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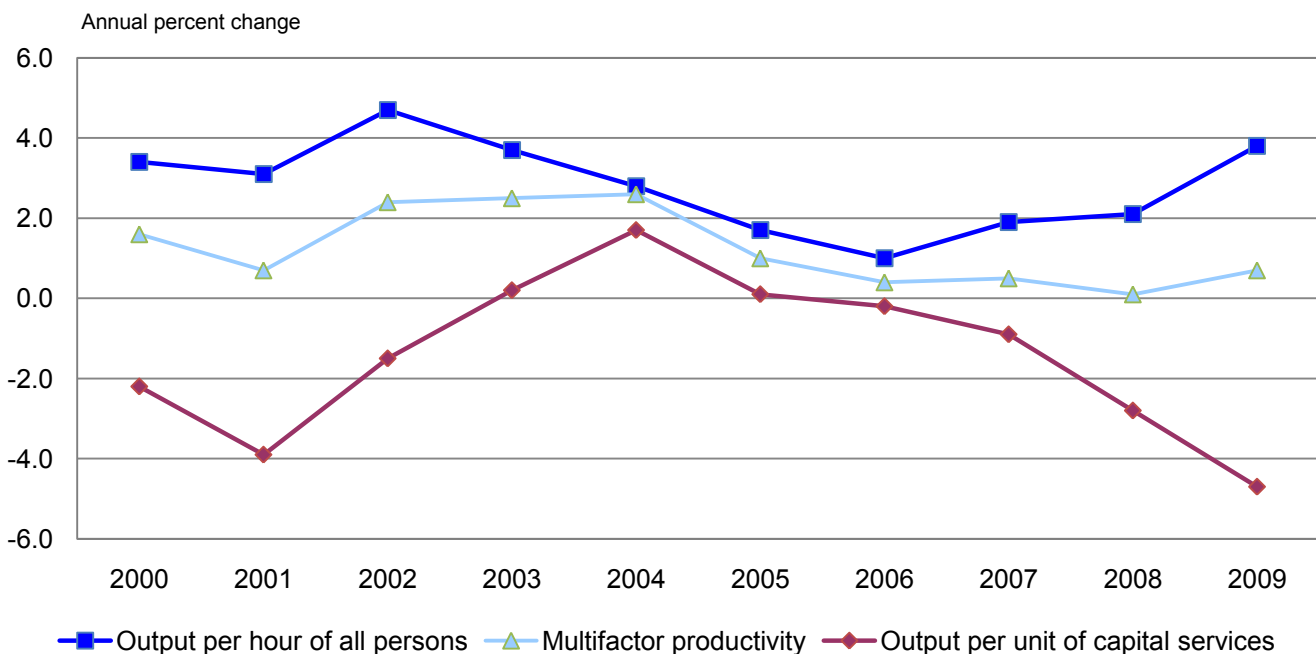
## PRELIMINARY MULTIFACTOR PRODUCTIVITY TRENDS - 2009

**Private nonfarm business sector** multifactor productivity increased at a 0.7 percent annual rate in 2009, the U.S. Bureau of Labor Statistics reported today. (See chart 1, table A.) This was the largest gain in multifactor productivity since 2005. (See table 1.) Multifactor productivity measures the change in output per unit of combined inputs of labor and capital. Multifactor productivity is designed to measure the joint influences on economic growth of technological change, efficiency improvements, returns to scale, reallocation of resources, and other factors, allowing for the effects of capital and labor. Multifactor productivity, therefore, differs from labor productivity (output per hour worked) measures that are published quarterly by BLS since it includes information on capital services and other data that are not available on a quarterly basis. Additionally, multifactor productivity measures for the private business and private nonfarm business sectors account for shifts in the composition of labor. Estimates of labor composition are not included in the quarterly labor productivity measures.

The multifactor productivity gain in 2009 reflected a 3.6 percent decrease in output and a 4.3 percent decrease in the combined inputs of capital and labor. Capital services grew by 1.2 percent, the slowest gain in the series which began in 1987. Labor input fell 6.9 percent, the largest decline for the series which began in 1987.

