10. U.S. QUARTERLY PRODUCTIVITY MEASURES
Uses and Methods

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Introduction

Since 1967, the Bureau of Labor Statistics (BLS) has regularly published quarterly data on the change in labor productivity. Data on labor productivity and unit labor costs, together with related measures, are published on a very timely basis eight times per year in the form of a "Productivity and Costs" press release.[157] The initial data for a quarter are released shortly after publication of the advance gross domestic product (GDP) data by the Bureau of Economic Analysis (BEA) at the end of the month following the close of the quarter. Revised productivity and costs measures are released the following month after BEA's publication of the "preliminary" GDP data. There is no release in the third month because changes in the data usually are minimal. Historical data are made available on the BLS website and in other formats upon request.

The quarterly press release includes measures for six major U.S. sectors: business, nonfarm business, manufacturing, durable and nondurable goods manufacturing, and nonfinancial corporations. The measures for the broadest sector now published, the business sector, were introduced in 1976.[158] Business sector output excludes from GDP the output of general government, nonprofit institutions, and the household sector (including owner-occupied housing). The method of estimating output for these components of the economy is problematic for productivity measurement, as will be discussed below, and thus measures of productivity for the total economy are considered less reliable. Measures are produced for the total economy, however, and are made available by request. Most attention is given to the nonfarm business sector. Although the farm sector is small in the United States, it is highly volatile.

Multifactor productivity (MFP) data give a more comprehensive picture of productivity change over time, and they provide a decomposition of labor productivity change into sources

[157] The press release includes data on changes in labor productivity, output, hours, compensation per hour, and unit labor costs. See http://www.bls.gov/lpc/home.htm. Although the costs series are important economic measures, we do not discuss them in this paper.

[158] In 1967, BLS began publishing quarterly data on the change in labor productivity for the total economy excluding general government, but this measure was supplanted by the quarterly measures for the business sector. Measures for manufacturing also began in 1967.

of growth. However, due to the complexities associated with constructing MFP, these data are not available on a quarterly basis.[159]

The quarterly labor productivity and costs data are widely watched by the financial community, nonfinancial businesses, government policymakers, researchers, and many others. Two reasons for interest in quarterly productivity data stand out. First, they provide more current information than do the annual data. Second, they provide necessary information for analyzing economic behavior around recessions. A brief overview of trends and cyclical behavior, as well as volatility, of the quarterly labor productivity measures for the nonfarm business sector, the business sector and the total economy is provided in Section II. Section III presents procedures and measurement issues for constructing quarterly productivity and cost statistics for major sectors of the U.S. economy. Although various other industry productivity data are available on an annual basis, many users have requested additional industry productivity detail on a current, quarterly basis.[160] In the final section, we briefly discuss BLS's effort to develop prototype quarterly labor productivity and unit labor costs measures for retail trade and to assess their performance.

Trends and cycles in U.S. labor productivity

Labor productivity growth rates between selected business cycle peaks are presented in Table 10–1 for the total economy, the business and nonfarm business sectors, and total manufacturing. In every period, the nonfarm business and business sectors experienced the same or higher productivity growth than did the whole economy.[161] The speedup in labor productivity growth during the 1990s, which followed the slowdown that began around 1973, has generated widespread attention and analysis. Most focus has been on the nonfarm business sector, which accounts for approximately 77 percent of GDP. A strong productivity speedup is seen for the economy as a whole and for the business sector during the latter part of the 1990s,[162] but they experienced slightly lower productivity growth in the earlier part of the 1990s than in the previous decade.

Because of the conversion of our data from the Standard Industrial Classification system (SIC) to the North American Industry Classification system (NAICS), current figures for

159 Publication of annual multifactor productivity measures lags considerably behind the publication of the labor productivity data. In order to provide MFP information on a more current basis, BLS recently developed and published preliminary measures of MFP building on a method developed by Steve Oliner and Dan Sichel (2000) at the Federal Reserve Board. See the latest news release at www.bls.gov/news.release/pdf/prod3.pdf, and Meyer and Harper (2005).

