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United States Department of Labor
Bureau of Labor Statistics
Washington, D.C. 20212

Internet address: http://www.bls.gov/mfp
Historical, technical information: (202) 691-5606
Media contact: (202) 691-5902

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# PRELIMINARY MULTIFACTOR PRODUCTIVITY TRENDS, 2007

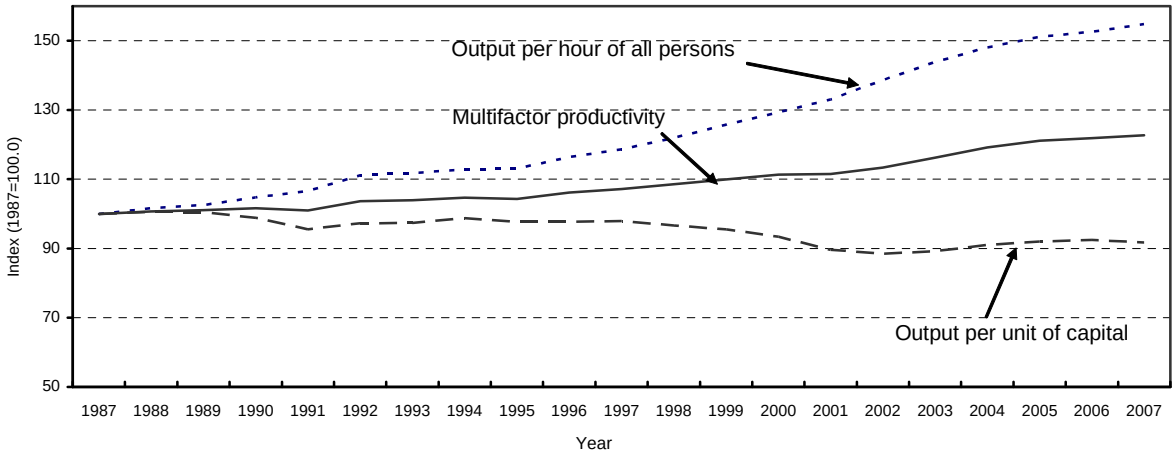
Private Business Sector and Private Nonfarm Business Sector

Multifactor productivity, defined as output per combined units of labor and capital inputs, grew at an annual rate of 0.7 percent in the private business sector and 0.6 percent in the private nonfarm business sector for 2007, the Bureau of Labor Statistics (BLS) and the U.S. Department of Labor reported today.

| | 2006-07 |
|---|---|
| Private business sector | 0.7 |
| Private nonfarm business sector | 0.6 |

The estimates of multifactor productivity in the private business and in the private nonfarm business sectors for 2007 both show a slight increase from 2006. The 2006-07 annual changes are summarized in tables A and B. Table B also presents data showing historical trends.

**Chart 1. Output per hour of all persons, output per unit of capital, and multifactor productivity in the private business sector, 1987 to 2007**



Multifactor productivity is designed to measure the joint influences of economic growth on 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 the 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.

In private business and private nonfarm business, the change in multifactor productivity reflects the difference between the change in real gross domestic product for the sector and the change in labor and capital inputs engaged in the production of this output. The output measures for private business and private nonfarm business are similar to the indexes of output for business and nonfarm business used in the quarterly labor productivity measures differing only in that the output of government enterprises is omitted.

A change in multifactor productivity reflects the change in output that cannot be accounted for by the change in combined inputs of labor and capital. In contrast, a change in labor productivity reflects the change in output that cannot be accounted for by the change in hours of all persons engaged in production.

Table A. Productivity and related data, percent changes 2006-07

| | Private Business[1] | Private Nonfarm Business[1] |
|---|---|---|
| Productivity | | |
| Multifactor Productivity[2] | 0.7 | 0.6 |
| Output per hour of all persons | 1.8 | 1.8 |
| Output per unit of capital services | -0.8 | -0.9 |
| Output | 2.3 | 2.3 |
| Inputs | | |
| Labor input[3] | 0.9 | 1.0 |
| Hours | 0.4 | 0.5 |
| Labor Composition[4] | 0.5 | 0.5 |
| Capital services | 3.2 | 3.2 |
| Combined units of labor and capital inputs[5] | 1.6 | 1.7 |
| Analytic ratio | | |
| Capital services per hour of all persons | 2.7 | 2.7 |

[1] Excludes government enterprises.
[2] Output per unit of combined labor and capital inputs.
[3] Index of hours at work by education and experience group, weighted by each group's share of labor compensation.
[4] Ratio of labor input to hours.
[5] Labor input index combined with capital services input index, weighted by labor's and capital's shares of nominal output.