**Private business sector** multifactor productivity grew 0.8 percent in 2009, the largest gain in multifactor productivity since 2005. The multifactor productivity gain in 2009 reflected a 3.5 percent decline in output and a 4.2 percent decrease in the combined inputs of capital and labor.

Chart 1. Output per hour of all persons, multifactor productivity, and output per unit of capital services in the private nonfarm business sector, 2000-2009



## Historical trends in private nonfarm business

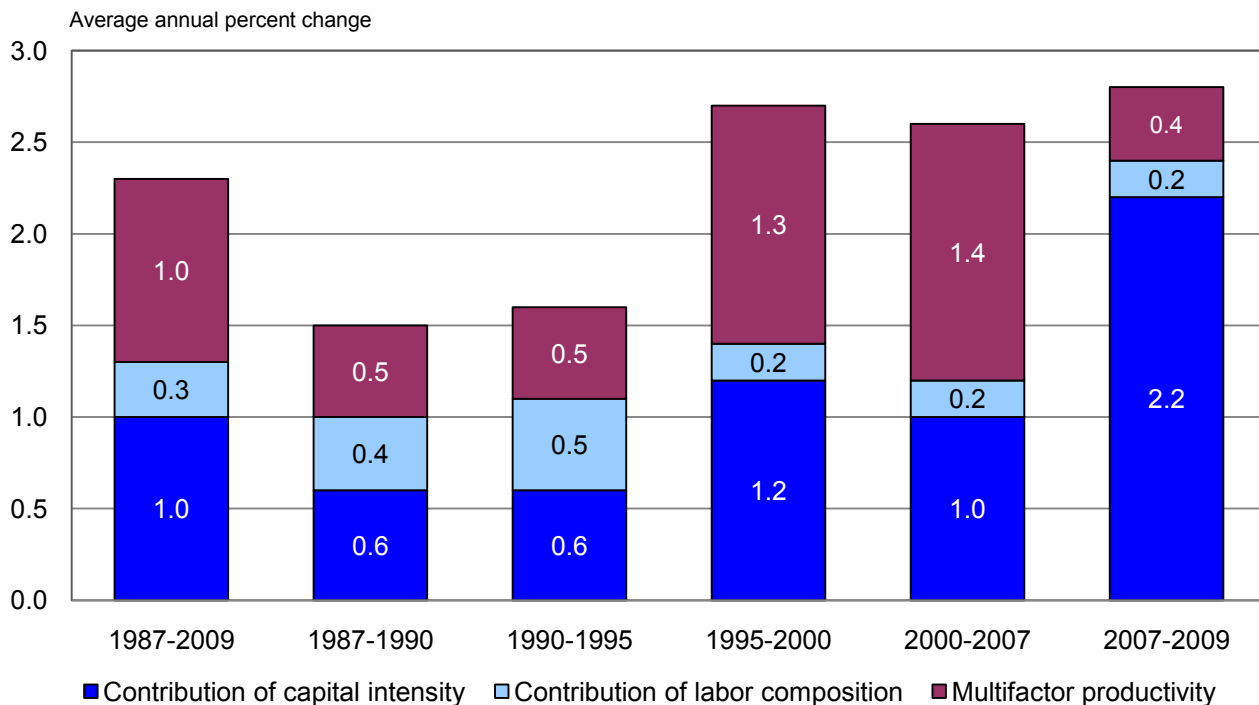
Multifactor productivity in private nonfarm business grew 1.0 percent annually between 1987 (the starting point of the series) and 2009. (See table A.) Output increased at a 2.9 percent annual rate over the period and combined units of labor input and capital services rose an average of 1.9 percent per year. Output per hour (labor productivity) grew 2.3 percent. For the 2007-2009 period, multifactor productivity in private nonfarm business slowed, averaging 0.4 percent per year, a sharp decline from the 1.4 percent growth rate in the 2000-2007 period.

Historical trends in labor productivity growth can be viewed as the sum of three components: multifactor productivity growth, the contribution of increased capital intensity, and the contribution of shifts in labor composition. The relationship between labor productivity growth and these three components can be seen in table B and chart 2. Chart 2 shows how, relative to output per hour, multifactor productivity and the contribution of capital intensity shifted upward in the latter half of the 1990s. These contributions continued to be relatively high over the 2000-2007 period. For 2007-2009, the contribution of capital intensity rose sharply compared to previous periods.