160 We emphasize the importance of not inferring specific results for the nonmanufacturing sector from the business sector and manufacturing data, both because of differences in output concepts and because of concerns about some aspects of service sector measurement that are less important in broader measures.

161 As will be explained in Section III, the output measures for the excluded sectors have some built-in productivity assumptions.

162 In 2004, business sector output accounted for 77.1 percent of GDP output, and nonfarm business output accounted for 76.1 percent. The share of farm output has declined, primarily early in the period analyzed. In 1948, business sector output accounted for 84.5 percent of GDP, and nonfarm business sector output accounted for 76.3 percent of GDP.

manufacturing are not precisely comparable to data prior to 1987. Nonetheless, these figures are relatively similar for the period where data are available on both an SIC and a NAICS basis, 1987–2002, and a speedup appears for this sector as well.

T 10 – 1 Labor Productivity Growth, 1947–2004

average annual rates of change

	Total Economy	Business	Nonfarm Business	Manufacturing (SIC)	Manufacturing (NAICS)
1948–1973	2.6%	3.0%	2.7%	2.4%[a]	
1973–1979	1.1%	1.3%	1.2%	2.1%	
1979–1990	1.4%	1.6%	1.4%	2.6%	
1990–1995	1.1%	1.5%	1.6%	3.2%	3.4%
1995–2000	2.1%	2.7%	2.5%	4.4%	4.0%
2000–2004	2.8%	3.5%	3.4%		5.0%

[a] change for 1949–73

Source: U.S. Bureau of Labor Statistics

Data released August 9, 2005

Given the interest in productivity, the timeliness of the quarterly data is important both for business analysts and government policy makers. The quarterly data also are invaluable for studying economic behavior around recessions, as well as other changes in economic behavior that can not be observed in annual data.

We stress two things to users, however. The first is that the quarterly data are volatile, so that too much weight should not be placed on the precise movement for just one quarter, and changes for a few quarters should not be taken as an indicator of a change in trends.[163] Second, productivity movements should be analyzed with reference to the business cycle, because there are patterns of productivity change that appear around business cycles that should not be interpreted as a measure of trend.

Various theories have been put forth on how productivity varies just before, during, and shortly after recessions. For instance, the Wesley Mitchell story is that before a recession, productivity declines and this triggers an increase in unit labor costs and cutbacks by the weaker firms. The labor hoarding argument postulates that when demand starts dropping for whatever reasons, firms cut back on output but want to hold on to their workers because of recruitment and training costs, so productivity declines. A third story is a structural one in which deaths of inefficient firms, and births of efficient ones, raise productivity faster during periods of economic stress; see Caballero and Hammour (1994). In the United States, analyses of productivity behavior around recessions focus on the nonfarm business sector. Here, we first examine the change in nonfarm business productivity and hours around recessions, then compare movements in nonfarm business sector output per hour and GDP per hour for these periods.

[163] The press release also presents the percent change from the corresponding quarter of the previous year. Analysts often use those data, which tend to be smoother than the quarter-to-quarter changes.

T 10 – 2 Comparison of quarterly movements in labor productivity (LP) and hours (H) around business cycle peaks: nonfarm business sector

