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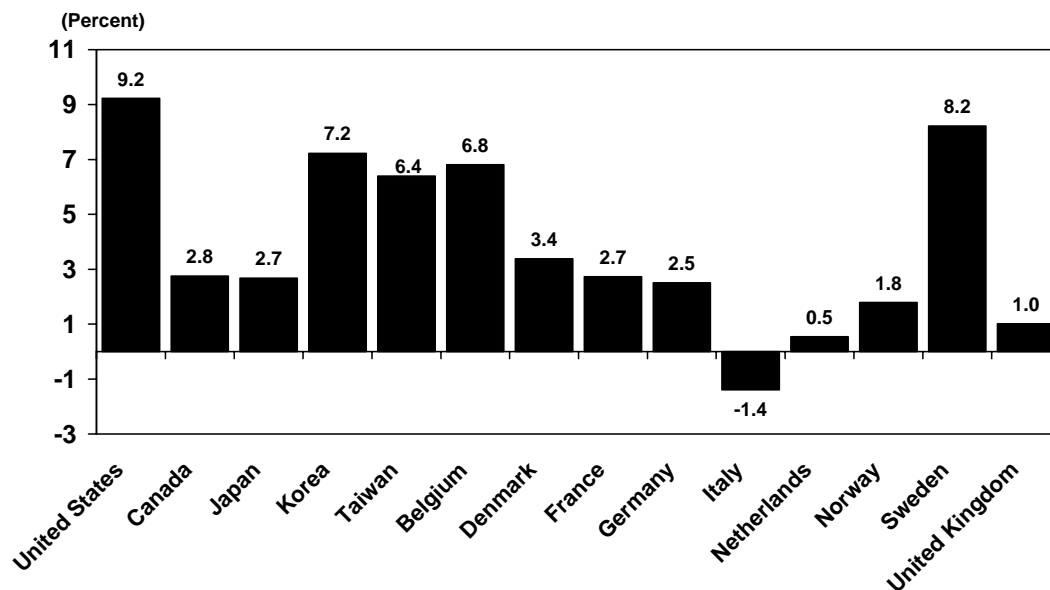
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INTERNATIONAL COMPARISONS OF MANUFACTURING PRODUCTIVITY AND UNIT LABOR COST TRENDS, REVISED DATA FOR 2002

In 2002, the increase in U.S. manufacturing productivity, at 9.2 percent, was the largest among 14 economies compared, according to revised data released by the U.S. Department of Labor's Bureau of Labor Statistics. Except for Italy, productivity also increased in all the other economies, with gains of more than 6 percent in Sweden, Korea, Belgium, and Taiwan. (See chart 1.)

The U.S. productivity growth in 2002 was substantially above its 3.5 percent average annual growth rate since 1979. Six of the other 11 economies for which historical comparisons are available also surpassed their 1979-2002 average annual rates of increase in 2002. (Average annual growth rates for selected measures over various time periods are found in tables A and B.)

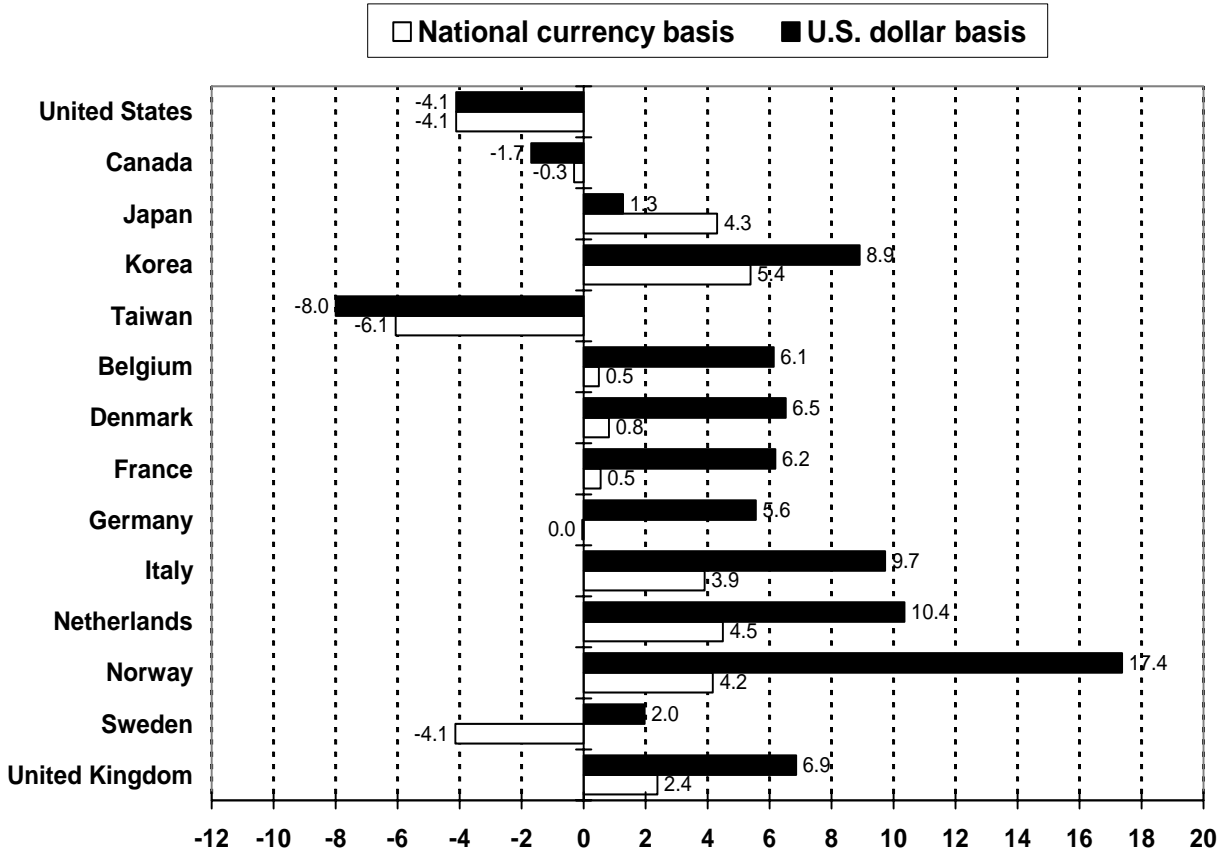
**Chart 1. Percent change in
manufacturing output per hour, 2002**



