The U.S. and Japanese work injury and illness experience

The incidence and severity of work injuries and illnesses are considerably lower in Japan than in the United States, although fatality rates are comparable; a decline in Japanese injury and illness rates noted in the 1960's and 1970's continued into the 1980's

Richard E. Wokutch and Josetta S. McLaughlin

This article compares work injury and illness experience in the United States and Japan by examining national work injury and illness data.[1] These data are worth studying for a number of reasons. First, the unparalleled growth of the Japanese economy in recent decades has been accompanied by evidence of improvements in Japanese injury and illness experience relative to such experience in the United States. Second, there appear to be major differences in the patterns associated with work injury and illness experiences within the U.S. and Japanese economies. And third, there have been greatly divergent accounts of the safety and health conditions in Japanese industry and in Japanese firms operating in the United States,[2] often based on relatively little hard evidence. As direct Japanese investment in the United States continues its explosive growth, assessing this last point with more concrete evidence becomes increasingly important.

We begin with an examination of the nature of work injury and illness data in the United States and in Japan and the factors that complicate comparisons between the two sets of data.

Work injury and illness data

A previous article[3] focusing primarily on work injuries suggests nine principal sources of bias in making international comparisons of occupational injury and illness rates: (1) different work injury and illness definitions; (2) different methods by which injury and illness statistics are collected; (3) different bases on which injury and illness rates are calculated; (4) different incentives and disincentives for having a work injury or illness officially recorded as such; (5) different national and international political influences regarding the compiling and reporting of injury and illness statistics; (6) different national traditions regarding reporting of work injuries and illnesses; (7) different industrial relations; (8) different industrial compositions of the national work force; and (9) different degrees of ethnic homogeneity of the national work force. Space does not permit a systematic discussion here of the relevance of all these factors to U.S.-Japanese comparisons, so we will examine the first three items because of their particular importance to the analysis that follows.

Work injury and illness definitions. Differences between the U.S. and Japanese definitions of work injuries and illnesses are substantial. Three critical factors that must be recognized and for which adjustments must be made before data can be compared are the duration and degree of a worker's incapacitation with respect to work, the designation of an injury versus an illness, and, in Japan, the calculation of lost workday "charges" for permanent disabilities and fatalities.

Richard E. Wokutch is professor of management in the R. B. Pamplin College of Business, Virginia Polytechnic Institute and State University, Blacksburg, Virginia. Josetta S. McLaughlin is assistant professor of management at Radford University, Radford, Virginia.

(1) *Duration and degree of incapacitation.* The minimum time a worker is incapacitated before the worker's injury or illness is counted as a lost work incident differs between the United States and Japan. In Japan, the statistics on the *number* of work injuries and illnesses presuppose a 4-day incapacitation criterion. That is, a worker must be absent 4 full days (for injuries, not including the day of the accident) for the incident to be officially recorded as an injury or illness. Statistics on *rates* of injury and illness presuppose an incapacitation period of 1 or more days (again, for injuries, not including the day of the accident).

In the United States, the minimum duration of incapacitation for an incident to be counted as a lost workday case involving days away from work is the same as that used in Japan for injury and illness rate calculations (1 full day). However, lost workday cases in the United States also include cases of restricted work activity,[4] that is, cases in which a worker is able to report to work but is not able to perform all the duties of the job.

The inclusion of restricted work activity cases in U.S. data reflects an important difference in the degree of incapacitation necessary for an incident to be considered a lost workday case. In Japan, where there are more flexible job descriptions, there is no requirement that cases involving only restricted work activity be recorded as lost workday incidents. However, if actual U.S. reporting practices rather than stipulated requirements are examined, the impact of cases involving only restricted work activity on differences in U.S. and Japanese data may not be substantial. In 1985, the U.S. Office of Technology Assessment observed that it is likely that a large percentage of cases involving only restricted work activity may go unreported in the United States.

(2) *Injury versus illness.* In both the United States and Japan, a work-related incapacity is supposed to be reported as an injury if it is incurred from a one-time event, whereas it is to be reported as an illness if it is due to repetitive factors over a period of time.[5] In certain cases, however, such as sore backs, it is difficult to determine how the condition arose. For consistency's sake, in the United States, back ailments are supposed to be reported as injuries, regardless of whether or not a single precipitating event can be cited. For other ailments, the attending physician or the recordkeeping staff of the safety and health department must judge whether a condition is a result of an illness or an injury. By contrast, in Japan, conditions such as sore backs are considered uniformly as illnesses. Most sore backs are diagnosed as lumbago-related conditions and are classified into a Japanese category of illnesses called, confusingly enough, "disease due to hazardous injuries." The remainder are classified as "occupational back pain not caused by injuries."

Back ailments often account for a large share of reported injuries in the United States. As a result, differences in how conditions are reported can substantially affect U.S.-Japanese comparisons of work injury rates *or* work illness rates. The approach we take here to address this problem is to compare combined work injury *and* illness rates.

(3) *Fatalities and permanent disabilities.* In Japan, deaths and permanent disabilities are translated into a predetermined number of lost workdays. A work fatality is charged as 7,500 lost workdays in the year in which it occurs, and permanent disabilities are charged proportionately fewer days, depending on their severity. In the United States, such charges are not made and, hence, not included in injury and illness severity rate calculations.

