Occupational Fatality Risks in the United States and the United Kingdom

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Background *There are very few careful studies of differences in occupational fatality rates across countries, much less studies that try to account for those differences.*
Methods *We compare the rate of work injury fatalities (excluding deaths due to highway motor vehicle crashes and those due to violence) identified by the US Census of Fatal Occupational Injuries in recent years with the number reported to the Health and Safety Executive in the United Kingdom (UK) and by other European Union (EU) members through Eurostat.*
Results *In 2010, the fatality rate in the UK was about 1/3 the rate in the US. In construction the rate was about ¼ the US rate, a difference that had grown substantially since the 1990s. Several other EU members had rates almost as low as the UK rate. Across EU countries, lower rates were associated with high-level management attention to safety issues and to in-house preparation of "risk assessments."*
Conclusions *Although work fatality rates have declined in the US, fatality rates are much lower and have declined faster in recent years in the UK. Efforts to find out the reasons for the much better UK outcomes could be productive.* Am. J. Ind. Med. 57:4–14, 2014. © 2013 Wiley Periodicals, Inc.

KEY WORDS: *work fatality; construction; United Kingdom; injury reporting; comparison of safety*

INTRODUCTION

During the last century, all developed nations made great strides in reducing workplace fatalities, but some have made more progress than others.[1] These differences in outcomes across countries have not, to date, been very well described,

much less explained. This paper attempts to provide a somewhat richer description than we currently have. It compares reported workplace fatality rates between the United States and the United Kingdom, with some attention to other members of the European Union.[2] Given the number of factors that affect the level of reported (and actual) fatalities, findings of differences in rates cannot be easily attributed to any particular set of practices without an in-depth analysis. Nevertheless, determining whether the level of risk in other countries is lower or higher than in the United States

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[Pennsylvania Department, 2007]. Of course, a substantial share of the reduction reflects changes in economic activity—away from mining and primary metals and toward services. But it is clear that the same economic activities have become safer as well. Steel is still being produced, but it is a safer process. Decreases in risk are not inevitable, however. Hazards like asbestos exposure in the 1940s through 1960s certainly increased the occupational disease death rate and perhaps the total occupational death rate for a number of years.

[1] To take one example, in 1919 there were over 3,000 workplace deaths in Pennsylvania.
Ninety years later, the number averages about 150–200 per year, a reduction of 93–95% despite a population increase of about 50%

[2] The United Kingdom consists of Great Britain and Northern Ireland. In some cases, the data apply only to Great Britain; in other cases, to the United Kingdom. Northern Ireland has <3% of the UK population.

may inform judgments about the adequacy of safety efforts in the United States and provide information about the nature of the gaps.

The analysis here is limited to fatalities. As Azaroff et al. [2002] have pointed out, the reporting of non-fatal injuries goes through multiple filters. These filters vary from country to country (as well as firm to firm). Therefore, efforts to compare the numbers or rates of non-fatal injuries across countries face such serious threats to validity that they are not often credible. As noted below, we find that even fatality reporting is subject to major flaws in some countries.

MATERIALS AND METHODS

For fatality data for the United States, we rely on data from the Census of Fatal Occupational Injuries (CFOI). Carried out by the Bureau of Labor Statistics (BLS) since 1992, CFOI relies on multiple sources of information to identify all decedents who were "self-employed, working for pay, or volunteering at the time of the event, engaged in a legal work activity, and present at the site of the incident as a job requirement." Although BLS now calculates rates based on hours worked, we used rates based on number of employees to try to make them comparable to rates reported for the EU. CFOI relies upon 20 different sources to identify deaths and their work-relatedness, including death certificates, state workers' compensation records, news media, and OSHA reports. Despite those efforts, BLS acknowledges that, "there are some fatal injuries at work that are missed by the CFOI. Some unidentified work-related fatal injuries undoubtedly occur on farms, at sea, and on highways, to cite three examples."[3]

The UK does not include data on highway motor vehicle crashes; to make the CFOI data comparable, we eliminated these cases there. We also excluded deaths due to violence from the CFOI data. Although the UK does count them, the numbers are so small compared to the US that we left them in the UK data set. Our objective was to focus on the more traditional set of fatality causes. Both the US and UK data do include the self-employed, a group we discuss below. The UK data are for years beginning April 1 so, for example, UK data from 2002/3 is most comparable to US data for 2002.

Injury data from EU members are compiled by Eurostat. Information about both non-fatal and fatal injuries comes from either a country's compensation system or from a count by its labor inspection agency. In the UK, the information is collected by the Health and Safety Executive (HSE), which is also responsible for setting and enforcing health and safety standards. We report the standardized fatality rates calculated by EU-OSHA. The standardization here simply involves calculating what each country's fatality rate would be, given its sector-specific rates, if it had the same industry composition as the EU as a whole.