Unit labor costs in manufacturing, expressed in national currency units, rose in 9 of the 14 economies in 2002, with Korea recording the largest increase (+5.4 percent). Spurred on by productivity gains, unit labor costs declined in Taiwan (-6.1 percent) and in the United States and Sweden (both by -4.1 percent). Canada had a much smaller decline (-0.3 percent), while unit labor costs in Germany were unchanged.

The general rise in unit labor costs in U.S. dollar terms is explained primarily by the depreciation of the dollar versus most other national currencies in 2002 and, secondarily, by the fact that hourly compensation grew faster than output per hour in most countries. Norway had the greatest increase in unit labor costs in dollar terms primarily because it also had the greatest increase in the value of its currency versus the dollar. (See chart 2 and table A.)

Chart 2. Percent change in manufacturing unit labor costs, 2001-2002



**Table A. Output per hour, hourly compensation, unit labor costs, and related measures
Manufacturing, 14 countries or areas, 2001-2002**

Percent change

Country or area	Output per hour		Total hours	Employment	Average hours	Total compensation	Hourly compensation	Unit labor costs		Exchange rate (1)
	Output	hour						National currency	U.S. dollars	
United States	9.2	1.8	- 6.8	- 6.8	0.0	- 2.4	4.7	- 4.1	- 4.1	---
Canada	2.8	2.9	0.1	0.3	- 0.2	2.6	2.4	- 0.3	- 1.7	- 1.4
Japan	2.7	- 2.0	- 4.5	- 4.7	0.2	2.3	7.1	4.3	1.3	- 2.9
Korea	7.2	6.3	- 0.8	- 0.2	- 0.7	12.0	13.0	5.4	8.9	3.3
Taiwan	6.4	6.3	- 0.1	- 1.8	1.7	- 0.2	- 0.1	- 6.1	- 8.0	- 2.1
Belgium	6.8	1.0	- 5.5	- 3.6	- 2.0	1.5	7.3	0.5	6.1	5.6
Denmark	3.4	0.2	- 3.1	- 2.9	- 0.2	1.0	4.2	0.8	6.5	5.7
France	2.7	0.1	- 2.6	- 1.7	- 0.9	0.6	3.3	0.5	6.2	5.6
Germany	2.5	- 0.2	- 2.7	- 2.2	- 0.5	- 0.3	2.5	0.0	5.6	5.6
Italy	- 1.4	- 0.7	0.7	0.9	- 0.2	3.1	2.5	3.9	9.7	5.6
Netherlands	0.5	- 1.6	- 2.2	- 2.2	0.0	2.8	5.1	4.5	10.4	5.6
Norway	1.8	- 0.6	- 2.4	- 1.1	- 1.3	3.5	6.0	4.2	17.4	12.7
Sweden	8.2	3.4	- 4.5	- 2.8	- 1.7	- 0.9	3.7	- 4.1	2.0	6.4
United Kingdom	1.0	- 3.5	- 4.5	- 5.0	0.5	- 1.2	3.4	2.4	6.9	4.4

(1) Value of foreign currency relative to the U.S. dollar.

Table A summarizes changes in manufacturing productivity, unit labor costs, and related variables between 2001 and 2002.

This release examines comparative trends in the revised figures for manufacturing output per hour, unit labor costs, and related measures in 2002, the most recent year for which comparative data are available, and for certain selected time periods shown in table B (pages 7-11).

Additional data available

Annual index series of these data also are estimated for the time period 1950-2002 and are available at the Bureau of Labor Statistics, Division of Foreign Labor Statistics website at address <http://www.bls.gov/fls/home.htm>. Because the value added output data for U.S. manufacturing industries are not available prior to 1977, the comparative measures of output, output per hour, and unit labor costs for the United States begin with 1977. However, for analytical purposes, the international comparisons in this release go back to 1979.

For further information, contact the Office of Productivity and Technology by phone at 202-691-5654, by e-mail at flspr@bls.gov, or by mail at Bureau of Labor Statistics, 2 Massachusetts Avenue, NE, Room 2150, Washington, DC 20212.

Notes about the measures

The measures in this release are based on data available to BLS as of January 2004. Revisions for 2002 and earlier years were made to the measures for several countries to incorporate data not available at the time of the September 2003 report.

U.S. manufacturing output measure

The output measure for manufacturing in the United States is the chain-weighted index of real gross domestic product by industry (deflated value added), published by the Bureau of Economic Analysis (BEA), U.S. Department of Commerce. This series is based on annually changing price weights.

The U.S. real output data through 2001 used in this report were released by BEA in November 2002 and are described in the *Survey of Current Business*, November 2002. Real U.S. output for 2002, for the first time, comes from the newly-available BEA accelerated estimates of gross domestic product by industry using an abbreviated methodology, described in the May 2003 *Survey of Current Business*. The regular BEA estimates, ordinarily available in November, have been delayed until June 2004 because of a comprehensive revision of the national income and product accounts. The new accounts will be based on the North American Industry Classification System (NAICS 2002), as opposed to the current 1987 Standard Industrial Classification (SIC).

The change in U.S. manufacturing output for 2002, published in the September 2003 news release, was estimated from the Federal Reserve Board's Industrial Production Index for Total Manufacturing. Use of the BEA preliminary output estimate in the current release resulted in an upward revision of U.S. manufacturing output growth, from a decline of 1.1 percent to an increase of 1.8 percent.

