

International trends in productivity and labor costs

Output per employee hour in manufacturing generally improved and unit labor cost trends moderated in the U.S. and 10 other nations in 1981; relative productivity and labor cost indexes are introduced

PATRICIA CAPDEVIELLE, DONATO ALVAREZ,
AND BRIAN COOPER

Manufacturing productivity increased in 1981 in the United States, Japan, and most European countries studied, with gains ranging from about 2 to 4 percent in the United States, Japan, France, Germany,¹ Italy, and the Netherlands, to almost 6 percent in the United Kingdom and Denmark, and more than 7 percent in Belgium. In Canada and Sweden, productivity remained essentially unchanged.

These productivity changes occurred in what was for most countries the second year of recession. In most European countries, productivity rose because employment and hours declined more than output. In the United States, Canada, and Japan, productivity gains were accompanied by modest output growth—temporary recoveries from 1980 declines in the United States and Canada.

Unit labor cost increases, which reflect changes in both productivity and hourly compensation costs, ranged from 2 to 5 percent in Japan, Germany, Belgium, Denmark, and the Netherlands, up to 15 percent in France and 18 percent in Italy. When measured in U.S. dollars, however, unit labor costs declined substantially in all the European countries—5 to 20 percent—because of the sharp appreciation of the dollar, while rising 7 to 8 percent in Canada and Japan as well as in the United States.

While the 1981 appreciation of the dollar partially offset the lower long-term U.S. cost trend, unit labor costs in the United States nevertheless declined 29 percent between 1970 and 1981, relative to the average costs of our trade competitors. Unit labor costs in Canada, Belgium, Denmark, the Netherlands, and Italy also declined relative to those of their trade competitors while those of Japan, France, Germany, the United Kingdom, and Sweden increased.

This article describes developments in manufacturing productivity (as measured by output per hour), hourly compensation, and unit labor costs in 1981, and compares the 1980–81 trends with those of the 1974–75 recession, for the United States, Canada, Japan, France, Germany, Italy, the United Kingdom, and four smaller European countries—Belgium, Denmark, the Netherlands, and Sweden.² Percent changes in productivity, labor costs, and related measures for selected periods and for each year from 1973 are shown in tables 1 through 3;³ percent changes are also presented for the eight European countries and for the 10 foreign countries combined.⁴ (Annual indexes for the years 1950 to 1981 are available from the authors.) The data for 1981 are based on preliminary underlying statistics, while those for other recent years reflect revised underlying statistics for several countries.

Although the productivity measure relates output to the hours 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,

Patricia Capdevielle, Donato Alvarez, and Brian Cooper are economists in the Division of Foreign Labor Statistics and Trade, Bureau of Labor Statistics.

capital investment, the level of output, capacity utilization, energy use, and managerial effectiveness, as well as the skills and efforts of the work force.

This article also introduces new measures of relative trends in productivity and labor costs. Table 5 presents indexes of relative output per hour, hourly compensation, and unit labor costs in national currency and in U.S. dollars for the 11 countries. Each relative index represents the ratio of a country's own index to a weighted geometric average of the corresponding indexes for the other 10 countries; the weights used to combine the other country indexes reflect the relative importance of each country as a manufacturing trade competitor (table 4).

Productivity trends

In 1981, manufacturing productivity increased by more than 7 percent in Belgium, almost 6 percent in the United Kingdom and Denmark, and about 2 to 4 percent in the United States, Japan, France, Germany, Italy, and the Netherlands. In Canada and Sweden, it rose less than 0.5 percent. (See table 1.)

For the United States, the 1981 productivity gain was the largest annual increase since 1976. And for Belgium and the United Kingdom, the 1981 gains were the largest in many years. For Japan and Italy, the 1981 increases represent substantial slowdowns from large 1980 gains, but for most other countries, they were improvements over small gains or productivity declines in the previous year.

Output. With the exception of a small gain in Denmark, manufacturing output fell in each of the European countries in 1981—by more than 6 percent in the United Kingdom and about 1 to 4 percent in the other countries. In the non-Scandinavian countries, productivity increased because employment and hours declined even more than output. Most of Denmark's productivity gain also resulted from decreases in employment and hours. In Sweden, hours and output fell equally.

The 1981 drop in British output followed an even larger 1980 decline of 9 percent. For France and Belgium, 1981 marked the second consecutive year of declining output, but the 1980 declines were under 1 percent. Germany, Denmark, Sweden, and the Netherlands had zero or only slight 1980 output increases—under 1 percent—while Italy had a more substantial gain. In most countries, output turned down during the first half of 1980, and showed little if any recovery by late 1981 or early 1982. Only in Italy did output recover in late 1980 and turn down again in 1981.

In the United States and Canada, 1980 manufacturing output levels declined about 3 to 4 percent from previous year levels, but 1981 annual output levels were up 2 percent. In both countries, manufacturing production dropped in the second quarter of 1980, recovered in the fourth quarter, then turned down again during the second half of 1981. In Japan, manufacturing output increased more than 9 percent in 1980, and rose another 3 percent in 1981, but then turned down during the first half of 1982.

Table 1. Annual percent changes in manufacturing productivity and output, 11 countries, 1960-81

Year	United States	Canada	Japan	France	Germany	Italy	United Kingdom	Belgium	Denmark	Netherlands	Sweden	Eight European countries	Ten foreign countries
<i>Output per hour:</i>													
1960-81	2.7	3.6	9.2	5.5	5.2	5.8	3.6	7.2	6.1	7.1	5.0	5.3	5.9
1960-73	3.0	4.5	10.7	6.0	5.5	6.9	4.3	7.0	6.4	7.6	6.7	5.8	6.4
1973-81	1.7	1.4	6.8	4.6	4.5	3.7	2.2	6.2	4.1	5.1	2.2	4.1	4.7
1974	-2.4	2.2	2.4	3.5	5.4	4.9	.8	5.8	3.3	8.3	3.6	4.1	3.8
1975	2.9	-2.6	3.9	3.1	5.3	-4.4	-2.0	4.4	10.4	-1.8	-4	1.6	2.0
1976	4.4	5.3	9.4	8.2	7.1	8.6	4.0	10.4	3.8	12.8	1.0	7.2	7.5
1977	2.5	4.0	7.2	5.1	4.9	1.1	1.6	6.5	2.1	4.1	-1.5	3.3	4.3
1978	.9	1.6	7.9	5.7	3.3	3.0	3.3	5.0	2.4	6.6	4.3	4.0	4.9
1979	.7	1.7	8.9	4.9	4.9	7.3	3.3	6.5	5.8	4.9	8.4	5.3	6.1
1980	.2	-3.3	6.8	1.6	1.4	5.8	.6	3.1	1.4	1.3	1.2	2.8	3.6
1981	2.8	.3	3.2	1.6	2.7	3.4	5.9	7.3	5.6	3.1	.1	3.8	3.3
<i>Output:</i>													
1960-81	3.6	4.8	10.0	5.2	3.8	5.4	1.6	5.0	4.0	4.7	3.2	4.0	5.3
1960-73	4.7	6.3	13.0	6.6	5.2	6.8	3.0	6.5	5.2	6.4	5.1	5.4	6.8
1973-81	2.3	2.0	6.5	2.3	1.9	3.3	-1.7	1.1	1.8	1.7	-3	1.5	2.9
1974	-4.2	3.6	-2.0	3.2	-3	6.4	-1.2	4.6	1.5	4.4	4.8	1.8	-9
1975	-7.1	-5.9	-4.0	-2.1	-4.8	-9.7	-7.0	-7.4	-2.1	-6.7	-1.5	-5.2	-5.0
1976	9.6	5.9	13.3	7.0	8.0	12.6	2.0	8.6	4.8	8.0	-4	7.0	8.5
1977	6.9	2.0	7.3	3.7	2.4	2.1	1.9	.7	.6	.9	-5.6	2.1	3.5
1978	5.3	5.0	7.3	3.2	1.3	1.8	.6	.9	.7	2.8	-1.3	1.6	3.4
1979	2.7	4.7	9.9	2.6	4.8	6.7	2	3.7	6.5	2.7	6.9	3.8	5.6
1980	-4.3	-3.1	9.4	-1	5	6.3	-9.1	-1.4	0	9	0	-4	2.4
1981	2.3	1.6	3.2	-2.7	-1.4	-1.0	-6.3	-2.5	.5	-9	-3.6	-2.4	-4

NOTE: Rates of change computed from the least squares trend of the logarithms of the index numbers.