Methods of data collection. Different national methods of data collection make international comparisons of injury and illness experiences more difficult than they otherwise would be. There are two basic national recordkeeping approaches to counting work injuries and illnesses: reported cases are based on national compulsory injury and illness reporting systems; compensated cases are derived from government or industry compensation data.

(1) *Reported cases.* In Japan, statistics on injury, illness, and fatality *rates* are collected through surveys conducted by the Ministry of Labor. Statistics on the *number* of work *fatalities* come from a separate reporting system. A work fatality is reported to the local Labor Standards Bureau or Office, which then reports it to the Tokyo headquarters of the Ministry of Labor.

In the United States, national injury and illness statistics are derived from establishment surveys conducted by the Bureau of Labor Statistics. Injuries and illnesses compensated through State workers' compensation programs are not tabulated on a national basis. Such a national tabulation would be extremely difficult, given the differences among the 50 State workers' compensation programs. Thus, the Federal Government's deferral to the States in the matter of workers' compensation necessitates an alternative recordkeeping system.

(2) *Compensated cases.* Japan also collects statistics on injuries and illnesses compensated

through the national workers' compensation system. These statistics refer to the *number* of "casualties" resulting in 4 or more days' absence from work and are based on workers' compensation data. When data on compensated injuries and illnesses are used, incentives for employers and employees or their survivors to have or not to have an injury or illness classified as work related will directly affect the statistics. By contrast, the effect in the United States is indirect. There are different standards and systems for reporting work injuries and illnesses to the Occupational Safety and Health Administration and to State workers' compensation programs; however, the determination that an injury or illness is work related for one system will likely influence its designation under another system.

(3) *Size and industrial sector.* Another difficulty in making international comparisons arises from systematic differences in coverage with respect to employer size and industrial sector. In the United States, nearly all private sector establishments with one or more employees are covered in published injury and illness statistics. An exception is agricultural production establishments (farms), for which only establishments with 11 or more employees are covered. Also, published U.S. occupational *fatality* data generally exclude all establishments with 10 or fewer employees.

Japanese statistics on the *number* of work fatalities and casualties resulting in 4 or more days' absence from work cover private sector establishments with one or more employees. Statistics on fatality, injury, and illness *rates* in Japan, however, cover only private sector establishments with 100 or more employees. Exceptions are injuries and illnesses to seamen, which are excluded from statistics on *numbers* of injuries and illnesses; and injuries and illnesses to workers in the construction industry, which are excluded from statistics on *rates* of injuries and illnesses.

Bases for rate calculations. To be meaningful, international comparisons of injury and illness rates must be made on the same bases. Yet comparable data are not always available. Worker fatality rates in the United States are generally reported on a basis of 200 million hours worked, whereas in Japan, they are reported on a basis of 1 million hours worked. The (nonfatal) U.S. injury and illness statistics presented in this article are given in terms of injuries and illnesses per hundred full-time workers, while the Japanese injury and illness statistics, like their fatality rates, are presented in terms of occurrences per million hours worked. The standard assumption that a full-time worker in the United States works 2,000 hours per year (so that 100 full-time workers work 200,000 hours a year) allows us to convert from one basis to another.

Work injury and illness experience

To reduce the difficulties associated with making international comparisons of occupational injuries and illnesses, we take the following steps: (1) We examine combined figures for injuries and illnesses, so that different national practices regarding the classification of a work-related incident as an injury or an illness will not affect our analysis. (2) We use injury and illness statistics over a period of years, to allow us to evaluate trends in the two countries over time. (3) We consider work fatalities separately, eliminating many of the problems stemming from definitional differences and ensuring greater confidence that a given incident really is work related. (4) We use unpublished injury and illness data and fatality data from the U.S. Bureau of Labor Statistics to adjust published data in these categories. In this way, we make U.S. data more comparable to Japanese data.[6]

Trends in occupational injury and illness rates. Table 1 gives long-term statistics on the numbers and rates of occupational injuries and illnesses for the United States and Japan. The data have not been adjusted to allow direct comparisons between U.S. and Japanese injury and illness experiences. They are presented for the sole purpose of showing overall trends in the two countries. (The data on injury and illness rates are for establishments with 100 or more employees; the data on numbers of injuries and illnesses are for establishments with 1 or more employees.)

Similar trends are found in U.S. data on both rates and numbers of injuries and illnesses from 1975 to 1988.[7] U.S. injury and illness rates show an increase from 3.5 injuries and illnesses per 100 full-time workers in 1975 to 4.6 in 1979, followed by a decline to 3.6 in 1982 and then another increase to 4.0 in 1988. From 1975 to 1988, there was an overall 14-percent rise in reported injury and illness rates.[8] As regards numbers of injuries and illnesses, the trend was upward from 1975 to 1979, downward from 1979 to 1982, and upward again from 1982 to 1988, with the overall increase from 1975 to 1988 being 63 percent.