Of the 2.3 percent growth rate in labor productivity for the 1987-2009 period, 1.0 percent can be attributed to increases in multifactor productivity, 1.0 percent to the contribution of capital intensity, and 0.3 percent to changes in labor composition. (See table B.)

The methodology for measuring preliminary multifactor productivity for 2009 is a simplified version of the methodology that BLS uses when more detailed information is available. Data will be revised in mid-year 2011.

Chart 2. Percentage point contributions to growth in output per hour in the private nonfarm business sector, 1987-2009



Multifactor productivity plus the contributions of capital intensity and labor composition may not sum to output per hour due to independent rounding.

**Table A. Compound annual growth rates for productivity, output, and inputs in the private nonfarm business and private business sectors for selected periods, 1987-2009**

In percent

	1987-2009	1987-1990	1990-1995	1995-2000	2000-2007	2007-2009	2008-2009
<u>Private nonfarm business<sup>1</sup></u>							
Productivity							
Multifactor Productivity <sup>2</sup>	1.0	0.5	0.5	1.3	1.4	0.4	0.7
Output per hour of all persons	2.3	1.5	1.6	2.8	2.7	2.9	3.8
Output per unit of capital services	-1.0	-0.4	-0.5	-1.1	-0.6	-3.8	-4.7
Output	2.9	3.2	2.9	5.0	2.7	-1.9	-3.6
Inputs							
Combined inputs <sup>3</sup>	1.9	2.7	2.4	3.6	1.3	-2.3	-4.3
Labor Input <sup>4</sup>	1.0	2.3	2.0	2.5	0.4	-4.3	-6.9
Hours	0.6	1.7	1.3	2.2	0.0	-4.7	-7.1
Labor composition <sup>5</sup>	0.4	0.6	0.7	0.3	0.3	0.4	0.3
Capital services	3.9	3.7	3.4	6.2	3.4	2.0	1.2
Analytic ratio							
Capital services per hour of all persons	3.3	1.9	2.0	3.9	3.4	7.0	9.0
<u>Private business<sup>1</sup></u>							
Productivity							
Multifactor Productivity <sup>2</sup>	1.0	0.6	0.4	1.5	1.5	0.4	0.8
Output per hour of all persons	2.4	1.6	1.5	2.9	2.7	2.9	3.8
Output per unit of capital services	-0.8	-0.4	-0.3	-0.9	-0.5	-3.6	-4.5
Output	2.9	3.2	2.9	5.0	2.7	-1.8	-3.5
Inputs							
Combined inputs <sup>3</sup>	1.9	2.6	2.4	3.4	1.2	-2.2	-4.2
Labor Input <sup>4</sup>	1.0	2.1	2.0	2.3	0.3	-4.2	-6.8
Hours	0.5	1.6	1.3	2.0	0.0	-4.6	-7.0
Labor composition <sup>5</sup>	0.5	0.6	0.7	0.3	0.3	0.4	0.2
Capital services	3.8	3.6	3.2	6.0	3.3	1.9	1.1
Analytic ratio							
Capital services per hour of all persons	3.2	2.0	1.8	3.9	3.3	6.8	8.8

1 Excludes government enterprises.

2 Output per unit of combined labor input and capital services.

3 The growth rate of each input is weighted by its share of nominal costs.

4 Index of hours at work; hours at work by age, education, and gender group are weighted by each group's share of labor compensation.