The U.S. output series used for international comparisons differs from the official manufacturing 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. See Technical Notes section of this release for additional information.

Canada

Data for Canada have been revised from 1997 forward because of the introduction of the North American Industry Classification System (NAICS 97). Data prior to 1997 have not been converted from the Canadian Standard Industrial Classification system (SIC 80). The two data series have been linked in 1997.

Denmark

Statistics Denmark has published a new hours worked series for employees from 1995 forward. No hours measure is available for 1994. Thus no trends involving hours could be calculated over time periods which include 1994.

Germany

German data pertain to unified Germany from 1991 onward and to the former West Germany for prior years. The two data series have been linked in 1991.

United Kingdom

The deflation method used for converting output in current prices to output in real terms has been changed from a fixed base-year to an annual chain-linked method, consistent with the United Nations System of National Accounts (SNA 93) guidelines.

Manufacturing productivity, output, and labor input

The growth in labor productivity (output per hour) in U.S. manufacturing of 9.2 percent in 2002 was the highest since the beginning of the current series in 1977, surpassing the previous high of 8.0 percent in 1987. The U.S. productivity increase in 2002 was followed by Sweden (+8.2 percent), Korea (+7.2 percent), Belgium (+6.8 percent), and Taiwan (+6.4 percent). Italy's productivity declined 1.4 percent, and the United Kingdom's gain of 1.0 percent and the Netherlands' gain of 0.5 percent were the lowest among the economies compared. In a majority of the economies, the 2002 productivity gains followed smaller productivity increases or declines in 2001. Denmark, France, Italy, Norway, and the United Kingdom, where labor productivity growth slowed or declined in 2002, were exceptions. (See table B.)

In the United States, Canada, Taiwan, and Sweden, manufacturing output increased in 2002 following declines in 2001. Only three of the other eight European countries increased their manufacturing output, but by no more than 1 percent. Manufacturing output fell in Japan, but, unlike the European countries that experienced declines, less than in 2001. Canada, Taiwan, and Sweden were the only economies whose rate of increase in manufacturing output was greater in 2002 than the average annual growth since 1979. (See table B.)

Hours worked in manufacturing declined in 2002 in all the economies compared, except Canada and Italy. In the United States, hours worked fell by 6.8 percent in 2002, the greatest annual drop in 20 years and the largest among the economies compared. This was the second year in a row of substantial declines in U.S. hours worked. Other declines in 2002 ranged from 0.1 percent in Taiwan to 5.5 percent in Belgium. In seven economies, these declines in hours worked were accompanied by increases in manufacturing output, leading in most cases to substantial increases in productivity. In five other countries, declines in manufacturing output were more than offset by larger drops in hours worked, also resulting in productivity gains. Canada's productivity increase was associated with an increase in output that greatly surpassed the increase in hours worked. Italy's productivity downturn was related to a decline in output that equaled the increase in hours worked. (See tables A and B.)

The reductions in hours worked in manufacturing continued a general trend during the last decades in the manufacturing sectors of these economies. The only exception to this general trend is Canada, where hours rose 0.2 percent per year over the period since 1979. In most of the other economies, hours worked in manufacturing reached their maximum levels in the 1960s and 1970s (the United States in 1979) and have trended downward since then. Only two of the eight European countries for which hours data are available experienced smaller declines than in the United States over the period 1979–2002. In Taiwan and Korea, manufacturing hours have been declining since the late 1980s. In most economies, the rate of decline slowed somewhat in the second half of the 1990's, when compared to the 1990–1995 period. (See table B.)

For most countries, reductions in manufacturing hours over the last several decades were the result of declines in both manufacturing employment and average hours worked. The reduction in average hours began earlier, but the decline in employment has been steeper and steadier. In the United States, Italy, and Sweden, average hours have risen slightly since 1979. (See table B.)

The 2002 U.S. decline in manufacturing employment was the largest among the economies compared for the second year in a row. Manufacturing employment also declined in all the other economies except Canada and Italy. The declines were accompanied by the same or fewer average hours worked in all the other economies except for Japan, Taiwan, and the United Kingdom. (See tables A and B.)

Manufacturing hourly compensation and unit labor costs

Hourly compensation in manufacturing, expressed in national currencies, increased in all but one of the economies compared. Korea posted an increase of 13.0 percent, followed by Belgium and Japan, at over 7 percent. The U.S. increase of 4.7 percent was about average. Only Taiwan showed a small decline. For most economies for which historical comparisons are available, hourly compensation increases in 2002 lagged behind their average annual growth rates for the 1979–2002 period. (See table B.)

Unit labor costs, expressed in national currency units, also increased in a majority of the economies compared, although only Japan and the Netherlands had increases in 2002 greater than their average annual rate since 1979. The United States, Canada, and Sweden recorded declines in unit labor costs in 2002, as their productivity growth exceeded the hourly compensation increases. In Taiwan, the increase in productivity and decline in hourly compensation resulted in a 6.1 percent decline in unit labor costs. (See tables A and B.)

To compare changes in competitiveness across economies, the impact of exchange rate fluctuations have to be taken into account by expressing unit labor costs in a common monetary unit. When a foreign currency appreciates against the U.S. dollar, more dollars must be paid in exchange for each national currency unit. This leads to a larger increase, or a smaller decline, in unit labor costs converted from the foreign currency into U.S. dollars than the corresponding change in unit labor costs expressed in the national currency. This makes products from that country more expensive and lessens its competitiveness.

In 2002, the U.S. dollar depreciated against the currencies of most economies compared, particularly against the Norwegian krone (12.7 percent). The decline against the euro was 5.6 percent. This depreciation reversed a seven-year trend, when the U.S. dollar recorded annual average appreciation against most other currencies. Only the Japanese yen and Canadian and Taiwanese dollars depreciated against the U.S. dollar in 2002. (See table B.)

