Compensation costs in manufacturing across industries and countries, 1975–2007

Rankings of manufacturing industries based on employers' labor costs for production workers changed very little from 1975 to 2007 and also did not tend to differ much from country to country; however, trends in the range and dispersion of labor costs have varied substantially across countries

Elizabeth Zamora
and
Jacob Kirchmer

Lower wages in foreign markets and the rise in outsourcing by U.S. companies have become important topics in the debate on U.S. competitiveness. Though discussion of these issues tends to evoke images of the quickly growing information technology sector and of other service sectors especially vulnerable to outsourcing, debate has also focused on the impact of globalized markets on U.S. manufacturing activities. The United States remains, by far, the world's leading producer of manufactured goods, accounting for 17.5 percent of total world manufacturing output in 2008.[1] However, manufacturing employment in the United States has been declining over the long term, partly because of rising productivity[2] and partly because of the emergence of developing economies as important producers and exporters of manufactured goods.[3]

One measurement of the international standing of U.S. manufacturing is the hourly cost to the manufacturer of employing labor, or what is referred to in this article as the hourly compensation cost. This cost is one of the important factors used in evaluating international manufacturing competitiveness,[4] both at the sector level and at levels below it. Average compensation costs in industries within the manufacturing sector, however, can differ greatly from the average cost of

manufacturing compensation. Measures of compensation costs at the sector level are instructive but often mask important differences among industries. A country's overall compensation cost advantage in the production of manufactured goods does not imply that its compensation costs for the production of, for example, apparel and automobiles are equally competitive.

This article compares hourly compensation cost data from 1975 to 2007 published by BLS across 18 industries within manufacturing[5] in the United States and in selected foreign economies. A fairly basic use of these industry data is to directly compare labor costs in similar industries across countries. This study, however, takes an additional step by analyzing how industries' compensation costs vary not only across countries but also over time. As a foundation, a brief literature review and an overview of general trends in compensation costs at the all-manufacturing level are first presented. The analysis then moves to industries within the manufacturing sector. To elucidate differences in labor costs at the industry level, this article ranks manufacturing industries according to their mean hourly compensation costs for employers, focusing on the highest and lowest ranked industries in several representative countries. Because data suggest that ranking order has remained fairly stable over time

Elizabeth Zamora and Jacob Kirchmer are economists in the Division of International Labor Comparisons in the Office of Productivity and Technology at the Bureau of Labor Statistics. Email: zamora.elizabeth@bls.gov or kirchmer.jacob@bls.gov

and is similar across countries, each manufacturing industry is classified into one of four compensation cost categories ranging from "low" to "high." Such groupings allow for a generalized discussion of relative compensation costs at the industry level. Next, the article addresses national differences in the dispersion of compensation costs between the industries with the lowest compensation costs for employers and those with the highest costs. The study concludes with an analysis of whether the positioning of industries in other countries is similar or dissimilar to that in the United States.

This article finds that BLS comparative data are consistent with the larger economic literature on the dispersion of earnings across industries. That is, BLS data indicate that the rankings of industries within manufacturing by employers' compensation costs have changed little over time and are similar from country to country. In contrast, differences among countries in the degree of dispersion of hourly compensation costs are more notable: differences in labor costs among industries are small and have remained so over time for some countries, whereas for others, such differentials are large and have fluctuated greatly from year to year.[6] Finally, the study analyzes ratios involving manufacturing industries and the manufacturing sector as a whole both in the United States and in other countries, and it identifies those economies which are most and least similar to that of the United States with regard to these ratios.

Framework for analysis

The data in this article are from a long-standing BLS comparative series on international hourly compensation costs in manufacturing.[7] Compensation cost data for industries within manufacturing have been made available by BLS (though not always formally published) since 1980. This study analyzes hourly compensation cost data for production workers[8] in manufacturing and in 18 industries within manufacturing for the period from 1975 to 2007.[9]

BLS also publishes hourly compensation cost statistics for all employees in manufacturing, a category that includes production workers as well as all other employees in manufacturing establishments. The BLS all-employees series begins in 1996 and thus is less suitable for historical analysis. It should be noted that assessing data for all employees in manufacturing would result in higher compensation cost levels, since this worker group also includes salaried workers and managers, who tend to be paid higher wages. However, the distribution of compensation costs across industries and countries does not vary substantially

by category of worker (all employees or production workers), so the use of the all-employees BLS series would result in similar conclusions with regard to industry rankings, dispersion, and the positioning of foreign industries relative to those of the United States.[10]

The economies included in this study are those of the United States, the remaining Group of Seven countries (Canada, Japan, France, Germany, Italy, and the United Kingdom), Mexico, the Republic of Korea (hereinafter South Korea), Taiwan, and Sweden. Although the BLS comparative series for production workers covers 34 economies, a subset of these economies is chosen to provide more in-depth analysis and because a variety of industry data are not available for all countries. In addition, most of the economies selected are those of countries exhibiting high trade levels with the United States, such as Canada and Mexico, and some economies were chosen to represent certain regions, such as Asia and Europe. South Korea and Taiwan are included specifically to represent the relatively quickly growing economies of East Asia. Sweden serves to represent the Scandinavian region, known for its relatively compressed wage distribution, which is due, in part, to high unionization rates.[11] China and India, both major trading partners with the United States, are conspicuously absent from this analysis. See the box on pages 43 and 44, which addresses the exclusion of China and India and provides some information on the dispersion of earnings and compensation costs among industries within manufacturing in those countries.

For each economy, compensation cost data are examined for the 18 industries within manufacturing listed in exhibit 1, as the industries are defined by the North American Industry Classification System (NAICS).[12] It should be noted that the quality of data at the industry level is often not as high as that at the sector level and may affect the comparability of industry compensation cost measures. Such quality issues include differences in industrial classification systems, gaps in source data sets, and source data derived from samples that are relatively small. Where possible, however, BLS makes adjustments and estimations to mitigate these issues and to enhance the comparability of compensation cost measures.[13] For example, for countries outside North America, data are adjusted to correspond with NAICS industry definitions.

For every country in this study, BLS produces compensation cost estimates for each manufacturing industry listed in exhibit 1; the estimates cover the years 1975 to 2007. There are some missing data, however. For Canada and Mexico, hourly compensation cost data series for manufacturing industries begin with 1983 and 1985, respec-

Exhibit 1.	North American Industry Classification System (NAICS) manufacturing industries covered in this article
NAICS code(s)	Industry
31–33	(All) Manufacturing
311–312	Food, beverage, and tobacco product manufacturing
313–314	Textiles and textile product mills
315	Apparel manufacturing
316	Leather and allied product manufacturing
321	Wood product manufacturing
322	Paper manufacturing
325	Chemical manufacturing
326	Plastics and rubber products manufacturing
327	Nonmetallic mineral product manufacturing
331	Primary metal manufacturing
332	Fabricated metal product manufacturing
333	Machinery manufacturing
334	Computer and electronic product manufacturing
335	Electrical equipment, appliance, and component manufacturing
336	Transportation equipment manufacturing
3361–3363	Motor vehicle and parts manufacturing
3364	Aerospace product and parts manufacturing
337	Furniture and related product manufacturing

tively, because comparable source data for earlier years are unavailable. Sweden has the smallest industry data set of all countries included in this analysis. For Sweden, data are missing for all years for 8 of the 18 industries listed in exhibit 1, including the textiles and textile products (NAICS 313–314), apparel manufacturing (NAICS 315), leather and allied products (NAICS 316), motor vehicles and parts (NAICS 3361–3363), and aerospace products and parts (NAICS 3364) industries. However, data for the combined industry of textiles, apparel, and leather manufacturing (NAICS 313–316) and for transportation equipment manufacturing (NAICS 336) are reported for all years. Because these industries encompass some of the missing industries, and because they correspond to the low end and high end, respectively, of the compensation cost spectrum, the data on Sweden remain largely representative of the country's compensation costs.[14] For a number of other countries, there are gaps in data coverage that are less prevalent than the gaps for Canada, Mexico, and Sweden, and these gaps do not affect the overall comparability of the measures or the analysis in this article.

To make sound comparisons, national manufacturing data for all economies are adjusted to a common concept of compensation costs. Hourly compensation costs consist of direct payments made to workers (including base wages, overtime pay, bonuses, and pay for vacations, holidays, and other leave), employer expenditures for social insurance and other worker benefits, and taxes on payrolls

or employment.[15] From the perspective of employers, assessing compensation costs instead of worker earnings or wages is more meaningful because it captures not only the take-home pay that employees receive but also all other labor costs that employers incur. For this reason, the terms "compensation cost" and "labor cost" are used interchangeably throughout the following discussion. Hourly compensation costs are computed in national currency units and are converted to U.S. dollars with the average daily exchange rate[16] for the reference year.[17]

This article aims to make relevant comparisons of compensation costs across countries and industries within the manufacturing sector. This study's findings are not transferable to other sectors of the economy, such as services and information technology. The manufacturing sector provides the most data for making hourly compensation cost comparisons, and the BLS compensation cost indicators presented in this article are adjusted to a common conceptual basis to facilitate these comparisons.

A brief literature review

This international analysis of hourly compensation costs in manufacturing industries builds upon a vast literature addressing interindustry wage differentials. Multicountry comparisons of distributions of wages by industry make up a much smaller portion of the literature, although such comparisons have been a topic of interest since the 1940s.[18] It should be noted that the terms "wages," "earnings," and "compensation" in the literature are often not explicitly defined and are frequently used interchangeably to denote worker pay. The BLS definition of "compensation" is a broader measure of worker pay, including both direct wage payments made to the worker and social benefits. In the majority of studies reviewed, analysis relates to wages as opposed to compensation costs.

In the earliest works, various authors reached similar findings relating to interindustry wage differentials. For instance, in 1944 Stanley Lebergott[19] found that, when ranked by average hourly earnings, manufacturing industries were placed in similar orders in the United States, Canada, the United Kingdom, Sweden, Switzerland, and even the Soviet Union to some degree. Using various data sets and analyzing different countries, relatively more recent studies, such as those of Alan B. Krueger and Lawrence H. Summers (1986),[20] Josef Zweimuller and Erling Barth (1992),[21] and Maury Gittleman and Edward N. Wolff (1993),[22] arrive at similar conclusions: that industry rankings according to earnings levels are similar across countries and have remained so over time. In line with

shared industry rankings, these sources also note that the lowest and highest wage industries tend to be the same in many countries.

In their article, Gittleman and Wolff also address changes in the degree of wage dispersion across manufacturing industries. They find that, although industry rankings according to earnings levels are similar from one country to another and have remained fairly stable, the degree of industry wage dispersion varies considerably across countries and has tended to expand and contract over time. Gittleman and Wolff also discuss the factors affecting levels of and trends in industrial wage differentials. They note that regression results pointing to causal factors are sensitive to the period covered, to the regression specification used, and to econometric problems (such as multicollinearity) that limit their interpretation. However, Gittleman and Wolff's findings suggest that higher capital intensity, greater openness to exporting, and growth in total factor productivity among industries significantly increase wage dispersion. Conversely, the researchers find that high levels of unionization within a country significantly decrease wage dispersion.

More recently, a 2003 study by the European Commission has investigated interindustry wage differentials in the European Union.[23] The study finds strong variation in wages both across countries and within sectors of the economy including manufacturing, mining and quarrying, energy and electricity, construction, and services. Among manufacturing industries, wages in the year 2000 are found to be generally above average in metals, tobacco, and fuel and petroleum, whereas wages in textiles and textile products and in wood products are found to be lower than average. That same year, among the E.U. member states or accession countries, the greatest interindustry wage differentials were found in the United Kingdom and France, and the lowest were found in Denmark and Slovenia.