5 Ratio of labor input to hours.

**Table B. Compound annual growth rates in output per hour of all persons and the contribution of capital intensity, labor composition, and multifactor productivity in the private nonfarm business and private business sectors for selected periods, 1987-2009**

In percent

	1987-2009	1987-1990	1990-1995	1995-2000	2000-2007	2007-2009	2008-2009
<u>Private nonfarm business<sup>1</sup></u>							
Output per hour of all persons	2.3	1.5	1.6	2.8	2.7	2.9	3.8
Contribution of capital intensity <sup>2</sup>	1.0	0.6	0.6	1.2	1.0	2.2	2.8
Contribution of labor composition <sup>3</sup>	0.3	0.4	0.5	0.2	0.2	0.2	0.1
Multifactor productivity <sup>4</sup>	1.0	0.5	0.5	1.3	1.4	0.4	0.7
<u>Private business<sup>1</sup></u>							
Output per hour of all persons	2.4	1.6	1.5	2.9	2.7	2.9	3.8
Contribution of capital intensity <sup>2</sup>	1.0	0.6	0.6	1.2	1.0	2.2	2.8
Contribution of labor composition <sup>3</sup>	0.3	0.4	0.5	0.2	0.2	0.3	0.1
Multifactor productivity <sup>4</sup>	1.0	0.6	0.4	1.5	1.5	0.4	0.8

1 Excludes government enterprises.

2 Growth rate in capital services per hour multiplied by capital's share of current dollar costs.

3 Growth rate of labor composition (the growth rate of labor input less the growth rate of the hours of all persons) multiplied by labor's share of current dollar costs.

4 Output per unit of combined labor input and capital services.

Multifactor productivity plus the contributions of capital intensity and labor composition may not sum to output per hour due to independent rounding.

## Technical Notes

The simplified methodology for preparing preliminary estimates of MFP is outlined in the June 2005 Monthly Labor Review article, "Preliminary estimates of multifactor productivity growth" located at <http://www.bls.gov/opub/mlr/2005/06/art3abs.htm>. This methodology is applied to both the private nonfarm business and private business sectors and measures are calculated only for the most recent year. Data for all previous years are not different from the August 24, 2010 "Multifactor Productivity Trends" news release (USDL-10-1171).

**Capital Services:** Capital services are the services derived from the stock of physical assets and software. Capital services measures constructed for the preliminary MFP measures are based on less detail only for the most recent year. The preliminary measures consist of eight asset types as opposed to the 76 asset types included in estimates for all previous years. The assets included in the preliminary estimates are computers, software, communications and other information processing equipment, other fixed business equipment, structures, inventories, rental residences, and land. Investments, depreciation, and capital income are estimated for each of these eight aggregates. Capital services are calculated by a chained superlative Tornqvist index combining stocks of the eight asset categories, weighted by capital income shares.

**Labor Input:** Labor input in private business and private nonfarm business is obtained by chained superlative Tornqvist aggregation of the hours at work by all persons, classified by age, education, and gender with weights determined by each group's share of labor compensation. The preliminary estimates of 2009 hours worked for the private nonfarm business and private business sectors are extrapolated from the hours worked reported in the nonfarm business and business sectors, respectively, in the June 3, 2010 "Productivity and Costs" news release (USDL-10-0747).

The labor composition index estimates the effect of shifts in the age, education, and gender composition of the work force on the efficiency of hours worked. The preliminary MFP labor composition measure estimates the number of hours worked by each type of worker based on Current Population Survey (CPS) data. The estimate of the 2009 labor composition index assumes relative wages across groups remain constant between 2008 and 2009.

Additional information concerning data sources and methods of measuring labor composition can be found in Cindy Zoghi, 2007, "Measuring Labor Composition: A Comparison of Alternate Methodologies" <http://www.bls.gov/bls/fesacp1121407.pdf>.

**Combined Inputs:** Labor input and capital services are combined using Tornqvist aggregation, employing weights that represent each component's share of total costs. The Tornqvist index uses changing weights; the share in each year is averaged with the preceding year's share. Total costs are defined as the value of output less a portion of taxes on production and imports. Most taxes on production and imports, such as excise taxes, are excluded from costs; however, property and motor vehicle taxes remain in total costs.

