} + 37E_{35-39} + 40E_{40} + 44.5E_{41-48} + 54E_{49-59} + 62.5E_{60+})(E / N_R)$
3. Hours per Person H/N
4. Hours per Worker H/E
5. Employment/Population E/N.

Ratio of Female to Male Full-Time Earnings

This ratio of earnings is based on full-time, year-round employees.

The source of these data is Goldin 1994, Figure 13. The manufacturing data between 1820 and 1930 are from Goldin 1990, Table 3.1. New England data are used between 1820 and 1850. The manufacturing estimate for 1930 is for weekly full-time employment. The all-sectors data for 1900 and 1930 are from Goldin 1990, Table 3.2. The data for 1955–1987 are from Goldin 1990, Table 3.1, with median year-round workers used for 1955–1969 and median weekly wage and salary income for 1971–1987. The all-sectors data for 1988–1992 are from the U.S. Department of Labor's Bureau of Labor Statistics *Employment and Earnings*.

Quality-Adjusted Price Index for Eight Appliances

This quality-adjusted divisia price index uses data for the following eight appliances: refrigerators, room air conditioners, automatic washing machines, clothes dryers, TV sets, undercounter dishwashers, and microwave ovens. The price index is deflated using the GDP implicit deflator.

The sources of these data are Gordon 1990, Table 7.23, and the national accounts Table 1.19 of the U.S. Department of Commerce's Bureau of Economic Analysis, available at www.bea.gov.

Social Security Benefits

Social Security benefits are the average monthly benefits for retired workers in current dollars divided by the consumer price index for all items for all urban consumers (converted to 2000 dollars).

The sources of these data are the U.S. Social Security Administration's 2001 *Annual Statistical Supplement* to the *Social Security Bulletin,* Table 5.C2, and the Bureau of Labor Statistics Series CUUR0000SA0, available at www.bls.gov.

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*In McGrattan and Rogerson 1998, we did not use records with totals (that is, sex = 0, age group = 0, or marital status = 0), but instead aggregated using population weights. Here we do use the available data for aggregate categories. The choice of aggregation only affects aggregation of hours per worker. Population-weighted estimates in McGrattan and Rogerson 1998 are not directly comparable to the estimates we report here, which, for each group, are the total group hours divided by the total group employment.

Appendix B
Two Measures of Hours per Person

Here we describe the two measures of hours per person that we use in the preceding paper. The first is available for the period 1950–90, and the second is available for the period 1980–2000. We then describe how we construct a time series for the entire 1950–2000 period.

In decennial censuses 1950 through 1990, the survey included the following question. **How many hours did this person work last week (at all jobs)?** *Subtract any time off, add overtime or extra hours worked*. The respondent was to give the actual number of hours worked at all jobs last week, even if that was more or fewer hours than usually worked. The IPUMS variable corresponding to this survey question is HRSWORK2.

In decennial censuses 1980 through 2000, the survey included the following question. **During the weeks worked in 19xx, how many hours did this person usually work each week?** The respondent was to give the best estimate of the hours usually worked most weeks if the hours worked each week varied considerably. The IPUMS variable corresponding to this survey question is UHRSWORK.

To construct a time series using all six censuses, we start by applying the procedure outlined in Appendix A with the data in HRSWORK2 for the period 1950–90. We then take the variable UHRSWORK for the period 1980–2000 and construct hours for people with the following two characteristics: (1) they are employed now (that is, have detailed EMPSTAT codes 10 through 15) and (2) they have UHRSWORK > 0. The hours are put in the same intervals that are used for HRSWORK2. Then the procedure described in Appendix A is applied.

We find some level differences between hours per person based on HRSWORK2 and UHRSWORK for the overlapping years 1980 and 1990. In Chart B1, we show average weekly hours for the total population (aged 15 and over) using the two measures. Notice that while the change between 1980 and 1990 is exactly the same, the levels of hours are not exactly the same. Much of the difference is in the level estimates for males. In Charts B2 and B3, we display the two measures for all males and all females. Again, we see that the changes in the average weekly hours between 1980 and 1990 are the same across the two measures. But the estimate of average hours per person for males is lower by about one-third of an hour when we use UHRSWORK to construct our measure of hours. If we consider male hours by marital status, we find that most of the difference in the measures is coming from a difference in estimates for males with a spouse present.