Fatality Reporting in the United Kingdom

The British require employers to report certain injuries to HSE. These include fatalities, injuries where the employee loses >3 days from work, and a category called "major injuries." HSE states that "*While the enforcing authorities are informed about almost all relevant fatal workplace injuries*, it is known that non-fatal injuries are substantially under-reported" (emphasis added). The underreporting by employers has ranged from 40% to 60% of the reportable non-fatal cases.

HSE bases this conclusion on a comparison of reported non-fatal cases with the results of a Labour Force Survey. According to HSE officials with whom we spoke, the agency has not carried out any special studies to try to determine the extent of fatality underreporting. Infractions of the current requirements for reporting—called Reporting of Injuries, Diseases, and Dangerous Occurrences Regulations 1995—have been the subject of a few prosecutions per year. We were not able to determine if the cases involved fatalities, although it seems likely that they did. Of course, we assume that reporting of fatal injuries is far better than reporting of non-fatal injuries. Employers are less likely to be confused about whether a fatal injury is reportable and less likely to believe that they could evade detection if they did not report. Also, at least in the past, the police visited fatality scenes and notified the HSE of the deaths even if the employer does not.[4] One other piece of evidence suggesting that reporting in the UK may be as good as in the US comes from a US study that compared the number of work fatalities that the law requires to be reported to OSHA with the number identified by CFOI for the same injury categories [Schoenbaum, 2008]. The study found that the numbers were within a range of a few percent. Since political scientists have long argued that the British have more respect for their government and that the British people are more respectful of authority, it is plausible that the reporting to the agency for fatalities would be at least as good in the US. Despite the lack of firmer evidence, for the purposes of this study we proceed with the assumption that the claim that "the enforcing authorities are informed about almost all" relevant fatal workplace injuries could be valid.

Industry and employment data

Do the construction sectors in both countries cover the same activities and has their coverage changed over time?

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[3] See

[4] Personal communication with Stephen Wright, HSE.

The industries covered are generally very similar. In 2007, however, the UK revised its standard industrial classification (SIC) system to add the development of building projects.[5] According to HSE, this group "accounts for about 4% of the construction workforce. This makes rates slightly lower, as real estate involves a much lower risk—at least in terms of health and safety." It went on to say that "LFS rates of illness and injury for construction are of a similar order to those previously published under SIC 2003 [HSE, 2013].[6]

The US also made some changes in what is counted as the construction industry when it shifted from the standard industrial classification—1987 system to the North American Industrial Classification System (NAICS) beginning in 2003.[7] All of the industries in the SIC construction sector remained in the NAICS construction sector; however, a number of components from other SIC categories were added [BLS, 2004]. The bulk of these additions appear to be lower risk industries (e.g., SIC 8741-"Management and services"), so we believe that the net effect of the change to NAICS has been a small reduction in construction rates in the US.

Prior Studies

There are a very small number of previous studies that have tried to compare fatality rates. Benavides et al. [2003] looked at the US and EU-15 for 1995–1998, although the comparison was limited to the manufacturing and construction sectors because of concerns about the ability to match industry categories in other sectors. Benavides et al. found that the EU and US rates in those two sectors were not very different—for manufacturing the EU rate was a little higher; for construction, the EU rate was about 8% lower in 1995 with the gap widening to almost 30% by 1998. This growing gap is interesting in light of the larger gaps we find in more recent years.

The International Labour Organization attempts to collect work fatality rates for all countries. For our purposes, their reports do not add anything because they rely on Eurostat and CFOI for their data on the EU and the US[8] In summary, we compare the rate of US work injury deaths to the same category of deaths reported to the HSE in the UK.

COMPARING FATALITY RATES IN THE US AND UK

Comparing Industry Fatality Rates

Table I shows the average fatality rate for different sectors in the UK from 2005 to 2007 and for the US for 2006. For manufacturing and hotels/restaurants, the rates are about twice as high in the US. For construction, they are about three times as high. We did not compare other sectors because we lacked confidence that we were comparing similar industries.

Comparing Fatality Causes

We explored two issues to gain more insight. First, we looked at the percentage of deaths in each country due to different causes. This was for all workers, employed and self-employed. The results are shown in Table II for all sectors. We subtracted highway motor vehicles, rail, water, and air transportation, and violence (except from animals) from the

TABLE I. Comparison of Work Fatality Rates in the US and UK, Selected Sectors

	UK workers	US workers
	Fatality rate per 100,000	
Manufacturing	0.97	2.08
Construction	3.17	9.03
Hotels and restaurants	0.25	0.53

Note: Other categories could not be easily matched across countries. Numerator for GB: Fatal injuries to employees or self-employed, in GB reported under RIDDOR 05/06−07/08, based on 2003 SIC codes. Denominator for GB: Total employment for self-employed or employees, 2005−2007, Annual Population Survey US rates from BLS, CFOI for 2006.

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[5] "For information on the British industry coding system, see http://www.hse.gov.uk/statistics/industry/sic2007.htm. The rates shown in the Tables and Figures in this paper use the 2007 SIC, which has been recoded back to 2004/5. For earlier years, the prior industrial classifications are used.