Because of the dollar's depreciation, the unit labor costs of all European countries and of Korea increased more when expressed in U.S. dollars than in national currencies. In Sweden, a krona-denominated 4.1 percent decline in unit labor costs changed to a 2.0 percent increase in dollar terms. The European increases were all well above the average annual rates of increase since 1979, though, with the exception of Norway, they were less than in the 1985-1990 period. The increase in Korean unit labor costs, expressed in U.S. dollars, was the largest since 1995. In both 2001 and 2002, Taiwan showed the largest decline in unit labor costs. Unit labor costs in dollar terms also declined in Canada. (See tables A and B.)

**Table B. Output per hour, hourly compensation, unit labor costs, and related measures
Manufacturing, 14 countries or areas, 1979-2002**

Average annual rates of change¹

Country or area	1979-2002	1979-1985	1985-1990	1990-1995	1995-2000	2000-2001	2001-2002
Output per hour							
United States	r 3.5	3.5	2.4	3.3	4.5	0.4	r 9.2
Canada	r 2.5	3.6	.5	3.8	r 2.8	r -1.8	r 2.8
Japan	3.6	3.5	4.3	3.3	4.1	r - .1	r 2.7
Korea	NA	NA	8.2	9.7	11.0	- .8	7.2
Taiwan	r 5.9	5.1	7.9	5.3	5.5	6.3	r 6.4
Belgium	r 3.7	6.0	2.2	3.2	r 2.9	r 1.4	r 6.8
Denmark	NA	2.4	.7	NA	2.0	5.0	3.4
France	4.2	5.1	3.3	4.0	r 4.6	r 3.4	2.7
Germany ²	2.4	2.1	2.1	3.3	r 2.5	r .6	r 2.5
Italy	r 1.8	r 3.0	r 1.3	r 2.2	r 1.0	r 2.0	-1.4
Netherlands	3.0	4.6	2.2	3.5	2.5	- .3	.5
Norway	1.5	2.4	1.4	.5	1.1	2.2	1.8
Sweden	r 4.2	3.1	1.9	5.7	r 7.1	r -3.0	r 8.2
United Kingdom	r 3.7	4.4	4.6	3.6	r 2.7	r 3.7	r 1.0
Output							
United States	r 2.5	2.2	2.5	3.1	4.3	-6.0	r 1.8
Canada	r 2.7	2.0	1.8	2.4	r 5.9	r -3.6	r 2.9
Japan	2.5	4.7	4.8	.4	2.0	r -3.4	r -2.0
Korea	8.8	8.3	12.2	8.4	8.1	2.1	6.3
Taiwan	6.0	8.2	7.0	5.0	5.7	-5.7	r 6.3
Belgium	2.1	2.6	2.5	.6	r 2.9	r .4	r 1.0
Denmark	1.4	2.3	- .6	1.7	1.8	4.4	r .2
France	2.1	1.6	2.5	1.1	3.5	3.0	.1
Germany ²	.6	.2	2.3	- .7	r 1.0	r - .2	r - .2
Italy	1.5	.9	3.2	1.5	1.2	.8	- .7
Netherlands	2.0	2.0	3.1	1.8	2.6	- .9	-1.6
Norway	.3	.6	-1.6	1.1	1.0	.5	- .6
Sweden	r 3.3	2.2	1.4	3.7	r 7.4	r -2.8	r 3.4
United Kingdom	r .6	-1.2	3.4	r .5	r 1.3	r -1.3	r -3.5

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**Table B. Output per hour, hourly compensation, unit labor costs, and related measures
Manufacturing, 14 countries or areas, 1979-2002**

Average annual rates of change¹

Country or area	1979-2002	1979-1985	1985-1990	1990-1995	1995-2000	2000-2001	2001-2002
Total hours							
United States	-1.0	-1.2	0.0	-0.1	-0.2	-6.4	r -6.8
Canada	r .2	-1.5	1.3	-1.3	r 3.0	r -1.8	r .1
Japan	r -1.0	1.1	.5	-2.8	-2.0	r -3.3	r -4.5
Korea	NA	NA	3.7	-1.2	-2.6	2.9	- .8
Taiwan	.0	2.9	- .8	- .3	.2	-11.3	- .1
Belgium	-1.6	-3.2	.4	-2.5	- .1	-1.0	-5.5
Denmark	NA	- .1	-1.3	NA	- .2	- .6	-3.1
France	-2.0	-3.3	- .7	r -2.8	r -1.1	r - .4	-2.6
Germany ²	-1.8	-1.9	.2	-3.9	-1.5	- .8	r -2.7
Italy	r - .3	r -2.0	r 1.9	r - .7	r .1	r -1.2	.7
Netherlands	-1.0	-2.5	.9	-1.7	.0	- .6	-2.2
Norway	-1.2	-1.8	-2.9	.6	- .1	-1.7	-2.4
Sweden	r - .9	- .8	- .5	-1.9	r .3	r .2	r -4.5
United Kingdom	-3.0	-5.3	-1.2	-3.0	-1.4	-4.8	r -4.5
Employment							
United States	-1.1	-1.4	-0.1	-0.6	-0.1	-4.7	-6.8
Canada	.2	-1.3	1.2	-1.5	r 2.8	r - .8	r .3
Japan	r - .6	1.2	.8	-1.6	-1.9	-2.6	r -4.7
Korea	NA	NA	5.4	- .9	-2.5	5.2	- .2
Taiwan	.7	4.1	- .5	- .3	.5	-4.5	-1.8
Belgium	-1.5	-2.6	- .3	-2.2	- .7	r .8	r -3.6
Denmark	- .7	.2	- .8	-1.2	- .5	-1.1	r -2.9
France	-1.4	-2.3	- .9	-2.5	- .3	r 1.2	-1.7
Germany ²	-1.2	-1.1	1.1	-4.2	- .8	.4	r -2.2
Italy	r - .7	r -1.8	r .3	r -1.6	r .1	r - .3	r .9
Netherlands	- .8	-2.3	1.0	-1.6	.2	- .5	-2.2
Norway	-1.1	-1.8	-2.7	.3	.1	-1.4	-1.1
Sweden	r -1.3	-1.2	- .8	-3.5	.0	r 1.1	-2.8
United Kingdom	-2.7	-4.5	- .9	-3.0	-1.1	r -4.5	r -5.0