average annual rates of change

PEAK	1948 IV		1953 II		1957 III		1960 II		1969 IV		1973 IV		1980 I		1981 III		1990 III		2001 I	
	LP	H	LP	H	LP	H	LP	H	LP	H	LP	H	LP	H	LP	H	LP	H	LP	H
-4	1.4	2.6	-1.8	2.9	4.1	2.2	0.0	-1.2	3.4	3.7	9.1	6.0	-1.1	1.6	4.4	4.9	0.6	0.0	7.1	0.2
-3	-0.3	-0.2	7.5	10.7	4.6	0.4	-0.7	0.1	-3.3	3.7	0.3	4.2	-0.5	3.4	6.1	2.2	3.7	0.9	-0.9	0.0
-2	0.8	2.8	2.9	4.1	-1.4	-0.9	9.1	2.5	0.1	1.9	-3.6	2.7	-0.5	0.8	-5.2	0.1	2.7	-2.1	3.9	-1.7
-1	2.6	-3.7	1.2	0.7	5.9	-1.9	-5.8	0.7	-1.9	-1.2	-2.5	2.0	1.6	-1.0	3.5	-0.1	1.6	-2.7	-0.4	-0.7
PEAK																				
+1	3.5	-6.7	2.1	-4.0	1.4	-8.3	1.0	-2.3	1.2	-1.6	-0.6	-1.7	-4.5	-7.0	-5.1	-1.5	-2.9	-2.0	5.5	-4.3
+2	4.3	-6.7	-1.5	-6.3	-6.2	-9.1	-5.2	-3.7	6.2	-5.3	-1.0	1.0	1.6	-1.8	-2.6	-6.5	0.9	-4.2	1.4	-4.3
+3	9.9	-4.2	0.5	-5.4	7.6	-5.7	4.9	-2.2	6.3	-2.0	-4.2	-1.4			0.8	1.6			6.3	-5.1
+4	-2.9	-1.6	2.8	-3.0					-3.5	-3.1	3.9	-6.6			0.7	-2.8				
+5											3.2	-12.5			3.4	-3.6				
Prior Peak to Peak			3.5	1.9	2.0	0.4	2.3	0.4	2.7	1.8	2.9	1.5	1.3	1.8	1.0	-0.3	1.6	1.9	2.0	1.6
-4 to Peak	1.1	0.4	2.4	4.6	3.3	-0.1	0.6	0.5	-0.4	2.0	0.8	3.7	-0.1	1.2	2.2	1.8	2.2	-1.0	2.4	-0.5
Peak to Trough	3.7	-4.8	0.9	-4.7	0.9	-7.7	0.2	-2.7	2.5	-3.0	0.3	-4.3	-1.5	-4.4	-0.6	-2.6	-1.0	-3.1	4.4	-4.6
Tough +4	7.0	7.3	5.1	3.8	5.0	6.5	6.9	2.0	3.3	1.9	4.2	3.3	2.2	1.8	5.0	5.5	4.4	-1.4	2.8	-0.8
Trough +8	4.7	4.4	2.1	3.4	2.8	3.5	4.6	1.5	4.0	2.7	3.0	2.7			3.0	4.9	3.1	0.4	3.8	-0.4
Trough +14	3.5	3.9	2.2	1.2			4.2	2.2			2.3	3.9			2.9	3.3	1.9	1.8	3.3	0.5

Source: U.S. Bureau of Labor Statistics

Data released August 9, 2005

For each recession, Table 10–2 presents the change in nonfarm business sector labor productivity and hours for each of the four quarters preceding the peak and for each quarter during the period between the peak and trough; notice that these are percent changes from the previous quarter at an annual rate. Table 10–2 also presents annual average movements over the complete cycle (peak to peak) and over the four quarters preceding the peak. Finally, it presents the average annual productivity change over the first 4, 8, and 14 quarters following the trough.

With the exception of the business cycle peak in 1990.III, there are productivity declines for at least one of the four quarters prior to each peak. For most periods prior to 1981, productivity changes tended to be smaller in the four quarters leading up to the peak than the productivity trend over the preceding cycle, but the reverse is true for the last three recessions. One difference in the economy over time has been the increasing size of the service economy. For 7 out of the 10 business cycle peaks, including the last four, we observe labor hours declining immediately preceding the peak quarter.

During recessions, productivity growth has tended to demonstrate some weakness. For all but the most recent recession, there was a decline in nonfarm business sector productivity in at least one quarter between the peak and trough. The three recessions between 1980 and 1990 demonstrated cumulative productivity change from peak to trough that was negative. In contrast, the recession of 2001 has the greatest cumulative positive productivity growth of all past U.S. recessions at 4.4 percent annual average growth. The last recession that demonstrated such strong productivity growth was the recession of 1948, with 3.7 percent annual growth. In addition, the average nonfarm business productivity change was lower between the peak and trough than the average for the preceding cycle for all the recessions except that in 2001. One recent factor is that because of just-in-time production processes and because of the dominance of the service sector where inventories are less important than in the goods sector, there now tend to be lower inventories; this may result in weaker productivity declines around recessions. Nonfarm business sector hours decline from peak to trough in all periods.