[6] In addition, in late 2011, the UK altered the method it relied on to estimate employment, the result of which was about a 5% drop in measured employment. This change would, of course, lead to an increase in the estimated injury and fatality rates; however, it does affect the rates we report here. Prior to that date, it had used the Labour Force Survey for employees and the Annual Population Survey (APS) for the self-employed. The new system relies solely on the APS, which is less likely to involve double-counting (HSE, "Data Sources," www.hse.gov.uk/statistics/sources.htm Accessed 6/26/2013.

[7] Another change to NAICS in 2007 did not change the definition of the construction sector.

[8] In another study, Benavides et al. [Benavides et al. 2005] compared fatality rates among 5 EU countries, but did not include the UK. Another study [Feyer et al., 2001] compared the US death rate with rates in Australia and New Zealand and found the US and Australia had very similar rates, and New Zealand's were a little higher. A study by Nishikitani and Yano [2008] compared the number of reported fatal injuries to the number of reported total injuries for all OECD countries from 1993 to 1998. This "lethality index" varied from 3,000 deaths per 10,000 reported injuries in Turkey to fewer than 9 per 10,000 in Germany. However, since the study relied on ILO data, it is not helpful here.

TABLE II. Work Fatality Rates Per 100,000 in the US and UK by Cause of Death

US OIICS code	Event type	UK rate	US rate	Ratio
03	Contact with moving machinery	0.06	0.20	3.3
02	Struck by moving, including flying/falling object	0.13	0.38	2.9
42, 43	Struck by moving vehicle	0.11	0.43	3.9
01	Strike against something fixed or stationary	0.025	0.006	0.2
22	Injured while handling, lifting or carrying			
13	Slips, trips or falls on the same level	0.018	0.055	3.1
11, 12	Falls from a height of which: Up to 2 m			
	Over 2 m	0.17	0.50	2.9
	Height not stated			
04	Trapped by something collapsing/overturning	0.06	0.07	1.2
38	Drowning or asphyxiation	0.028	0.055	2.0
30, 32–37, 39	Exposure to, or contact with, a harmful substance	0.012	0.13	10.8
50, 52	Exposure to fire	0.011	0.053	4.8
50, 52	Exposure to an explosion	0.013	0.051	3.9
31	Contact with electricity or electrical discharge	0.037	0.14	3.8
63	Injured by an animal	0.015	0.025	1.7

Data for the US are from CFOI for 2007. Data for the UK are based on the totals for 5 years—2004/05 through 2008/09. The "injured while handling" category is omitted because of uncertainty about matching categories. "Struck by moving vehicle" in the CFOI includes both pedestrian work deaths and non-highway deaths. In the UK data, 7% of deaths were unclassified by accident type, while all of the 2007 CFOI deaths were classified.

US figures to make them comparable with the UK figures. That reduced the US figures for 2007 from 5,657 to 3,121. To obtain a larger UK sample, we aggregated over 5 years from 2004/5 to 2008/9. That gave us 1099 reported deaths in the UK, a rate of 0.77 deaths per 100,000 workers compared to 2.1 per 100,000 in the US.

Most of the larger categories of injury causes show the same 3:1 ratio in fatality rates as the total figures show. Some of the smaller categories show bigger differences. For exposures to harmful substances, the ratio of death rates was a striking 10–1. For fire, it was almost 5:1 and for explosions and electrocutions it was about 4:1. On the other hand, deaths due to being "trapped by something collapsing/overturning" were almost as frequent in the UK and "drowning/asphyxiation" deaths were only half as rare.

Figure 1 presents the fatality rates in the UK and US for all sectors. The US rate excludes the highway motor vehicle, violent, and air/water/railroad deaths that are omitted from the UK data. This figure indicates that the gap between the US and UK has been long-standing. Since 1993, the US rate has declined slightly more in absolute terms, but the UK rate has declined more in percentage terms (50% vs. 31%). As a result, the US rate was just over twice as high in 1993, but was three times as high in 2010. We have not adjusted these rates for differences in industry composition. In 2010, in both countries manufacturing employed 10% of all workers and the construction sector employed 7% [Office of National Statistics, 2011]. However, employment in riskier sectors may have declined more rapidly during the prior decades in the UK.

In 1992, the average annual hours actually worked by employed people was 5–6% lower in the UK than in the US. From 1992 to 2006 that figure declined by 2.6% to 3.7% in the UK and from 0.6% to 1.2% in the US [Fleck, 2009] (the ranges reflect two different estimation methods). Thus the overall change for all workers could account for a relative reduction in fatality rates for UK workers of between 2% and 2.5% over this period.

Comparing Fatalities in Construction

Because construction is the industry in both countries with the largest number of fatalities, we looked at it more closely. Also, changes in industry composition may be controlled for to a larger extent when we examine only this one sector. Figure 2 shows that in the early 1990s, the rate in the US was only about 50% higher than the GB rate. Over the next 15 years, the disparity grew to between three and fourfold, depending upon the year.