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**Table B. Output per hour, hourly compensation, unit labor costs, and related measures
Manufacturing, 14 countries or areas, 1979-2002**

Average annual rates of change¹

Country or area	1979-2002	1979-1985	1985-1990	1990-1995	1995-2000	2000-2001	2001-2002
Average hours							
United States	0.1	0.2	0.1	0.4	-0.1	-1.8	r 0.0
Canada	r .0	- .2	.1	.3	r .1	-1.0	r - .2
Japan	- .4	.0	- .3	-1.3	- .1	r - .7	r .2
Korea	NA	NA	-1.6	- .2	- .1	-2.1	- .7
Taiwan	- .7	-1.1	- .4	.0	- .3	-7.1	1.7
Belgium	- .1	- .6	.7	- .3	r .6	r -1.7	r -2.0
Denmark	NA	- .3	- .5	NA	.3	.5	- .2
France	- .6	-1.1	.1	r - .3	r - .8	r -1.6	- .9
Germany ²	- .6	- .8	- .9	.3	- .6	-1.2	r - .5
Italy	.5	- .1	1.6	.9	.0	- .9	- .2
Netherlands	- .2	- .3	- .2	.0	- .2	- .1	.0
Norway	- .1	.0	- .2	.3	- .2	- .3	-1.3
Sweden	r .5	.4	.3	1.7	r .2	r - .8	r -1.7
United Kingdom	r - .4	- .8	- .3	- .1	- .3	r - .3	r .5
Total labor compensation in manufacturing³: National currency basis							
United States	3.6	5.8	3.9	3.4	3.7	-4.1	-2.4
Canada	r 5.0	7.5	5.6	2.4	r 5.5	r 1.6	r 2.6
Japan	r 2.5	5.9	5.1	.7	-1.1	r -2.5	r 2.3
Korea	NA	NA	19.9	16.8	4.1	10.2	12.0
Taiwan	8.2	15.9	10.6	6.8	4.2	-9.4	- .2
Belgium	r 3.1	4.7	4.0	1.3	r 2.0	r 4.4	r 1.5
Denmark	4.7	9.1	4.8	2.3	r 2.9	r 3.9	r 1.0
France	r 3.7	9.0	3.6	1.1	r 1.1	r 3.4	r .6
Germany ²	3.1	4.0	5.2	2.3	1.6	r 2.6	r - .3
Italy	r 7.2	r 13.6	r 8.8	r 4.2	r 2.9	r 2.3	r 3.1
Netherlands	3.1	2.4	3.9	2.8	3.4	4.6	2.8
Norway	5.4	8.0	4.7	4.0	5.0	3.7	3.5
Sweden	r 5.8	8.9	7.9	2.0	r 5.3	r 5.3	r - .9
United Kingdom	4.5	6.3	8.1	2.5	3.2	r - .3	-1.2

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**Table B. Output per hour, hourly compensation, unit labor costs, and related measures
Manufacturing, 14 countries or areas, 1979-2002**

Average annual rates of change¹

Country or area	1979-2002	1979-1985	1985-1990	1990-1995	1995-2000	2000-2001	2001-2002
Hourly compensation³: National currency basis							
United States	4.6	7.2	3.9	3.5	4.0	2.4	r 4.7
Canada	r 4.8	9.1	4.2	3.7	r 2.5	r 3.4	r 2.4
Japan	r 3.6	4.7	4.6	3.6	1.0	r .8	r 7.1
Korea	NA	NA	15.6	18.2	6.9	7.0	13.0
Taiwan	8.2	12.6	11.5	7.1	4.0	2.2	- .1
Belgium	4.7	8.1	3.7	3.9	2.0	r 5.5	r 7.3
Denmark	NA	9.3	6.2	NA	3.1	4.5	4.2
France	r 5.9	12.7	r 4.4	r 4.0	r 2.3	r 3.8	r 3.3
Germany ²	5.0	6.0	5.0	6.4	r 3.2	r 3.4	r 2.5
Italy	7.4	15.9	6.8	4.9	2.8	3.6	2.5
Netherlands	4.1	5.1	3.0	4.5	3.3	5.2	5.1
Norway	6.6	10.0	7.8	3.4	5.2	5.5	6.0
Sweden	r 6.7	9.8	8.4	4.0	r 5.1	r 5.1	3.7
United Kingdom	7.8	12.2	9.4	5.7	4.7	r 4.8	r 3.4
Unit labor costs³: National currency basis							
United States	r 1.1	3.6	1.4	0.2	-0.5	2.0	r -4.1
Canada	r 2.3	5.3	3.7	- .1	r - .4	r 5.3	r - .3
Japan	r .0	1.1	.3	.3	-3.0	r .9	r 4.3
Korea	NA	NA	6.9	7.8	-3.7	7.9	5.4
Taiwan	2.1	7.1	3.4	1.7	-1.5	-3.9	r -6.1
Belgium	r 1.0	2.0	1.5	.7	r - .9	r 4.0	r .5
Denmark	3.3	6.7	5.4	.6	r 1.1	r - .5	r .8
France	r 1.6	7.3	r 1.1	- .1	r -2.2	r .4	r .5
Germany ²	2.5	3.8	2.8	3.1	r .6	r 2.8	r .0
Italy	r 5.5	r 12.5	r 5.4	r 2.6	r 1.7	r 1.5	r 3.9
Netherlands	1.1	.5	.8	1.0	.8	5.5	4.5
Norway	5.1	7.4	6.4	2.9	4.0	3.2	4.2
Sweden	r 2.4	6.5	6.4	-1.6	r -1.9	r 8.4	r -4.1
United Kingdom	r 3.9	7.5	4.5	r 2.0	r 1.9	r 1.1	r 2.4