Employment and hours. Manufacturing employment and aggregate hours both increased only in Canada in 1981; in Japan, employment rose slightly but total hours were essentially unchanged. In 1980, hours had increased slightly in Canada and by more than 2 percent in Japan. In the United States, employment and hours declined only slightly in 1981, after falling more than 3 percent in 1980. (See table 2.)

In Europe, employment declined 10 percent in the United Kingdom and 2 to 6 percent in the other countries in 1981. Those declines followed 1980 drops of 6 percent in the United Kingdom and 1 to 2 percent in most of the other countries. Employment had increased slightly in Germany in 1980 and was essentially unchanged in Italy and Sweden. Aggregate hours fell even more than employment in 1981—except in Denmark—as average hours were also reduced.

Comparisons with 1974–75. Comparisons of developments during the years 1980 and 1981 with the recession of 1974–75 cannot be precise, particularly when dealing with annual average data, because of differences among countries in the extent and timing of the 1974–75 recession and the 1980–81 downturns. Nevertheless, certain broad comparisons can be made.

Over the 1974–75 period, manufacturing output fell in one or both years in all 11 countries studied. During 1980–81, neither Japan nor Denmark experienced annual average declines in output, although Denmark had virtually no output growth over the period and Japanese output slowed sharply in 1981; most of the other countries had smaller output declines than in 1974–75. However, there were exceptions. The recent output declines in the United Kingdom were substantially greater than during 1974–75, and those in France and Sweden also appear to have been larger. Only in the United States did output regain its pre-1974 average rate of growth during the 1976–79 recovery period.

As in the case of output, manufacturing employment and hours declined less sharply during 1980–81 than during 1974–75 in most of the countries studied. For example, German employment declined about 2 percent in 1980–81, compared with 9 percent in 1974–75, and total hours declined 5 percent versus 15 percent. Again, major exceptions were France, where employment and hours declined somewhat more in 1980–81, and the United Kingdom, where the recent declines—16 percent for employment and 21 percent for total hours—were substantially greater than those in 1974–75. In Sweden, the employment effects of the 1974–75 recession were delayed; therefore, direct comparison between the two periods is not appropriate.

Although employment losses over the 2-year period of 1980–81 were less severe in most countries than in 1974–75, employment in most of Europe also declined

during the intervening 1976–79 period. The rate of decline ranged from about 1 percent per year in France and Germany to almost 4 percent annually in Belgium. Only in Denmark and Italy was employment essentially stable during the recovery period. By 1981, employment in manufacturing was down 6, 11, and 14 percent from 1973 levels in Sweden, France, and Germany; 17 percent in Denmark and the Netherlands; and almost 25 percent in Belgium and the United Kingdom. In contrast, employment in the United States and Canada was higher in 1981 than in 1973.

All European countries have taken actions, through collective bargaining or government programs, to shorten average hours worked to preserve manufacturing jobs. Most countries have partial unemployment benefit programs to provide wage replacement to employees on short work schedules for economic reasons. In addition, minimum annual holiday (vacation) entitlements have been increased in Denmark, Germany, the Netherlands, Sweden, and the United Kingdom (and are scheduled to increase in France) as a job creation measure as well as a fringe benefit improvement. (In Italy, on the other hand, several national holidays were abolished in 1977 as a labor cost cutting measure, although many employees receive extra annual holidays in lieu of the national holidays.) In Belgium, the standard workweek was shortened through collective bargaining from 40 hours in 1977 to 38 hours for most employees in 1981; the shorter hours are provided as either a shorter workweek or a longer annual holiday.

Given the relative output and employee-hours changes, manufacturing productivity increased in most countries during both the 1974–75 recession and in 1980–81. The following tabulation shows average annual productivity changes over the two periods:

	1974–75	1980–81
United States	0.2	1.5
Canada	-.2	-1.5
Japan	3.2	5.0
France	3.3	1.6
Germany	5.4	2.1
Italy2	4.6
United Kingdom	-.6	3.2
Belgium	5.1	5.2
Denmark	6.8	3.5
Netherlands	3.2	2.2
Sweden	1.6	.7

In the United States, Japan, Italy, and the United Kingdom, the productivity trend was higher during 1980–81, while productivity gains were higher during 1974–75 in France, Germany, Denmark, the Netherlands, and Sweden. In Belgium, productivity rose equally in both periods. In Canada, productivity declined in both periods.

Hourly compensation

Hourly compensation increases in 1981 varied considerably among the 11 countries studied. The

Table 2. Annual percent changes in manufacturing employment and hours, 11 countries, 1960-81

Year	United States	Canada	Japan	France	Germany	Italy	United Kingdom	Belgium	Denmark	Netherlands	Sweden	Eight European countries	Ten foreign countries
Aggregate hours:													
1960-81	0.9	1.1	0.7	-0.2	-1.3	-0.4	-1.9	-2.1	-2.0	-2.3	-1.7	-1.2	-0.6
1960-73	1.6	1.7	2.1	6	-2	-1	-1.2	-5	-1.1	-1.1	-1.5	-4	4
1973-81	6	5	-3	-2.2	-2.5	-4	-3.8	-4.8	-2.2	-3.2	-2.5	-2.4	-1.7
1974	-1.9	1.4	-4.3	-3	-5.4	1.4	-2.0	-1.7	-1.7	-3.6	1.2	-2.2	-2.7
1975	-9.7	-3.4	-7.6	-5.0	-9.6	-5.5	-5.1	-11.3	-11.3	-5.0	-1.1	-6.7	-6.8
1976	4.9	5	3.6	-1.1	8	3.8	-1.9	-1.7	1.0	-4.3	-1.5	-2	1.0
1977	4.2	-2.0	1	-1.3	-2.4	1.0	.2	-5.4	-1.4	-3.0	-4.1	-1.2	-8
1978	4.4	3.4	-5	-2.3	-1.9	-1.2	-2.6	-3.9	-1.7	-3.6	-5.4	-2.3	-1.5
1979	2.0	2.9	1.0	-2.2	-1	-6	-3.0	-2.6	.7	-2.1	-1.3	-1.5	-5
1980	-4.5	2	2.5	-1.7	-9	5	-9.6	-4.3	-1.4	-4	-1.2	-3.1	-1.1
1981	-5	1.3	-1	-4.3	-4.0	-4.3	-11.5	-9.2	-4.8	-3.8	-3.7	-6.0	-3.7
Employment:													
1960-81	.9	1.4	1.5	5	-4	1.1	-1.1	-.7	-.7	-1.0	-.3	-.2	.3
1960-73	1.5	1.9	3.0	1.2	.5	1.4	-.5	.6	.2	.0	-.2	.5	1.1
1973-81	7	8	-4	-1.4	-1.6	0	-2.9	-3.6	-1.8	-2.4	-1.0	-1.7	-1.2
1974	-4	2.0	2	1.3	-2.6	2.5	1.9	1.1	-3.6	-.4	2.4	.3	.4
1975	-8.6	-2.2	-5.1	-2.7	-6.7	-4	-3.8	-6.1	-8.4	-3.2	.9	-3.9	-4.2
1976	3.7	4	4	-1.0	-2.4	2	-2.2	-4.1	6	-4.0	-.2	-1.7	-1.0
1977	3.6	-2.0	-2	-.5	-.8	1	-.4	-3.9	-.5	-2.7	-3.5	-.7	-.6
1978	4.2	3.2	-1.1	-1.6	-.6	-1.0	-2.4	-4.1	-.5	-2.5	-2.8	-1.5	-1.2
1979	2.6	3.7	-.1	-1.8	.3	5	-2.5	-2.7	.8	-1.0	.3	-.9	-.5
1980	-3.4	.3	2.5	-1.3	6	2	-6.0	-1.9	-2.0	-1.2	-.1	-1.6	-.3
1981	-5	1.8	.5	-3.6	-2.4	-1.9	-10.1	-5.5	-4.8	-3.3	-3.2	-4.5	-2.8
Average hours:													
1960-81	-.1	-.3	-.8	-.7	-.9	-1.4	-.9	-1.4	-1.3	-1.2	-1.4	-1.0	-.8
1960-73	.1	-.2	-.9	-.5	-.8	-1.5	-.7	-1.0	-1.4	-1.1	-1.3	-.9	-.8
1973-81	-2	-.3	.1	-.8	-.9	-.3	-1.0	-1.2	-.5	-.8	-1.5	-.9	-.5
1974	-1.5	-.6	-4.5	-1.5	-2.9	-1.1	-3.8	-2.2	2.0	-3.2	-1.1	-2.5	-3.1
1975	-1.2	-1.1	-2.6	-2.3	-3.1	-5.1	-1.3	-5.6	-3.2	-1.8	-2.0	-2.9	-2.8
1976	1.2	.1	3.2	-.1	3.2	3.5	.3	2.5	.4	-.3	-1.3	1.5	2.0
1977	.6	.0	.3	-.9	-1.6	.9	.6	-1.6	-.9	-.3	-.7	-.4	-.2
1978	2	.3	.6	-.7	-1.4	-.2	-.2	.3	-1.2	-1.1	-2.6	-.8	-.3
1979	-.6	-.7	1.1	-.4	-.4	-1.0	-.5	.1	-.1	-1.1	-1.6	-.6	0
1980	-1.0	-.1	-.1	-.3	-1.5	.3	-3.9	-2.5	.7	.8	-1.1	-1.5	-.8
1981	0	-.5	-.6	-.7	-1.6	-2.4	-1.6	-3.8	.0	-.6	-.6	-1.6	-.9