Interindustry wage differentials and the related issues of rank and wage dispersion are investigated in this article as well, but in the broader context of hourly compensation costs. As is shown in the following sections, results based on data published by BLS are in line with findings in the larger economic literature. The data on compensation costs used in this study permit more meaningful comparisons of employers' labor costs across countries than data from studies based on employee earnings only. Further, BLS compensation cost data for all countries are adjusted to an hourly basis and adjusted to meet NAICS industry definitions. Together, the broad measure of hourly compensation costs and the adjustments to enhance multicountry comparability yield more reliable results.

Trends in all-manufacturing compensation costs

This section examines overall trends in manufacturing-sector mean hourly compensation costs in 11 economies for the period from 1975 to 2007. Trends at the sector level serve as a basis for more in-depth comparisons at the industry level. In this study, the manufacturing sector as a whole is referred to as "all manufacturing," and the divisions within manufacturing—which are 3- and 4-digit NAICS manufacturing industries, in some cases analyzed in combination with one another—generally are referred to as "industries."

Employers' compensation costs for production workers in manufacturing increased between 1975 and 2007 in all countries. (See tables 1 and 2.) Because the compensation cost measures discussed in this study are nominal—not adjusted for inflation—the steady increase over time is attributed primarily to a rise in the overall price level. Though nominal labor costs in U.S. dollars have risen across the board over the long term, trends in growth rates have varied considerably from country to country. According to the compensation cost levels in table 1 and the growth rates in table 2, the mean hourly compensation cost quadrupled in the United States, from $6.24 in 1975 to $25.27 in 2007, an average increase of 4.5 percent per year. South Korea showed the largest percentage change in hourly compensation costs, increasing from $0.31 in 1975 to $16.02 in 2007—an average increase of approximately 13 percent per year. Conversely, compensation cost growth in Mexico was sluggish over the long term; the mean cost increased from $1.43 in 1975 to only $2.92 just over 30 years later—an average annual increase of 2.3 percent.

Growth rate trends in other countries relative to the trend in the United States are illustrated in chart 1, in which the U.S. compensation cost level is set to 100 for all years. For any economy, a relatively flat line indicates that the growth rate of compensation costs was similar to that of the United States. A line sloping upward implies a larger increase or smaller decrease than that in the United States, and a line sloping downward indicates a smaller increase or larger decrease than that in the United States. Because of relatively high compensation cost growth rates in later years, labor costs in many of the European countries in chart 1 rose from relatively lower levels in the early-to-mid 1980s to levels higher than those in the United States during parts of the 1990s and 2000s. Compared with the growth of labor costs in the European economies covered, labor cost growth in Canada and Mexico more closely tracked that in the United States from 1975

Table 1.	Mean hourly compensation costs for production workers in the manufacturing sector (in nominal U.S. dollars), and those costs as a percentage of corresponding costs in the United States, selected years, 1975–2007								
Country	1975	1980	1985	1990	1995	2000	2005	2006	2007
United States.................................	$6.24	$9.75	$12.87	$15.00	$17.39	$19.88	$23.81	$24.15	$25.27
	100	100	100	100	100	100	100	100	100
Canada...	6.40	9.02	11.39	16.62	16.80	16.78	24.29	26.12	29.08
	102	92	89	111	97	84	102	108	115
Mexico...	1.43	2.15	1.55	1.54	1.43	2.17	2.65	2.77	2.92
	23	22	12	10	8	11	11	11	12
Japan...	2.95	5.43	6.24	12.52	23.34	21.69	21.31	19.99	19.75
	47	56	48	83	134	109	90	83	78
South Korea..................................	.31	.93	1.20	3.59	7.14	8.08	12.48	14.48	16.02
	5	10	9	24	41	41	52	60	63
Taiwan...	.39	1.05	1.51	3.91	5.99	6.19	6.42	6.56	6.58
	6	11	12	26	34	31	27	27	26
France...	4.76	9.42	7.91	16.25	20.06	15.98	24.56	25.47	28.57
	76	97	62	108	115	80	103	105	113
Germany..	5.28	10.26	7.98	18.32	26.29	19.80	29.00	30.06	33.26
	85	105	62	122	151	100	122	124	132
Italy...	4.70	8.21	7.67	17.92	16.71	14.53	24.33	25.17	28.23
	75	84	60	120	96	73	102	104	112
Sweden..	7.12	12.41	9.58	20.75	21.63	20.70	30.50	31.85	36.03
	114	127	74	138	124	104	128	132	143
United Kingdom...........................	3.21	7.22	5.97	11.95	13.60	16.69	25.75	26.76	30.18
	51	74	46	80	78	84	108	111	119

SOURCES: "International Hourly Compensation Costs for Production Workers, by Sub-Manufacturing Industry, 1992-2007," on the Internet at **www.bls. gov/ilc/flshcpwindnaics.htm**; and authors' calculations made by use of "Hourly Compensation Costs for Production Workers in Manufacturing (SIC Basis), 30 Countries or Areas, 40 Manufacturing Industries, Selected Years, 1975-2002," on the Internet at **www.bls.gov/ilc/flshcindsic.htm**.

to 2007. Compensation cost growth in Japan and Taiwan was relatively high throughout most of the 1975–2007 period, but growth was slower in these economies than in the United States from the mid-1990s to 2007. During the 1975–2007 timespan, compensation costs in South Korea generally increased at a faster rate than they did in the United States.

In the 1975–2007 period, compensation costs for production workers in U.S. manufacturing generally were higher than costs for production workers in Canada and Mexico, East Asia, and parts of Europe. (See chart 1 and table 1). By contrast, manufacturing labor costs in the United States tended to be lower than those in Germany and Sweden. In the mid-to-late 1970s, compensation rates in the United States were among the highest internationally. Bolstered by a U.S. dollar that was strong relative to foreign currencies, this trend continued for the next few years, and by the mid-1980s the United States

had the highest labor costs of all the countries covered for this article. During the 1985–90 period, however, compensation costs in the United States declined in relative terms because labor costs in almost all the economies in the study increased at a faster rate during that time. This was due, in part, to the depreciation of the dollar. From 1990 to 1995 U.S. compensation costs grew at an average annual rate of approximately 3.0 percent, somewhat lower than compensation costs in France (which grew at a rate of 4.3 percent per year) and substantially lower than costs in Germany (7.5 percent) and Japan (13.3 percent) during the same period. (See table 2). As a result, U.S. manufacturing firms compensated production workers at a lower cost during the mid-1990s in comparison with firms in Japan and most of the selected economies in Europe. By the year 2000 this trend had changed: compensation costs for U.S. production workers once again were more in line with those of their European counterparts. Since that

[In percent, as calculated from costs in U.S. dollars]

Country	1975–2007	1975–80	1980–85	1985–90	1990–95	1995–2000	2000–07
United States.............................	4.5	9.3	5.7	3.1	3.0	2.7	3.5
Canada.......................................	4.8	7.1	4.8	7.8	.2	.0	8.2
Mexico.......................................	2.3	8.5	−6.3	−0.2	−1.5	8.7	4.3
Japan...	6.1	13.0	2.8	14.9	13.3	−1.5	−1.3
South Korea..............................	13.1	24.3	5.2	24.6	14.7	2.5	10.3
Taiwan.......................................	9.2	21.8	7.7	21.0	8.9	.7	.9
France..	5.2	14.6	−3.4	15.5	4.3	−4.4	8.7
Germany....................................	5.9	14.2	−4.9	18.1	7.5	−5.5	7.7
Italy...	5.8	11.8	−1.4	18.5	−1.4	−2.8	10.0
Sweden......................................	5.2	11.8	−5.0	16.7	.8	−.9	8.2
United Kingdom........................	7.3	17.6	−3.7	14.9	2.6	4.2	8.8

time, however, labor costs in U.S. manufacturing have decreased relative to costs in Europe, a phenomenon caused primarily by the appreciation of the euro in relation to the dollar.

Compensation cost levels in the East Asian economies of South Korea and Taiwan remained low relative to those in the United States throughout the entire 1975-to-2007 period. Nevertheless, the gap narrowed somewhat over time as labor costs for manufacturing production workers in these countries increased more rapidly than those in the United States. This is especially true for South Korea, where compensation costs grew at an average rate of 13.1 percent per year from 1975 to 2007, compared with 4.5 percent annually for the United States during the same timeframe. As a result, South Korea's mean compensation cost also increased from only 5 percent of the U.S. level in 1975 to 63 percent by 2007. Likewise, compensation costs in Taiwan grew from 6 percent to 26 percent of U.S. compensation costs between 1975 and 2007. As with South Korea, this can be attributed to Taiwan's much faster average annual rate of growth in hourly compensation costs relative to that of the United States (9.2 percent versus 4.5 percent annually from 1975 to 2007).

Trends in hourly compensation costs in Mexico, by contrast, were far removed from the trends shared by South Korea and Taiwan. Mexico's average annual rate of growth in compensation costs from 1975 to 2007 (2.3 percent) was by far the lowest of the rates of the countries addressed in this article and was approximately half that of the United States over the same period. As a result, Mexico's mean compensation cost decreased from 23 percent of the U.S. level in 1975 to 12 percent by 2007. The devaluation of the Mexican peso in December 1994 contributed to this drop

in labor costs as measured in U.S. dollars. Canada's compensation cost growth (4.8 percent annually) tracked the U.S. growth fairly closely and consequently led to little relative change over time.

U.S. average annual growth rates in hourly compensation costs were highest in the earlier years of the 1975–2007 period, nearly reaching double digits during the late 1970s (see table 2), a period with high rates of inflation. Despite moderate slowing, annual growth—averaged over 5-year periods—in U.S. labor costs remained between 2.7 percent and 5.7 percent after the 1970s.

Compensation cost growth rates in all foreign economies fluctuated significantly across time, and most reached negative levels in at least one period. This was due in large part to cyclical exchange rate variations that occurred over time. For example, the average cost of hourly compensation in the United Kingdom grew at an average annual rate of 17.6 percent during the period from 1975 to 1980; during the early-to-mid 1980s, however, the situation changed dramatically and compensation costs actually declined at a rate of 3.7 percent. Such dramatic fluctuation in the level of compensation cost growth between these two periods was common among all European countries in the study: virtually all currencies across the continent weakened, to varying degrees, against the U.S. dollar during those years. Despite the drop in compensation costs as measured in U.S. dollars in the late 1970s and early 1980s, in local currency terms, costs grew steadily in Europe.