Because the changes in hours are the same across the two

Charts B1–B2

Two Measures of Average Hours of Work per Person

Chart B1 Total Population

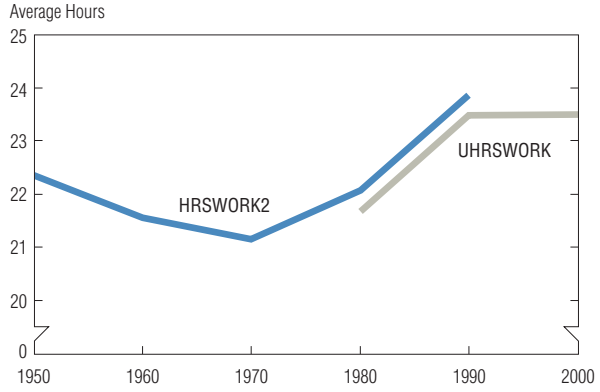


Chart B2 Males

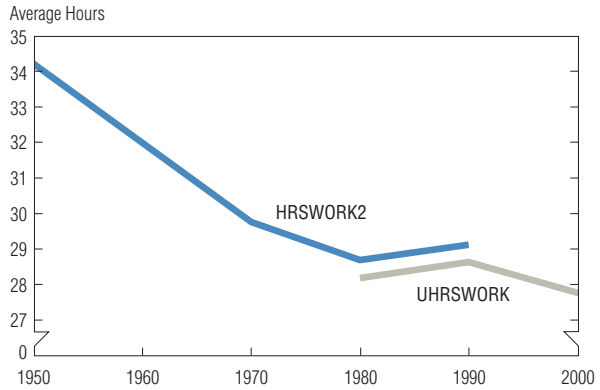
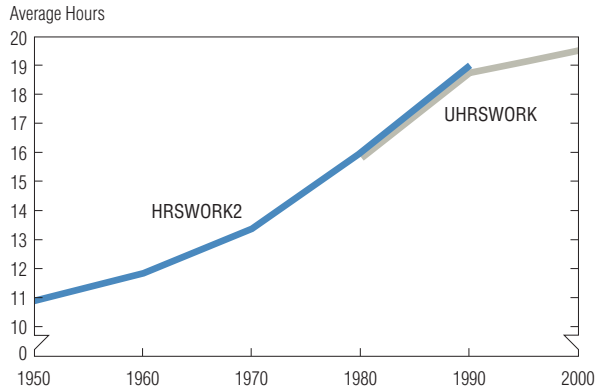


Chart B3 Females



measures of per-person hours, we use the estimates of hours for 1950–90 based on HRSWORK2, and we use the estimate of the difference between hours in 1990 and 2000 based on UHRSWORK.

Appendix C
Decomposing Hours per Person

The number of weekly hours worked per person differs across demographic groups, for example, with age and marital status. If the distribution of people across demographic groups is changing over time, a natural question is, To what extent do changes in aggregate hours per person reflect changes in hours across demographic groups and to what extent do they reflect changes in the distribution of people across those groups? Here we try to answer that question by decomposing changes in aggregate hours.

The accompanying table shows the result. The demographic categories used in the calculation are sex, age, and marital status. (See Appendix A for an explanation of the categories.) The table first shows the actual hours of work per person for 1950–2000, as reported in the preceding paper's Table 1. Then the accompanying table shows the result of using the category weights for 1950 to aggregate the hours per person per category for the other years. Finally the table shows the result of using the hours per person per category for 1950 to aggregate, using weights for each of the other years.

The basic message of this table is that if category weights had not changed at all over the 1950–2000 period, the increase in hours per person would have been about 13 percent rather than the 7 percent actually observed. The increase would thus have been nearly twice as large. However, this increase is small relative to the changes in the factors behind work reallocations. (See the section on changes in relevant factors.)

A Decomposition of Average Weekly Hours Worked per Person

		Hours per Person Recalculated With	
Year	Average Hours per Person	1950 Weights	1950 Hours
1950	22.34	22.33	22.33
1960	21.55	21.97	21.83
1970	21.15	22.51	21.19
1980	22.07	23.67	21.30
1990	23.86	25.43	21.76
2000	23.94	25.23	22.02
% Change 1950–2000	7.18	13.01	–1.36

Source: U.S. Department of Commerce, Bureau of the Census

Appendix D
The Extrapolation Procedure

Here we provide the details of our extrapolation procedure for constructing full life-cycle profiles of Tables 8–10 in the preceding paper.

Consider, for example, Table 8. Basically, we use the estimates in the shaded area of the table—which are based on the census data—to construct the estimates in the non-shaded portion of the table.

To fill in missing observations, we use data on average weekly hours worked for other cohorts of the same age. For example, suppose we want to fill in an estimate of average hours worked for males aged 35–44, born in 1966–75. To do so, we use the hours for the five earlier cohorts (those born in 1916–65) and extrapolate. In particular, we estimate the missing element by taking a weighted sum of the past three changes in hours of work. For males aged 35–44 born in 1966–75, our estimate looks like this:

$$37.93 + \omega_1(37.93 - 39.83) + \omega_2(39.83 - 40.18) + \omega_3(40.18 - 40.88).$$

The estimates in Tables 8–10 use equal weights: $\omega_1 = 1/3$, $\omega_2 = 1/3$, and $\omega_3 = 1/3$. Therefore, our estimate of average hours worked for males aged 35–44 born in 1966–75 is 36.95.

To estimate the average weekly hours worked by males aged 35–44 born in 1976–85, then, we use data for cohorts born in 1926–65 and our estimate for those born in 1966–75 and proceed as before. Applying this procedure for all missing observations leads to the estimates of Table 8.

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