NOTE: Rates of change computed from the least squares trend of the logarithms of the index numbers.

smallest gain was 5 percent in the Netherlands and the largest, 22 percent in Italy. In the United Kingdom and France, the increases were also large—over 16 percent. In Japan and Germany, the gains were relatively small—under 8 percent—while in the United States, Canada, Belgium, Denmark, and Sweden, they were 9 to 12 percent. (See table 3.)

Four countries—the United States, Germany, Denmark, and the United Kingdom—showed some degree of moderation in hourly compensation gains for 1981. In the United Kingdom, there was a substantial slowdown from the 24 percent recorded in 1980. (In the Netherlands, a significant slowdown occurred in 1980.) In Canada, Japan, Italy, and Sweden, however, the 1981 increases were higher than those of the previous year, and in France, Belgium, and the Netherlands, the increases in both years were virtually the same.

Compared with the hourly compensation trend during the 1974-75 recession, annual rates of increase during the 1980-81 period were considerably lower in every country except the United States and France. In the United States, however, the 1974-75 increases were relatively small. The moderation in wage gains and other

labor costs occurred even though consumer price trends were generally about as high in 1980-81 as in 1974-75—with Japan and Belgium as principal exceptions. However, growing concern with moderating labor costs and containing inflation, as well as preserving manufacturing jobs, had a significant impact on recent compensation trends.

Concerted action was taken in several countries to moderate wage settlements during 1980-81. Temporary pay freezes were imposed in Belgium and the Netherlands and a temporary price freeze was undertaken in Sweden. The Dutch government subsequently imposed statutory pay controls. In several countries with wage indexation systems, the price indexes used were adjusted to exclude fuel and energy prices, or the cost-of-living allowances (COLA's) normally payable were reduced or rescinded.

In Japan and Germany, annual wage agreements in 1980 and 1981 continued the moderate pattern of recent years. In Japan, the average manufacturing settlement was 6.7 percent in 1980 and 7.6 percent in 1981, and in Germany, the average settlements were 6.7 percent in 1980 and 4.6 percent in 1981. In the United States and

the United Kingdom, wage-and-salary concessions were made in some impacted companies or industries.

In the Netherlands, a pay freeze was imposed from January through April 1980, followed by statutory controls which were later extended through 1981. No basic wage increases were allowed. Furthermore, the June 1980 cost-of-living adjustment was restricted to a flat-rate amount, and the January 1981 adjustment was reduced by 2 percent. In 1981, holiday bonuses were lowered slightly, and extra annual holidays delayed.

The Belgian Government imposed a pay freeze in January 1981. The national wage agreement signed in February, under threat of statutory pay controls, provided either a 1-percent wage rate increase or an extra hour off the standard workweek by 1983. Wages are indexed for consumer price increases in Belgium, however, and the indexation system was not changed. The emphases of recent wage settlements in Belgium have not been basic wage increases but reductions of standard hours. Standard weekly hours were reduced from 40 hours per week in 1977 to 38 hours for most workers by 1980, and the 1981 national agreement allowed

additional reductions. Because wage rates are adjusted to compensate for the shorter workweek, the hours reductions are measured as hourly compensation gains.

Wage rates are also indexed for consumer price increases in Italy, and cost-of-living allowances are paid under collective agreements in Denmark, Sweden, and the United Kingdom. In Italy as in Belgium, the indexation system continued unchanged during 1980-81. In Denmark and Sweden, COLA payments were restricted. In Denmark, the index used to compute the COLA's was changed in December 1979 to exclude fuel and energy prices, and was also rebased. As a result, one of the COLA's was eliminated in 1980. In Sweden, the 1981 pay agreements specified exclusion of energy prices from the consumer price index used in COLA computation. The government imposed a price freeze in September 1981 and cut value-added taxes in November, and thereby kept the price rise below the COLA threshold (trigger) specified in the pay agreement.

In Denmark, early 1981 wage settlements at the industry level provided moderate wage increases and restricted additional company-level wage negotiations. In

Table 3. Annual percent changes in hourly compensation and unit labor costs in manufacturing, 11 countries, 1960-81