South Korea and Taiwan experienced strong positive growth in hourly compensation costs between 1975 and 1995, on some occasions reaching annual rates of increase of more than 20 percent. During the 1995–2000 period, however, compensation cost growth in these countries

Chart 1. **Hourly compensation costs for production workers in manufacturing, measured in U.S. dollars and indexed to the corresponding costs in the United States, by country, 1975–2007**

North America

U.S. = 100

U.S. = 100

United States and Asia

U.S. = 100

U.S. = 100
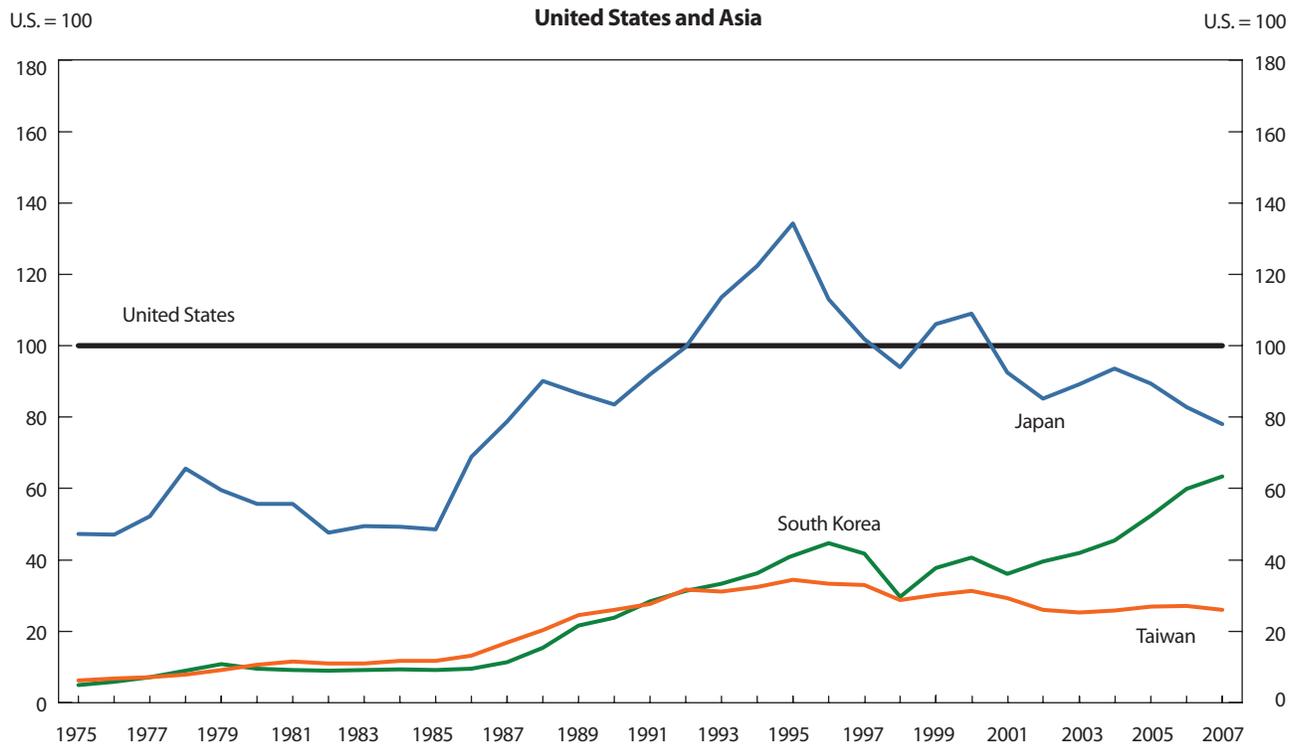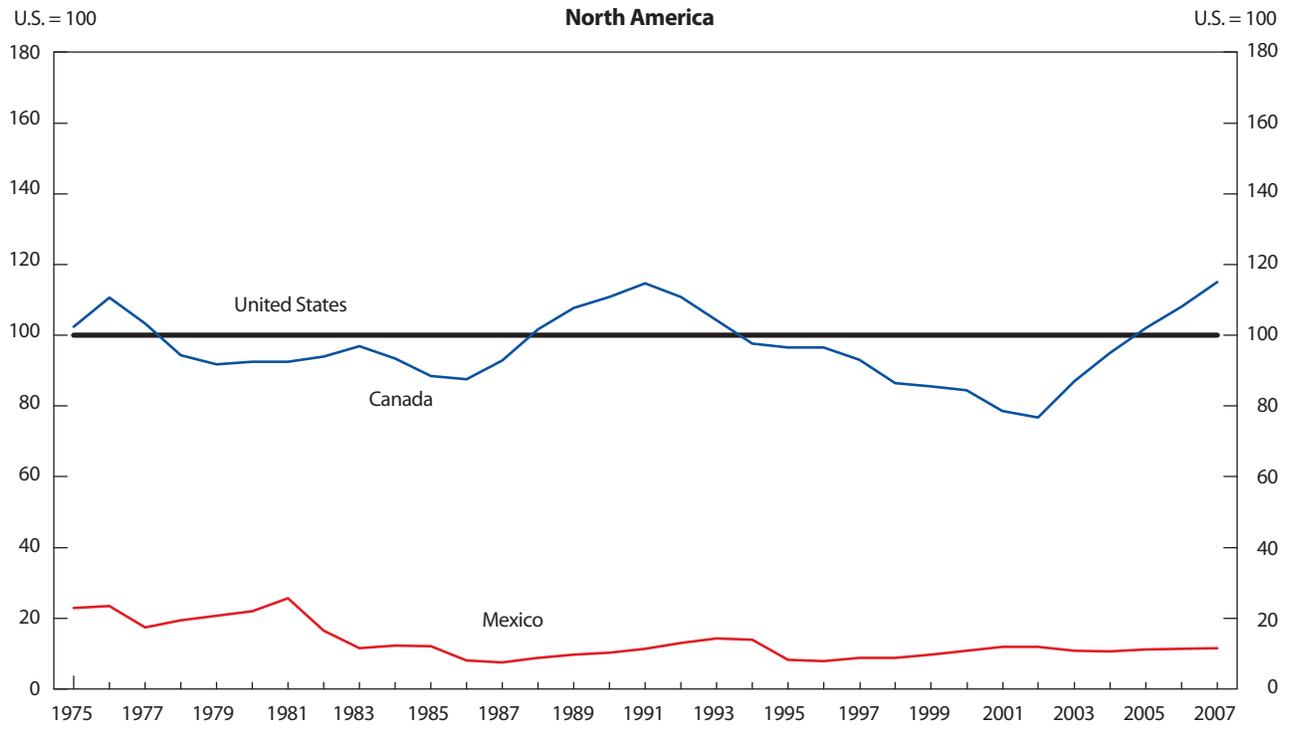
Chart 1. Continued—Hourly compensation costs for production workers in manufacturing, measured in U.S. dollars and indexed to the corresponding costs in the United States, by country, 1975–2007

U.S. = 100

United States and Europe

U.S. = 100

SOURCE: Authors' calculations made by use of "International Hourly Compensation Costs for Production Workers, by Sub-Manufacturing Industry, 1992-2007," on the Internet at **www.bls.gov/ilc/flshcpwindnaics.htm**; and by use of "Hourly Compensation Costs for Production Workers in Manufacturing (SIC Basis), 30 Countries or Areas, 40 Manufacturing Industries, Selected Years, 1975-2002," on the Internet at **www.bls.gov/ilc/flshcindsic.htm**.

slowed significantly, as measured in U.S. dollars, with Taiwan even approaching zero percent growth in the late 1990s and early 2000s. For these two East Asian economies, the sluggish compensation cost growth rates can be attributed at least in part to significant changes in exchange rates between the currencies in South Korea and Taiwan and the U.S. dollar. For instance, Taiwan's compensation cost growth averaged 4.5 percent per year between 1995 and 2000 when measured in local currency. Compensation cost growth in U.S. dollars for Taiwan, however, was much slower (an average of 0.7 percent annually) during this period.

Trends in all-manufacturing compensation costs are instructive for assessing the sector as a whole, but, depending on the economy studied, they may or may not be generally representative of trends in industries within the sector. That is, compensation costs across industries within manufacturing can vary considerably. The following sections of the article take an in-depth look at hourly compensation cost levels across the industries listed in exhibit 1.

Industry rankings and groupings

General trends in labor costs for the whole manufacturing sector are important, but they sometimes mask significant differences in compensation at the industry level. This section highlights these differences by ranking industries within manufacturing and grouping them into general categories according to levels of compensation costs. This approach reveals the general distribution of manufacturing labor costs within countries.

Table 3 shows the three highest and three lowest ranked industries by labor costs in the United States, Japan, and Germany for the years 1975, 1985, 1995, and 2007. Data for these countries reveal not only the variation in compensation cost levels across industries (shown in U.S. dollars), but also that industry rankings within countries have remained fairly stable over time. In addition, the highest and lowest ranked industries tended to be the same from one country to another. Other data (not shown in table 3 but available upon request) indicate that this trend extends across all economies in the study.

Considering the United States, Japan, and Germany, a large degree of stability in compensation cost rankings was seen over the 1975–2007 period on both the high and low ends of the spectrum. Table 3 suggests that the chemicals, primary metals, transportation equipment, motor vehicles and parts, and aerospace products and parts industries were consistently among the most highly compensated in manufacturing. Apparel, leather and allied products, and textiles and textile products firms consistently incurred the lowest labor costs in the manufacturing sector.

For all countries in this study, certain industries were consistently ranked at or near the top or at or near the bottom in terms of compensation costs across the period from 1975 to 2007. In other words, the industrial spectrum of manufacturing compensation costs was largely stable throughout the past 30 or so years. This observation can be generalized—and quantified—for the 11 countries included in this study by classifying the manufacturing industries from exhibit 1 into four groups based on employers' costs for compensation: *low*, *medium–low*, *medium–high*, and *high*. These categories are relative to the national mean for the manufacturing sector. Industries with "low" levels of compensation costs are defined as those industries with labor costs generally 1 standard deviation[24] or more *below* the all-manufacturing average, whereas industries with "high" levels of compensation costs are those with labor costs generally 1 standard deviation or more *above* the mean for all of manufacturing. Industries in the medium–low and medium–high categories are more comparable to the all-manufacturing average, incurring labor costs within 1 standard deviation below the all-manufacturing benchmark and within 1 standard deviation above it, respectively. Using standard deviations in this way allows industries to be grouped into the four categories, by country, without disregarding national differences in the dispersion of compensation costs. Thus, for each country and year, the 18 industries are classified into these four categories.

The results of these groupings for 2007 are shown in exhibit 2. Each industry in the exhibit has a corresponding fraction in parentheses: the numerator represents the number of countries for which the industry fell into the category in question, and the denominator represents the total number of countries for which data for the industry are available. An industry's placement within this exhibit thus reflects the placement of that industry for a majority of the countries for which data are reported.[25] In 2007, for instance, the plastics and rubber products industry was classified as medium–low in 10 out of 10 economies that published data for that industry. Several other industries

were grouped similarly across nearly all the economies, namely the following: apparel, as low; food, beverages, and tobacco, and fabricated metal products, as medium–low; machinery, and computer and electronic products, as medium–high; and aerospace products and parts, as high. Some industries, however, had greater variability across countries, such as furniture and related products, and paper. For most countries, furniture was classified primarily in the low category in 2007, but, in the United States, Mexico, and Japan, the industry had relatively higher compensation costs and was therefore placed in the medium–low category. In 2007, paper manufacturing had the most variability across countries: the industry was classified as medium–low in Mexico, South Korea, Taiwan, Germany, and the United Kingdom; as medium–high in the United States, Canada, Japan, France, and Italy; and as high in Sweden. Though exhibit 2 is a generalized representation of relative industry compensation for all covered economies in 2007, it can be said that, overall, the exhibit most closely corresponds to the 2007 distributions of compensation costs in France and the United Kingdom and is least representative of those in Mexico and Taiwan.

This snapshot of 2007 is compelling in that it is generally representative of the industrial spectrum of manufacturing labor costs for all economies in this study throughout the period from 1975 to 2007. The industries in exhibit 2 with a footnote are those which, in a majority of countries, remained, on average, in the compensation cost grouping in question for over 30 years. Such constancy in compensation costs was characteristic of 11 of the 18 industries in the exhibit. Apparel manufacturing was the most static industry in this sense. For all 10 countries in this study that reported data for apparel, the industry remained in the low compensation cost category for most years between 1975 and 2007. Other industries that were particularly consistent in their average grouping during the 1975–2007 period were plastics and rubber products, in medium–low; machinery, in medium–high; and aerospace products and parts, in high.