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**Table B. Output per hour, hourly compensation, unit labor costs, and related measures
Manufacturing, 14 countries or areas, 1979-2002**

Average annual rates of change¹

Country or area	1979-2002	1979-1985	1985-1990	1990-1995	1995-2000	2000-2001	2001-2002
Unit labor costs³: U.S. dollar basis							
United States	r 1.1	3.6	1.4	0.2	-0.5	2.0	r -4.1
Canada	r 1.0	2.7	7.0	-3.3	r -2.0	r 1.0	r -1.7
Japan	r 2.4	- .3	10.8	9.4	-5.7	r -10.5	r 1.3
Korea	NA	NA	11.1	6.0	-10.7	-5.6	8.9
Taiwan	2.3	5.3	11.8	2.0	-4.7	-11.2	r -8.0
Belgium	r - .6	-9.3	13.8	3.3	r -8.4	r .9	r 6.1
Denmark	1.5	-5.0	17.4	2.7	r -6.1	r -3.3	r 6.5
France	r - .5	-5.3	r 11.7	1.7	r -8.9	r -2.6	r 6.2
Germany ²	r 2.0	-4.1	15.9	5.6	-6.9	r - .3	r 5.6
Italy	r 1.5	r -2.0	r 15.7	r -3.5	r -3.3	r -1.6	r 9.7
Netherlands	.4	-7.6	13.6	3.6	-6.9	2.3	10.4
Norway	3.0	-1.7	13.3	2.6	-2.7	1.1	17.4
Sweden	r -1.1	-5.2	14.7	-5.2	r -6.7	r -3.9	r 2.0
United Kingdom	r 2.4	-1.0	11.4	- .4	r 1.1	r -4.0	r 6.9
Exchange rates⁴							
United States	—	—	—	—	—	—	—
Canada	-1.3	-2.5	3.2	-3.2	-1.6	-4.1	-1.4
Japan	2.4	-1.5	10.5	9.1	-2.7	-11.3	-2.9
Korea	-4.0	-9.2	3.9	-1.7	-7.3	-12.5	3.3
Taiwan	.2	-1.7	8.2	.3	-3.3	-7.6	-2.1
Belgium	-1.6	-11.1	12.2	2.5	-7.6	-3.0	5.6
Denmark	-1.7	-11.0	11.4	2.0	-7.1	-2.8	5.7
France	-2.1	-11.7	10.5	1.8	-6.8	-3.0	5.6
Germany ²	- .5	-7.6	12.7	2.5	-7.5	-3.0	5.6
Italy	-3.8	-12.9	9.8	-6.0	-4.9	-3.0	5.6
Netherlands	- .7	-8.0	12.7	2.6	-7.6	-3.0	5.6
Norway	-2.0	-8.4	6.6	- .3	-6.4	-2.0	12.7
Sweden	-3.5	-11.0	7.8	-3.7	-4.9	-11.3	6.4
United Kingdom	-1.5	-7.9	6.6	-2.4	- .8	-5.0	4.4

r = revised

NA = not available

¹Rates of change based on the compound rate method.

³Adjusted for employment taxes and government subsidies to estimate the actual cost to employers.

²Data for years before 1991 pertain to the former West Germany.

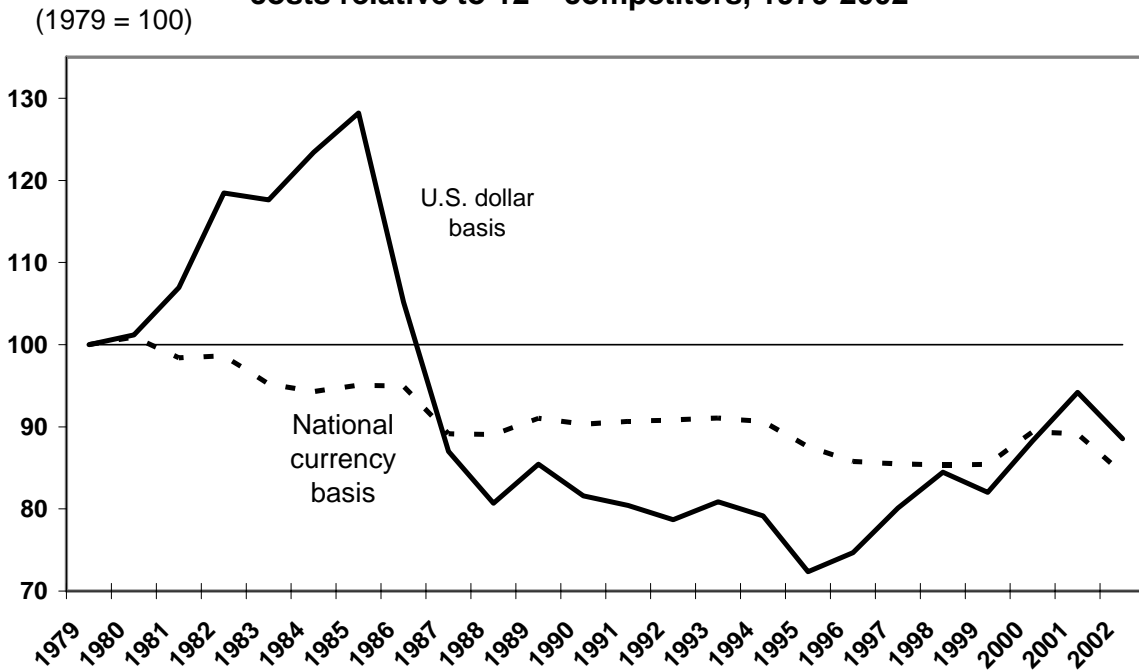
⁴Value of foreign currency relative to the U.S. dollar.