Year	United States	Canada	Japan	France	Germany	Italy	United Kingdom	Belgium	Denmark	Netherlands	Sweden	Eight European countries	Ten foreign countries
Hourly compensation:													
1960-81	6.9	8.7	14.8	11.9	10.1	16.2	13.1	12.6	13.2	12.9	12.0	12.0	11.9
1960-73	5.0	6.4	14.6	9.2	9.3	12.3	8.6	10.7	11.8	12.8	10.4	9.8	10.1
1973-81	9.6	11.1	9.7	15.1	9.4	19.8	19.1	12.1	12.5	9.7	13.0	13.7	12.4
1974	10.6	15.8	31.2	19.6	15.0	24.6	25.0	22.5	21.0	19.2	17.6	18.3	21.4
1975	11.9	14.2	17.0	19.0	12.4	28.9	29.9	21.4	19.3	14.3	21.2	18.4	18.0
1976	8.0	14.2	6.7	14.1	7.8	19.8	17.2	13.2	11.7	12.5	18.5	13.0	11.2
1977	8.3	11.0	9.7	13.7	10.5	18.8	12.6	12.0	10.6	8.6	9.2	12.0	11.3
1978	8.3	6.7	5.9	12.7	8.5	14.5	16.5	8.0	10.2	8.7	11.3	11.6	9.8
1979	9.7	10.1	6.5	13.8	7.3	17.6	18.9	7.7	11.8	7.8	7.8	12.4	10.7
1980	11.8	9.1	6.5	16.6	8.6	18.5	23.6	9.6	10.9	5.0	10.9	14.9	12.0
1981	10.2	11.1	7.4	16.5	7.5	22.3	16.2	9.6	9.3	5.3	12.4	13.8	11.5
Unit labor costs:													
1960-81	4.1	4.8	5.1	6.1	4.6	9.8	9.2	5.1	6.8	5.5	6.7	6.3	5.8
1960-73	1.9	1.8	3.5	3.1	3.7	5.1	4.1	3.5	5.1	4.8	3.5	3.8	3.5
1973-81	7.7	9.5	2.7	10.0	4.7	15.5	16.6	5.6	8.0	4.4	10.6	9.2	7.4
1974	13.3	13.3	28.1	15.6	9.1	18.7	24.1	15.7	17.1	10.0	13.5	13.7	17.0
1975	8.8	17.2	12.6	15.4	6.8	34.9	32.5	16.3	8.0	16.4	21.7	16.6	15.6
1976	3.4	8.4	-2.5	5.5	.6	10.4	12.7	2.5	7.6	-3	17.3	5.5	3.5
1977	5.7	6.7	2.4	8.2	5.3	17.5	10.8	5.2	8.4	4.3	11.0	8.4	6.7
1978	7.4	5.0	-1.8	6.6	5.0	11.2	12.8	2.9	7.6	1.9	6.7	7.2	4.7
1979	9.0	8.3	-2.2	8.5	2.4	9.6	15.0	1.1	5.7	2.8	-5	6.7	4.3
1980	11.6	12.8	-2	14.8	7.0	12.1	22.9	6.4	9.4	3.7	9.6	11.8	8.1
1981	7.2	10.7	4.0	14.6	4.7	18.3	9.7	2.1	3.5	2.1	12.3	9.7	7.9
Unit labor costs in U.S. dollars:													
1960-81	4.1	4.4	7.9	6.5	9.1	7.6	7.1	7.8	7.9	8.7	7.7	7.6	7.2
1960-73	1.9	1.9	4.9	2.8	6.1	5.4	2.6	4.6	5.0	6.1	4.2	4.2	3.9
1973-81	7.7	6.5	7.2	9.4	9.1	8.1	15.0	8.6	7.7	8.0	9.6	9.9	8.8
1974	13.3	15.8	19.0	6.7	11.9	6.2	18.5	15.5	16.0	13.9	11.5	11.4	13.5
1975	8.8	12.7	10.7	29.6	12.3	34.5	25.8	23.2	14.6	23.8	30.2	22.6	19.3
1976	3.4	11.9	-2.4	-5.4	-1.8	-13.3	-8.5	-2.5	2.1	-4.8	11.5	-5.0	-3.8
1977	5.7	-1.0	13.3	5.1	14.2	10.5	7.1	13.3	9.1	12.3	8.2	10.0	9.9
1978	7.4	-2.1	26.2	16.5	21.6	15.6	24.0	17.3	17.3	15.8	5.6	18.8	19.3
1979	9.0	5.4	-6.5	14.7	12.0	12.0	27.3	8.4	10.6	10.7	4.8	14.5	8.2
1980	11.6	13.0	-3.5	15.7	8.1	8.9	34.6	6.8	2.2	4.8	11.1	13.6	8.6
1981	7.2	8.0	6.7	-10.5	-15.7	-10.6	-4.5	-19.5	-18.0	-18.5	-5.7	-12.0	-7.4

NOTE: Rates of change computed from the least squares trend of the logarithms of the index numbers.

France, there were no government restrictions on wage increases during 1980–81, and wage rate increases followed the consumer price index although there is no formal indexation system. Minimum-wage increases above the price index rate raised average wages further in some lower wage industries. In Italy, the major wage agreements were concluded in 1979 and expired in late 1981. Their wage rate provisions and the indexation system were not limited, although there were discussions of labor cost reductions and indexation changes for 1982. In Italy and several other European countries, actions were taken to cut employers' social security tax rates, although in other cases tax rates were raised to finance system deficits.

Unit labor costs

Unit labor costs, which reflect the interplay between hourly compensation and output per hour, increased about 7 percent in the United States and 10 to 12 percent in Canada, Sweden, and the United Kingdom in 1981, compared with more than 14 percent in France and 18 percent in Italy, but only 2 to 5 percent in Denmark, Japan, Germany, Belgium, and the Netherlands. (See table 3.)

In every country except Japan, France, Italy, and Sweden, unit labor costs increased less in 1981 than in the previous year. In the United Kingdom, the slowdown from the 23 percent recorded in 1980 was substantial, and reflected both a smaller compensation increase and a larger productivity gain. In most other countries also, the moderation in unit labor costs reflects a slowdown in hourly compensation and improvements in productivity. In France, the 1981 increase in unit labor costs, as well as in productivity and hourly compensation, was essentially the same as the previous year's. In Japan and Italy, the acceleration in unit labor costs primarily reflects their productivity slowdowns.

The 1980–81 increases in unit labor costs were generally much smaller than those of 1974–75 because hourly compensation gains were relatively moderate, in contrast to the substantial wage gains during the 1974–75 recession. The average annual unit labor cost increases for the two periods are shown in the following tabulation:

	1974–75	1980–81
United States	11.0	9.4
Canada	15.2	11.8
Japan	20.3	1.9
France	15.5	14.7
Germany	7.9	5.9
Italy	26.8	15.2
United Kingdom	28.3	16.3
Belgium	16.0	4.2
Denmark	12.5	6.4
Netherlands	13.2	2.9
Sweden	17.6	10.9

For some countries—Japan, Belgium, Denmark, and the Netherlands—the differences are substantial. Even for the countries with the largest unit labor cost increases in 1980–81—Italy and the United Kingdom—the recent increases are down considerably from 1974–75 peaks. The differences are less marked for the United States and Germany, which had the smallest 1974–75 unit labor cost increases.

In U.S. dollars. In comparing trends in unit labor costs among countries, an important analytical element is the shift in relative currency values through international exchange rate adjustments. In recent years, the number and extent of such adjustments have been so great as to constitute a major variable in competitive assessment.

The relationship between exchange rate shifts and unit labor cost trends is partial and indirect but nonetheless important. The two are linked by the price mechanism, a main determinant of trade directions and competitive relationships. Because labor cost is the principal cost factor in the production of manufactured goods, it exerts a strong influence on the price at which goods can be offered in international markets. Relative changes in exchange rates alter the effect of relative changes in costs in national currency. Consequently, in assessing relative changes in unit labor costs in competitive terms, changes in exchange rates need to be taken into account.

Changes in currency exchange rates in 1981 had a significant effect on relative changes in unit labor costs measured in U.S. dollars. The dollar appreciated substantially—from about 15 percent to more than 30 percent—relative to the European currencies. (By September 1982, the dollar had further appreciated—compared with the annual average for 1981—10 percent versus the German mark and Dutch guilder, and 8 to 30 percent versus the other European currencies.) The dollar also appreciated somewhat relative to the Canadian dollar, but declined slightly versus the Japanese yen. (By September 1982, however, the dollar had appreciated 19 percent versus the yen, as well as another 3 percent versus the Canadian dollar.)

Therefore, when measured in U.S. dollars, unit labor costs in the European countries fell about 5 percent in Sweden and the United Kingdom; 11 percent in France and Italy; 16 percent in Germany; and 18 to 20 percent in Belgium, the Netherlands, and Denmark. In U.S. dollars, unit labor costs increased 8 percent in Canada and 7 percent in Japan—about the same rate as for U.S. costs. (See table 3.)

The largest contrast was between Japan and Germany. On a national currency basis, they had increases of 4 and 5 percent, respectively. On a U.S. dollar basis, Japanese unit labor costs rose 7 percent while German unit labor costs fell 16 percent.

While the 5-percent decline in the United Kingdom was not as large as in the other European countries, it was the sharpest trend reversal among all the countries, for British unit labor costs had increased 35 percent in 1980. Unit labor costs in Japan had posted a small decline in 1980; among the other countries, they had risen 2 to 16 percent.