In contrast, some industries varied more over time in their categorization, including textiles and textile products, wood products, furniture and related products, and paper manufacturing. Paper was the most volatile industry, having moved across groupings over time for 6 out of 11 countries. In Mexico, for example, paper moved from being medium–high to being medium–low in the early 2000s, and it made the same move in the mid-2000s in South Korea. In Taiwan, paper was classified as having high compensation costs in the late 1970s and throughout the 1980s and as medium–high in the 1990s; it has been

| Table 3. | Manufacturing industries with the highest and lowest mean hourly compensation costs for production workers, selected countries and years | | | | | |

| Country | 1975 | | | 1985 | | |
| | Industry | Mean hourly compensation cost | | Industry | Mean hourly compensation cost | |
		In U.S. dollars	As a percent of the mean hourly compensation cost in all of manufacturing		In U.S. dollars	As a percent of the mean hourly compensation cost in all of manufacturing
Highest ranked industries						
United States	Motor vehicles and parts..........	9.69	155	Motor vehicles and parts........	19.99	155
	Transportation equipment	8.78	141	Transportation equipment	18.73	146
	Primary metals............................	8.52	137	Aerospace products and parts	17.51	136
Japan	Primary metals............................	4.53	154	Chemicals......................................	9.62	154
	Chemicals......................................	4.08	138	Primary metals............................	9.47	152
	Transportation equipment	3.74	127	Transportation equipment	8.25	132
Germany	Motor vehicles and parts..........	6.18	117	Aerospace products and parts	9.74	122
	Aerospace products and parts	6.05	115	Motor vehicles and parts........	9.48	119
	Transportation equipment	5.99	113	Transportation equipment	9.43	118
Lowest ranked industries						
United States	Textiles and textile products ...	4.23	68	Textiles and textile products	8.75	68
	Leather and allied products.....	4.13	66	Leather and allied products...	8.07	63
	Apparel..	3.67	59	Apparel..	7.04	55
Japan	Wood...	2.21	75	Textiles and textile products	4.65	75
	Textiles and textile products ...	2.12	72	Leather and allied products...	4.61	74
	Apparel..	1.57	53	Apparel..	3.27	52
Germany	Textiles and textile products ...	3.88	73	Textiles and textile products	5.88	74
	Apparel..	3.71	70	Leather and allied products...	5.61	70
	Leather and allied products.....	3.67	69	Apparel..	5.23	66
	1995			**2007**		
Highest ranked industries						
United States	Motor vehicles and parts..........	26.97	155	Aerospace products and parts	42.98	170
	Aerospace products and parts	26.07	150	Transportation equipment	34.86	138
	Transportation equipment	25.72	148	Motor vehicles and parts........	33.23	131
Japan	Chemicals......................................	35.51	152	Chemicals......................................	29.15	148
	Primary metals............................	33.04	142	Primary metals............................	28.84	146
	Transportation equipment	29.80	128	Transportation equipment	24.95	126
Germany	Motor vehicles and parts..........	33.09	126	Motor vehicles and parts........	42.75	129
	Transportation equipment	32.27	123	Transportation equipment	41.93	126
	Aerospace products and parts	31.51	120	Primary metals............................	36.78	111
Lowest ranked industries						
United States	Textiles and textile products ...	12.74	73	Textiles and textile products	18.58	74
	Leather and allied products.....	11.72	67	Leather and allied products...	17.55	69
	Apparel..	9.62	55	Apparel..	15.29	61
Japan	Textiles..	18.39	79	Food, beverages, tobacco.......	14.91	75
	Leather and allied products......	16.70	72	Leather and allied products....	14.26	72
	Apparel..	12.02	51	Apparel..	10.33	52
Germany	Textiles and textile products ...	19.48	74	Textiles and textile products	24.27	73
	Leather and allied products.....	17.23	66	Apparel..	22.46	68
	Apparel..	17.19	65	Leather and allied products...	22.25	67

classified as medium–low since the early 2000s. Wood products, and furniture and related products also saw similar movements across compensation cost groupings. Between 1975 and 2007, the compensation cost category changed in 5 of 10 countries for wood and in 5 of 7 for furniture.

Germany and Sweden had the fewest occurrences of industries switching from one compensation cost category to another, while South Korea, Taiwan, and France had the most. Put another way, relative compensation costs across industries were most stable in Germany and Sweden and least stable in South Korea, Taiwan, and France during the period from 1975 to 2007. For South Korea and Taiwan, shifts across compensation cost categories occurred for many industries during the period. For France, movements of industries across these categories during the early 2000s indicate a trend of industries returning to the relative positions seen in the 1980s and 1990s. Industry shifts in the United Kingdom also show a return to the distribution of compensation costs of earlier years, although not to the same degree as in France. In Canada, Italy, and Japan, changes in the industries' relative compensation costs occurred primarily during the 1990s; industry positions have been relatively steady since. Most industry movements in Mexico occurred during the late 1990s and early 2000s, with few changes in the most recent years. Finally, the U.S. distribution of compensation costs remained largely stable throughout the 1980s and 1990s, although the industries of nonmetallic mineral products and primary metals did change categories.

For all countries taken together, however, there were not many industry movements across compensation cost cat-

egories. Therefore, the 2007 groupings shown in exhibit 2 give a general characterization of the industrial spectrum of manufacturing labor costs since 1975 for a majority of the countries. The categorization of industries in exhibit 2 is especially close to the historical (1975–2007) categorization of industries in the United States, Canada, France, and the United Kingdom. The classification of industries by compensation costs as low, medium–low, medium–high, and high highlights not only the variety of labor costs within manufacturing, but also the stability of relative compensation costs in manufacturing over time: the industries with the very highest and lowest compensation costs have tended to be the same across countries and to remain in these positions across the period studied.

Range and dispersion of compensation costs

Despite the aforementioned stability across countries of industry rankings based on compensation costs, the overall range and dispersion of industries' labor costs can vary substantially from one country to another. The range of labor costs refers to the distance between the highest and lowest ranked industry compensation cost values, whereas dispersion—measured in this article by use of standard deviation—refers to the degree to which industry compensation costs are clustered about the mean for all manufacturing. Both the range and the dispersion of compensation costs provide additional insight into the distribution of labor costs across countries, and these topics are examined in the following sections.

Ranges of labor costs.   One way to depict an intracountry

Exhibit 2.	Industries within manufacturing grouped by their mean hourly compensation costs for production workers, 2007				
Low	**Medium–low**	*All-manufacturing average*	**Medium–high**		**High**
313–314 Textiles and textile products (6/10)	311–312 Food, beverages, and tobacco (10/11)[1]		322 Paper (5/11)		325 Chemicals (7/11)[1]
315 Apparel (8/10)[1]	326 Plastics and rubber products (10/10)[1]		327 Nonmetallic mineral products (7/11)[1]		331 Primary metals (6/11)[1]
316 Leather allied products (6/10)	332 Fabricated metal products (10/11)[1]		333 Machinery (9/11)[1]		336 Transportation equipment (6/11)[1]
321 Wood products (6/10)	335 Electrical equipment, appliances, and components (6/10)[1]		334 Computers and electronic products (5/6)		3361–3363 Motor vehicles and parts (6/9)
337 Furniture and related products (4/7)					3364 Aerospace products and parts (5/6)[1]

[1] In the majority of countries, this industry has remained in this compensation group for over 30 years.

NOTE: The fraction given for each industry is the ratio of the number of countries for which the industry falls into the category in question to the total number of countries for which data for that industry are available.

SOURCE: Authors' calculations made by use of "International Hourly Compensation Costs for Production Workers, by Sub-Manufacturing Industry, 1992-2007," on the Internet at **www.bls.gov/ilc/flshcpwindnaics.htm**.

What about China and India?

China and India have emerged as important forces in the global market. In 2006, China replaced Mexico as the United States' second-largest trading partner, behind Canada.[1] In 2009, India garnered a spot on the list of the top 15 U.S. trading partners, and it climbed from the 14th position to the 11th by April 2010.[2] Acknowledging the importance of China and India, BLS has developed estimates of hourly compensation costs for workers in the Chinese[3] and Indian[4] manufacturing sectors. Published compensation costs for China and India, however, are not directly comparable with data for other countries covered by BLS and, therefore, are presented apart from the BLS all-manufacturing series.

Although this limitation precludes coverage of China and India in the multicountry analysis of this article, estimates of average earnings in industries within manufacturing are available from the Chinese and Indian statistical agencies. These estimates facilitate analysis of trends in the range and dispersion of earnings and compensation costs in each country. Industry earnings data for China are published by China's National Bureau of Statistics.[5] Unlike the BLS compensation measures presented for other countries in this article, industry earnings data from Chinese publications refer only to urban manufacturing units[6] and do not include required employer social insurance payments or other nonwage labor costs. It should be noted that workers in industries with high earnings may receive social insurance and other nonwage payments that are disproportionately large in relation to their earnings, such that the dispersion of earnings could understate the dispersion of employers' compensation costs. As for India, industry data on workers' wages and social insurance benefits are available from the country's Central Statistics Office.[7] The data refer to India's organized (or formal) manufacturing sector only, rather than to the whole manufacturing sector,[8] and include contract workers, who typically are not included in BLS estimates and who generally receive less compensation.[9]

Although these challenges and others limit the ability to compare manufacturing compensation costs in China with those costs in India—and the ability to compare China and India with other countries in the BLS series—the data nonetheless reveal trends in the range and dispersion of earnings and compensation costs in these countries. National Bureau of Statistics data indicate that both the range and dispersion of Chinese manufacturing earnings declined between 2002 and 2006. During this timespan, the dispersion of Chinese earnings across the spectrum of manufacturing industries was roughly comparable to the dispersion of compensation costs in the United States and Canada. Compared with compensation costs in other economies in Asia, Chinese earnings were more compressed than compensation costs in Japan but more dispersed than those in South Korea and Taiwan. For India, hourly compensation costs estimates were constructed for 1999–2005 with data primarily from the Central Statistics Office. Similar to the general trend seen in the United States, in India the range between the industry with the highest compensation costs and that with the lowest was larger in 2005 than in 1999, whereas dispersion decreased overall during that period. The overall increase in the range of compensation costs was driven primarily by the aerospace products and parts industry, in which the mean hourly compensation cost increased (nominally) by 61 percent, from $1.69 in 1999 to $2.72 in 2005. By contrast, the mean hourly compensation cost in wood product manufacturing, the industry with the lowest compensation costs throughout most of the 1999–2005 period, increased (nominally) by 26 percent, from $0.31 to $0.39. During this same timeframe, the dispersion of compensation costs in India decreased overall and was most comparable to, but generally greater than, that in Mexico. Although compensation costs in China and India cannot be *directly* compared because of certain data limitations,[10] both the range and dispersion of compensation costs in India are substantially greater than those in China. For additional information, see *Monthly Labor Review* articles on compensation costs in China and India.[11]

Notes

[1] For trade in goods only. See "Top Trading Partners - Total Trade, Exports, Imports, Year-to-Date December 2005" (U.S. Census Bureau, Foreign Trade Statistics), on the Internet at **www.census.gov/foreign-trade/statistics/highlights/top/top0512.html** (visited June 21, 2010) and "Top Trading Partners - Total Trade, Exports, Imports, Year-to-Date December 2006" (U.S. Census Bureau, Foreign Trade Statistics), on the Internet at **www.census.gov/foreign-trade/statistics/highlights/top/top0612.html** (visited June 21, 2010).

[2] For trade in goods only. See "Top Trading Partners - Total Trade, Exports, Imports, Year-to-Date December 2009" (U.S. Census Bureau, Foreign Trade Statistics), on the Internet at **www.census.gov/foreign-trade/statistics/highlights/top/top0912yr.html** (visited June 21, 2010) and "Top

Trading Partners - Total Trade, Exports, Imports, For month of April 2010" (U.S. Census Bureau, Foreign Trade Statistics), on the Internet at **www.census.gov/foreign-trade/statistics/highlights/top/top1004cm.html** (visited June 21, 2010).

[3] *International Comparisons of Hourly Compensation Costs in Manufacturing, 2007*, USDL 09-0304 (Bureau of Labor Statistics), Mar. 26, 2009, on the Internet at **www.bls.gov/news.release/pdf/ichcc.pdf** (visited June 3, 2010). See the box titled "Compensation Costs for China" on page 6.