For the construction sector in the UK, the Labour Force Survey reports that average hours worked fell by 4.4% from 1992 and 2011 [Office of National Statistics, 2011]. Comparison with US Current Population Survey indicates that in 2011 and 2012 the usual hours worked were very similar in the two countries (US Current Population Survey, Household Data, Annual Averages, Table 21, 2013). Based on the data in hand, it seems unlikely that differences in the number of hours worked per worker can account for much, if any, of the UK's lower rate.[9] However, a closer review of the employment data is needed to justify a firm conclusion.

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[9] In the US, the BLS has recalculated rates based on hours of work rather than number of employees. For 2 years, it produced both rates. In 2006, the total industry rate was 4.0 per 100,000 for the employment-based rate and 4.3 per 100,000 for the hours-based rate. In 2007, the change was from 4.0 to 4.2. In construction the effects were smaller—from 10.9 to 11.2 in 2006 and unchanged at 10.8 in 2007. The conclusion of this analysis is that part-
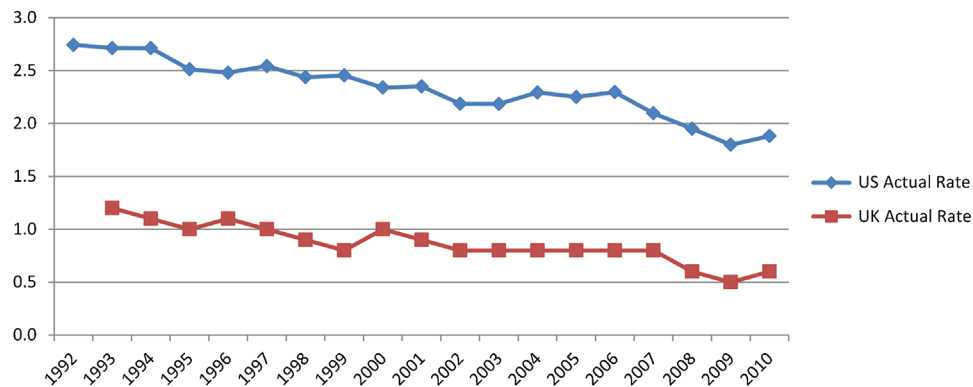
FIGURE 1. US and UK fatality rates per 100,000 workers, all industries. *Note*: Deaths due to highway motor vehicle accidents, planes, railroads, or ships are excluded. Deaths due to violence are excluded, except violence by animals.

Self-Employed and Part-Time Workers

In 2002, 39% of UK construction workers were self-employed [Weir, 2003], compared to only 14% in the United States. In 2009 the US percentage was 17.5% [Hipple, 2010]. Those differences might cause some distortions if we look at the fatality rate only for employees. However, since we include both groups in the rates we report, there is no distortion.[10]

Another question is whether we need to control for the effects of the business cycle on the fatality rate. A number of studies have shown that the non-fatal injury rate increases when the unemployment rate goes down [Robinson and Shor, 1986]. However, there does not appear to be similar evidence

about the fatality rate. A study of the 1960s and 1970s in California found no cyclical effect there for either construction or manufacturing deaths [Robinson and Shor, 1986]. For the US, we compared the change in the annual unemployment rate with the change in the all industry annual fatality rate from 1993 through 2006. The correlation coefficient was −0.06. When we added the years from 2007 to 2010, with their big jump in unemployment, the coefficient changed to −0.21. Even then, however, the "*P*" value was only 0.41. Therefore, we do not consider cyclical effects in comparing fatality rate changes across countries.

## Other Factors Explaining National Differences

One strategy for assessing performance of EU countries was to carry out an analysis that would use variables thought to influence fatality rates and then to see whether Member States had rates above or below what the model predicted they "should" have. The key variable we began with was the GDP per capita in the country. The reasoning here was that both the demand for safety by workers and the ability to supply it increase with wealth. We also included variables on average weekly hours. The reasoning was that, because the fatality rates are based on deaths per worker, rather than deaths per hours worked, circumstances where workers are employed for more hours should tend to increase the estimated fatality rate because they increase exposure. We also looked separately at fatality rates for each industry sector and, within them, calculated fatality rates for different size categories of establishments. Specifically, we looked at establishments with fewer than 10 employees, those with 10–49, and those with >49.

Only 1 of the independent variables—GDP per capita—displayed a clear impact on fatality rates across the 24 countries included in the sample. In 9 of the 13 sectors, an

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time work appeared to play a fairly small role in the estimated fatality rate for the total US economy (decreasing the fatality rate by 5–7%) and a very small role in construction, reducing the rate by between 0% and 3%.

[10] In both countries' construction sectors, the death rate among the self-employed is lower than among employees (BLS CFOI and HSE annual reports). One reviewer argued that the differences could be ignored only if we standardized the share of employment in the categories. However, this assumes that the difference in rates between employed and self-employed is an inherent feature, like the differences in rates between the banking industry and the logging industry. In that case you would have to standardize to see what the rates would be if both countries had the same industry mix. However, the rates of employed and self-employed workers in construction presumably depend upon what type of work they are assigned to do. Therefore, it is sufficient to look at the total work force rates.