Once past the trough, nonfarm business productivity rebounds. In the 14 quarters since the business cycle peak in 2001, labor productivity has grown strongly, not only compared to past complete cycles, but also compared to other recoveries since 1973. The recession of 1991 was the first to be followed by cumulative negative nonfarm business sector hours growth through the second quarter following the trough. The recession of 2001 was the first to show a cumulative decline in nonfarm business sector hours through eight quarters following the trough; following the trough of 2001, these hours declined for 10 quarters before showing positive growth.

Because measures of the economic activity of general government, nonprofits, and the household sector may differ over time from that of the business sector, it is interesting to examine how the productivity story around recessions would differ if we looked instead at GDP per hour. Table 10–3 presents the comparison of nonfarm business and total economy productivity movements around the business sector peaks. Except for the two most recent recessions, the growth in labor productivity for nonfarm business was the same or lower over the 4 quarters prior to the peak than was the growth in labor productivity for the whole

T 10 – 3 Comparison of quarterly movements in labor productivity around business cycle peaks for the nonfarm business sector (NFB) and the total economy (GDP)

average annual rates of change

PEAK	1948 IV		1953 II		1957 III		1960 II		1969 IV		1973 IV		1980 I		1981 III		1990 III		2001 I	
	NFB	GDP	NFB	GDP	NFB	GDP	NFB	GDP	NFB	GDP	NFB	GDP	NFB	GDP	NFB	GDP	NFB	GDP	NFB	GDP
-4	1.4		-1.8	1.0	4.1	6.7	0.0	3.1	3.4	1.3	9.1	5.6	-1.1	0.9	4.4	3.1	0.6	-1.2	7.1	6.1
-3	-0.3	6.2	7.5	5.6	4.6	3.4	-0.7	0.8	-3.3	0.0	0.3	0.8	-0.5	-2.6	6.1	6.7	3.7	4.3	-0.9	0.0
-2	0.8	-2.1	2.9	6.1	-1.4	0.5	9.1	9.3	0.1	1.0	-3.6	-4.5	-0.5	0.0	-5.2	-1.0	2.7	3.1	3.9	3.6
-1	2.6	2.4	1.2	3.5	5.9	2.8	-5.8	-6.0	-1.9	-0.9	-2.5	2.6	1.6	2.6	3.5	6.6	1.6	-0.2	-0.4	-0.4
PEAK																				
+1	3.5	-1.4	2.1	0.2	1.4	3.7	1.0	0.0	1.2	2.4	-0.6	-4.1	-4.5	-3.3	-5.1	-7.1	-2.9	-2.0	5.5	4.1
+2	4.3	1.6	-1.5	-1.5	-6.2	-1.6	-5.2	-1.6	6.2	3.6	-1.0	2.8	1.6	0.5	-2.6	-0.3	0.9	0.9	1.4	0.3
+3	9.9	10.3	0.5	1.4	7.6	4.5	4.9	3.3	6.3	7.0	-4.2	-3.8			0.8	-0.8			6.3	4.6
+4	-2.9	-0.2	2.8	5.3					-3.5	-2.3	3.9	2.2			0.7	1.4				
+5											3.2	4.3			3.4	2.8				
Prior Peak to Peak			3.5	3.6	2.0	2.1	2.3	2.6	2.7	2.5	2.9	2.7	1.3	1.1	1.0	2.1	1.6	1.3	2.0	1.6
-4 to Peak	1.1		2.4	4.0	3.3	3.3	0.6	1.8	-0.4	0.3	0.8	1.1	-0.1	0.2	2.2	3.8	2.2	1.5	2.4	2.3
Peak to Trough	3.7	2.5	0.9	1.3	0.9	2.2	0.2	0.6	2.5	2.6	0.3	0.3	-1.5	-1.4	-0.6	-0.8	-1.0	-0.6	4.4	3.0
Tough +4	7.0	6.5	5.1	4.7	5.0	3.8	6.9	5.1	3.3	3.5	4.2	3.4	2.2	3.8	5.0	3.2	4.4	3.4	2.8	2.1
Trough +8	4.7	4.2	2.1	2.2	2.8	2.8	4.6	4.2	4.0	3.4	3.0	2.4			3.0	2.4	3.1	2.4	3.8	3.1
Trough +14	3.5	3.9	2.2	2.5			4.2	3.8			2.3	1.8			2.9	2.3	1.9	1.5	3.3	2.7