**Private business sector**

Chart 1 shows the annual indexes of multifactor productivity, output per hour worked, and output per unit of capital services during the 1987-2007 period for the private business sector. Over the last 20 years, capital services have grown more rapidly than hours in the private business sector, and the skills of workers -- as measured by their education and work experience -- also have risen over this period. These shifts toward more capital intensive production and toward workers with more human capital have supplemented labor productivity growth, usually allowing output per hour to grow at a faster rate than multifactor productivity.

Multifactor productivity rose 0.7 percent for the private business sector in 2007 (see table A). The multifactor productivity gain in 2007 reflected a 2.3 percent increase in output and a 1.6 percent increase in the combined inputs of capital and labor.

Capital services grew 3.2 percent. Labor input posted an increase of 0.9 percent, as both hours worked and labor composition rose. The capital-labor ratio (capital services per hour of all persons) increased by 2.7 percent.

Labor input reflects the change in hours at work adjusted for the effects of changing labor composition. The increase of labor input was due to an increase in hours at work of 0.4 percent and an increase of 0.5 percent in labor composition. Labor productivity (output per hour worked) increased 1.8 percent. Capital productivity (output per unit of capital services) fell 0.8 percent. As shown in table B, the contribution of labor composition rose 0.3 percent from 2006 to 2007, while the contribution of capital intensity growth gained 0.9 percent over the same period.

**Private nonfarm business sector**

Multifactor productivity rose 0.6 percent for the private nonfarm business sector in 2007 (see table A). The multifactor productivity gain in 2007 reflected a 2.3 percent increase in output and a 1.7 percent increase in the combined inputs of capital and labor.

Capital services grew 3.2 percent. Labor input posted an increase of 1.0 percent, as both hours worked and labor composition rose. The capital-labor ratio (capital services per hour of all persons) increased by 2.7 percent.

The increase of labor input was due to an increase of 0.5 percent in hours at work and an increase of 0.5 percent in labor composition. Labor productivity (output per hour worked) increased 1.8 percent. Capital productivity (output per unit of capital services) fell 0.9 percent. The contribution of labor composition rose 0.3 percent, while the contribution of capital intensity growth gained 0.9 percentage points from the previous period (see table B).

Table B. Compound average annual rates of growth in output per hour of all persons and the contributions of capital intensity, labor composition, and multifactor productivity, by major sector, 1987 to 2007

(percent per year)

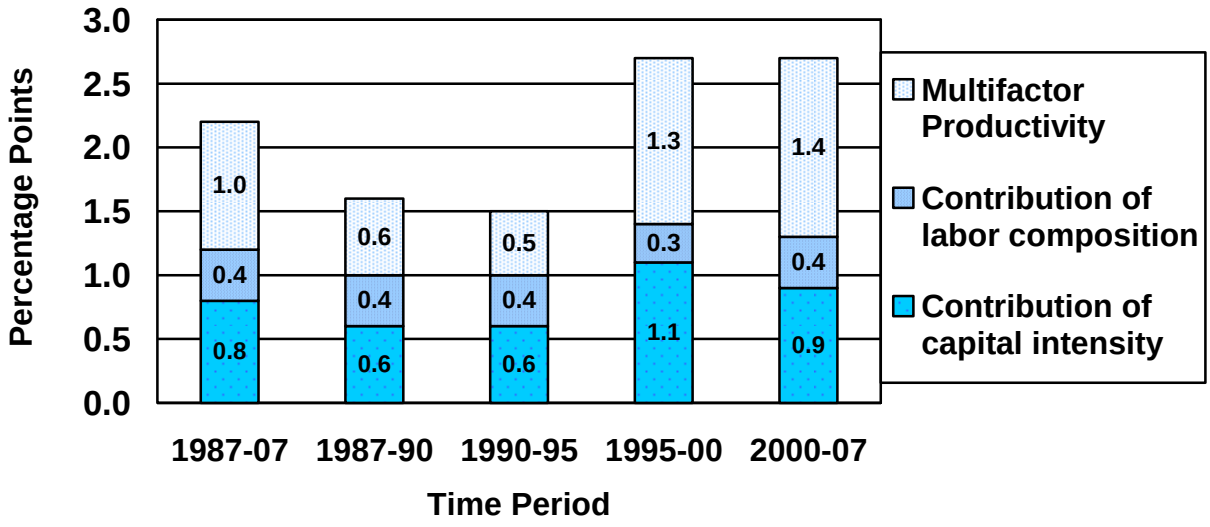
| | 1987-07 | 1987-90 | 1990-95 | 1995-00 | 2000-07 | 2006-07 |
|---|---|---|---|---|---|---|
| Private business[1] | | | | | | |
| Output per hour of all persons | 2.2 | 1.6 | 1.5 | 2.7 | 2.7 | 1.8 |
| Contribution of capital intensity[2] | 0.8 | 0.6 | 0.6 | 1.1 | 0.9 | 0.9 |
| Contribution of labor composition[3] | 0.4 | 0.4 | 0.4 | 0.3 | 0.4 | 0.3 |
| Multifactor productivity[4] | 1.0 | 0.6 | 0.5 | 1.3 | 1.4 | 0.7 |
| Private nonfarm business[1] | | | | | | |
| Output per hour of all persons | 2.2 | 1.5 | 1.6 | 2.5 | 2.6 | 1.8 |
| Contribution of capital intensity[2] | 0.8 | 0.6 | 0.6 | 1.1 | 0.9 | 0.9 |
| Contribution of labor composition[3] | 0.4 | 0.4 | 0.4 | 0.3 | 0.4 | 0.3 |
| Multifactor productivity[4] | 1.0 | 0.5 | 0.5 | 1.1 | 1.3 | 0.6 |