[4] Jessica R. Sincavage, "Labor costs in India's organized manufacturing sector," *Monthly Labor Review*, May 2010, pp. 3–22, on the Internet at **www.bls.gov/opub/mlr/2010/05/art1full.pdf** (visited June 21, 2010).

range of manufacturing labor costs is to calculate the ratio of the mean hourly compensation cost in the highest ranked industry to that in the lowest ranked industry. (See table 4.)[26] In the United States, for example, the ratio of the highest ranked to lowest ranked industry ranged from 2.6 to 3.0 for the years between 1975 and 2007 for which data are displayed in table 4. In the most extreme case for the United States (1980), firms in the motor vehicle and parts industry experienced 3.0 times the labor costs of firms in the apparel industry. In table 4, countries are placed in descending order according to the 2007 ratio of compensation costs in the highest ranked industry to those in the lowest ranked industry. There is a clear break between the European countries in the bottom portion of the table with high-to-low ratios frequently under 2.0 and the North American and Asian economies with ratios well above this level. In 2007, for example, Mexican chemical manufacturers experienced 3.2 times the labor costs of Mexican employers in the wood products industry, whereas the compensation costs of Swedish chemical manufacturers were only 1.3 times the labor costs of Swedish firms in the apparel, textiles, and leather[27] industry. For select periods in Mexico, Japan, the United States, and Taiwan, firms in the highest ranked industry spent nearly 3 times or above 3 times the amount on compensation as firms in the lowest ranked industry. In contrast, for all European countries in this study, the highest ranked industry had compensation costs of less than twice as much as the lowest ranked industry for most years.

The relative distance between the industries with the highest compensation costs and those with the lowest compensation costs suggested by these ratios is further illustrated in chart 2. The range of compensation costs for each country in this study is shown for the years 1975, 1980, 1985, 1990, 1995, 2000, and 2007. (Data for Canada and Mexico are shown beginning in 1985.)[28] For each economy, average compensation costs for manufacturing as a whole are based to 100. Bold diamond markings denote the highest ranked industry in each country for a particular year, and bold circular markings represent the lowest ranked industry, with each notch along the connecting line representing an industry lying between the two extremes. Countries are ordered from left to right on the basis of the average difference between the industry with the lowest mean compensation cost and that with the highest during the period from 1975 to 2007. Thus, on average between 1975 and 2007, Taiwan exhibited the largest spread between the highest and lowest compensated industry, and Sweden had the smallest.

The chart demonstrates clearly that the overall range of labor costs in manufacturing varied greatly both within and across countries over time. For the European economies especially, the spread between the industry with the highest compensation costs and that with the lowest compensation costs was relatively small and stable. For others—such as Taiwan and Mexico, and to a lesser extent the

Country	1975	1980	1985	1990	1995	2000	2007
Mexico..	—	—	2.1	2.7	3.1	3.5	3.2
Japan..	2.9	2.8	2.9	3.1	3.0	2.7	2.8
United States..................................	2.6	3.0	2.8	2.8	2.8	2.6	2.8
Canada..	—	—	2.3	2.4	2.6	2.4	2.8
Taiwan...	2.3	2.3	3.3	3.5	3.0	2.8	2.5
South Korea.....................................	2.3	2.2	2.3	2.4	2.2	2.8	2.1
United Kingdom.............................	1.8	1.7	1.8	1.9	1.9	1.9	2.1
Germany...	1.7	1.7	1.9	1.9	1.9	2.0	1.9
France..	1.7	1.7	1.6	1.6	1.6	1.7	1.8
Italy..	1.7	1.6	1.6	1.7	2.0	1.9	1.7
Sweden..	1.4	1.3	1.3	1.3	1.4	1.4	1.3

United States and South Korea—the range of manufacturing labor costs was typically wider and contracted and expanded over time. Compared with these economies, the ranges of compensation costs in Japan and Canada were much less variable, although not as compressed as labor costs in Europe.

Despite these differences, some general trends in the range of labor costs are evident across economies. In Taiwan, Mexico, the United States, Canada, the United Kingdom, Germany, Italy, and France, the range of labor costs generally has widened over time; for these economies, the vertical distance between the highest and lowest compensated industry was larger in 2007 than in 1975.[29] Only in Japan, South Korea, and Sweden was the range of labor costs more compressed in 2007 than 32 years before. In most of the countries studied, fluctuations in the range of compensation costs were driven by movements in the highest ranked industries; the lower end of the spectrum of manufacturing compensation costs remained relatively stable over time, though there were some exceptions.

Dispersion of labor costs. Examining the notches along the connecting lines in chart 2 reveals differences among economies in the dispersion of compensation costs among industries. In Europe, and especially in Sweden, labor costs in the manufacturing industries covered in this study were closely clustered around the all-manufacturing average (100). For other economies, such as those of Taiwan and Mexico, compensation costs were very high in just a few industries—yielding a wide range of labor costs—while compensation costs in the remaining industries were relatively close to the manufacturing average. The dispersion of compensation costs in manufacturing thus varies across countries as well as over time.

To measure the dispersion of labor costs, this study uses the standard deviation of industries' compensation costs as determined by the variation of those costs from the manufacturing-sector average. In general, when industries' compensation costs are clustered tightly together, differentials are small and the standard deviation is small. Conversely, when industries' compensation costs are spread apart, the standard deviation is large. Chart 3 presents standard deviations as percentages of the all-manufacturing average (set at 100)[30] for each country and year from 1975 to 2007. In this chart, upward movements of a country's bars signify increases in that country's dispersion of labor costs, whereas downward movements denote a decrease.

Some trends in the dispersion of compensation costs are evident across countries. Dispersion generally increased between 1975 and 2007 in Mexico, Canada, Germany, the United Kingdom, and Sweden. Of these countries, Mexico exhibited the largest overall rise in dispersion, whereas in the other four countries dispersion reached its highest level during the mid-to-late 2000s. Conversely, in South Korea, the United States, Taiwan, and Italy, compensation cost differentials among industries on the whole decreased from 1975 to 2007. In both South Korea and Taiwan, dispersion levels were highest during the mid-1970s and declined overall in subsequent years. Only in Japan and in France were dispersion levels in 2007 relatively comparable to those seen over 30 years earlier.

All economies, however, experienced shorter term fluctuations in the dispersion of compensation costs throughout the period studied. In the United States, the standard deviation peaked during the early 1980s and mid-1990s

Chart 2. **Range and dispersion of mean hourly compensation costs across manufacturing industries, by country, selected years**
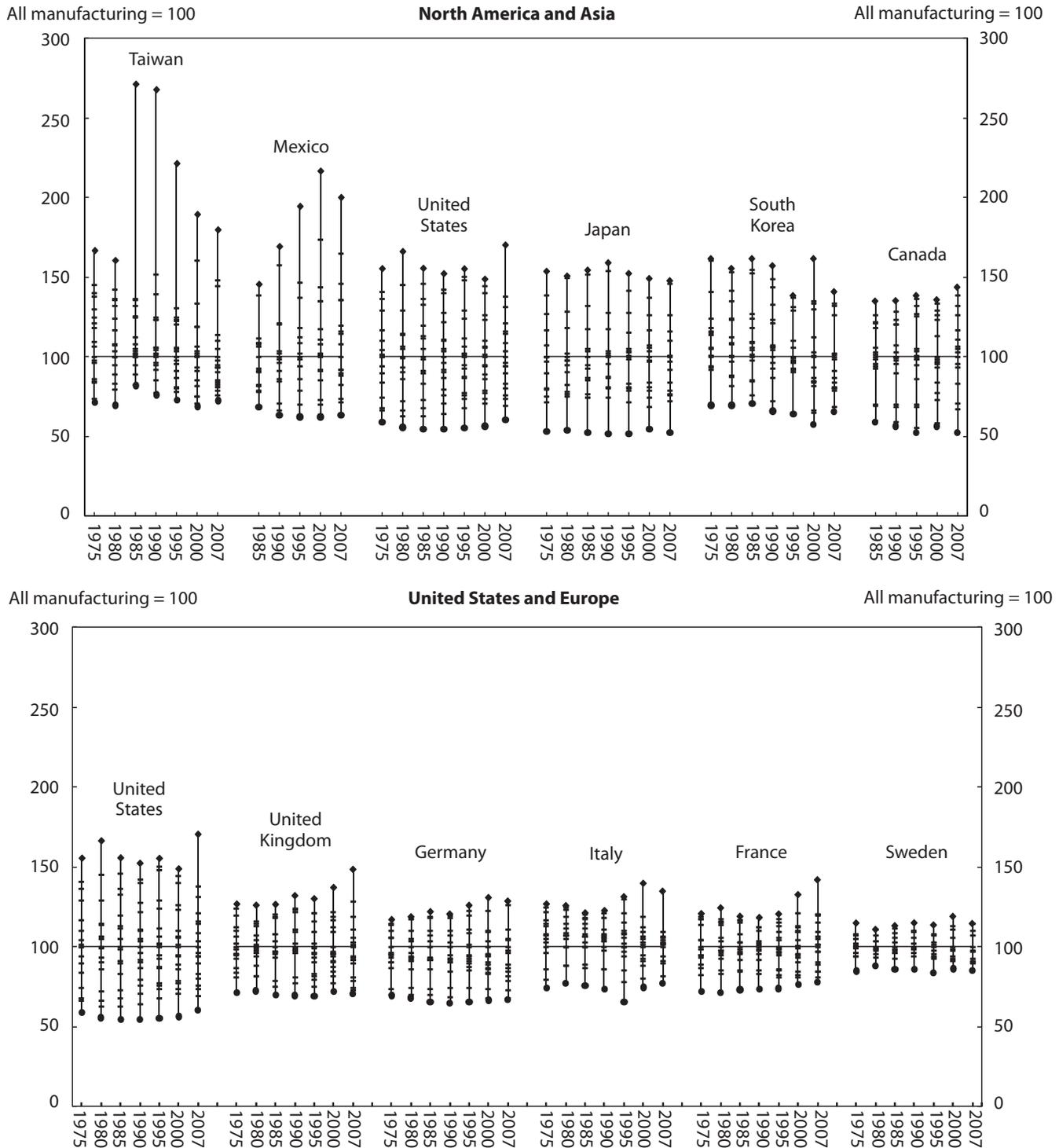
NOTE: Data are represented by notches along the lines in the chart. Thus, each notch represents one industry statistic (or multiple, overlapping statistics) for the economy in question. The U.S. Government does not recognize Taiwan as a country, but Taiwan is still regarded as an economy in this article.

SOURCE: Authors' calculations made by use of "International Hourly Compensation Costs for Production Workers, by Sub-Manufacturing Industry, 1992-2007," on the Internet at **www.bls.gov/ilc/flshcpwindnaics.htm**; and by use of "Hourly Compensation Costs for Production Workers in Manufacturing (SIC Basis), 30 Countries or Areas, 40 Manufacturing Industries, Selected Years, 1975-2002," on the Internet at **www.bls.gov/ilc/flshcindsic.htm**.