Source: U.S. Bureau of Labor Statistics

Data released August 9, 2005

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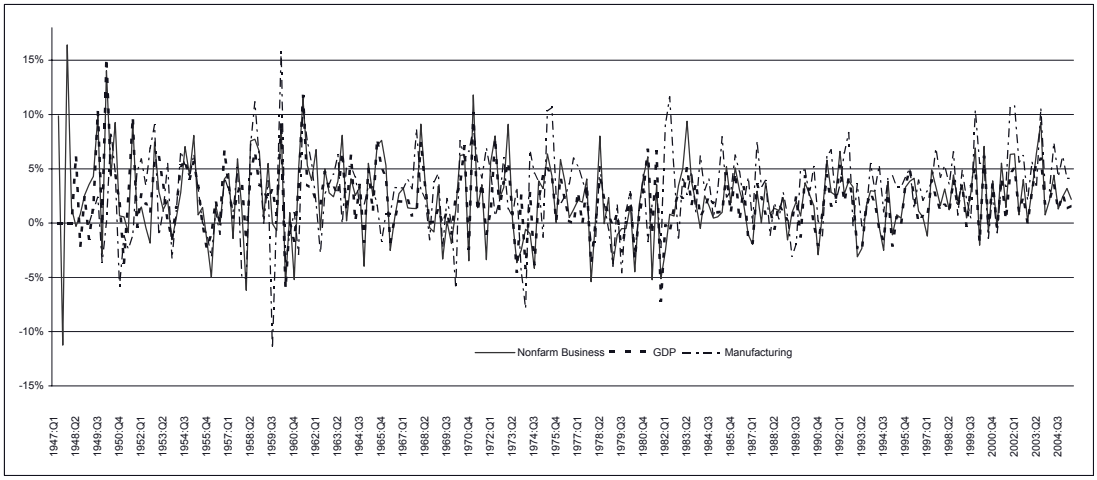
economy; this is in contrast to the situation for whole cycles, where the total economy experiences lower productivity growth. For the recession periods from peak to trough, productivity growth for the nonfarm business and total economy sectors are often quite similar. However, in 2001 we observe stronger growth in nonfarm business productivity as compared to total economy productivity. For quarters following the trough, nonfarm output per hour growth usually exceeds the growth in GDP per hour.

Volatility comparisons

Analysts interested in the stability of the economy have studied the volatility of time series data. High-frequency data, such as quarterly series on productivity, although seasonally adjusted, show volatility throughout cycles that can be missed when analyzing only annual data. Graph 10–1 shows quarterly productivity changes from 1947 to the present for the whole economy, nonfarm business, and manufacturing.

Graph 10-1:
U.S. Major Sector Productivity
percent change from previous quarter at an annual rate



Source: U. S. Bureau of Labor Statistics
Data released August 9,2005

One method of precisely measuring the volatility of a series is to look at the variance of the quarter-to-quarter changes in the series over time. For the period 1949–2003, the variances of quarterly productivity fluctuations for the total economy, the nonfarm business sector and the manufacturing sector are quite similar, with the total economy series (0.09) being slightly more stable than the nonfarm business (0.13) and manufacturing (0.14) sectors.[164]

[164] The time period of 1949–2003 was selected in order to have a consistent time period for all 3 sectors. Manufacturing data are available on an SIC basis from 1949–2003.

