

Detailed technical notes for the news release

International Comparisons of Manufacturing Productivity and Unit Labor Cost Trends

This file contains the detailed technical notes for the news release titled “International Comparisons of Manufacturing Productivity and Unit Labor Cost Trends.” This news release can be accessed at <http://www.bls.gov/news.release/prod4.toc.htm>. The comparisons in this release are based on data available to the Bureau of Labor Statistics as of September 1 from the national statistical offices of the 19 countries compared.

Definitions. Labor productivity is defined as real output per hour worked. Although the labor productivity measure presented in this release relates output to the hours worked of persons employed in manufacturing, it does not measure the specific contributions of labor as a single factor of production. Rather, it reflects the joint effects of many influences, including new technology, capital investment, capacity utilization, energy use, and managerial skills, as well as the skills and efforts of the workforce.

Unit labor costs are defined as the cost of labor input required to produce one unit of output, and are computed as compensation in nominal terms divided by real output.

Methodology. BLS constructs trends of manufacturing labor productivity and unit labor costs from three basic aggregate measures: output, total labor hours, and total compensation. The hours and compensation measures, as well as the employment measures, generally refer to all employed persons (employees, self-employed persons, and unpaid family workers).

In general, the measures relate to total manufacturing as defined by the International Standard Industrial Classification (ISIC). However, the measures for France include parts of mining. Data for the United States are in accordance with the North American Industry Classification System (NAICS), except compensation data before 1987. Canadian data are in accordance with NAICS starting in 1961.

Most measures are prepared according to the United Nations System of National Accounts 1993 (SNA 93) for the most recent years. For earlier years, data were compiled according to other systems of national accounts. To obtain historical time series, BLS may link together data series which were compiled according to different accounting systems by national statistical offices. Very recent years may be estimates based on various current indicators until national accounts and other preferred statistics become available.

Output. For recent years, the output measures are real value added in manufacturing, based on national accounts. However, output for Japan prior to 1970 and for the Netherlands prior to 1960 are indexes of industrial production.

Most countries now estimate manufacturing real output using moving price weights, as recommended by SNA 93. However, many earlier time periods within the historical real output series were estimated using fixed price weights, with the weights updated periodically (for example, every 5 or 10 years). For the United States, the output measure for the manufacturing

sector is a chain-weighted index of real gross product (deflated value added) produced by the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce.¹

The U.S. manufacturing output series used for international comparisons differs from the manufacturing output series that BLS publishes as part of its major sector productivity and costs measures for the United States. The international comparisons program uses a value added output concept, while the major sector series is on a sectoral output basis (the major sector series can be found at <http://www.bls.gov/lpc>). Sectoral output is gross output less intra-sector sales and transfers.²

BLS has determined that sectoral output is the correct concept for U.S. measures of manufacturing productivity; however, value added measures have been used for the international comparisons of productivity trends because the data are more readily available and also for technical considerations, such as differences among economies in the extent of vertical integration of industries.

Labor Input. For the most recent years, the term "hours" refers to hours actually worked. This measure excludes vacation, holidays, and sick leave, but includes paid and unpaid overtime. For some earlier years, BLS uses other hours measures, such as normal hours.

For the United States, the employment and hours data series beginning with 1987 are taken from the NAICS-based manufacturing all-employed series published by BLS as part of the major sector productivity and cost measures. For the period before 1987, these series are linked to NAICS-based, employees-only data from the Current Employment Statistics (CES) program.

For most other economies, recent aggregate hours series are obtained from national statistical offices, usually from national accounts. However, in some cases BLS calculates aggregate hours for earlier years using employment figures from the national accounts or other comprehensive employment series and data on average hours worked.

Compensation (Labor Cost). The compensation measures are from national accounts. Compensation includes employer expenditures for legally required insurance programs and contractual and private benefit plans, in addition to all payments made in cash or in kind directly to employees. When data for the self-employed are not available, total compensation is estimated by assuming the same average compensation for the self-employed as for employees. This measure is used to assess the remuneration that employed persons obtain for their labor. In the supplementary tables, compensation is used for the following tables: Table 13, Real hourly compensation, CPI basis; and table 14, Real average annual compensation, CPI basis.

Labor cost is defined as compensation plus employment taxes minus employment subsidies, i.e. the cost to employers of using labor. In the supplementary tables, labor cost is used for the following tables: Table 7, Hourly compensation, national currency basis; Table 8, Hourly compensation, U.S. dollar basis; Table 9, Unit labor costs, national currency basis; Table 10,

¹ For more information on the U.S. measure, see "Improved Estimates of Gross Product by Industry for 1947-98," *Survey of Current Business*, June 2000, pp. 24-38 and "Gross Domestic Product by Industry for 1947-86. New Estimates Based on the North American Industry Classification System," *Survey of Current Business*, December 2005, pp. 70-84.

² For more information on sectoral output, see "Measurement of productivity growth in U.S. manufacturing," *Monthly Labor Review*, July 1995, pp. 13-28 at <http://www.bls.gov/opub/mlr/1995/07/art2full.pdf>.

Unit labor costs, U.S. dollar basis; Table 12, Average annual compensation, national currency basis; and Table 15, Total labor compensation. For the majority of economies, labor cost is the same as compensation. However, for Australia, Canada, France, Singapore, and Sweden, compensation is increased to account for taxes on payroll or employment. For the Czech Republic, Finland, and the United Kingdom, compensation is reduced for certain years to account for subsidies.

Level Comparisons. The BLS measures are limited to trend comparisons. BLS does not prepare level comparisons of manufacturing productivity because of technical problems related to the valuation of manufacturing output in different economies. Each economy measures manufacturing output in its own currency units. To compare outputs among economies, a common unit of measure is needed. Market exchange rates are not appropriate as a basis for converting output into a common currency, and purchasing power parities (PPPs)³, which are only available at the total economy level, are not suitable for converting output in the manufacturing sector. In addition, there are differences in survey methodology, coverage, and indicators used in each economy that can have a significant impact on the levels of the data used in this report.

Historical Growth Rates. Average annual growth rates are based on the compound rate method. In some cases, BLS links data in order to maintain historical continuity and calculate long-term growth rates. Data for euro-area countries have been converted to euros by BLS or national statistical agencies by applying official fixed euro/national currency conversion rates to years prior to the introduction of the euro. Data for Germany are linked at 1991 to data that pertain to the former West Germany.

³ Purchasing Power Parities are the number of foreign currency units required to buy goods and services equivalent to what can be bought with one unit of U.S. currency.