Chart 3. Dispersion of mean hourly compensation costs for production workers in manufacturing, selected years
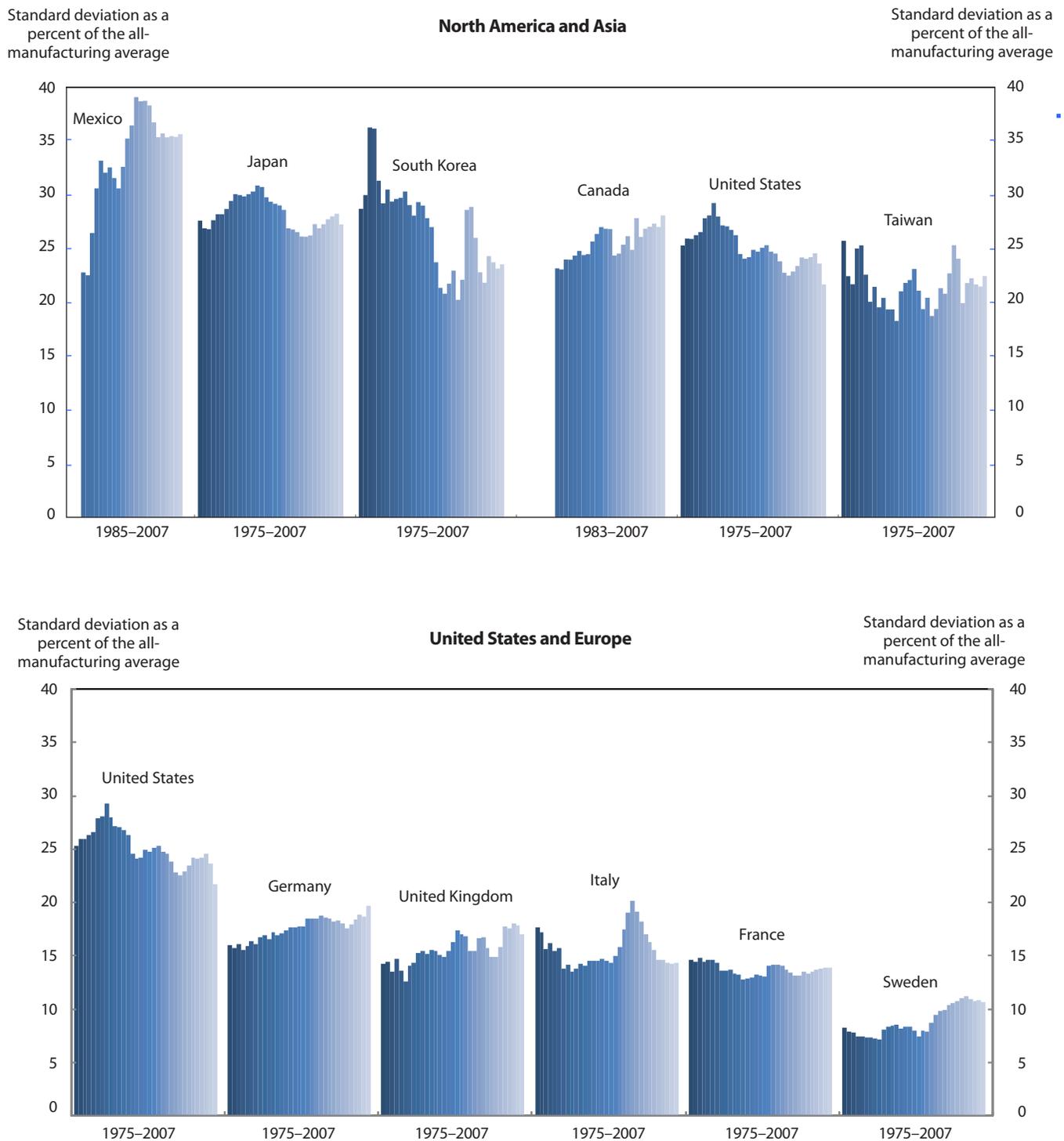
North America and Asia

Standard deviation as a percent of the all-manufacturing average

Standard deviation as a percent of the all-manufacturing average

Mexico
Japan
South Korea
Canada
United States
Taiwan

40
35
30
25
20
15
10
5
0

40
35
30
25
20
15
10
5
0

1985–2007   1975–2007   1975–2007   1983–2007   1975–2007   1975–2007

United States and Europe

Standard deviation as a percent of the all-manufacturing average

Standard deviation as a percent of the all-manufacturing average

United States
Germany
United Kingdom
Italy
France
Sweden

40
35
30
25
20
15
10
5
0

40
35
30
25
20
15
10
5
0

1975–2007   1975–2007   1975–2007   1975–2007   1975–2007   1975–2007

SOURCE: Authors' calculations made by use of "International Hourly Compensation Costs for Production Workers, by Sub-Manufacturing Industry, 1992-2007," on the Internet at **www.bls.gov/ilc/flshcpwindnaics.htm**; and by use of "Hourly Compensation Costs for Production Workers in Manufacturing (SIC Basis), 30 Countries or Areas, 40 Manufacturing Industries, Selected Years, 1975-2002," on the Internet at **www.bls.gov/ilc/flshcindsic.htm**.

and reached lows during the late 1980s and late 1990s. In 2007, the United States exhibited the lowest dispersion in manufacturing compensation costs of the whole 1975–2007 period. As can be seen in chart 2, the volatility with regard to labor cost dispersion in the United States can be attributed mostly to changes in the higher cost industries—because lower cost industries have remained more stable over time relative to the all-manufacturing average. For example, the peak in dispersion in the early 1980s was due primarily to a significant rise in primary metal manufacturing labor costs relative to the all-manufacturing average, and the low seen in 2007 was due to the overall effect of relatively lower compensation costs in paper, chemical, primary metal, and transportation equipment manufacturing—all industries with medium–high or high compensation costs in the United States in 2007. Thus, despite an overall increase in the *range* of labor costs during the 1975–2007 period (as shown in chart 2), the

dispersion of U.S. manufacturing compensation costs in the new millennium was at levels lower than those in the 1970s. That is, while the highest and lowest compensated industries in the United States generally spread further apart over time, labor costs in other manufacturing industries came closer together such that the overall degree of dispersion in recent years reached historic lows. As seen in charts 2 and 3, a similar phenomenon occurred in Taiwan: the range between the industry with the highest compensation costs and that with the lowest was larger in 2007 than in 1975, whereas dispersion decreased overall during that period. The opposite trend occurred in Sweden, where the range of labor costs decreased overall between 1975 and 2007 while the dispersion of compensation costs on the whole increased.

As seen in chart 3, dispersion levels and trends in Europe largely differed from those in North America and Asia. Overall, manufacturing labor cost differentials in

NAICS code(s)	Industry	United States	Canada	Mexico	Japan	South Korea	Taiwan	France	Germany	Italy	Sweden	United Kingdom
	Table 5. Mean hourly compensation costs for production workers in industries within manufacturing, in U.S. dollars, 2007											
31–33	(All) Manufacturing.........	25.27	29.08	2.92	19.75	16.02	6.58	28.57	33.26	28.23	36.03	30.18
311–312	Food, beverages, and tobacco.............................	20.31	24.12	2.40	14.91	13.91	6.21	25.86	27.23	29.10	32.75	27.65
313–314	Textiles and textile products...........................	18.58	19.54	2.58	16.52	10.51	5.51	23.00	24.27	26.46	—	24.48
315	Apparel.................................	15.29	15.17	1.88	10.33	10.98	5.16	22.31	22.46	21.76	—	21.94
316	Leather and allied products...........................	17.55	15.16	2.09	14.26	12.80	5.60	25.44	22.25	23.03	—	22.42
321	Wood products..................	19.20	27.16	1.85	15.59	12.61	4.97	24.22	26.18	—	32.57	21.36
322	Paper......................................	27.50	33.87	2.61	19.92	14.62	5.95	31.13	32.03	29.84	41.17	27.75
325	Chemicals............................	29.21	30.54	5.84	29.15	21.43	9.49	34.28	34.64	38.02	41.28	33.51
326	Plastics and rubber products...........................	22.59	—	2.68	19.10	13.45	5.42	27.61	28.02	25.34	33.42	28.40
327	Nonmetallic mineral products...........................	24.33	30.99	3.14	19.83	16.38	6.15	30.03	28.93	28.62	35.09	31.11
331	Primary metals..................	28.92	41.74	4.25	28.84	20.16	9.75	34.24	36.78	30.81	39.78	30.53
332	Fabricated metal products...........................	23.74	27.85	2.67	18.15	12.78	5.34	27.67	29.55	28.85	32.41	28.19
333	Machinery...........................	26.10	32.21	3.38	22.89	16.20	6.42	30.31	34.82	30.02	34.81	31.82
334	Computer and electronic products............	30.60	—	3.35	—	15.79	6.91	28.92	—	—	—	30.35
335	Electrical equipment, appliances, and components....................	23.80	29.78	3.50	21.70	12.94	6.14	28.91	32.48	25.75	—	27.09
336	Transportation equipment......................	34.86	38.42	3.95	24.95	22.54	7.23	34.28	41.93	29.46	38.48	38.68
3361–3363	Motor vehicles and parts...................................	33.23	40.38	3.95	—	21.10	7.48	32.89	42.75	28.78	—	35.79
3364	Aerospace products and parts...................................	42.98	36.64	4.82	—	—	11.82	40.50	—	—	—	44.74
337	Furniture and related products...........................	20.90	20.44	2.14	15.06	—	4.77	24.23	—	—	—	23.72

NOTE: Dashes indicate data not available.
SOURCE: "International Hourly Compensation Costs for Production Workers, by Sub-Manufacturing Industry, 1992-2007," on the Internet at **www.bls.gov/ilc/flshcpwindnaics.htm**.

Germany, the United Kingdom, Italy, France, and Sweden were lower and more stable than cost differentials in the North American and Asian economies. Germany displayed the overall highest degree of dispersion among the European economies in chart 3, and Sweden showed the lowest both among this group of countries and overall. For both Germany and Sweden, the overall rise in dispersion was mostly smooth and continuous throughout the period. Increasing labor costs (relative to labor costs in the national manufacturing sector) in transportation equipment manufacturing in Germany and in chemical product manufacturing in Sweden were the main contributors to this upward trend. Italy and the United Kingdom experienced the most variability in compensation cost differentials among the European countries. In Italy, the sharp rise in dispersion during the late 1990s was largely the result of labor cost increases in chemical manufacturing.

In South Korea and Taiwan, the degree of dispersion among industries was much more volatile than in any European country. In South Korea, for example, dispersion reached a low in 1997, then peaked only 3 years later. Sudden relative decreases and increases in primary metal and chemical manufacturing labor costs played a key role in this trend. Similarly, because of relatively increasing compensation costs in chemicals, differentials in Mexican manufacturing grew substantially throughout the 1980s and 1990s, reaching the highest levels of dispersion exhibited by any country in this study. For both Mexico and South Korea, however, high volatility was driven primarily by the Mexican peso crisis of the mid-1990s and the Asian financial crisis of the late 1990s.

Unlike industry rankings and groupings, which tend to be similar from one country to another, trends in the dispersion of compensation costs vary substantially across countries. The foreign economies studied here also differ in the degree to which the distributions of their compensation costs among industries are comparable to that of the United States, and these comparisons are the topic of the following section.

The industry–sector relationship

This article has discussed the intracountry relationships between manufacturing industries' compensation costs and the all-manufacturing average. It has also touched on the relationships between foreign manufacturing labor costs and U.S. manufacturing labor costs. Connecting all these relationships provides some clues as to whether the domestic positioning of industries in other countries is similar or dissimilar to that in the United States. Ul-

timately, structural similarities and dissimilarities can be identified and measured by addressing two basic questions.

First, in regard to hourly compensation costs, to what degree are the relationships between foreign manufacturing sectors and the U.S. sector indicative of the relationships between foreign manufacturing industries and the corresponding U.S. industries? For example, if all-manufacturing hourly compensation costs in Germany were 32 percent greater than those in the United States in 2007, does that mean that labor costs in each of Germany's manufacturing industries were around 32 percent greater than their U.S. counterparts? This can be determined by dividing the 2007 compensation cost levels for each foreign industry listed in table 5 by the corresponding industry in the United States. The resulting ratios are displayed in table 6, which shows how labor costs in foreign manufacturing industries compared with those in the same industries in the United States in 2007.