Japanese injury and illness *rates* (statistics that are for private sector establishments with 100 or more employees) declined steadily from 1968 on, except for a slight rise from 1982 to

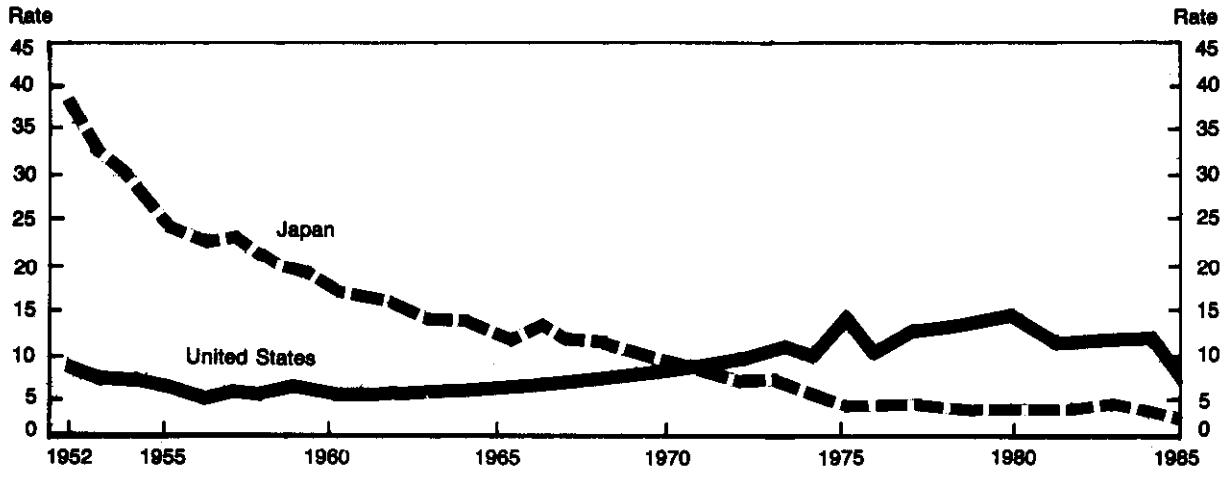
1983. From 1968 to 1975, the rate dropped 57 percent, and by 1988, it declined another 56 percent. Over the entire period from 1968 to 1988, the rate fell 81 percent. Similarly, Japanese statistics on *numbers* of injuries and illnesses show a general decline prior to and following 1973, with some few fluctuations in the opposite direction. The increase from 324,435 in 1972 to 387,742 in 1973 can be attributed to a change in reporting practices.[9] Data collected after 1973 are more inclusive. From 1975 to 1988, there has been a 30-percent decrease in the number of reported work injuries and illnesses in Japan.

A 1988 report by the Japan Institute of Labour shows the substantial decline in Japanese work injury and illness rates relative to U.S. rates.[10] Using U.S. data from the National Safety Council[11] and Japanese data from the Ministry of Labor, the report graphs industrial injury and illness rates for the two countries from 1952 to 1985. (See chart 1.) In 1952, the U.S. rate of 8.40 injuries and illnesses per million hours worked was about one-fifth of the Japanese rate of 39.24. By 1985, the U.S. rate had increased to 9.90, while the Japanese rate decreased 94 percent, to 2.52. Thus, in 1985, the U.S. injury and illness rate was almost 4 times as high as the Japanese rate.

Work injury and illness and fatality rate comparisons. Table 2 gives adjusted work injury and illness rates for the United States and Japan for two sectors of their economies—the private sector and the manufacturing sector.[12] Statistics for U.S. establishments with 11–99 employees have been eliminated, cases of restricted work activity have been subtracted from the U.S. injury and illness statistics,[13] and the U.S. severity rates have been adjusted by adding 7,500 days for each fatality to the figures for days lost from work due to injuries and illnesses.[14] Japanese incidence rates, severity rates, and fatality rates have been converted to U.S. bases to conform with U.S. practice.[15]

Examination of the table reveals that U.S. injury and illness *incidence rates* are substantially higher than the corresponding Japanese rates for both the private sector and the manufacturing sector. The magnitude of the differences are worthy of note. In the U.S. private sector, the 1983–87 average injury and illness incidence rate of 3.8 injuries and illnesses per 100 full-time workers is more than 7 times as high as the average injury and illness incidence rate of 0.51 for the Japanese private sector for the same 5-year period. In the manufacturing sector, the U.S. injury and illness incidence rate of 3.7 is 11 times the Japanese rate of 0.34.

Chart 1. Frequency of injuries and illnesses, United States and Japan, all industries, 1952-85[1]



[1]Lost work injuries and illnesses per million hours worked.

SOURCE: Industrial Safety and Health, Japanese Industrial Relations Series 9 (Tokyo, the Japan Institute of Labour, 1988), p. 13. Rates for Japan are based on surveys of industrial accidents conducted by the Japanese Ministry of Labor. Rates for the United States are based on statistics from the National Safety Council and have been adjusted to the Japanese basis.