The trend in unit labor costs in U.S. dollars for the 1980–81 period differs significantly from that for the years 1974–75 in most countries covered. First, unit labor costs in national currency increased much less during 1980–1981 in most countries. Secondly, the U.S. dollar appreciated versus all European currencies and the Canadian dollar in 1981, while in 1974–75, the dollar appreciated versus the Japanese yen, Italian lira, and British pound but depreciated versus all the other currencies. Therefore, unit labor costs in U.S. dollars increased substantially more in most other countries than in the United States during the 1974–75 recession, while in the 1980–81 period, unit labor costs in U.S. dollars declined in all European countries covered.

Relative productivity and cost trends

Indexes of manufacturing productivity and labor costs are often used in analyses of changes in the relative competitive position of countries in the international trade of manufactures. Unit labor costs are an important element in determining the underlying price competitiveness of manufactured products, with relative productivity and hourly compensation trends determining unit labor cost performance. The International Monetary Fund (IMF) and Organization for Economic Cooperation and Development (OECD) publish indexes for key cost and price measures—including unit labor costs in U.S. dollars—which show the trend of each country's own indicators relative to those of other industrial (competitor) countries.⁵ The BLS unit labor cost measures are used in the computation of the IMF and OECD indicators for most countries they cover. The fol-

lowing section introduces indexes of trade-weighted relative trends in manufacturing productivity, hourly compensation, and unit labor costs in national currency, as well as unit labor costs in U.S. dollars.

Because trade involves individual products, the use of aggregate manufacturing measures as indicators of trade competitiveness has certain limitations. In general, labor productivity growth rates in export sectors probably exceed those for manufacturing as a whole. On the other hand, hourly compensation tends to grow at similar rates in all manufacturing sectors within a country. Overall, therefore, trend measures for the total manufacturing sector would be expected to overstate, to some extent, the growth of unit labor costs for the export sector. However, this would probably be true for every country, and, in any case, the measures are intended to represent relative changes only. In addition, exchange rate changes have a significant effect on relative unit labor cost developments, and these affect unit labor costs in all manufacturing industries equally.

Index calculation methods. The indexes of relative trends in manufacturing productivity and labor costs represent ratios of each country's own indexes to weighted geometric averages of the corresponding indexes for the other 10 "competitor" countries.

The weights used to combine the other 10 countries' indexes into an average "competitors" index reflect the relative importance of each country as a manufacturing trade competitor. The weights are those developed by the IMF for computation of their own relative cost and price indicators—except that they have been adjusted from the 14-country coverage of the IMF series to the 11-country coverage of the BLS series.⁶ The weights are based on disaggregated trade data for manufacturers in 1975. They take into account the relative importance of each country's trading partners in its direct bilateral trade with them and the relative importance of those partners in competition in "third country" markets, ad-

Table 4. Trade weights used to compute competitor indexes

[In percent]

Reference country	Competitor country										
	United States	Canada	Japan	Belgium	Denmark	France	Germany	Italy	Netherlands	Sweden	United Kingdom
United States	—	19.3	17.3	3.3	1.1	13.1	18.8	7.4	4.9	3.2	11.6
Canada	76.9	—	5.1	.9	.2	2.5	5.3	1.7	.9	2.0	4.5
Japan	36.2	2.9	—	3.8	1.4	11.3	18.2	7.4	4.4	3.7	10.8
Belgium	5.7	.5	6.2	—	.9	22.9	34.1	7.7	9.5	2.4	10.1
Denmark	12.7	.9	10.3	2.9	—	9.6	23.4	6.4	4.7	13.2	15.9
France	16.7	1.1	11.9	4.0	1.3	—	31.1	13.3	5.0	3.0	12.5
Germany	17.5	1.5	12.1	7.8	1.2	21.0	—	12.8	8.1	5.3	12.8
Italy	16.3	1.4	12.2	4.5	1.4	10.8	34.3	—	4.9	2.8	11.5
Netherlands	11.9	.7	9.1	8.7	1.5	16.5	33.9	4.2	—	2.7	10.7
Sweden	18.0	3.5	11.6	3.3	4.8	10.3	23.4	6.5	3.8	—	14.8
United Kingdom	25.0	2.0	11.6	5.4	2.1	13.7	22.5	7.8	5.3	4.7	—

Note: Because of rounding, sums of individual items may not equal 100.0.

justed for the importance of foreign trade to the manufacturing sector as a whole in each country.⁷ Table 4 shows the weights used for each of the 11 countries.

The relative indexes of output per hour, hourly compensation, and unit labor costs in national currency and in U.S. dollars are shown in table 5. The underlying "own country" and "competitor countries" indexes used to compute the relative indexes, and indexes of trade-weighted exchange rates, not shown in table 5, are available from the authors.

Chart 1 shows the trends from 1970 to 1981 in U.S. manufacturing output per hour, hourly compensation,

and unit labor costs compared with those for its trade-weighted competitors, as well as relative U.S. versus competitors trends. Charts 2 and 3 show the relative unit labor cost trends in national currency and in U.S. dollars for four countries—the United States, Japan, Germany, and the United Kingdom; the three foreign countries shown are important U.S. trade partners, and each also represents different relative cost trends.

Relative productivity trends. The countries in which manufacturing productivity grew more rapidly than that of trade competitors since 1970 were Japan, Belgium,

Table 5. Relative indexes of output per hour, hourly compensation, and unit labor costs in manufacturing, 11 countries, 1970–81

[1970=100]