A reviewer suggested that it would have been better to focus on occupational categories for construction rather than the industry category. Each has shortcomings. Industry is based on the employer's work. If an employee of a trucking firm dies while delivering materials at a construction site, it is not counted as a construction industry death. We reviewed OSHA data on 200 US deaths at construction sites and found that 91% of decedents were categorized in the construction industry. The problem of using occupation as the category is that it would include craft workers who do maintenance and home repairs. We are primarily interested here in the risks involved in building things, which is why we chose to use industry rather than occupation.
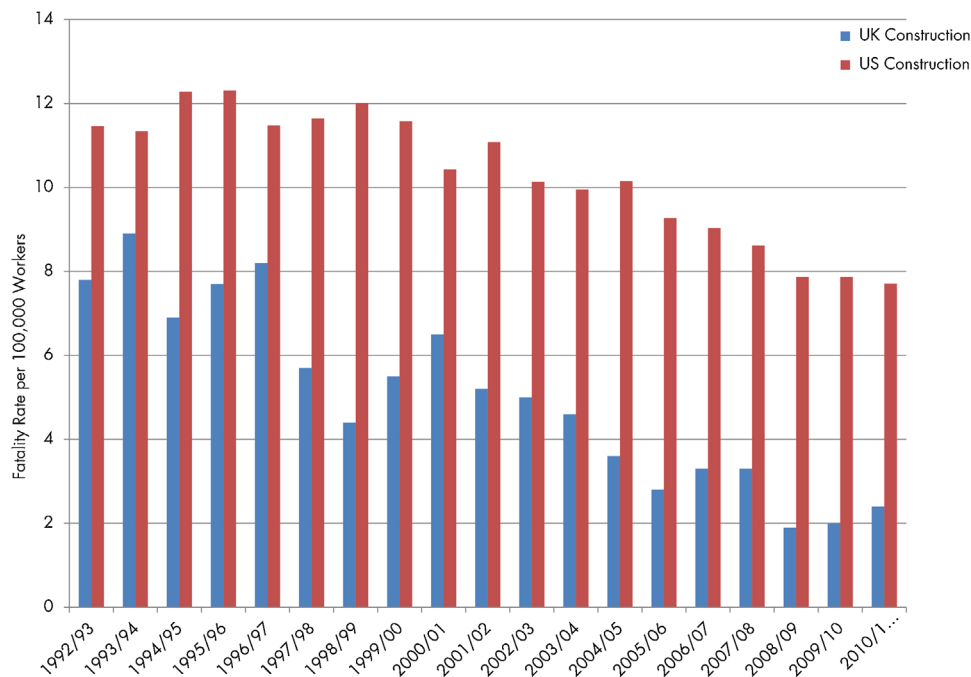
FIGURE 2. Construction fatality rates in the US and UK, 1992–2010, deaths per 100,000 workers. *Source*: US-CFOI and calculations by authors; UK-HSE key facts/statistics/historical injuries/Copy of histrate.xls/Fatal. These rates exclude deaths due to highway motor vehicle accidents and deaths due to violence.

extra $1,000 of GDP per capita was associated with a reduction, on average, of 5–10% in the fatality rate in that sector (for workplaces of all sizes).[11] Because GDP per capita in the US is much higher than in the UK, this finding about the negative association between fatality rates and GDP per capita makes the higher US fatality rates, compared to the UK rates, even more striking.

Other EU Member States Also Have Lower Fatality Rates Than the US

We saw above that the UK rate has been about 1/3 the US rate in recent years. Figure 3 shows that the UK had the lowest standardized fatality rate in the EU in 2008. However, Finland France, Sweden, and Germany all were no more than twice the UK rate. The implication is that they also have work fatality rates considerably below the US rate. During the previous decade, the UK and the Scandinavian countries always had among the lowest rates. Thus these rates have been fairly stable.[12]

EXPLAINING DISPARITIES

The objective of this paper is to describe the lower fatality rates in the UK compared to the US. However, it may be worthwhile to speculate briefly about some possible reasons for these findings. The first pertains to the construction sector, but the others apply to all sectors.

- A more fine-grained examination of industries than provided in Table I might show that their average riskiness in the UK tends to be lower. Perhaps the type of construction activity in the UK poses fewer safety risks.
- The reported rates may not be comparable because there could be more under-reporting of fatalities in the UK. In the US, the CFOI has a good reputation for completeness, although it surely misses some cases. In the UK, there have been no major quality assurance studies of fatality reporting.

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[11] The four sectors where it did not have an effect were mining, public administration, health and social work, and other community services. In a cross-section analysis, the coefficient on GDP represents the long-term effect of different levels of wealth. In the annual time-series analysis reported above, the effects we estimate are short-term (i.e., cyclical).