Trade-weighted unit labor costs

BLS constructs indexes of U.S. unit labor cost trends relative to a trade-weighted average of unit labor cost trends in the other economies to take account of differences in the relative importance of foreign economies to U.S. trade in manufactured goods. Relative trade-weighted unit labor cost indexes are calculated on both a national currency and a U.S. dollar basis. In this release, the relative U.S. trade-weighted indexes are estimated against 12 economies for which comparable data are available over this period; the indexes underlying this chart are shown in table C.

Chart 3 begins in 1979, a year in which U.S. manufacturing output reached a business cycle peak.

Chart 3. U.S. manufacturing unit labor costs relative to 12⁽¹⁾ competitors, 1979-2002



(1) Data for Korea begin with 1985 and have been omitted from this chart.

In the chart, the solid line indicates that U.S. unit labor costs rose faster than "competitors" costs from 1979 to 1986 on a U.S. dollar basis. In most years from 1986 to 1995, U.S. costs either rose at a slower rate than the "competitors" costs or fell at a faster rate. From 1996 to 1998, however, the strength of the U.S. dollar caused relative U.S. unit labor costs to rise. After a dip in 1999, the index of relative U.S. unit labor costs rose in 2000 and 2001, only to dip again in 2002 with a weakening of the U.S. dollar.

Table C. U.S. manufacturing unit labor costs relative to 12⁽¹⁾ competitors, 1979-2002

Year	Unit Labor Costs National Currency Basis			Unit Labor Costs U.S. Dollar Basis		
	U.S. Index	Competitors' Index	Ratio	U.S. Index	Competitors' Index	Ratio
1979	100.0	100.0	100.0	100.0	100.0	100.0
1980	111.4	110.4	100.9	111.4	110.1	101.2
1981	116.5	118.4	98.4	116.5	108.9	107.0
1982	124.2	126.0	98.6	124.2	104.9	118.5
1983	121.6	127.6	95.2	121.6	103.3	117.6
1984	121.0	128.3	94.3	121.0	98.0	123.4
1985	123.4	129.7	95.1	123.4	96.2	128.2
1986	128.9	135.7	95.0	128.9	122.6	105.2
1987	122.8	137.7	89.1	122.8	141.1	87.0
1988	122.5	137.6	89.0	122.5	151.9	80.7
1989	128.0	140.6	91.0	128.0	149.8	85.4
1990	132.4	146.6	90.3	132.4	162.3	81.6
1991	138.0	152.2	90.7	138.0	171.6	80.4
1992	141.3	155.6	90.8	141.3	179.6	78.7
1993	142.3	156.2	91.1	142.3	175.9	80.9
1994	139.2	153.6	90.6	139.2	175.8	79.1
1995	134.0	153.0	87.6	134.0	185.1	72.4
1996	132.1	154.0	85.8	132.1	176.9	74.7
1997	129.9	152.0	85.5	129.9	162.2	80.1
1998	131.2	153.7	85.4	131.2	155.3	84.5
1999	129.1	151.1	85.4	129.1	157.4	82.0
2000	130.4	145.9	89.4	130.4	147.7	88.3
2001	133.0	149.2	89.1	133.0	141.2	94.2
2002	127.5	151.2	84.3	127.5	144.0	88.5

(1) Data for Korea begin with 1985 and have been omitted from this chart.

Technical Notes

The comparisons in this release are based on data available to BLS as of January 2004.

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. They are computed as compensation in nominal terms divided by real output.

The Bureau of Labor Statistics constructs trends of manufacturing labor productivity, hourly compensation costs, and unit labor costs from three basic aggregate measures – output, total labor hours, and total compensation. The hours and compensation measures refer to employees (wage and salary earners) in Belgium, Denmark, and Taiwan. For all other economies, the measures refer to all employed persons, including employees, self-employed persons, and unpaid family workers. For all of the economies, the term “hours” refers to hours worked.

In general, the measures relate to total manufacturing as defined by the International Standard Industrial Classification (ISIC). However, the measures for Denmark include mining and exclude manufacturing handicrafts from 1950 to 1966, and the measures for France include parts of mining. Data for Canada are in accordance with the North American Industry Classification System (NAICS 97) from 1997 forward and, prior to 1997, with the Canadian Standard Industrial Classification (SIC 80). The change to NAICS reduced Canadian manufacturing employment and hours by about 8 percent. U.S. manufacturing output in this release is based on the 1987 Standard Industrial Classification (SIC). The next regular U.S. Department of Commerce, Bureau of Economic Analysis publication (scheduled for June 2004) of U.S. manufacturing output, for the period 1998–2002 will be on a NAICS basis. Likewise, in the present release, U.S. data for manufacturing employment, hours worked, and labor compensation are based on the 1987 SIC, but will be based on NAICS in the next and future releases.

For most countries, the data for the most recent years are based on the United Nations System of National Accounts 1993 (SNA 93) or its sub-system, the European System of Integrated National Accounts (ESA 95). For some countries, data were compiled according to previously used systems.

Output. For most countries, the output measures are real value added in manufacturing from national accounts. However, output for Japan prior to 1970, and for the Netherlands prior to 1960, are indexes of industrial production. The manufacturing value added measures for the United Kingdom are essentially identical to their indexes of industrial production.

The output measure for manufacturing in the United States is the chain-weighted index of real gross product originating (deflated value added), introduced by the Bureau

of Economic Analysis (BEA) of the U.S. Department of Commerce in August 1996. These value added output data for U.S. manufacturing industries are not available for years prior to 1977. For more information on the U.S. measure, see Sherlene K.S. Lum, Brian C. Moyer, and Robert E. Yuskavage, "Improved Estimates of Gross Product by Industry for 1947-98," *Survey of Current Business*, June 2000, pp. 24-38.