Similarly, as regards *severity rates*, the 1983–87 U.S. private sector average severity rate of 95.5 is 77 percent higher than the corresponding Japanese rate of 54.0, while for the manufacturing sector, the U.S. average severity rate of 92.9 for the same 5 years is 147 percent higher than the Japanese average of 37.6. Note, however, that these differences, although substantial, are nowhere near the order of magnitude of the differences in incidence rates. Unfortunately, because Japanese severity data translate permanent disabilities into lost workdays, whereas U.S. data do not, no firm conclusions can be drawn from the discrepancy. It is conceivable (but not likely) that a similar translation applied to U.S. data would inflate U.S. severity rates enough to produce the same order of magnitude of differences as exists for injury and illness incidence rates.

An examination of work *fatality rates* for the years 1983–87 reveals a different relationship than that found for incidence and severity rates. For the private sector, the average U.S. work fatality rate, 4.1 per 200 million hours worked, is only 13 percent higher than the average Japanese rate of 3.6 per 200 million hours worked. By contrast, in the manufacturing sector, the average U.S. fatality rate of 3.3 per 200 million hours worked is 65 percent higher than the corresponding figure of 2.0 for Japan.

Factors affecting data interpretation

The dramatic decline in Japanese injury and illness rates during the 1960's and 1970's (see chart 1) has been noted in the literature.[16] The improvement, both absolutely and relative to U.S. figures, continues to be striking and clearly observable in more current data. Still, there is reason to question the accuracy of the data on which the comparisons are based.

Two trends are discernible in the comparisons: (1) the United States fares worse for the manufacturing sector than it does for the entire private sector across the different categories of injury and illness statistics; (2) the United States fares much better relative to Japan in the comparison of work fatality rates than it does in the comparison of work injury and illness incidence rates and severity rates. A rational argument may be made for the first trend based on values associated with Japanese manufacturing management practices, which emphasize the elimination of inefficiency and waste, of which accidents are extreme examples.[17] By contrast, the second trend is not as easily explained. Two plausible candidates for an explanation are the underreporting of injuries and illnesses in Japan and the exclusion of small establishments from Japanese data. Let us examine each of these in turn.

Underreporting. There is undoubtedly some degree of underreporting of fatal and nonfatal

Table 1. **Work injury and illness experience in the United States and Japan, 1958–88**

[Numbers in thousands]

Year	United States		Japan	
	Number of injuries and illnesses[1]	Injuries and illnesses per 100 full-time workers[2]	Number of injuries and illnesses[3]	Injuries and illnesses per million hours worked[4]
1958	—	—	401.760	—
1959	—	—	435.017	—
1960	—	—	468.139	—
1961	—	—	481.686	—
1962	—	—	466.126	—
1963	—	—	440.547	—
1964	—	—	428.558	—
1965	—	—	408.331	—
1966	—	—	405.361	—
1967	—	—	394.627	—
1968	—	—	386.443	11.08
1969	—	—	382.642	10.37
1970	—	—	364.444	9.20
1971	—	—	337.421	8.14
1972	—	—	324.435	7.25
1973	1,908.0	—	387.742	6.67
1974	2,001.8	—	347.407	5.11
1975	1,827.5	3.5	322.322	4.77
1976	1,978.8	3.8	333.311	4.37
1977	2,203.6	4.1	345.293	4.32
1978	2,492.0	4.3	348.826	3.91
1979	2,757.7	4.6	340.731	3.65
1980	2,539.9	4.3	335.706	3.59
1981	2,457.5	4.0	312.844	3.23
1982	2,182.4	3.6	294.319	2.98
1983	2,182.7	3.6	278.623	3.03
1984	2,501.5	3.8	271.884	2.77
1985	2,537.0	3.7	257.240	2.52
1986	2,590.3	3.8	246.891	2.37
1987	2,801.6	3.9	232.953	2.22
1988	2,975.9	4.0	226.318	2.09

[1] Reported injuries and illnesses: lost workday cases. Coverage: private sector employers with one or more employees.

[2] Reported injuries and illnesses: lost workday cases. Coverage: private sector employers with 100 or more employees.

[3] Compensated injuries and illnesses: deaths, injuries, and illnesses resulting in incapacitation for 8 or more days through 1972 and 4 or more days from 1973 onward. Coverage: all establishments with one or more employees, excluding seamen.

[4] Reported injuries and illnesses: injuries and illnesses resulting in incapacitation for 1 or more days (not including the day of the accident for injuries). Coverage: all establishments with 100 or more employees, excluding the construction industry.

NOTE: Figures are reported to the level of precision of the original sources. Dash indicates data not available.

SOURCES: U.S. data—Bureau of Labor Statistics, *Handbook of Labor Statistics, 1977* (Washington, Government Printing Office, 1977); Bureau of Labor Statistics, *Occupational Injuries and Illnesses in the United States by Industry* (Washington, Government Printing Office, 1982, 1987, 1988, 1989, 1990); Occupational Safety and Health Administration, *Report of the President to Congress on Occupational Safety and Health for Calendar Year 1987* (Washington, 1988); unpublished data from Bureau of Labor Statistics.