[12] The standardization of fatality rates was carried out at the industry sector level. The standardized rate is the fatality rate each EU member would have had if it had the same distribution of employment among sectors as the EU as a whole. So the fatality rate in each sector in a member state is multiplied by the share of employment in that sector for the EU as a whole (Fig. 2 omits several of the smaller EU members—Malta, Cyprus, and Luxembourg).
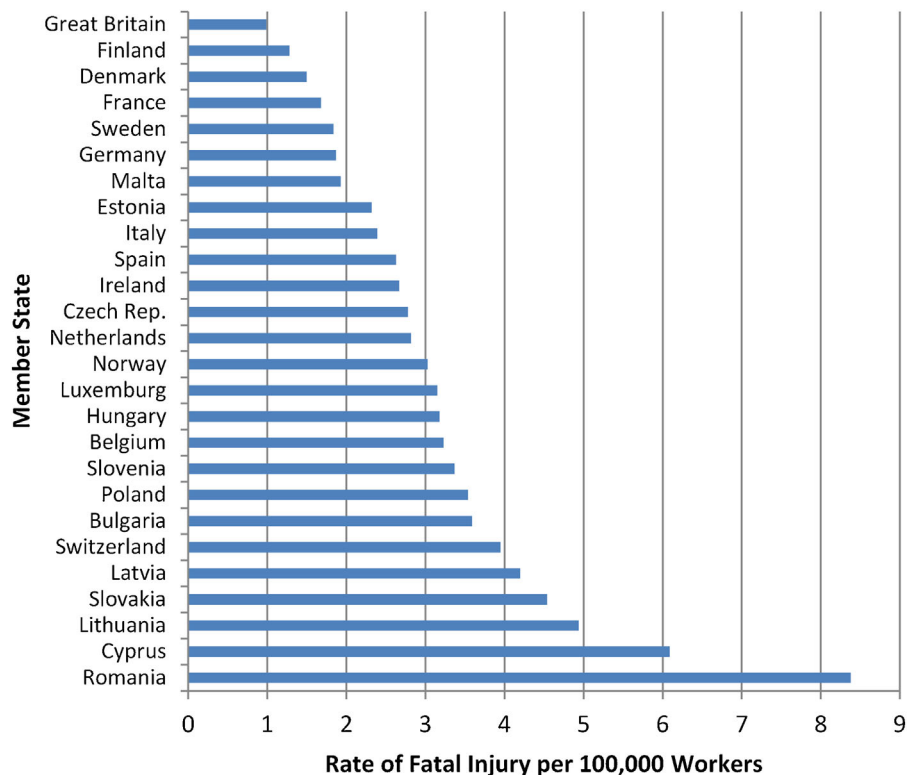
FIGURE 3. Standardized work fatality rates in the European Union, 2008 (*Source*: www.hse.gov.uk/statistics/europe).

- Employers may make greater and more successful efforts to reduce risks, perhaps partly due to HSE enforcement or its other programs. Or employers may increase their safety efforts because of the greater role of lawsuits against employers due to the employer liability laws [Parsons, 2002].
- The workforce in the UK may be more stable with lower turnover.
- Workers in GB may be less likely to take risks.

We asked Lawrence Waterman, a former President of the Institution for Occupational Safety and Health (IOSH), the chief UK organization for safety and health professionals, and recently the safety director at the largest construction project in Europe, the London Olympics site, about the disparity between construction rates in the US and UK. He mentioned three issues. First, he thought that the UK had better rules on fall protection from roofs and other elevated platforms. Second, he thought that the construction work force in the UK is more stable, which reduces inexperience and ensures that people have learned to work together to a greater extent. Third, he thought that there was less risk-taking "cowboy" behavior in the UK. Another point that others emphasized was that the government sponsors a large share of construction in the UK, which probably improves compliance with safety rules.

Another recent contributor to greater safety may be the 2007 Construction, Design and Management Regulations), which require a designated co-coordinator to notify HSE about all construction operations that are likely to last longer than 30 days or involve >500 person days of construction. The information includes the planned date of construction, the number of contractors employed, and the maximum number of people at work on site at any one time. This information helps the HSE direct its inspectors to high-risk sites. Yet because it was issued in 2007, this regulation cannot explain the patterns we saw in Figure 1.

