

# News

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## **PRELIMINARY MULTIFACTOR PRODUCTIVITY TRENDS, 2005**

### Private Business Sector

The Bureau of Labor Statistics of the U.S. Department of Labor reported today the preliminary multifactor productivity data, output per combined units of labor and capital inputs, for 2005 for the private business sector. The estimated annual rate of multifactor productivity change from 2004 to 2005 was an increase of 1.8 percent.

The estimate of multifactor productivity in the private business sector for 2005 shows a slower rate of growth than the past two years. The 2004-5 annual changes are summarized in tables A and B.

Multifactor productivity growth 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 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.

In the private business sector, the change in multifactor productivity reflects the difference between the change in real gross domestic product for the private business sector and the change in labor and capital inputs engaged in the production of this output. The output measures for the private business sector are similar to the indexes of output for business used in the quarterly labor productivity measures but the output of government enterprises is omitted. Government enterprises are agencies that maintain separate accounts and that cover a substantial portion of their operating costs by selling goods and services to the public.

Beginning with this release, BLS will issue annually in news release format preliminary multifactor productivity measures for the prior calendar year. The methodology for producing these preliminary estimates is discussed in "Preliminary estimates of multifactor productivity growth", published in the June, 2005 *Monthly Labor Review*, available at <http://www.bls.gov/opub/mlr/2005/06/art3abs.htm>. The Bureau intends to issue more comprehensive data containing updated inputs and using a more thorough methodology for each calendar year at a later date; for instance, data for 2005 are expected to be available in early 2007.

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.

Multifactor productivity rose 1.8 percent in 2005. The multifactor productivity gain in 2005 reflected a 4.0 percent increase in output and a 2.2 percent increase in the combined inputs of capital and labor.

Growth in capital services rose to 3.7 percent. Hours worked rose 1.3 percent in 2005; labor input posted an increase of 1.4 percent. The capital-labor ratio (capital services per hour of all persons) increased by 2.3 percent.

Table A. Productivity and related data, private business sector<sup>1</sup>, percent changes 2004-05

<u>Productivity</u>	
Multifactor Productivity <sup>2</sup>	1.8
Output per hour of all persons	2.6
Output per unit of capital services	0.3
<u>Output</u>	4.0
<u>Inputs</u>	
Labor input <sup>3</sup>	1.4
Hours	1.3
Labor Composition <sup>4</sup>	0.1
Capital services	3.7
Combined units of labor and capital inputs <sup>5</sup>	2.2
<u>Analytic ratio:</u>	
Capital services per hour of all persons	2.3

1. Excludes government enterprises.

2. Output per unit of combined labor and capital inputs

3. Index of hours at work; hours at work by education and experience group are 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.

Labor input reflects the change in hours at work adjusted for the effects of changing labor composition. As mentioned previously, labor input increased 1.4 percent. The increase of labor input was due to an increase in hours at work and a modest increase of 0.1 percent in labor composition (see table A). Labor composition measures the shifts in the educational attainment and work experience of the work force. Hours increased 1.3 percent in 2005. Labor productivity (output per hour worked) increased 2.6 percent. Capital productivity (output per unit of capital services) grew 0.3 percent. In table B, the contribution of labor composition rose 0.1 percent, while the contribution of capital intensity growth gained 0.7 percentage points from the previous period.

Table B. Contributions to percentage change in private business sector<sup>1</sup> output per hour, 2005

	2004-05
Output per hour of all persons	2.6
Contribution of capital intensity <sup>2</sup>	0.7
Contribution of labor composition <sup>3</sup>	0.1
Multifactor productivity <sup>4</sup>	1.8

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 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. Contribution of information processing equipment and all other capital may not sum to the contribution of capital intensity due to independent rounding.

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

## Summary of Methods

This release uses the methodology for preliminary estimates discussed in “Preliminary estimates of multifactor productivity growth” located at <http://www.bls.gov/opub/mlr/2005/06/art3abs.htm>. This methodology was inspired by previous work of Stephen Oliner and Dan Sichel, cited there.

**Capital Input:** Capital input is an estimate of 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 estimated 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 2005 labor composition index assumed that relative wages across groups remained constant between 2004 and 2005. The sum over all groups of the hours 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:** The labor and capital input components are combined using a Tornqvist index. In this procedure, the growth rates of the components are combined with weights that represent each component's share of total production 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 index for the private business sector is derived by dividing an output index by the superlative index (Tornqvist index) combining labor input and capital services. The output indexes are also computed as chained superlative indexes (Fisher Ideal indexes) of components of real output.