Japanese data—*Industrial Safety and Health*, Japanese Industrial Relations Series 9 (Tokyo, the Japan Institute of Labour, 1982, 1988); *Safety and Health Data Book in Japan* (Tokyo, Japan Industrial Safety and Health Association, 1988, 1989). Original sources of data are workers' compensation records for numbers of injuries and illnesses and Ministry of Labor surveys for rates of injuries and illnesses.

work injuries and illnesses in both the United States and Japan. Still, it seems that work fatalities would be more likely to be reported accurately than would nonfatal injuries or illnesses. A work injury or illness can be hidden or can be claimed to be nonwork related far more easily than can a work fatality, especially one resulting from an accident. The great difference in comparative injury and illness rates versus fatality rates thus suggests that nonfatal injuries and illnesses are underreported to a greater extent in Japan than in the United States. This idea can be explored further by examining the ratios of lost work injuries and illnesses to fatalities in Japan and the United States.[18]

Table 2. **Adjusted work injury and illness experience in the United States and Japan, private sector and manufacturing sector, 1983–87**

[Percent]

Year and sector	Incidence rate[1]	Severity rate[2]	Fatality rate[3]
United States[4]			
Private sector:			
1983	3.6	90.2	4.1
1984	3.8	96.2	4.3
1985	3.7	97.9	4.4
1986	3.8	93.5	3.7
1987	3.9	99.6	3.8
Average, 1983–87	3.8	95.5	4.1
Manufacturing sector:			
1983	3.5	87.0	3.5
1984	3.7	87.6	3.1
1985	3.6	91.6	3.4
1986	3.7	96.6	2.9
1987	4.0	101.6	3.5
Average, 1983–87	3.7	92.9	3.3
Japan[5]			
Private sector:			
1983	.61	60.0	4.0
1984	.55	68.0	6.0
1985	.50	58.0	4.0
1986	.47	44.0	2.0
1987	.44	40.0	2.0
Average, 1983–87	.51	54.0	3.6
Manufacturing sector:			
1983	.39	44.0	2.0
1984	.36	40.0	2.0
1985	.33	38.0	2.0
1986	.32	36.0	2.0
1987	.30	30.0	2.0
Average, 1983–87	.34	37.6	2.0

[1] For the United States, number of lost workday cases involving days away from work per 100 full-time workers. For Japan, number of lost time injuries and illnesses per 200,000 hours worked (equivalent to working time of 100 full-time workers).

[2] For the United States, days away from work due to injuries and illnesses per 100 full-time workers. (For each U.S. fatality, 7,500 lost workdays are added to the U.S. severity figures to enhance comparability with the corresponding Japanese figures.) For Japan, days away from work per 200,000 hours worked.

[3] For both the United States and Japan, fatalities per 200 million hours worked (or, alternatively, per 100,000 full-time workers).

[4] Reported injuries and illnesses: lost workday cases involving days away from work. Coverage: private sector and manufacturing establishments with 100 or more employees.

[5] Reported injuries and illnesses: lost workday cases. Coverage: private sector (excluding construction) and manufacturing establishments with 100 or more employees.

SOURCES: U.S. data—unpublished data from Bureau of Labor Statistics. Japanese data—*Safety and Health Data Book in Japan* (Tokyo, Japan Industrial Safety and Health Association, 1988, 1989); *General Guidebook on Industrial Safety* (Tokyo, Japan Industrial Safety and Health Association, 1984, 1988); *Annual Report* (Tokyo, Japan Industrial Safety and Health Association, 1984, 1988, and two undated reports); *Year Book of Labour Statistics* (Geneva, International Labour Office, 1988).

Using the private sector injury and illness and fatality data in table 2, we can make the following rough calculations. The average U.S. rate of lost workdays involving days away from work for the years 1983–87 is 3.8 cases per 100 full-time workers (200,000 hours worked). This converts to about 3,800 cases per 200 million hours worked. During the same 5 years, there was an average of 4.1 U.S. fatalities per 200 million hours worked. Thus, the ratio of lost workday cases involving days away from work to fatalities is 3,800/4.1, or 927 to 1. In other words, from 1983 to 1987, 1 out of every 927 lost workday cases involving days away from work was a fatality.

For Japan, for the same period, the ratio of the lost work injury and illness rate to the work fatality rate is 510/3.6, or 142 to 1. Hence, the ratio of the lost work injury and illness rate to the work fatality rate is approximately 6–1/2 times as high in the United States as in Japan (927/142 = 6.53). Or, inversely, the proportion of fatalities to total lost work injuries and illnesses is about 6–1/2 times as great in Japan as in the United States. This is a very odd finding in light of the demonstrated stability of ratios between major and minor injuries and in light of the closeness of (adjusted) U.S. and Japanese injury and illness definitions. Japanese underreporting of lost work injuries and illnesses appears to be the most logical explanation for the discrepancy in these ratios.

Establishment size. Comparisons of U.S. and Japanese work injury and illness data by establishment size are complicated by the fact that categories of size differ for the two countries. Nevertheless, differences in patterns can be identified. Table 3 gives work injury and illness data for U.S. and Japanese manufacturing industries, broken down by establishment size.

Work injury and illness rates for the United States generally decline as establishment size increases. In 1987, the rate of lost workday cases involving days away from work for establishments with 100 to 499 employees was more than twice as high as it was for establishments with 1,000 or more employees. For Japan, the disparity between large and small establishments was even greater. The 1987 lost work injury and illness rate for establishments with 100–299 employees was 7.5 times as great as the rate for establishments with 1,000 or more employees, and the rates for establishments with 300 to 499 employees and 500 to 999 employ-

ees were, respectively, 3.8 times and 2.6 times as great as for establishments with 1,000 or more employees.