Survey Data on National Differences

The EU Framework Directive of 1989 requires firms to do things that are not required in the US: carry out an assessment of risks at their worksites and ensure that some safety expertise is available for their workplace. Although the Directive was issued in 1989, several observers say that it took the better part of a decade for member states to implement the Directive in national legislation and for businesses to comply; small workplaces are often still not in compliance [Walters, 2002]. The European Survey of Enterprises on New and Emerging Risks (ESENER) survey, conducted in 2009 among 30,000 European firms, inquired
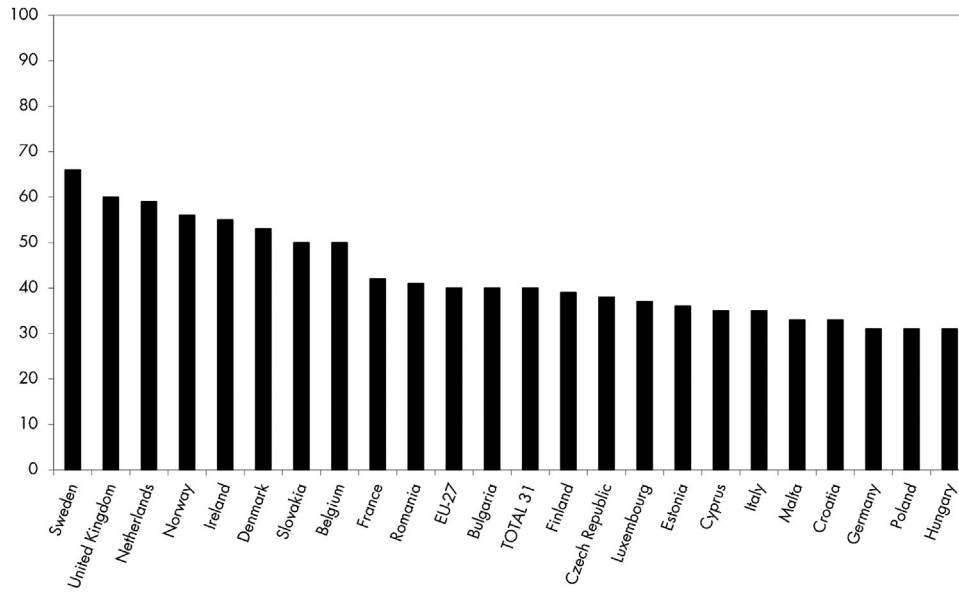
FIGURE 4. Percentage of establishments Reporting that safety issues were "regularly" raised in high-level management meetings [*Source*: ESAW, 2011].

about safety-related practices. We asked a panel of US safety directors and consultants to identify the questions in the ESENER survey that they thought would be most effective in capturing factors that distinguished good performers from poor performers. The panel pointed to the question on whether OSH issues were raised in high-level management meetings—regularly, occasionally, or never. Figure 4 shows the percentage in each country that answered "regularly." There is considerable variability in these answers and they generally show that countries with low fatality rates are more

likely to have high-level management attention to safety. The UK is second, after Sweden, in terms of managers' reports that they regularly raised health and safety issues at "high-level" meetings.

The panel also thought that preparing risks assessment within the firm, rather than contracting out their preparation to a consultant, was a sign of greater management attention to safety. Figure 5 from the ESENER survey suggests that firms in the UK appear to take the responsibility to prepare risks assessments particularly seriously. They are the second least
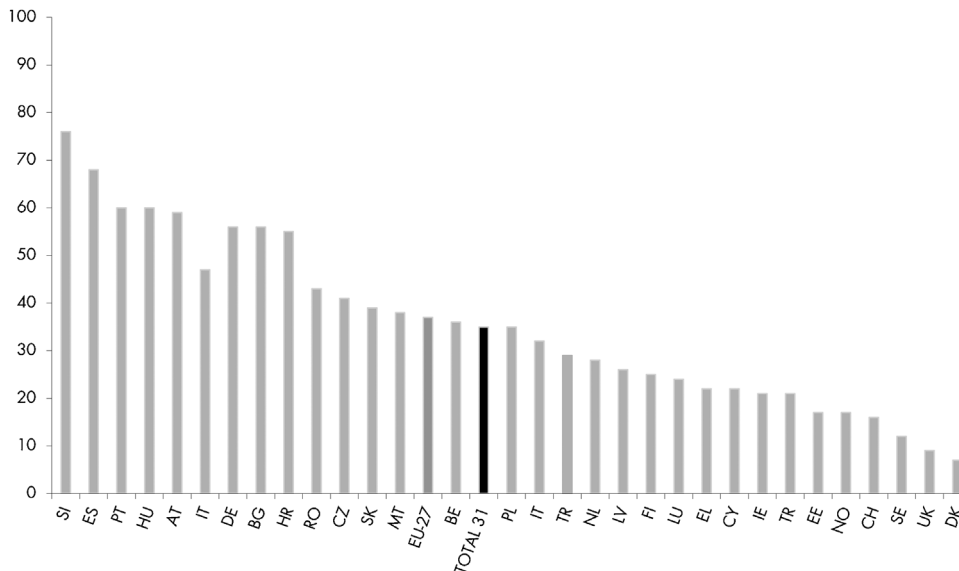
FIGURE 5. Percentage of managers who contracted out the preparation of the required risk assessment [*Source*: ESAW, 2011].

likely, after Denmark, to farm out the responsibility to a contractor.