**Output:** Private business sector output is a chain-type, current-weighted index constructed after excluding from gross domestic product (GDP) the following outputs: general government, nonprofit institutions, private households (including owner-occupied housing), and government enterprises. This release presents data for the private business and private nonfarm business sectors. The private business sector accounted for approximately 76 percent of gross domestic product in 2005. Additionally, the private nonfarm business sector excludes farms from the private business sector, but includes agricultural services. Multifactor measures exclude government enterprises, while the BLS quarterly Productivity and Cost series include them. The output measures reflect the revised National Income and Product Accounts (NIPA) data released by the Bureau of Labor Statistics (BEA) on July 31, 2009 but do not reflect the revised data released by BEA on July 30, 2010. The preliminary estimates of 2009 output for the private nonfarm business and private business sectors are extrapolated from the output reported in the nonfarm business and business sectors, respectively, in the June 3, 2010 “Productivity and Costs” news release (USDL-10-0747).

**Multifactor Productivity:** Multifactor productivity measures describe the relationship between output in real terms and the inputs involved in its production. They do not measure the specific contributions of labor, capital, or any other factor of production. Rather, multifactor productivity is designed to measure the joint influences of output, capital, and labor on economic growth of technological change, efficiency improvements, returns to scale, reallocation of resources due to shifts in factor inputs across industries, and other factors.

The multifactor productivity indexes for private business and private nonfarm business are derived by dividing an output index by an index of labor input and capital services. The output indexes are computed as chained superlative indexes (Fisher Ideal indexes) of components of real output.

**Table 1. Private nonfarm business sector: productivity and related measures for the 1987-2009<sup>1</sup> period**

Annual percent change from previous year

Year	Productivity			Output <sup>3</sup>	Inputs			Capital services per hour of all persons
	Output per hour of all persons	Output per unit of capital services	Multifactor Productivity <sup>2</sup>		Labor Input <sup>4</sup>	Capital Services <sup>5</sup>	Combined units of labor input and capital services <sup>6</sup>	
1988	1.7	0.9	1.0	4.6	3.5	3.7	3.5	0.8
1989	0.8	-0.3	0.1	3.5	3.3	3.9	3.5	1.1
1990	1.9	-1.9	0.4	1.4	0.1	3.4	1.0	3.8
1991	1.7	-3.6	-0.9	-0.9	-1.1	2.9	0.0	5.5
1992	4.0	1.3	2.3	3.8	1.0	2.5	1.5	2.7
1993	0.7	0.4	0.3	3.6	3.3	3.2	3.3	0.3
1994	1.1	0.9	0.7	4.7	4.1	3.7	4.0	0.1
1995	0.5	-1.2	0.0	3.3	2.7	4.5	3.2	1.7
1996	2.6	-0.4	1.4	4.4	2.2	4.9	3.0	3.0
1997	1.5	-0.4	0.6	5.1	4.0	5.5	4.5	1.9
1998	3.0	-1.2	1.5	5.2	2.4	6.6	3.6	4.3
1999	3.3	-1.4	1.6	5.6	2.6	7.1	3.9	4.7
2000	3.4	-2.2	1.6	4.5	1.2	6.8	2.8	5.8
2001	3.1	-3.9	0.7	1.0	-1.6	5.1	0.3	7.3
2002	4.7	-1.5	2.4	1.9	-2.0	3.5	-0.5	6.2
2003	3.7	0.2	2.5	3.1	-0.4	2.9	0.6	3.5
2004	2.8	1.7	2.6	4.2	1.2	2.4	1.5	1.1
2005	1.7	0.1	1.0	3.4	1.9	3.3	2.4	1.5
2006	1.0	-0.2	0.4	3.2	2.5	3.4	2.8	1.2
2007	1.9	-0.9	0.5	2.4	1.2	3.3	1.9	2.8
2008	2.1	-2.8	0.1	-0.2	-1.7	2.8	-0.3	5.1
2009	3.8	-4.7	0.7	-3.6	-6.9	1.2	-4.3	9.0

See footnotes following table 4.