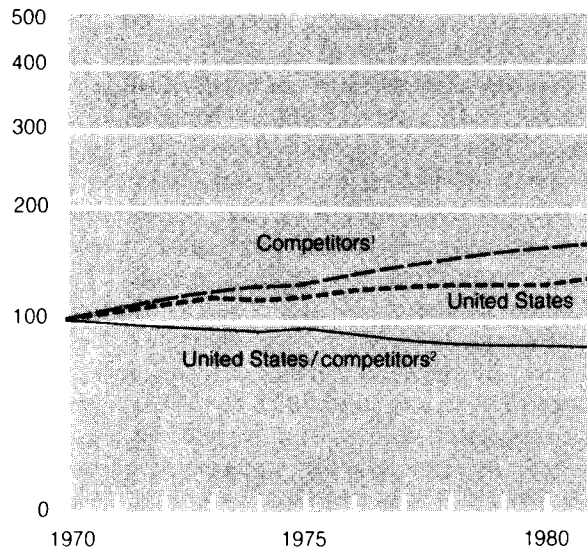
Year	United States	Canada	Japan	France	Germany	Italy	United Kingdom	Belgium	Denmark	Netherlands	Sweden
Output per hour:											
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	100.7	101.2	101.0	100.4	98.9	98.1	98.7	101.4	101.2	101.7	100.0
1972	98.5	100.0	105.9	98.9	98.0	99.0	99.4	105.6	102.2	102.4	98.2
1973	96.5	100.3	109.5	96.9	96.2	103.8	98.4	109.2	105.2	105.5	98.3
1974	91.0	103.6	110.2	97.2	98.7	105.8	96.5	111.1	105.5	110.6	99.2
1975	92.6	98.4	112.3	98.4	102.9	98.1	92.1	113.4	114.6	105.4	96.5
1976	90.3	98.7	115.9	99.6	102.8	99.6	89.5	116.5	112.0	111.2	91.4
1977	88.8	99.8	120.4	101.0	104.2	96.6	87.5	119.2	110.7	111.0	86.6
1978	85.9	99.6	126.3	103.0	103.2	95.8	87.1	120.0	109.1	113.9	87.2
1979	82.3	99.4	132.9	103.0	103.1	98.3	86.0	121.7	109.8	113.9	90.4
1980	81.0	95.4	140.3	102.3	102.1	102.1	84.8	123.1	109.2	113.1	89.8
1981	81.1	93.0	140.5	100.6	101.6	102.3	87.4	128.5	111.9	112.9	87.0
Hourly compensation:											
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	94.2	99.8	104.8	99.3	99.8	103.0	102.9	101.8	102.2	101.8	100.2
1972	88.7	99.9	110.5	99.2	98.7	106.1	105.1	105.6	101.3	104.6	100.7
1973	82.4	100.7	120.8	98.4	96.3	118.3	102.5	107.4	107.8	109.4	98.8
1974	75.4	103.0	136.3	98.7	91.8	124.4	108.7	110.5	109.3	109.7	97.4
1975	71.4	103.5	136.5	99.7	86.1	137.9	121.7	114.2	109.9	106.7	100.3
1976	68.6	108.4	130.6	102.3	82.0	149.7	128.8	115.6	109.2	108.1	106.8
1977	66.6	110.4	129.4	104.4	80.9	161.0	130.8	115.9	108.7	105.4	105.0
1978	65.8	108.2	124.3	107.0	79.2	168.3	139.5	113.2	108.4	104.1	106.1
1979	65.2	108.3	119.2	110.2	75.9	180.4	151.2	109.9	109.4	101.7	103.1
1980	65.3	105.5	112.5	114.8	72.6	192.1	168.4	107.2	107.8	95.2	101.6
1981	64.5	106.1	108.1	120.5	69.0	213.5	176.6	105.3	105.6	90.2	102.7
Unit labor costs in national currency:											
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	93.6	98.6	103.7	98.9	101.0	105.0	104.3	100.4	101.0	100.1	100.2
1972	90.0	99.9	104.4	100.3	100.7	107.2	105.8	100.0	99.1	102.1	102.4
1973	85.4	100.4	110.3	101.6	100.1	113.9	104.2	98.4	102.5	103.7	100.5
1974	82.9	99.4	123.6	101.6	93.0	117.7	112.7	99.5	103.6	99.1	98.2
1975	77.1	105.2	121.5	101.3	83.6	140.6	132.1	100.7	95.9	101.3	103.9
1976	76.0	109.9	112.8	102.7	79.7	150.3	143.9	99.2	97.5	97.2	116.9
1977	75.0	110.6	107.5	103.4	77.7	166.5	149.6	97.2	98.2	94.9	121.2
1978	76.6	108.6	98.4	103.9	76.7	175.6	160.1	94.3	99.3	91.4	121.7
1979	79.3	108.9	89.7	107.0	73.7	183.5	175.7	90.3	99.7	89.3	114.1
1980	80.5	110.6	80.2	112.2	71.1	188.1	198.5	87.1	98.7	84.2	113.2
1981	79.6	114.0	76.9	119.8	68.0	208.6	202.2	82.0	94.3	79.9	118.1
Unit labor costs in U.S. dollars:											
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	91.1	101.3	105.2	96.6	104.3	103.7	104.2	100.0	100.0	101.1	99.5
1972	81.5	102.6	116.1	100.3	106.4	104.6	101.2	102.0	97.7	104.4	102.6
1973	71.1	99.9	129.0	106.0	119.2	100.3	88.9	101.4	107.0	109.9	101.1
1974	70.9	102.1	136.6	99.9	118.6	93.8	93.8	104.9	109.8	111.2	99.4
1975	64.9	103.3	128.8	110.2	109.1	108.5	100.8	107.5	105.0	116.4	110.3
1976	68.1	113.5	127.4	107.6	111.0	95.9	93.5	109.1	109.2	113.9	126.4
1977	66.4	105.2	133.5	102.2	116.9	96.1	91.5	112.2	108.6	116.1	125.0
1978	61.7	93.5	148.2	101.0	122.7	94.2	98.4	111.1	109.0	113.7	112.4
1979	61.8	90.2	123.6	105.1	124.3	95.5	115.4	107.2	108.8	113.2	106.1
1980	62.4	91.5	105.7	110.3	120.2	94.1	143.2	102.8	99.2	106.7	105.9
1981	70.8	95.4	118.7	106.6	107.8	91.1	146.0	92.5	87.6	95.6	106.8

NOTE: Relative indexes are calculated from the ratio of the reference country index to a trade-weighted average index for the other 10 countries.

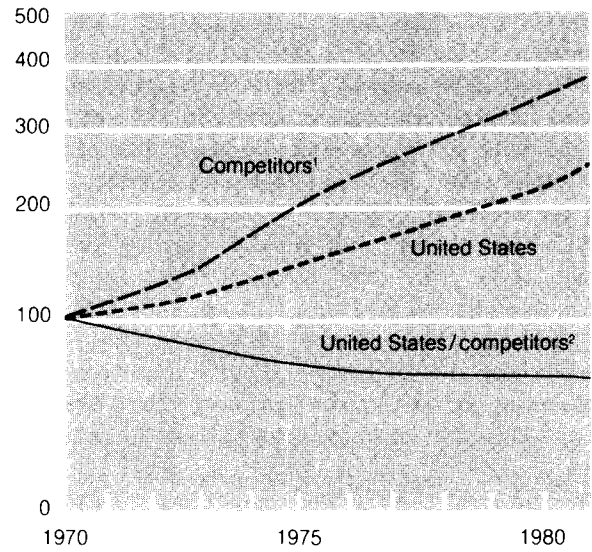
Chart 1. U.S. productivity and labor costs relative to 10 competitor countries, 1970-81

[1970=100]

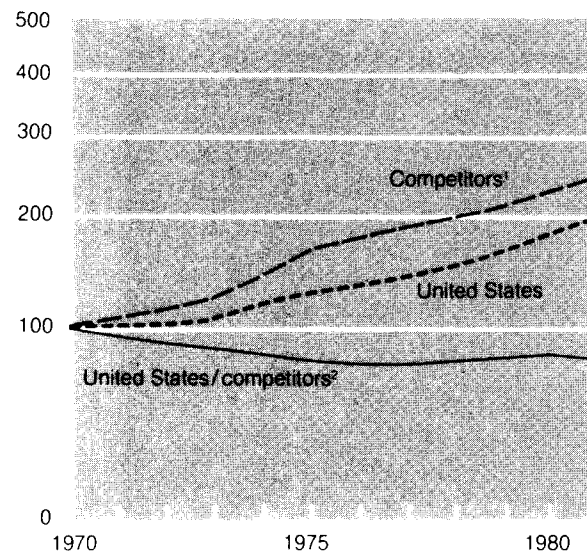
Output per hour



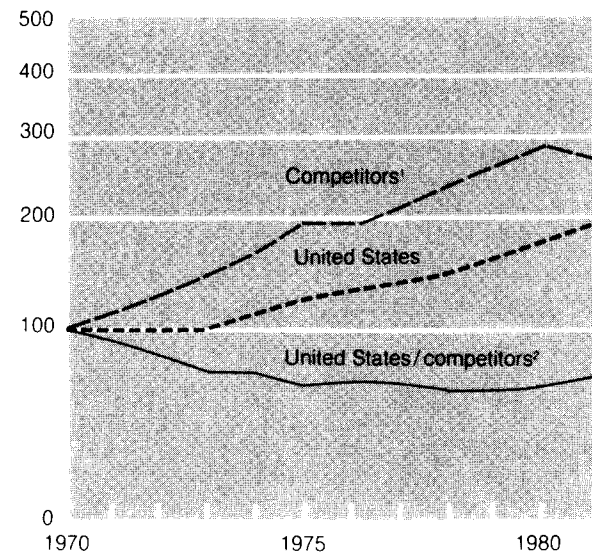
Hourly compensation



Unit labor costs



Unit labor costs in U.S. dollars



¹Weighted geometric average of the indexes for 10 competitor countries

²Relative index calculated from the ratio of the U.S. index to the competitors' index.

the Netherlands, and Denmark. Productivity had risen 11 to 12 percent more in Denmark and the Netherlands and 16 percent more in Japan and Belgium by 1976. By 1981, their relative trends had diverged: For Japan, productivity gains were 41 percent higher and for Belgium, 29 percent, while in Denmark and the Netherlands the gains were 12 and 13 percent higher.

In France, Germany, and Italy, productivity increased at about the same rate as that of trade competitors from 1970 to 1981. Their relative rates of change varied during the period, however. In the early 1970's, productivity in France and Germany rose somewhat less rapidly, and in Italy it rose more rapidly, but during the late 1970's, the relative rates were reversed.