T 10 – 4 Volatility of quarterly changes in major sector output, hours and productivity

	1949–2003	Pre-1984	Post-1983	Change
Total Economy				
Variance(output)	0.16	0.23	0.05	-0.19
Variance(hours)	0.10	0.13	0.05	-0.08
Variance(labor Productivity)	0.09	0.11	0.04	-0.07
2* Cov(hours, labor productivity)	-0.03	-0.01	-0.05	-0.03
Nonfarm Business Sector				
Variance(output)	0.29	0.41	0.08	-0.33
Variance(hours)	0.13	0.17	0.07	-0.10
Variance(labor Productivity)	0.13	0.16	0.07	-0.10
2* Cov(hours, labor productivity)	0.02	0.06	-0.06	-0.12
Manufacturing				
Variance(output)	0.68	0.98	0.17	-0.82
Variance(hours)	0.46	0.65	0.13	-0.52
Variance(labor Productivity)	0.14	0.17	0.07	-0.11
2* Cov(hours, labor productivity)	0.07	0.14	-0.03	-0.17

Source: U.S. Bureau of Labor Statistics

Data released August 9,2005

Output in the United States has been more stable since the mid-1980s than previously, and there exists a literature that seeks to explain the phenomenon. This body of research postulates several possibilities for the decreased volatility such as: a shift to a service economy which is less volatile than manufacturing; improvement in inventory management that stabilizes the gap between production and sales; a reduction in external economic shocks; and improvements in monetary policy.[165] [166] McConnell and Perez-Quiros (2000) identify a structural break in the volatility of U.S. output growth in the first quarter of 1984.

A recent study by Stiroh contributes to this body of research, examining the declining volatility of output growth from a production perspective. He decomposes output volatility into the influences of hours, labor productivity and the correlation between the two as follows: *Var(output) = Var(hours) + Var(labor productivity) + 2* Cov(hours, labor productivity).*

He finds that, for the nonfarm business sector, the dramatic decline in output volatility after 1983 can be attributed equally to modest declines in the volatility of hours and labor productivity and an increasingly negative correlation between hours and labor productivity.[167] In the manufacturing sector, he finds that the significant stabilization of output is primarily

[165] A detailed discussion of this issue can be found in Stock and Watson (2002) and Ramey and Vine (2004). There is no consensus on which of these factors is primarily responsible for the stabilization of output in the past two decades.

[166] The variance of a series also will be affected by characteristics of the underlying survey data.

[167] This decreased volatility of productivity can be seen in figure 1.

attributed to declining hours volatility with smaller contributions from labor productivity stabilization and the negative correlation between hours and productivity.[168] We have replicated Stiroh's findings for the nonfarm business and manufacturing sectors; see Table 10–4. Using data for the entire economy, we find that GDP per hour and hours for the total economy similarly became less volatile in the post-1983 period, and that the correlation between productivity and hours became more negative. In addition, we see that the total economy demonstrated a smaller decline in output volatility after 1983 as compared to the nonfarm business sector and that the correlation between hours and labor productivity played a smaller role in this decline.

Current procedures and major measurement issues

Output data for GDP, the business and nonfarm business sectors, and nonfinancial corporations, as well as compensation data come from the national income and product accounts constructed by the Bureau of Economic Analysis (BEA). Output data for manufacturing industries come from the Federal Reserve Board of Governors and the Census Bureau. Labor hours are constructed using various BLS data series, as well as other source data.

Business sector output

As we have noted earlier, our featured quarterly productivity measures are for the business and nonfarm business sectors, where productivity can most meaningfully be measured. This is because the portions of the total economy that have been excluded from the business sector are either measured using input costs such as employee compensation or are activities for which our data system has no corresponding hours.

The largest sector to be excluded is general government. Since the "output" of the sector is not sold on the market, it is evaluated in the national accounts as the sum of employee compensation in the sector and the general government consumption of fixed capital (economic depreciation). By far the largest proportion of this is employee compensation[169] and since this is tied closely to the hours worked by government employees, a no-growth productivity assumption is incorporated into the output measure.

The second sector to be excluded from the business sector is private households, which includes the compensation of employees in private households and owner-occupied housing. The first part, compensation of employees of private households, incorporates a no-growth productivity assumption. For the value of owner-occupied housing, on the other hand, there is no measure of the hours that homeowners put into maintaining their own housing.

Nonprofit organizations serving individuals – in the United States, these are primarily hospitals and universities – also are excluded from the definition of the business sector. Here we come closest to defining what we mean by "business" sector which excludes goods and

168 McConnell and Perez-Quiros (2000) and Stiroh evaluated industry effects on stability and both studies find that there is a substantial difference in volatility across industries. Both agree that durable goods manufacturing is a source of aggregate output volatility.