Source: Bureau of Labor Statistics

**Table 2. Private business sector: productivity and related measures for the 1987-2009<sup>1</sup> period**

Annual percent change from previous year

Year	Productivity			Output <sup>3</sup>	Inputs			Capital services per hour of all persons
	Output per hour of all persons	Output per unit of capital services	Multifactor Productivity <sup>2</sup>		Labor Input <sup>4</sup>	Capital Services <sup>5</sup>	Combined units of labor input and capital services <sup>6</sup>	
1988	1.6	0.5	0.8	4.4	3.4	3.8	3.5	1.1
1989	1.0	-0.1	0.3	3.7	3.2	3.8	3.4	1.1
1990	2.2	-1.6	0.7	1.5	-0.1	3.1	0.9	3.8
1991	1.6	-3.4	-0.9	-0.8	-1.0	2.7	0.1	5.2
1992	4.2	1.6	2.5	4.0	1.0	2.3	1.4	2.5
1993	0.6	0.3	0.2	3.3	3.1	3.1	3.1	0.4
1994	0.9	1.2	0.7	4.9	4.5	3.6	4.2	-0.3
1995	0.1	-1.4	-0.3	2.9	2.7	4.4	3.2	1.6
1996	2.9	-0.1	1.7	4.6	2.0	4.6	2.8	3.0
1997	1.7	-0.1	0.8	5.2	3.9	5.3	4.4	1.9
1998	3.0	-1.2	1.5	5.1	2.3	6.4	3.5	4.3
1999	3.5	-1.2	1.8	5.6	2.4	6.9	3.7	4.7
2000	3.5	-1.9	1.7	4.6	1.2	6.6	2.8	5.5
2001	3.2	-3.8	0.8	0.9	-1.8	5.0	0.2	7.3
2002	4.6	-1.3	2.4	2.0	-1.9	3.4	-0.4	6.0
2003	3.9	0.4	2.6	3.1	-0.5	2.8	0.5	3.5
2004	2.9	1.6	2.6	4.2	1.1	2.5	1.5	1.3
2005	1.7	0.2	1.0	3.4	1.9	3.2	2.3	1.5
2006	1.0	0.0	0.5	3.1	2.3	3.1	2.6	1.0
2007	1.8	-0.8	0.5	2.3	1.1	3.1	1.8	2.6
2008	2.1	-2.6	0.1	0.0	-1.5	2.7	-0.1	4.9
2009	3.8	-4.5	0.8	-3.5	-6.8	1.1	-4.2	8.8

See footnotes following table 4.

Source: Bureau of Labor Statistics



**Table 3. Private nonfarm business sector: indexes of productivity and related measures, 1987-2009<sup>1</sup>**

Indexes 2005=100

Year	Productivity			Output <sup>3</sup>	Inputs			Capital services per hour of all persons
	Output per hour of all persons	Output per unit of capital services	Multifactor Productivity <sup>2</sup>		Labor Input <sup>4</sup>	Capital Services <sup>5</sup>	Combined units of labor input and capital services <sup>6</sup>	
1987	66.1	113.6	82.1	54.2	75.6	47.7	66.0	58.2
1988	67.2	114.6	83.0	56.7	78.3	49.4	68.3	58.6
1989	67.7	114.2	83.0	58.7	80.9	51.4	70.7	59.3
1990	69.0	112.1	83.3	59.5	80.9	53.1	71.4	61.5
1991	70.2	108.1	82.6	59.0	80.0	54.6	71.4	64.9
1992	73.0	109.5	84.5	61.3	80.8	56.0	72.5	66.7
1993	73.4	109.9	84.8	63.5	83.5	57.8	74.9	66.8
1994	74.2	110.9	85.4	66.5	87.0	59.9	77.9	66.9
1995	74.6	109.6	85.4	68.6	89.3	62.6	80.4	68.1
1996	76.5	109.1	86.5	71.7	91.3	65.7	82.8	70.1
1997	77.6	108.7	87.1	75.3	94.9	69.3	86.5	71.4
1998	80.0	107.3	88.4	79.3	97.2	73.9	89.7	74.5
1999	82.6	105.9	89.9	83.7	99.8	79.1	93.2	78.0
2000	85.4	103.5	91.3	87.5	101.0	84.5	95.8	82.5
2001	88.1	99.5	91.9	88.4	99.4	88.8	96.1	88.6
2002	92.2	98.0	94.2	90.1	97.4	91.9	95.7	94.1
2003	95.7	98.2	96.5	92.8	97.0	94.5	96.2	97.4
2004	98.4	99.9	99.0	96.7	98.1	96.8	97.7	98.5
2005	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2006	101.0	99.8	100.4	103.2	102.5	103.4	102.8	101.2
2007	102.9	98.9	100.9	105.6	103.7	106.8	104.7	104.0
2008	105.0	96.1	101.0	105.5	101.9	109.7	104.4	109.3
2009	109.0	91.6	101.7	101.6	94.9	111.0	100.0	119.1

See footnotes following table 4.