INSIGHTS ABOUT UNDERREPORTING OF FATALITIES

As we noted, the EU data on fatalities is provided by each national government or insurance system and we are not aware of any intensive audits on the quality of fatality reporting. One indication that wariness is justified comes from looking at differences in reported fatalities by the size of establishment. In the EU as a whole as well as in the United States, fatality rates have been found to be highest for the smallest establishments and to decrease monotonically [European Commission, 2009, Table A1.5; Mendeloff et al., 2006]. The European data show that in 2005, for example, the death rate for the EU-15 (plus Norway) for all nine sectors was 4.5 per 100,000 for establishments with 1–9 employees, 4.0 for 10–49, 2.9 for 5–249, and 2.2 for those larger. Table III shows that this inverse pattern is found in Western Europe countries.[13] In Eastern Europe, however, the smaller establishments report substantially lower fatality rates than larger establishments do. One explanation for this finding could be that deaths at smaller establishments in those countries are considerably less likely to be reported and recorded than deaths occurring at larger establishments.[14] If true, then correcting for that underreporting would generate death rate estimates in Eastern Europe at small establishments 50–300% higher than those reported here.

One implication of this analysis is that relationships that we know about might be used to provide better estimates where data are unreliable, as they are in many less-developed countries. When, for example, we find deaths rates of 4 per 100,000 at small establishments and 10 per 100,000 at large ones, we can reasonably assume that the actual rate at small establishments is considerably higher than 10 per 100,000. Working on the maxim that "it is better to be roughly right than exactly wrong," the adjusted estimate is probably preferable to the one using the reported data. This conclusion assumes that the relative rates we find in developed economies are similar to those we would find in developing economies.

TABLE III. Standardized Fatality Rates by Establishment Size, by Country

	Fatality rate for establishments with 10–49 employees	Fatality rate for establishments with 50+
Ireland	2.3	0.2
Switzerland	3.5	1.5
France	3.1	1.8
Belgium	1.8	1.3
Germany	1.8	1.3
Sweden	1.5	1.1
Spain	7.0	5.2
Italy	3.3	2.9
Poland	3.8	3.8
Lithuania	7.0	9.0
Greece	1.8	2.5
Czech Rep	2.5	3.3
Hungary	1.9	2.7
Austria	0.9	1.4
Latvia	5.5	12.5
Estonia	2.7	6.8
Romania	2.9	8.2
Slovakia	1.5	4.4
Bulgaria	2.0	6.6

Source: Data from Eurostat provided to authors. The rates are the average rates for 2005–2007. Transport sector and road accidents excluded. No employment size data were available for the UK, the Netherlands, Denmark or Finland.

(1) These rates are standardized by multiplying the sector-specific rates in each country times the percentage share of each sector's employment in the European Union as a whole.

(2) Countries are listed from highest ratio to the lowest (fatalities per 100,000 employees).

DISCUSSION

Explanations for the reasons why the UK has substantially lower reported fatality rates than the US obviously need more attention. The objective of this paper was to suggest that the differences are large and that efforts to understand their causes could be very worthwhile. Our comparison of reported work injury deaths in the US and the UK indicates that workers are killed on the job at a much lower rate in the latter. The disparity is large—twofold in some sectors; more than fourfold in others. In construction, the sector with the largest number of deaths in the US, the disparity grew larger during the last decade—from a rate that was 50% higher to a rate almost four times as high. The size of these disparities is large enough that it merits more intensive scrutiny. If the US construction rate were as low as the UK rate, >300 deaths would be prevented each year.

Our findings suggest that the lower UK rates could have many different types of causes—differences in labor markets,

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[13] We omitted establishments in the category with fewer than 10 employees because we wanted to avoid possible uncertainty about whether workers were self-employed or were employees in a one person firm.

[14] A reviewer noted that the aging set of larger facilities from the era of Soviet Union domination might help to explain why the Eastern European countries differ in these ratios.

differences in culture, differences in compensation incentives, differences in standards, and differences in the methods used to inspect workplaces and enforce safety practices. If public policies account for a share of the difference, then these policies might be attractive candidates for adoption in the United States and other countries.

The comparison of rates in Eastern and Western Europe warns us that, although fatalities may be more reliably reported than less serious injuries, we still must be careful in assessing that data.

We did find that the number of hours worked and the changes in those hours, although they accounted for some of the UK advantage, played only a quite small role.

We also examined the definitions of the construction industry and changes in that definition, as well as methods of measuring employment, and found that they could not account for the differences we found between the two countries.

Limitations

We are not as confident about the accuracy of the fatality numbers in the UK as we are of those in the US. For comparisons of the UK rate for all industries with the US rate, we did not standardize for differences in sectoral employment or for changes in the employment share of those sectors over time. For comparisons within the construction sector, we did not examine any differences in the types of construction projects, which might have some effect on fatality rates.

One other limitation of this study to keep in mind is that it looks at only one outcome, the rate of traumatic fatalities, excluding deaths due to highway accidents and violence. Thus it ignores a host of issues—exposures to toxic chemicals and noise, many important non-fatal injury risks, and psychosocial issues, to name a few—that may be as important to an assessment of workplace risks as fatal injuries are. The chief defense for this narrow focus is that fatalities have the advantage of being relatively well-counted. It would be useful if we could assume that all of these measures were positively correlated with each other so that, if a country performed well on one measure, we could assume that it was good on others. Unfortunately, although this assumption is plausible, there is not much evidence that addresses it.

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