Productivity rose less rapidly than in competitor countries for the United States, Canada, Sweden, and the United Kingdom. From 1970 to 1981, U.S. relative productivity had increased 19 percent less, while in Sweden and the United Kingdom, gains were 13 percent lower, and in Canada, 7 percent lower. The slower gains were quite consistent throughout the entire period.

Relative compensation trends. Hourly compensation rose less than in competitor countries in the United States, Germany, and the Netherlands. From 1970 to 1981,

compensation increased about 35 percent less in the United States, 30 percent less in Germany, and 10 percent less in the Netherlands. For the United States and Germany, the slower relative trend was fairly consistent over the whole period. For the Netherlands, however, compensation rose more rapidly than competitors' during the early 1970's, then less rapidly after 1976, with the greatest relative declines occurring in 1980-81, following the imposition of wage controls.

Hourly compensation rose more rapidly than in competitor countries in Italy, the United Kingdom, Japan, and France. From 1970 to 1981, compensation had increased about 100 percent more in Italy and about 75 percent more in the United Kingdom. Almost without exception, both had consistently larger gains than their competitors throughout the 1970-81 period. Hourly compensation in Japan rose more rapidly during the early 1970's—by 1975, Japanese compensation had increased about 35 percent more than that of competitors—but grew less rapidly after 1975. By 1981, Japanese compensation gains were only 8 percent higher than competitors'. In France, hourly compensation rose at about the same rate as in competitor countries until the mid-1970's, then rose more rapidly to end in 1981 with about a 20-percent larger cumulative increase.

Canada, Belgium, and Denmark also ended the 1970-

Chart 2. Relative indexes of unit labor costs in national currency, selected countries, 1970-81

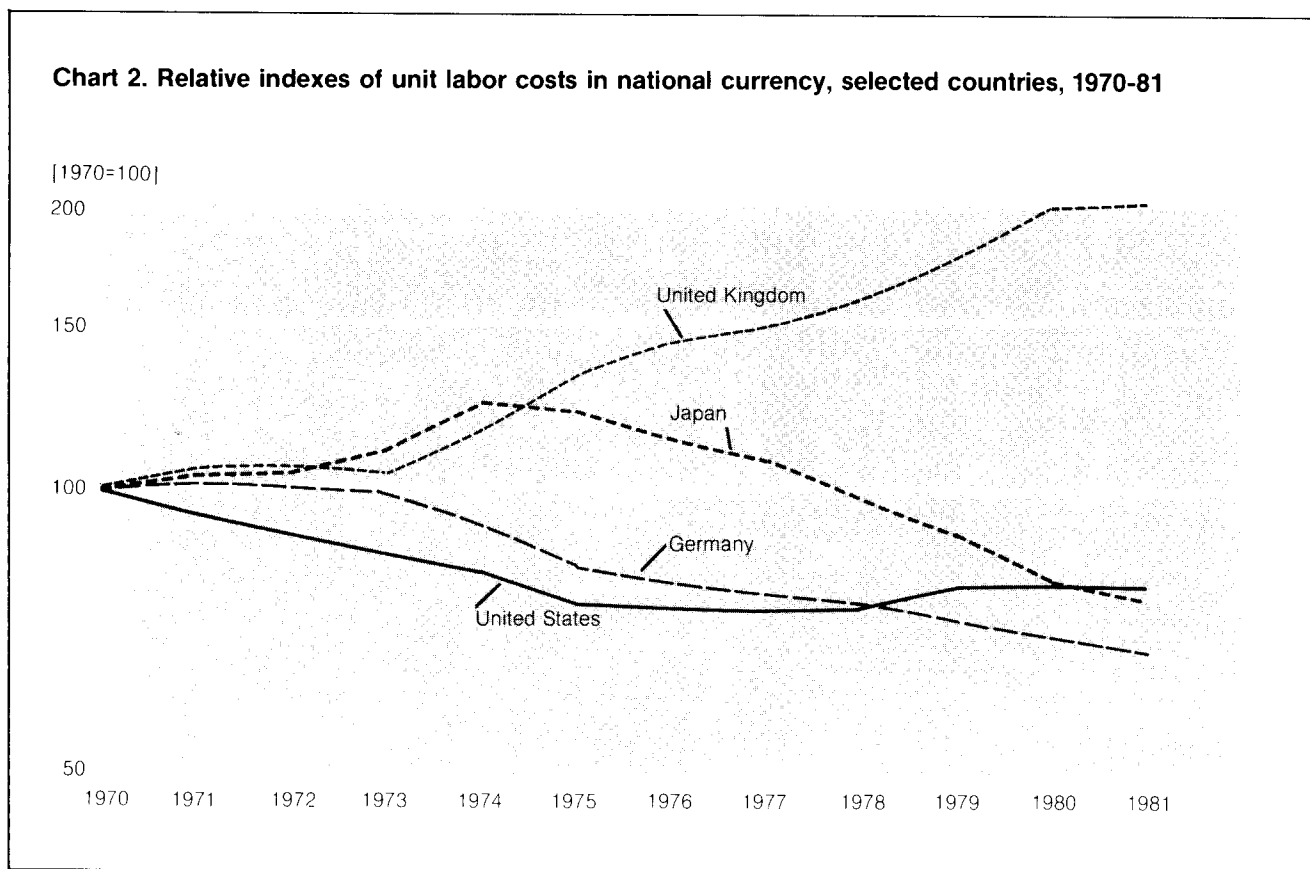
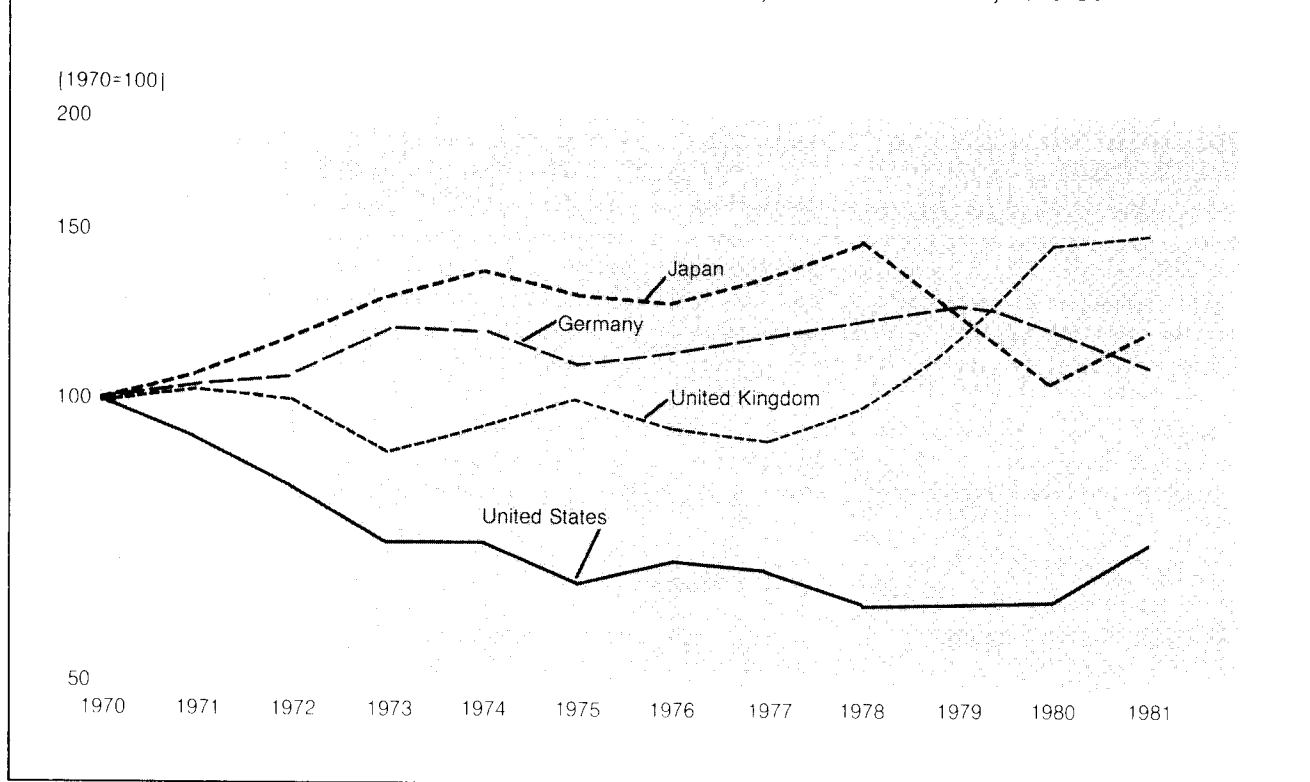