Second, to what extent is the industry-to-sector compensation cost relationship in other countries consistent with that of the United States? For example, if compensation costs in the U.S. chemicals industry were approximately 16 percent greater than the all-manufacturing average in 2007, was the corresponding ratio roughly equivalent in the other countries covered? Table 7 shows the compensation cost levels for each industry listed in table 5 divided by the all-manufacturing average in the country in question.

The degree of structural similarity with U.S. manufacturing across the countries covered can be gauged by dividing the foreign ratios from table 7 by the corresponding ratios in the United States. The resulting values are listed in table 8, which measures the magnitude of difference between foreign industry–sector relationships and the U.S. industry–sector relationship.[31]

For each datum, a value above 1.0 signifies that the ratio of the mean compensation cost in a particular industry to the all-manufacturing average is higher in the country in question than it is in the United States. A value below 1.0 means that the industry–sector compensation cost ratio is lower in the country in question than in the United States. A value close to 1.0 indicates a relationship between an industry and the manufacturing sector as a whole that is similar to the corresponding relationship in United States, whereas a value further away from 1.0 indicates relative positioning dissimilar to that of the United States.

Most of the ratios in table 8 cluster around the 1.0 benchmark in Germany, the United Kingdom, and South Korea, indicating that industries' labor costs relative to

Table 6. Mean hourly compensation costs for production workers in industries within manufacturing, measured in U.S. dollars and indexed to the corresponding mean cost in the United States, 2007

NAICS code(s)	Industry	United States	Canada	Mexico	Japan	South Korea	Taiwan	France	Germany	Italy	Sweden	United Kingdom
31–33	(All) Manufacturing..................	1.00	1.15	0.12	0.78	0.63	0.26	1.13	1.32	1.12	1.43	1.19
311–312	Food, beverages, and tobacco......................................	1.00	1.19	.12	.73	.68	.31	1.27	1.34	1.43	1.61	1.36
313–314	Textiles and textile products..................................	1.00	1.05	.14	.89	.57	.30	1.24	1.31	1.42	—	1.32
315	Apparel..	1.00	.99	.12	.68	.72	.34	1.46	1.47	1.42	—	1.43
316	Leather and allied products..................................	1.00	.86	.12	.81	.73	.32	1.45	1.27	1.31	—	1.28
321	Wood products........................	1.00	1.41	.10	.81	.66	.26	1.26	1.36	—	1.70	1.11
322	Paper...	1.00	1.23	.09	.72	.53	.22	1.13	1.16	1.09	1.50	1.01
325	Chemicals....................................	1.00	1.05	.20	1.00	.73	.32	1.17	1.19	1.30	1.41	1.15
326	Plastics and rubber products..................................	1.00	—	.12	.85	.60	.24	1.22	1.24	1.12	1.48	1.26
327	Nonmetallic mineral products..................................	1.00	1.27	.13	.82	.67	.25	1.23	1.19	1.18	1.44	1.28
331	Primary metals	1.00	1.44	.15	1.00	.70	.34	1.18	1.27	1.07	1.38	1.06
332	Fabricated metal products...	1.00	1.17	.11	.76	.54	.22	1.17	1.24	1.22	1.37	1.19
333	Machinery...................................	1.00	1.23	.13	.88	.62	.25	1.16	1.33	1.15	1.33	1.22
334	Computer and electronic products..................................	1.00	—	.11	—	.52	.23	.95	—	—	—	.99
335	Electrical equipment, appliances, and components..........................	1.00	1.25	.15	.91	.54	.26	1.21	1.36	1.08	—	1.14
336	Transportation equipment..............................	1.00	1.10	.11	.72	.65	.21	.98	1.20	.85	1.10	1.11
3361–3363	Motor vehicles and parts......	1.00	1.22	.12	—	.63	.23	.99	1.29	.87	—	1.08
3364	Aerospace products and parts...	1.00	.85	.11	—	—	.28	.94	—	—	—	1.04
337	Furniture and related products..................................	1.00	.98	.10	.72	—	.23	1.16	—	—	—	1.13

NOTE: Dashes indicate data not available.
SOURCE: Authors' calculations made by use of "International Hourly Compensation Costs for Production Workers, by Sub-Manufacturing Industry, 1992-2007," on the Internet at **www.bls.gov/ilc/flshcpwindnaics.htm.**

labor costs in manufacturing as a whole in these countries are fairly closely aligned with corresponding data from the United States. For example, in Germany only one of the industries has a value greater than 1.1 and only one has a value less than 0.9. This means that most German industries have compensation costs that relate to costs in all of German manufacturing similarly to the way that U.S. industries' compensation costs relate to costs in all of U.S. manufacturing. Conversely, Mexico, Taiwan, and Italy each contain multiple industries with very high and low values, which suggests less similarity between these countries and the United States as regards the ratio in question.

Table 8 also provides some insight as to which foreign industries are most and least similar to their counterparts in the United States—in terms of how their compensation costs relate to the all-manufacturing average. The foreign industry–sector ratios for some industries, in-cluding plastics and rubber products, machinery, fabricated metal products, and nonmetallic mineral products, are consistently more similar to the corresponding ratios in the United States than those ratios are for most industries. This can be seen by the prevalence of values for these industries tightly clustered around the 1.0 benchmark in table 8. In contrast, foreign industries relatively less similar to their counterparts in the United States in this respect include chemicals, apparel, and primary metals, which is indicated by the greater number of relatively high and low values across these rows in table 8.

This analysis suggests that in comparing compensation costs internationally it is important to be aware that compensation costs relative to those in the United States can show considerable variation in certain countries and industries. All manufacturing is an excellent indicator of relative costs in manufacturing industries for Germany, the United Kingdom, and South Korea, but a poor in-

NAICS code(s)	Industry	United States	Canada	Mexico	Japan	South Korea	Taiwan	France	Germany	Italy	Sweden	United Kingdom
31–33	(All) Manufacturing...............	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
311–312	Food, beverages, and tobacco..................................	.80	.83	.82	.75	.87	.94	.91	.82	1.03	.91	.92
313–314	Textiles and textile products.............................	.74	.67	.88	.84	.66	.84	.81	.73	.94	—	.81
315	Apparel......................................	.61	.52	.64	.52	.69	.78	.78	.68	.77	—	.73
316	Leather and allied products.............................	.69	.52	.72	.72	.80	.85	.89	.67	.82	—	.74
321	Wood products...................	.76	.93	.63	.79	.79	.76	.85	.79	—	.90	.71
322	Paper...	1.09	1.16	.89	1.01	.91	.90	1.09	.96	1.06	1.14	.92
325	Chemicals............................	1.16	1.05	2.00	1.48	1.34	1.44	1.20	1.04	1.35	1.15	1.11
326	Plastics and rubber products.............................	.89	—	.92	.97	.84	.82	.97	.84	.90	.93	.94
327	Nonmetallic mineral products.............................	.96	1.07	1.08	1.00	1.02	.93	1.05	.87	1.01	.97	1.03
331	Primary metals.....................	1.14	1.44	1.46	1.46	1.26	1.48	1.20	1.11	1.09	1.10	1.01
332	Fabricated metal products.............................	.94	.96	.91	.92	.80	.81	.97	.89	1.02	.90	.93
333	Machinery.............................	1.03	1.11	1.16	1.16	1.01	.98	1.06	1.05	1.06	.97	1.05
334	Computer and electronic products.............................	1.21	—	1.15	—	.99	1.05	1.01	—	—	—	1.01
335	Electrical equipment, appliances, and components......................	.94	1.02	1.20	1.10	.81	.93	1.01	.98	.91	—	.90
336	Transportation equipment.........................	1.38	1.32	1.35	1.26	1.41	1.10	1.20	1.26	1.04	1.07	1.28
3361–3363	Motor vehicles and parts..	1.31	1.39	1.35	—	1.32	1.14	1.15	1.29	1.02	—	1.19
3364	Aerospace products and parts...	1.70	1.26	1.65	—	—	1.80	1.42	—	—	—	1.48
337	Furniture and related products.............................	.83	.70	.73	.76	—	.72	.85	—	—	—	.79

NOTE: Dashes indicate data not available.
SOURCE: Authors' calculations made by use of "International Hourly Compensation Costs for Production Workers, by Sub-Manufacturing Industry, 1992-2007," on the Internet at **www.bls.gov/ilc/flshcpwindnaics.htm**.

dicator for Mexico, Taiwan, and Italy. Also, it can be assumed that, for some industries, like plastics and rubber, the relationship between compensation costs in those industries in foreign countries and compensation costs in all manufacturing in those countries is similar to the corresponding relationship in the United States. However, more caution is necessary when one looks at other industries, such as chemicals and apparel.

MEASURED IN U.S. DOLLARS, GROWTH RATES of compensation costs in other countries fluctuated greatly over time—due in large part to exchange rate variations—but industries exhibited little movement from one category of hourly compensation costs to another, and thus, their relative rankings remained fairly stable from 1975 to 2007. Put another way, most of the industries within manu-

facturing with relatively very low compensation costs in 1975 still have relatively very low costs today. Some of the countries with the lowest compensation costs in manufacturing in 1975, however, have seen their relative position change significantly over time. These findings indicate that, although labor costs within countries have changed and the countries' relative international positions have shifted over time, the basic hierarchy of industries has remained fairly stable and has not tended to deviate much from country to country or from period to period. It is difficult, however, to predict future labor cost rankings by country with any confidence. The experience of South Korea and Mexico demonstrates this: aspects of manufacturing compensation costs have changed dramatically in these countries since the 1970s.

Employers' compensation costs for production workers

Table 8.	Hourly compensation costs for production workers, industry-to-sector relationship in foreign economies relative to the United States, 2007

[Mean cost in each respective country's manufacturing sector = 1.00, and mean cost in each respective U.S. industry = 1.00]

NAICS code(s)	Industry	United States	Canada	Mexico	Japan	South Korea	Taiwan	France	Ger-many	Italy	Sweden	United Kingdom
31–33	(All) Manufacturing.......	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
311–312	Food, beverages, and tobacco............................	1.00	1.03	1.02	.94	1.08	1.17	1.02	1.02	1.28	1.13	1.14
313–314	Textiles and textile products............................	1.00	.91	1.20	1.14	.89	1.14	.99	.99	1.27	—	1.10
315	Apparel..............................	1.00	.86	1.06	.86	1.13	1.30	1.12	1.12	1.27	—	1.20
316	Leather and allied products........................	1.00	.75	1.03	1.04	1.15	1.23	1.28	.96	1.17	—	1.07
321	Wood products..............	1.00	1.23	.83	1.04	1.04	.99	1.12	1.04	—	1.19	.93
322	Paper..................................	1.00	1.07	.82	.93	.84	.83	1.00	.88	.97	1.05	.84
325	Chemicals........................	1.00	.91	1.73	1.28	1.16	1.25	1.04	.90	1.17	.99	.96
326	Plastics and rubber products........................	1.00	—	1.03	1.08	.94	.92	1.08	.94	1.00	1.04	1.05
327	Nonmetallic mineral products........................	1.00	1.11	1.12	1.04	1.06	.97	1.09	.90	1.05	1.01	1.07
331	Primary metals...............	1.00	1.25	1.27	1.28	1.10	1.29	1.05	.97	.95	.96	.88
332	Fabricated metal products........................	1.00	1.02	.97	.98	.85	.86	1.03	.95	1.09	.96	.99
333	Machinery........................	1.00	1.07	1.12	1.12	.98	.94	1.03	1.01	1.03	.94	1.02
334	Computer and electronic products....	1.00	—	.95	—	.81	.87	.84	—	—	—	.83
335	Electrical equipment, appliances, and components..................	1.00	1.09	1.27	1.17	.86	.99	1.07	1.04	.97	—	.95
336	Transportation equipment...................	1.00	.96	.98	.92	1.02	.80	.87	.91	.76	.77	.93
3361–3363	Motor vehicles and parts...............................	1.00	1.06	1.03	—	1.00	.86	.88	.98	.78	—	.90
3364	Aerospace products and parts......................	1.00	.74	.97	—	—	1.06	.83	—	—	—	.87
337	Furniture and related products........................	1.00	.85	.89	.92	—	.88	1.03	—	—	—	.95

NOTE: Dashes indicate data not available.
SOURCE: Authors' calculations made by use of "International Hourly Compensation Costs for Production Workers, by Sub-Manufacturing Industry, 1992-2007," on the Internet at **www.bls.gov/ilc/flshcpwindnaics.htm**.

in manufacturing are only one measure of international competitiveness in the global economy, but they serve as very useful data. Because the manufacture of goods can differ so much from one industry within manufacturing to another, focusing the analysis at the industry level helps to build a stronger understanding of relative costs and international competitiveness. With increasingly global labor markets and interconnected manufacturing operations, the task of understanding compensation costs becomes both more complex and more important over time.　　☐

Notes

[1] See chart 3.6, "Manufacturing output as a percent of world manufacturing output, 2008," on p. 29 of *Charting International Labor Comparisons* (Bureau of Labor Statistics, 2010), on the Internet at **www.bls.gov/ilc/chartbook.htm** (visited June 3, 2010).