169 Employee compensation in general government accounts for about 85 percent of output.

services with "prices" that may not reflect market pricing because of donated money and time as well as the tax-exempt status of much of the organizational income. Many charities and religious organizations may not even offer a good or service that can be quantified, so national accounts must value them in terms of input costs.

BEA constructs quarterly estimates of nominal and real output for detailed components of GDP from various data sources. Where necessary, BEA adjusts the data for seasonal change. The detailed data then are aggregated to the GDP level using a Fisher-Ideal index. BEA also calculates the measure of business sector output by removing from GDP the gross product of general government, private households (including owner-occupied housing) and nonprofit institutions.

The measurement of business sector hours

For productivity and cost measurement, the ideal measure of undifferentiated labor input is hours at work allocated to the industry in which it is worked. In addition, the production of quarterly labor productivity measures requires high-frequency data that are produced very soon after the end of the reference quarter. The BLS publishes monthly data on employment and hours from two surveys – the Current Establishment Statistics (CES) program and a labor force survey of households, the Current Population Survey (CPS) – that meet these criteria. Both surveys are conducted monthly and the data are released on the same day, usually the first Friday of the following month.

Because the data are monthly, all of the employment and hours data used for the productivity measures have to be adjusted to remove the effects of normal seasonal variation. Without seasonal adjustment, it is hard to distinguish the trend and cyclical movements in the data. Most of the data that we use in productivity measurement are seasonally adjusted by the office that produces them. We produce quarterly series by averaging three months of seasonally adjusted data.

The U.S. establishment survey is not perfect for our needs, however. Historically, only the paid hours of production and nonsupervisory workers in private, nonagricultural industries have been collected.[170] In addition, the establishment survey only covers wage and salary workers and excludes those working in private households.[171] For the business sector measures, therefore, we require a way to adjust paid hours to hours at work; we need hours measures for nonproduction and supervisory workers; we need employment and hours measures for the wage and salary workers in agriculture, forestry, fishing, and hunting and in government enterprises and all workers who are self-employed or working without pay in a family business; and we also need estimates of the number of wage and salary workers in nonprofit organizations serving individuals.

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170 The CES survey began collecting all employee payroll and hours data in September 2005. Publication of the first all employee hours and earnings series, on an experimental basis, began in April 2007. Publication of official series is scheduled for early 2010. Once several years of data are available, the Office of Productivity and Technology will begin studying the new series to see if and how they can be used for productivity and cost measurement.

171 Private household employees are excluded from the business sector measures. However, the hours of these employees are included in our unpublished total economy measure.

The U.S. labor force survey, called the Current Population Survey (CPS), was designed as a very current indicator of economic performance and is closely watched by persons studying trends in employment and the unemployment rate. Early each month, usually on the first Friday, BLS reports the employment rate for the preceding month. Because it was designed to cover employment trends for the entire economy, the labor force survey is the only monthly survey collecting data on the employment and hours of the self-employed and unpaid family workers and persons working on farms.

However, because of the emphasis on measuring employment and unemployment, the survey is collected using data for a specific period, the week containing the 12th of the month, a week that contains very few U.S. holidays. Having a reference week that is consistent from month to month facilitates the analysis of employment and unemployment trends. However, seven of the ten Federal holidays are never in the labor force reference week and two more are only included occasionally. Thus, using hours levels from the labor force survey to construct monthly hours levels is expected to lead to monthly estimates that are biased upward.[172]

In addition, more than one out of every twenty workers in the United States holds more than one job, and in the labor force survey all hours worked are allocated to the primary job of the worker. Beginning in 1994, the outgoing rotation group in the CPS, about 15,000 households, now are asked questions about their second job (but not any third or fourth jobs) if they work at more than one activity. Prior to 1994, information about the activities of multiple-jobholders was collected no more than once a year.