Even though the size categories are broken down differently for the United States and Japan, differences in relative injury and illness experiences can be examined by comparing the injury and illness experiences of the largest establishments with those of all establishments with 100 or more employees within each country. Thus, in 1987, U.S. establishments with 1,000 or more employees had a rate of lost workday cases involving days away from work that was 39 percent lower than the rate for all establishments with 100 or more employees.[19] In the same year, Japanese establishments with 1,000 or more employees had a lost work injury and illness rate that was 75 percent lower than the rate for establishments with 100 or more employees. Thus, the disparity was almost twice as great in Japan as in the United States. This analysis indicates that smaller establishments do much more poorly in injury and illness rate comparisons relative to large establishments in Japan than in the United States.

Table 3. **Work injury and illness rates by establishment size, United States and Japan, manufacturing sector, 1984–85, 1987**

[Percent]

Year		Number of employees[1]				
	100 or more	100 to 299	300 to 499	100 to 499	500 to 999	1,000 or more
United States[2]						
1984	3.7	—	—	5.3	3.6	1.9
1985	3.6	—	—	5.2	3.5	1.8
1987	3.8	—	—	5.4	3.7	2.3
Japan[3]						
1984	.362	.690	.352	—	.240	.102
1985	.334	.624	.350	—	.222	.098
1987	.298	.558	.282	—	.192	.074

[1] Establishment size categories are reported differently in the United States and Japan.

[2] Injury and illness rates per 100 full-time workers, cases involving days away from work. Cases involving only restricted work activity have been excluded.

[3] Injury and illness rates per 200,000 hours worked (equivalent to 100 full-time workers). Injury and illness rates normally are reported on a basis of 1 million hours worked but have been converted to a 200,000-hour basis for the sake of comparison.

NOTE: Figures are reported to the level of precision of the original sources. Dash indicates data not stated for this category.

SOURCES: U.S. data—unpublished data from Bureau of Labor Statistics. Japanese data—*Safety and Health Data Book in Japan* (Tokyo, Japan Industrial Safety and Health Association, 1988); *General Guidebook on Industrial Safety* (Tokyo, Japan Industrial Safety and Health Association, 1985, 1986).

Conclusions

It is obvious that various factors distort injury and illness rate comparisons. First among these may be underreporting. Earlier, we saw large discrepancies in ratios of injury and illness rates to fatality rates. It is possible, but not likely, that greater accuracy in reporting fatalities in Japan as compared with the United States accounts for the disparity in ratios. In fact, researchers have found that some work fatalities go unreported in the United States.[20] In addition, the Bureau of Labor Statistics cautions that fatalities are difficult to measure in establishment surveys and that they may be significantly understated in the United States.[21] However, the sheer magnitude of the differences in the injury/illness-to-fatality ratios in the United States and Japan, as well as other studies of injuries and illnesses and fatalities in Japan, suggests that underreporting of fatalities in the United States is not adequate to explain all the observed discrepancies. If it were adequate, the actual level of fatalities in the United States would be 6–1/2 times higher than the reported level, and this seems unlikely. In addition, there is evidence that underreporting is a problem in Japan as well.[22] T. Fujimoto found that, for Japan, the ratio of the rate of fatal injuries to the rate of total lost work injuries increased substantially over time.[23] This is contrary to what one would expect—that the percentage of injuries that result in death would decline over time due to improved medical care. Fujimoto concluded that one probable cause of this disparity is underreporting of nonfatal injuries. Certainly, the risk of incurring penalties for underreporting is far less in Japan than in the United States, where some employers have received large fines.[24] Clearly, the bulk of the evidence supports Fujimoto's conclusion and suggests greater underreporting of nonfatal injuries in Japan than in the United States.

A second factor that may distort injury and illness rate comparisons between Japan and the United States is the limitations imposed by the lack of certain Japanese data. For example, Japanese establishments with fewer than 100 employees are excluded from injury and illness rate statistics, resulting in an artificially low reported injury and illness rate. This is a substantial omission, as evidence suggests that smaller establishments are likely to have a higher incidence of injuries and illnesses than are large establishments. We have been able to control for this exclusion to an extent by excluding establishments with fewer than 100 employees from U.S. data. Still, the evidence leads us to believe that if data on work injuries and illnesses for these smaller establishments were available for both countries, the great disparities in Japanese-U.S. work injury and illness experiences reported here would be attenuated somewhat.

In general, underreporting and establishment size offer only partial explanations for the discrepancies observed in injury and illness rate comparisons. Even after accounting for their effects, substantial differences remain in U.S. versus Japanese work injury and illness experiences. Clearly, Japan has made substantial improvements in limiting work injuries and illnesses during the last decade, both in terms of frequency rates and in terms of total numbers of injuries and illnesses. Furthermore, when comparable data are examined, injury and illness incidence and severity rates can be seen to be substantially higher in the United States than in Japan.