[2] About one-fourth of U.S. manufacturing productivity gains are due to increased importing of intermediate inputs (that is, increased offshoring). See Lucy P. Eldridge and Michael J. Harper, "Effects of

imported intermediate inputs on productivity," *Monthly Labor Review*, this issue, pp. 3–15.

[3] Recent declines in U.S. manufacturing employment are also the result of slowing growth in the demand for manufactured goods in the United States, weakened demand for U.S. goods in other countries' markets, and manufacturers' increasing use of contract or temporary workers, among other reasons. For further information, see *Factors Underlying the Decline in Manufacturing Employment Since 2000* (Congressional Budget Office, 2008), on the Internet at **http://digitalcommons. ilr.cornell.edu/cgi/viewcontent.cgi?article=1590&context=key_ workplace** (visited June 3, 2010).

[4] In addition to employers' compensation costs, there are other important labor-related indicators of competitiveness, such as labor productivity and unit labor costs. Furthermore, businesses face non-labor related costs—such as the costs of materials, fuel, capital equipment, and transport of goods—that can be substantial factors in international competitiveness. For more information on international competitiveness, including comparisons of labor productivity and trends in unit labor costs, see section 3 in *Charting International Labor Comparisons.*

[5] The analysis in this article follows the North American Industry Classification System (NAICS). The United States, Canada, and Mexico report data for manufacturing and other sectors of the economy according to NAICS. Information about NAICS, including industry definitions and descriptions, is available on the Internet through the U.S. Bureau of Labor Statistics and the U.S. Census Bureau at **www. bls.gov/bls/naics.htm** and **www.census.gov/epcd/www/naics.html**, respectively. Most of the 18 industries analyzed in this article are NAICS subsectors. The article also analyzes the manufacturing sector as a whole.

[6] This article presents compensation cost differentials by industry but does not analyze the factors affecting them, though some causal factors that have emerged from other studies are mentioned in the literature review.

[7] See *International Comparisons of Hourly Compensation Costs in Manufacturing, 2007*, USDL 09-0304 (Bureau of Labor Statistics), Mar. 26, 2009, on the Internet at **www.bls.gov/news.release/pdf/ ichcc.pdf** (visited June 3, 2010). BLS publishes comparative hourly compensation cost statistics for all employees and production workers in manufacturing for the United States and 35 foreign economies. Hourly compensation cost data are prepared by BLS in order to assess international differences in labor costs paid by employers. For several reasons, comparisons based on the more readily available average earnings statistics published by many countries can be misleading. For example, national definitions of average earnings differ considerably. In addition, average earnings do not include all components of labor compensation costs, and the omitted components of compensation costs frequently represent a large proportion of total compensation costs.

[8] Production workers generally include those employees who are engaged in fabricating, assembly, and related activities; material handling, warehousing, and shipping; maintenance and repair; janitorial and guard services; auxiliary production (for example, power plants); or other services closely related to the above activities. Working supervisors generally are included; apprentices and other trainees generally are excluded.

[9] Hourly compensation cost data for production workers by industry (within manufacturing) are available on the Internet at **www.bls.gov/ ilc/flshcpwindnaics.htm** and **www.bls.gov/ilc/flshcindsic.htm** (both visited June 3, 2010).

[10] Hourly compensation cost data for all employees by industry (within manufacturing) are available on the Internet at **www.bls.gov/ ilc/flshcaeindnaics.htm** (visited June 3, 2010).

[11] Jelle Visser, "Union membership statistics in 24 countries," *Monthly Labor Review,* January 2006, pp. 38–49, on the Internet at **www.bls.gov/opub/mlr/2006/01/art3full.pdf** (visited June 3, 2010).

[12] The petroleum and coal products manufacturing industry (NAICS 324) also is classified in the manufacturing sector under NAICS, but is not one of the 18 manufacturing industries evaluated in this article. This is because data for petroleum and coal are not available for all countries and because, in countries that do report data on this industry, it is a highly compensated outlier that significantly skews the distribution of industry compensation costs. Thus, removing petroleum and coal from consideration allows for a more meaningful and comparative analysis of compensation costs across countries.

[13] To address differences in industrial classification systems among countries, BLS uses published industry definitions to identify the specific manufacturing activities classified under a given industry. BLS then adjusts source data accordingly in order to construct compensation cost estimates for similar manufacturing activities. Also, industry data for specific components of labor costs often are not available for all years. To address this, BLS estimates missing labor cost components by use of data for similar industries or for the manufacturing sector as a whole. If source data for a particular industry are derived from a small sample size, unusual and unexpected events occurring at large companies within the industry can have an extremely large effect on the reported data. In some instances this has been addressed by calculating a moving average of compensation costs, thereby smoothing out trends to reduce the effects of statistical anomalies.

[14] For Sweden, the other missing industries are computers and electronic products (NAICS 334); electrical equipment, appliances, and components (NAICS 335); and furniture and related products (NAICS 337).

[15] More formally, hourly compensation costs comprise (1) hourly direct pay, (2) employer social insurance expenditures, and (3) other labor taxes. Hourly direct pay is defined as all payments made directly to the worker, before payroll deductions of any kind, consisting of (a) pay for time worked (basic wages; pay for piecework; overtime premiums; shift, holiday, or night work premiums; cost-of-living adjustments; and bonuses and premiums paid each pay period) and (b) other direct pay (pay for time not worked, comprising vacations, holidays, and other leave except sick leave; seasonal and irregular bonuses; allowances for family events, commuting expenses, etc.; the cash value of payments in kind; and severance pay, in cases in which it is explicitly not linked to a collective agreement). Social insurance expenditures refer to the value of social contributions incurred by employers in order to secure entitlement to social benefits for their employees; these contributions often provide delayed (future) income and benefits to employees. Social insurance expenditures comprise employer expenditures for legally required insurance programs and for contractual and private benefit plans. The category of other labor taxes refers to taxes on payrolls or employment (or reductions to reflect subsidies), even if they do not finance programs that directly benefit workers.

[16] The rates used are prevailing commercial market exchange rates as published by either the U.S. Federal Reserve Board or the International Monetary Fund.

[17] The compensation cost data published by BLS are not adjusted with purchasing power parity exchange-rate calculations because the

measures focus on employer costs, not worker welfare. The hourly compensation cost figures in U.S. dollars analyzed in this article allow for comparisons of employers' labor costs; they do not provide intercountry comparisons of the purchasing power of workers' incomes. Prices of goods and services vary greatly among countries, and the commercial market exchange rates used to compare employers' labor costs do not reliably indicate relative differences in prices. A purchasing power parity exchange rate, that is, the number of currency units from one country required to buy goods and services equivalent to what can be purchased with one unit of currency from another country, must be used for meaningful international comparisons of the relative purchasing power of worker incomes.

[18] For example, see Stanley Lebergott, "Wage Structures," *Review of Economics and Statistics*, November 1947, pp. 274–85. Also see J. T. Dunlop and M. Rothbaum, "International Comparisons of Wage Structures," *International Labour Review*, April 1955, pp. 347–63.

[19] *Ibid.*

[20] Alan B. Krueger and Lawrence H. Summers, *Reflections on the Inter-Industry Wage Structure* (Cambridge, Mass., National Bureau of Economic Research, June 1986), on the Internet at **www.nber.org/papers/W1968.pdf** (visited June 3, 2010).

[21] Josef Zweimüller and Erling Barth, *Bargaining Structure, Wage Determination, and Wage Dispersion in 6 OECD-Countries* (University of California, Berkeley, August 1992), on the Internet at **http://repositories.cdlib.org/iir/iirwps/iirwps-047-92/** (visited June 3, 2010).

[22] Maury Gittleman and Edward N. Wolff, "International Comparisons of Inter-Industry Wage Differentials," *Review of Income and Wealth*, September 1993, pp. 295–312, on the Internet at **www.roiw.org/1993/295.pdf** (visited June 3, 2010).

[23] *Employment in Europe 2003* (Brussels, Belgium, European Commission) on the Internet at **http://ec.europa.eu/social/main.jsp?catId=119&langId=en** (visited June 3, 2010).

[24] A standard deviation is understood as a measurement of the dispersion of a set of numbers around their arithmetic mean. The standard deviation measure used to determine the results in exhibit 2, however, is calculated on the basis of the average hourly compensation cost for all manufacturing, which is technically a weighted average, not the mean of all industries within manufacturing. The difference between the weighted average and the mean is negligible.

[25] The exception to this rule is paper manufacturing. As explained in greater detail later, in 2007 the industry was classified as medium–low in 5 of the 11 economies that reported data for paper, as medium–high in another 5 of the 11 economies, and as high in the remaining economy. Because of this one entry in the high category, paper is classified as medium–high in table 4 even though the industry was not placed in this compensation cost category for a majority of the economies.

[26] The analysis of the range—and later on of the dispersion—of compensation costs is greatly influenced by the specific set of industries covered for each country. There are gaps in the annual data coverage for certain countries and industries. Despite these exceptions, most comparisons are made for an identical set of industries for all countries, which allows the the presented compensation cost data to be relevant and meaningful.

[27] For Sweden, textiles and textile product mills (NAICS 313–314), apparel manufacturing (NAICS 315), and leather and allied products manufacturing (NAICS 316) are not reported separately but are combined into textiles, apparel, and leather manufacturing (NAICS 313–316).

[28] For Canada and Mexico, data are shown for the years 1985, 1990, 1995, 2000, and 2007 only. For these countries, source data on labor costs in industries within manufacturing are unavailable for the years 1975 and 1980.

[29] For Mexico, the overall increase in the range of compensation costs occurred between 1985 and 2007. Source data on manufacturing labor costs for the country are available starting with 1985.

[30] Technically, a standard deviation is defined as a measurement of the dispersion of a set of numbers around their arithmetic mean. In chart 3, however, the standard deviation measure is calculated around the all-manufacturing benchmark of 100—which is not an arithmetic mean—so it would be more accurately described as a square root of the sum of squares around 100. The term "standard deviation" is used as a substitute for this mathematical expression and is meant to convey a sense of the dispersion of these industry compensation costs.

[31] It is also possible to measure the degree of structural similarity between manufacturing in other countries and U.S. manufacturing—and arrive at the exact same values as those in table 8—by dividing the ratios for the industries within manufacturing in table 6 by the corresponding all-manufacturing ratio for each country.