Chart 3. Relative indexes of unit labor costs in U.S. dollars, selected countries, 1970-81



81 period with somewhat larger compensation increases. But in each country, the 1981 relative gains were down from previous peaks—in Canada, 6 percent down from 10 percent in 1977; in Belgium, 5 percent down from 16 percent in 1976–77; and in Denmark, 6 percent down from 9 percent in 1974–79. In Sweden, hourly compensation generally rose at about the same rate as competitor countries' over the 1970–81 period.

Relative unit labor cost trends. Unit labor costs in national currency increased less from 1970 to 1981 in six countries—the United States, Japan, Germany, Belgium, Denmark, and the Netherlands—than in their competitor countries. The relative trend was 6 percent lower in Denmark by 1981, and about 20 to 30 percent lower in the other countries.

The relative change for the United States was down because hourly compensation had fallen more than output per hour. In Japan, Belgium, and Denmark, relative productivity gains more than offset relative compensation increases; in Germany, the relative productivity trend was about level, but relative compensation was sharply down; and the Netherlands had both productivity and hourly compensation advantages.

The relative trend for the United States was steadily downward from 1970 to 1977, up moderately from 1977 to 1980, and down again slightly in 1981. Relative

unit labor costs in Japan rose over 20 percent more than those of competitors by 1974–75, then declined steadily to 23 percent less than competitors' by 1981. Relative unit labor costs declined steadily in Germany from 1973, in Belgium and the Netherlands from 1975, and in Denmark from 1979. For the Netherlands, the most significant relative cost declines occurred during 1980 and 1981.

Unit labor costs in national currency increased by at least 100 percent more than competitors' in Italy and the United Kingdom and by about 15 to 20 percent more in Canada, France, and Sweden. The large relative increases in Italy and the United Kingdom are attributable to hourly compensation gains as the relative productivity trend was down in the United Kingdom and essentially level in Italy. In Canada and France, hourly compensation was up slightly, and the productivity trend was down in Canada and even in France. In Sweden, hourly compensation trends were equal to those of competitors, but productivity fell from 1970 relative levels.

In U.S. dollars. After adjustment for the relative change in the foreign exchange rate of the dollar, U.S. unit labor costs showed a decline of nearly 30 percent versus those of competitors from 1970 to 1981, compared with about 20 percent in national currency. In 1980, relative

unit labor costs adjusted for the dollar exchange rate were down almost 40 percent. However, the U.S. dollar appreciated 10 percent against trade-weighted U.S. competitor currencies from 1980 to 1981. This primarily reflected the dollar's appreciation relative to the German mark, French franc, and British pound, because, on a trade-weighted basis, the 2.5-percent appreciation of the Japanese yen was balanced by a 2.5-percent depreciation of the Canadian dollar.

Unit labor costs adjusted for relative exchange rates for Canada, Italy, Belgium, the Netherlands, and Denmark were also down—5 to 12 percent—versus competitors. For Canada, a 16-percent decline in the exchange rate, primarily against the U.S. dollar, offset higher increases in unit labor costs in Canadian dollars. For Italy, the exchange rate posted a 55-percent decline versus U.S. and German currencies. On the other hand, trade-weighted exchange rates were up 13 and 20 percent for Belgium and the Netherlands; therefore, rela-

tive unit labor costs in dollars declined less than in national currency terms.

For Germany and Japan, unit labor costs in U.S. dollars increased 8 and 19 percent more than those of trade competitors (principally the United States for Japan, and France and the United States for Germany) even though unit labor costs in national currency were down about 25 to 30 percent, because their relative exchange rates rose 55 to 60 percent over the 1970–81 period.

In the United Kingdom, relative unit labor costs increased 100 percent in national currency terms, but 46 percent in U.S. dollars, because the British pound declined 28 percent overall against competitor currencies—primarily the dollar and the German mark. In France and Sweden, unit labor costs in U.S. dollars posted 1970–81 relative increases of 7 percent, as costs in national currency rose nearly 20 percent more than those of competitors, but trade-weighted exchange rates declined about 10 percent versus competitor currencies. □

— FOOTNOTES —

¹ The Federal Republic plus West Berlin.

² The data relate to all employed persons, including the self-employed, in the United States and Canada, and to all wage and salary employees in the other countries. Hours refer to hours paid in the United States, hours worked in the other countries.

Compensation includes all payments made by employers directly to their employees (before deductions), plus employer contributions to legally required insurance programs and to contractual and private welfare plans for the benefit of employees. Labor costs include, in addition to compensation, employer expenditures for recruitment and training; the cost of cafeterias, medical facilities, and other plant facilities and services; and taxes (other than social security taxes, which are part of compensation) levied on payrolls or employment rolls. Annual data are not available for total labor costs. As used in this article, labor costs approximate more closely the concept of compensation. However, compensation has been adjusted to include all significant changes in taxes that are regarded as labor costs. For the United States and Canada, compensation of self-employed workers is measured by assuming that their hourly compensation is equal to the average for wage and salary employees.

³ Percent changes for 1960–81, 1960–73, and 1973–81 shown in the tables are computed using the least squares method—that is, from the least squares trend of the logarithms of index numbers—in order to remove much of the effect of cyclical changes on the average rates of change, and thereby estimate the underlying trends.

⁴ To compute the series for the eight European countries and 10 foreign countries, the data have been combined by aggregating the output, compensation, and hours figures for each year, adjusting where necessary for compatibility of coverage and concept. Average exchange rates for 1974–81 were used to aggregate the output and compensation data. The use of 1974–81 exchange rates, however, does not imply that these rates reflect the comparative real value of curren-

cies for manufacturing output. Moreover, the use of exchange rates for a different period would have little effect on the combined series.

⁵ The IMF publishes annual and quarterly indexes of relative unit labor costs and relative normalized unit labor costs in manufacturing—as well as relative value-added deflators, relative wholesale prices, and relative export unit values in manufacturing—for 14 industrial countries, in their monthly statistical publication *International Financial Statistics*. The OECD publishes quarterly indexes in chart form of relative unit labor costs in manufacturing, relative export unit values (prices) for manufactures, and relative consumer prices for 15 industrial countries in their monthly statistical publication *Main Economic Indicators*.

Series descriptions, data sources, and compilation methods for the IMF measures are described in "Inter-country Cost and Price Comparisons," a paper by Michael C. Deppler, Research Department, International Monetary Fund (November 1979); the OECD measures are described in *The International Competitiveness of Selected OECD Countries*, OECD Economic Outlook Occasional Studies, July 1978.

⁶ The IMF weights were derived from disaggregated 5-digit Standard International Trade Classification data (up to 1,400 individual commodity classes) for each of the 14 countries covered by their series. The IMF weights have been simply adjusted to the 11-country BLS comparative series by eliminating the weights for the three uncovered countries—Austria, Norway, and Switzerland—and proportionately increasing the weights for the remaining 11 countries so that they equal 100 percent. The result should be little different from a comprehensive reweighting based on trade data for the 11 countries alone, because the omitted countries account for no more than 8.1 percent of the total 14-country weight for any of the 11 countries, and for a total of only 4 percent in the case of the United States.

⁷ The weighting system is described in detail in Deppler, "Inter-country Cost and Price Comparisons."