Recent research employing multiple methods has attempted to identify additional reasons for the U.S.-Japanese disparity in occupational injury and illness experiences.[25] Onsite observation of the management of occupational safety and health and investigations into broader issues in labor-management-government relations with respect to safety and health have been conducted in both Japan and the United States. Results of these studies have been used to supplement findings generated through analysis of data from government and private organizations. Comparisons have also been made among Japanese-owned automotive plants operating in Japan and the United States and among U.S. domestic plants operating in the United States. It has been found that in many ways, Japanese systems for regulating and managing occupational safety and health in these plants are superior to those of the United States. In particular, cooperative relations among labor, management, and government in Japan pertaining to occupational safety and health work very well for large establishments and have many advantages over the more punitive regulatory system and confrontational labor-management-government relations prevalent in the United States and in U.S.-owned firms. However, these distinctive Japanese approaches have significant weaknesses. First, they do not seem to work nearly so well for smaller establishments. Also, the apparent large-scale underreporting of injuries and illnesses is itself a problem. In addition, there are indications that Japanese automotive plants operating in the United States have higher incidences of cumulative trauma disorders than do comparable U.S.-owned plants, due to their faster pace of production and more strictly defined work motions.[26] These are issues that bear further study, given the dramatic differences in U.S. versus Japanese patterns of occupational injury and illness and the substantial increases in direct Japanese investment in the United States. □

Footnotes

ACKNOWLEDGMENT: The authors acknowledge the assistance of the U.S. Bureau of Labor Statistics, the Japanese Ministry of Labor, the Japan-United States Educational Commission (Fulbright Program), and the Embassy of Japan in Washington, DC, in the research leading to the publication of this article.

[1] The analysis is adapted from Richard E. Wokutch's soon-to-be-published *Worker Protection, Japanese Style: Occupational Safety and Health in the Auto Industry* (Ithaca, NY, ILR Press, 1992), which also contains a more general discussion of occupational safety and health issues in the United States and Japan. The implications of Japanese safety and health management techniques for corporate social responsibility are examined in Richard E. Wokutch, "Corporate Social Responsibility Japanese Style," *Academy of Management Executive*, May 1990, pp. 56–74.

[2] See, for example, Joseph L. Fucini and Suzy Fucini, *Working for the Japanese: Inside Mazda's American Auto Plant* (New York, The Free Press, 1990); and Richard M. Kendall, "Safety Management: Japanese-Style," *Occupational Hazards*, Feb. 8, 1987, pp. 48–51.

[3] Richard E. Wokutch and Josetta S. McLaughlin, "The Sociopolitical Context of Occupational Injuries," in L. E. Preston, ed., *Research in Corporate Social Performance and Policy*, vol. 10 (Greenwich, CT, JAI Press, 1988), pp. 113–37.

[4] The precise definitions of these terms, as used in the United States, are provided in the following extract from a U.S. Government publication:

Lost workday cases are cases which involve days away from work, or days of restricted work activity, or both. *Lost workday cases involving days away from work* are those cases which result in days away from work or a combination of days away from work and days of restricted work activity. *Lost workday cases involving restricted work activity* are those cases which result in restricted work activity only (*Occupational Injuries and Illnesses in the United States by Industry, 1987* (Bureau of Labor Statistics, 1990), p. 76).

In the United States, companies sometimes refer to lost workday cases as lost time incidents or lost work incidents. In Japan, what the U.S. Bureau of Labor Statistics would call lost workday cases involving days away from work are referred to variously as lost time cases, lost work cases, or work shutdown cases.

[5] Efforts to differentiate between work injuries and illnesses in Japanese data are complicated by the fact that there is a certain degree of confusion or lack of precision in the English-language translations of published Japanese work injury and illness statistics. According to the 1973 *Dictionary of Labor Terms*, published by the Japanese Ministry of Labor, a *work accident* refers to "Injuries, illnesses and deaths which occur because of such things as buildings, equipment, materials, gas, steam, dust, or workers' own misconduct at the workplace" (p. 880). In addition to the term "work accident," various publications use the terms "injuries," "injuries and illnesses," and "casualties." Based on extensive discussions with officials from the Ministry of Labor, we have concluded that these terms are used interchangeably to denote what we in the United States would understand as injuries and illnesses combined. Even if this assessment is incorrect, however, it would not make a great deal of difference in the analysis that follows. This is because illnesses account for only a

small percentage of the combined total of injuries and illnesses in both the United States and Japan. For example, only 12,523 occupational illnesses were recorded nationwide in Japan in 1988, accounting for 5.5 percent of what we have interpreted as the combined total of injuries and illnesses. Similarly, in the United States, there were 240,700 private sector occupational illnesses reported in the same year, accounting for 3.7 percent of the total private sector injuries and illnesses.

[6] Data on U.S. establishments with fewer than 100 employees have been eliminated in compiling injury and illness rates and fatality rates. Also, injury and illness severity rates are adjusted by adding in charges of 7,500 days for each fatality in the United States to the statistics on the number of days lost due to injuries and illnesses, the convention followed in Japan. Because we were not able to adjust Japanese or U.S. severity data to take account of the earlier mentioned charges for nonfatal disabilities that the Japanese apply, Japanese severity rate data are somewhat overstated.