Source: Bureau of Labor Statistics

**Table 4. Private business sector: indexes of productivity and related measures, 1987-2009<sup>1</sup>**

Indexes 2005=100

Year	Productivity			Output <sup>3</sup>	Inputs			Capital services per hour of all persons
	Output per hour of all persons	Output per unit of capital services	Multifactor Productivity <sup>2</sup>		Labor Input <sup>4</sup>	Capital Services <sup>5</sup>	Combined units of labor input and capital services <sup>6</sup>	
1987	65.2	111.0	81.1	54.1	76.5	48.8	66.7	58.8
1988	66.3	111.6	81.8	56.5	79.0	50.6	69.0	59.4
1989	67.0	111.5	82.0	58.6	81.6	52.5	71.4	60.1
1990	68.4	109.7	82.6	59.5	81.5	54.2	72.0	62.3
1991	69.5	106.0	81.8	59.0	80.7	55.6	72.1	65.6
1992	72.5	107.8	83.9	61.4	81.5	56.9	73.1	67.2
1993	72.9	108.0	84.1	63.4	84.0	58.7	75.4	67.5
1994	73.6	109.4	84.7	66.5	87.8	60.8	78.6	67.3
1995	73.7	107.8	84.4	68.5	90.1	63.5	81.1	68.3
1996	75.8	107.8	85.9	71.6	91.9	66.4	83.4	70.3
1997	77.1	107.6	86.6	75.3	95.5	70.0	87.0	71.7
1998	79.5	106.4	87.9	79.2	97.7	74.4	90.1	74.7
1999	82.3	105.2	89.5	83.6	100.0	79.5	93.4	78.2
2000	85.2	103.1	91.0	87.4	101.2	84.8	96.0	82.6
2001	87.9	99.2	91.7	88.2	99.5	89.0	96.2	88.6
2002	91.9	97.8	93.9	90.0	97.5	92.0	95.8	94.0
2003	95.5	98.2	96.4	92.8	97.1	94.5	96.2	97.3
2004	98.3	99.8	99.0	96.7	98.1	96.9	97.7	98.5
2005	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2006	101.0	100.0	100.5	103.1	102.3	103.1	102.6	101.0
2007	102.9	99.3	101.0	105.5	103.5	106.2	104.4	103.6
2008	105.0	96.7	101.1	105.4	102.0	109.1	104.3	108.7
2009	109.0	92.3	101.9	101.7	95.0	110.3	99.9	118.2

See footnotes following table 4.

Source: Bureau of Labor Statistics

Footnotes, Tables 1-4

Source: BLS develops productivity measures using output data published by the Bureau of Economic Analysis (BEA), compensation and hours data published by other Bureau of Labor Statistics (BLS) programs, and capital data supplied by BEA and U.S. Department of Agriculture. Also see Technical Notes in this release.

- (1) The private business sector includes all of gross domestic product except the output of general government, government enterprises, non-profit institutions, the rental value of owner-occupied real estate, and the output of paid employees of private households. The private nonfarm business sector also excludes farms but includes agricultural services.
- (2) Output per unit of combined labor input and capital services.
- (3) Gross domestic product originating in the sector, superlative chained index.
- (4) Index of hours at work of all persons including employees, proprietors, and unpaid family workers, classified by age, education, and gender. This superlative chain index is computed by combining changes in the hours of each age, education, and gender group weighted by each group's share of labor compensation.
- (5) A measure of the flow of capital services used in the sector. Capital services are the services derived from the stock of physical assets and software. The assets included are fixed business equipment, structures, inventories, and land.
- (6) Labor input combined with capital services are weighted with labor's and capital's share of current dollar costs to form a superlative chained index.