Since June, the BLS has been using the limited information on second jobs to more properly count the hours of farm workers and persons working in their own or the family unincorporated business.[173] This method, which looks at hours worked in primary and secondary jobs separately, allows us to allocate the hours to the proper industry. The employment measure used for these workers now corresponds more closely to a job count, similar to the CES.

As mentioned above, the CES collects the hours for which production workers are paid. We prefer hours at work to hours paid as the proper measure for labor productivity. We consider that changes in vacation, holiday, and sick pay accounted for in hours paid are best viewed as changes in labor costs, which should be attributed to differences in average hourly compensation. However, hours at work, even unproductive ones, should be counted toward the labor input available to the employer for production of goods and services.

To calculate hours at work for the production workers and nonsupervisory workers, the BLS productivity office uses supplementary information to adjust paid hours to hours at work. *[174]* From 1983 through 2000, BLS collected information on the hours worked and hours paid of production and nonsupervisory workers in the Hours at Work Survey (HAWS). These data, collected for broad sectors of the economy, were used to directly convert the CES hours data

172 See Eldridge, Manser, and Otto (2004) for further discussion of CES and CPS hours and some empirical comparisons.

173 See "Productivity and Costs: First quarter 2005, Revised", 2 June 2005 at ftp://ftp.bls.gov/pub/news.release/History/prod2.06022005.news

174 See http://www.bls.gov/lpc/lprhws/lprhwhp.pdf .

to hours at work. However, this survey was discontinued following collection of 2000 data and replaced with information from the BLS Employment Cost Index program on normal work schedules and employer practices concerning vacation, holidays, and paid sick leave.

To cover all employees, data for nonproduction and supervisory workers are added by calculating average weekly hours at work for these workers relative to the average weekly hours at work of production and nonsupervisory workers in the same industry. Furthermore, we account for hours at work in all jobs. These data are from the CPS. We then apply the final average weekly hours per job ratios for all employees to job employment counts of production workers from the CES. Because the data are from the labor force survey and reflect hours at work rather than hours paid, it must be applied to average weekly hours for production and nonsupervisory workers that have already been adjusted to hours at work, as above.[175]

To measure hours for the business sector, we also need a way to estimate the number of employees of nonprofit organizations serving individuals.[176] In the United States, nonprofit status is designated by the Internal Revenue Service (IRS) which determines which organizations exhibit the required charitable, religious, educational, scientific, and other qualities that make them deserving of tax-exempt status.

Although salaries, compensation, and professional fees are included in the data reported by the IRS, employment is not. However, in the quinquennial censuses of many service-producing industry groups, the Census Bureau publishes separate employment counts for establishments subject to income tax and tax-exempt establishments. This employment information is used to establish the relative proportions of nonprofit employment in those industries for which the information is collected. For inter-censal years and other industries, we supplement the employment counts using information on compensation by legal form of organization from the Bureau of Economic Analysis.[177],[178] These relative proportions are applied to the hours data we derive from the CES to calculate hours of nonprofit organizations.

Possible enhancements

Users often ask for quarterly productivity data for additional industry sectors. Quarterly revenue and price data exist for certain sectors outside of manufacturing. Available labor hours data cover the economy. We recently have been exploring possibilities for publishing quarterly productivity measures for an additional sector, namely, retail trade. The primary

175 For information on how the hours of nonproduction and nonsupervisory workers are computed, see http://www.bls.gov/lpc/lprswawhtech.pdf

176 Nonprofit organizations serving businesses are considered to be part of the business sector.

177 Where employment information is not directly available, we have to make the assumption that employees of nonprofit organizations are compensated at the same rate as employees of for-profit establishments. Although we believe that this assumption is weak, it applies only to a small percentage of the nonprofit employment we calculate. In all cases, however, we make the assumption that employees of nonprofit and for-profit organizations work similar hours.

178 BEA breaks out employee compensation by industry group into four types of organizations, for-profit corporations, nonprofit corporations (which also includes private households), proprietorships and partnerships, and other types of business.

issues concern substantial volatility in the measures, how this might be handled, and whether the resulting measures would be informative and valuable for users. Because of the switch from SIC to NAICS, long, consistent time series cannot be developed, which hampers the effort to seasonally adjust or otherwise smooth the data at this time.

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