[7] Data collected before 1973 are not comparable with data collected from 1973 on, due to changes in recordkeeping requirements mandated in 1970 by the Occupational Safety and Health Act. Injury and illness rate data are not available for 1973 and 1974. See *Preventing Illness and Injury in the Workplace*, report no. OTA-H-256 (Washington, U.S. Congress, Office of Technology Assessment, April 1985).

[8] This apparent increase may be a spurious recordkeeping artifact. Some supporters of the Occupational Safety and Health Administration suggest that significant underreporting of injuries and illnesses occurred during the early years of the agency due to confusion. As individuals learned more about reporting requirements, the number of reported injuries and illnesses rose. In fact, long-term National Safety Council statistics indicate a substantial decline in injury and illness rates in the United States over the course of the 20th century.

[9] The Japanese statistics on numbers of injuries and illnesses come from workers' compensation records and cover all establishments with one or more employees. These statistics underwent a reporting change in 1973, complicating comparisons over time. Prior to 1973, data were available only for injuries and illnesses resulting in incapacitation for 8 or more days. Since then, data have been available for injuries and illnesses involving incapacitation for 4 or more days.

[10] *Industrial Safety and Health*, Japanese Industrial Relations Series 9 (Tokyo, the Japan Institute of Labour, 1988).

[11] While possessing weaknesses associated with being derived from surveys of firms that voluntarily choose to belong to the Council, the National Safety Council's occupational injury and illness data have the advantage of being available for a longer period of time than Bureau of Labor Statistics data. National Safety Council data on injury and illness rates are normally reported on a basis of number of cases per 200,000 hours worked. We have converted such data to the Japanese basis of number per million hours worked simply by multiplying by 5.

[12] The U.S. rates have been adjusted using unpublished Bureau of Labor Statistics data. Because of the way the data are collected and reported, it was not possible to make Japanese injury and illness statistics conform to U.S. standards.

[13] Lost workday cases involving only restricted work activities have been excluded from the figures, while lost workday cases involving both lost workdays and restricted work activity have been retained.

[14] No data were available on permanent disabilities, so the U.S. severity rates have not been adjusted by adding lost workday charges for permanent disabilities, as is the practice in Japan. The result is a downward bias in the U.S. severity rates—that is, if charges for permanent disabilities were added in, U.S. severity rates would be higher still.

[15] Published Japanese injury and illness incidence rates were divided by a factor of 5 to convert them to a 200,000-hour basis, making them generally equivalent to the 100 full-time-worker basis used in the United States (50 weeks and 40 hours per worker per week). Published Japanese severity data are reported on the U.S. basis of 100 full-time workers. Published Japanese fatality rate data are converted to the 200 million-hour basis used in the United States.

[16] See Robert Evans, Jr., "Japanese economic growth and industrial accidents," *Monthly Labor Review*, September 1978, pp. 50–53.

[17] See Wokutch, "Corporate Social Responsibility" and *Worker Protection, Japanese Style*, for a discussion of Japanese safety and health management practices in manufacturing establishments.

[18] There is evidence suggesting that these ratios are meaningful and in some sense predictable. In the early 1940's, H.W. Heinrich (*Industrial Accident Prevention: A Safety Management Approach* (New York, McGraw-Hill, 1941)) observed a stable relationship among the number of accidents resulting in no injuries, in minor injuries, and in major injuries of 300 to 29 to 1. Also, military strategists are able to project a relatively stable relationship between wounded and fatally wounded soldiers in combat. Given the closeness of the injury definitions for the United States and Japan, the two countries' ratios of injuries to fatalities should be comparable, assuming roughly equal underreporting of injuries and fatalities. Although restricted work activity injuries are reportable in the United States but not in Japan, there is considerable underreporting of such injuries in the United States. (See the Office of Technology Assessment's *Preventing Illness and Injury in the Workplace*.) Therefore, the ratios of injuries to fatalities should not be affected greatly. Heinrich did not address the issue of major versus minor illnesses in his analysis, but because these represent such a small percentage of total injuries and illnesses, their inclusion should not significantly affect the analysis that follows.

[19] It should be noted that these comparisons understate the disparity between large and small establishments for both the United States and Japan. This is because we are comparing the experience of large establishments with that of all establishments with 100 or more employees, which includes the large establishments. As we saw earlier, great disparities are evidenced when we compare the experiences of large versus small establishments against each other.

[20] B. Burrough and S. H. Lubove, "Credibility Gap: Some Concerns Fudge Their Safety Records to Cut Insurance Costs," *The Wall Street Journal*, Dec. 2, 1986, pp. 1, 28.

[21] *Occupational Injuries and Illnesses in the United States by Industry, 1988* (Bureau of Labor Statistics, 1990).

[22] See Wokutch, "Corporate Social Responsibility" and *Worker Protection, Japanese Style*; and T. Fujimoto, "A Short History of Occupational Accidents in Japanese Industries," *Report of the Institute for the Science of Labour*, no. 67, 1967, pp. 1–19, and personal interview, Kawasaki, Nov. 18, 1986.

[23] Fujimoto, "A Short History."

[24] Wokutch, "Corporate Social Responsibility" and *Worker Protection, Japanese Style*.

[25] *Ibid.*

[26] *Ibid.*