The U.S. output series used for international comparisons differs from the manufacturing series that BLS publishes as part of its official major sector productivity and costs measures for the United States. While both series are based on annually-changing price weights, the international comparisons program uses a value added output concept, while the major sector series is on a sectoral output basis and begins with 1949. Sectoral output is gross output less intrasector sales and transfers. For information on sectoral output, see William Gullickson, "Measurement of productivity growth in U.S. manufacturing," *Monthly Labor Review*, July 1995, pp. 13-28. The official U.S. major sector productivity and costs measures can be found at <http://www.bls.gov/lpc/home.htm>.

Value added measures have been used for the international comparisons series because the data are more readily available from the countries' national accounts, whereas sectoral output would require a complex estimation procedure. Also, although BLS has determined that sectoral output is the correct concept for U.S. measures of productivity, there are other considerations that may make value added a better concept for international comparisons of labor productivity, such as differences among countries in the extent of vertical integration of industries.

Estimation of manufacturing real output using chain-weighted indexes, as recommended by SNA 93, is becoming prevalent. However, many earlier time periods within the historical real output series have been estimated using fixed price weights, with the weights updated periodically (for example, every 5 or 10 years).

Measures of real output also may differ among countries because of different approaches to estimating the prices of high-technology products like computers and, in general, of products that undergo rapid quality change.

Labor Input. For the United States, the hours worked data are taken from the BLS major sector productivity program. The aggregate hours worked series used for France (from 1970 forward), Norway, Sweden, and Canada are series published with the national accounts. For the former West Germany after 1959 and Germany from 1991, BLS uses aggregate hours worked, which were developed by a research institute of the German Ministry of Labor for use with the national accounts employment figures. For the United Kingdom from 1992, an annual index of total manufacturing hours is used. For all other countries, the U.K. before 1992, and the former West Germany before 1959, BLS constructs its own estimates of aggregate hours, using employment figures published with the national accounts, or other comprehensive employment series, and estimates of average annual hours worked. The Italian hours worked series is based on estimates by the Bank of Italy. Denmark released a new hours worked series beginning with 1995. The previous series ends with 1993, and no hours measure is available for 1994. Because of the break in series, no historic trends involving hours can be calculated for periods that include 1994.

Compensation (Labor Cost). The compensation measures are from national accounts data. 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. For Canada, France, and Sweden, compensation is increased to account for important taxes on payroll or employment. For the United Kingdom, compensation is reduced between 1967 and 1991 to account for subsidies. When data for the self-employed are not available, total compensation is estimated by assuming the same hourly compensation for self-employed and employees. Real compensation for the United States is derived using the Consumer Price Index research series (CPI-U-RS).

Data for Germany. German data pertain to unified Germany from 1991 forward and to the former West Germany for prior years. The data series are linked in 1991. West German estimates end with 1998 and have not been revised by BLS since the news release USDL 99-235, on Aug. 27, 1999.

Current Indicators. The measures for recent years may be based on current indicators of output (such as industrial production indexes), employment, average hours, and hourly compensation until national accounts and other statistics, normally used for the long-term measures, become available.

Trade-Weighted Measures. The trade weights for Canada, Japan, and the European countries were obtained by re-scaling a series of weights, developed by the International Monetary Fund, based on average trade flows over the 1989-91 period. These weights are based on aggregate trade data for total manufacturing and take account of both bilateral trade and the relative importance of "third country" markets. The 1989-91 weights do not include Taiwan. BLS developed weights for Taiwan by using data from an earlier study from the International Monetary Fund and other sources. The weight used for Germany is based on the trade weight of the former West Germany.

The following weights were used for the entire period for which trade-weighted unit labor cost measures are produced:

<i>Country</i>	<i>Weight</i>	<i>Country</i>	<i>Weight</i>
Canada	25.31	Germany	11.61
Japan	30.57	Italy	4.60
Taiwan	5.79	Netherlands	2.25
Belgium	2.14	Norway	0.48
Denmark	0.48	Sweden	1.89
France	5.90	United Kingdom	8.99

Level Comparisons. The BLS measures are limited to trend comparisons. BLS does not prepare level comparisons of manufacturing productivity and unit labor costs because of data limitations and technical problems in comparing the levels of manufacturing output among countries. Each country measures manufacturing output in its own currency units. To compare outputs among countries, a common unit of measure is needed. Market exchange rates are not suitable as a basis for comparing output levels. What is needed are purchasing power parities, which 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.

Purchasing power parities are available for total gross domestic product (GDP) from the Organization for Economic Cooperation and Development (OECD). However, these parities are derived for expenditures made by consumers, business, and government for goods and services – not for value added by industry. Therefore, they do not provide purchasing power parities by industry. The parities developed for total GDP are not suitable for each component industry, such as manufacturing.

European exchange rates. On Jan. 1, 1999, 11 European countries joined the European Monetary Union (EMU). Greece joined on Jan. 1, 2001. The euro, the official currency of the EMU, was established at fixed conversion rates to the previous national currencies of EMU members. Data on manufacturing value added and labor compensation for euro-area countries are now reported in euros. Exchange rates between the previous national currencies of euro-area countries and the U.S. dollar are no longer reported; only the exchange rate between the euro and the U.S. dollar is available.

In order to maintain historical continuity of data series, data for euro-area countries for years before 1999 have been linked to the euro-denominated series by applying the fixed euro/national currency conversion rates. For countries and years where output, compensation and exchange rates are converted from national currency units into euros, the following fixed conversion rates were used:

1 euro equals:	40.3399	Belgian francs	1936.27	Italian lire
	6.55957	French francs	2.20371	Netherlands guilders
	1.95583	German marks		

The currency exchange rates cited in this publication are annual averages of daily buying rates in New York City.