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 and capital inputs.

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

Comprehensive tables containing additional data not included in this news release are available at http://www.bls.gov/mfp/mprdload.htm or in print upon request.

## Chart 2. Contributors to growth in output per hour in the private business sector 1987-2007




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

**Summary of Methods**

The methodology for preliminary estimates is discussed in "Preliminary estimates of multifactor productivity growth" located at http://www.bls.gov/opub/mlr/2005/06/art3abs.htm. This release uses a methodology for preliminary estimates that uses data that are available shortly after the end of the calendar year. The methodology is a simplified version of the full methodology that BLS uses when more detailed information is available. Preliminary estimates for the private nonfarm business sector are produced using the same methodology as that used for the production of estimates for the private business sector; the only difference is that the farm sector is excluded.

**Capital Input:** Capital input measures the services derived from the stock of physical assets and software. The assets included are computers, software, communications and other information processing equipment, other fixed business equipment, structures, inventories, rental residences, and land. Investments, depreciation, capital income, and rental prices are estimated for each of these eight aggregates. Rental prices reflect the nominal rates of return and rates of economic depreciation and revaluation for the specific asset. Rental prices are adjusted for the effects of taxes. Data on investments in physical assets are obtained from BEA. Capital input measures constructed for the preliminary MFP measures are based on less detail than those for full MFP measure.

**Labor Input:** Labor input is total hours worked multiplied by a labor composition index. Hours paid of employees are largely obtained from BLS's Current Employment Survey (CES). These hours of employees are then converted to an at-work basis by using information from the Employment Cost Index (ECI) of the National Compensation Survey (NCS) and the Hours at Work Survey. Hours at work for non-production and supervisory workers are derived using data from the CPS, the CES, and the NCS. The hours at work of proprietors, unpaid family workers, and farm employees are derived from the Current Population Survey.

The labor composition index estimates the effect of shifts in the experience, education, and gender composition of the work force on the efficiency of labor and multifactor productivity growth. The preliminary MFP labor composition measure estimates the number of hours worked by each type of worker based on CPS data. The estimate of the 2007 labor composition index assumed that relative wages across groups remained constant between 2006 and 2007. The sum over all groups of the hour's growth rates multiplied by the labor cost shares gives the growth in adjusted labor input. Subtracting this from the growth in total (un-weighted) hours yields the growth in labor composition.

Additional information concerning data sources and methods of measuring labor composition can be found in BLS Bulletin 2426 (December 1993), "Labor Composition and U.S. Productivity Growth, 1948-90." http://www.bls.gov/mfp/home.htm

**Combined Inputs:** Labor and capital input are combined using a Tornqvist index. Growth rates of labor and capital input are combined with weights that represent each component's share of total costs. Total costs are defined as the value of output (Gross Product Originating) 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. The index uses changing weights: The share in each year is averaged with the preceding year's share.

**Output:** This release presents data for the U.S. private business sector. The private business sector, which accounted for approximately 77 percent of gross domestic product in 2000, 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. Multifactor productivity measures exclude government enterprises, while the BLS quarterly Productivity and Cost series include them.

**Multifactor Productivity:** 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. BLS adjusts BEA output measures to remove the output of government enterprises.