Emerging Labor Market Trends and Workplace Safety and Health

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Introduction

Emerging labor market trends will impact occupational safety and health (OSH). Certain labor market trends, such as the decline in goods-producing industries, affect safety and health outcomes in known ways, and their impact can be predicted. Other trends such as the use of contract workers and new workplace practices have the potential to affect not only rates of injury and illness but also OSH monitoring. This paper addresses the impact of labor market trends on OSH outcomes and surveillance.

The aging of the workforce will affect the types and severity of injuries and illnesses received. The growth in service-producing industries and the decline in traditional goods-producing industries also have implications for the composition and overall number of OSH cases. While the shift to service industries has been accompanied by a decline in the aggregate occupational injury and illness rate, some service industries have seen rate increases. The shift has also been accompanied by greater exposure to risk by some groups of workers, such as women, who have tended to work in safer jobs.

Beyond these basic worker characteristics, there are a host of other labor market trends that are likely to have an impact on workplace injuries, illnesses and fatalities which are not easily measurable. The Employment Services industry, which includes Temporary Help Services and Professional Employer Organizations, is predicted to be a large source of employment growth over the next decade. For workers in these industries and for contract workers more generally, the separation of where an employee works from who he is employed by can lead to confusion both in workplace practices intended to improve safety and health and also in OSH reporting. Similarly, employers with workers who work at home are not liable for maintaining the safety and health of those home worksites. Finally new workplace practices such as Total Quality Management have been introduced to improve quality but may also have unintended negative consequences for worker safety and health.

In the numerical analysis, this paper focuses on the impact on workplace safety of future changes in the age, gender, industrial and occupational composition of employment over the next decade. The paper also speculates about the impact of other labor market trends on future occupational injuries and illnesses. It is important to observe that there are factors outside of these labor market trends that have contributed to a large decline in injury and illness rates in the US since the early 1990s. Specifically, between 1992 and 2006 nonfatal rates dropped from 8.9 to 4.4 injuries and illnesses per 100 workers, while the number of occupational fatalities due to injury declined from 6,217 to 5,703. These declines are largely not the result of compositional changes, as they are evident even within many industries, occupations, age and gender categories. The declines are also mirrored in the data from other countries such as Canada, Finland, France and others (Ussif (2004)).

Research has been largely unable to explain these drops. Some commentators suggest that the declines might have resulted in part from technology (Ussif (2004)), stronger economic incentives for safety and legislative initiatives both brought about by higher workers' compensation costs (Conway and Svenson (1998); Boden and Ruser (2003)), the deregulation of workers' compensation insurance (Barkume and Ruser (2001)), and changes in OSHA recordkeeping rules (Welch et al. (2007)). Declines particularly in non-fatal injury and illness rates have continued up to 2006, suggesting that the trend will persist in the future. We acknowledge that our empirical analysis is focused solely on the impact of workforce composition changes and does not account for other largely-unmeasurable factors that have been contributing to workplace injury and illness declines. In a later section we do discuss some factors other than compositional changes that could affect workplace safety and health, such as the growth of contract and alternative forms of work, flexible work schedules and workplaces, and new workplace practices.

This paper is organized as follows. The following section discusses the OSH data at the BLS in detail, followed by a brief discussion of other data utilized in the analysis. The next section provides a univariate analysis of injury and illness rates by industry, occupation, age and gender. The following section builds upon this analysis by using a multivariate framework to examine the injury and illness data and then uses BLS projections data to predict future changes. Finally, a discussion of remaining issues and their impact on OSH outcomes and measurement is provided.

Data

The Bureau of Labor Statistics (BLS) conducts two data programs to track injuries, illnesses and fatalities that occur in US workplaces: the Survey of Occupational Injuries and Illnesses (SOII) and the Census of Fatal Occupational Injuries (CFOI). SOII produces estimates of nonfatal injuries and illnesses that employers record on the Occupational Safety and Health Administration's (OSHA) "Log of Work-Related Injuries and Illnesses." SOII annually collects employers' reports from about 176,000 private industry establishments and from state and local government establishments in some States. The survey excludes all work-related fatalities as well as nonfatal workplace injuries and illnesses to the self employed; to workers on farms with 10 or fewer employees; to private household workers; and, nationally, to federal, state, and local government workers.

Injuries and illnesses logged by employers conform to definitions and recordkeeping guidelines set by OSHA. Nonfatal cases are recordable if they are occupational illnesses or if they are occupational injuries which involve lost worktime, medical treatment other than first aid, restriction of work or motion, loss of consciousness, or transfer to another job. Employers keep counts of injuries separate from illnesses and also identify for each whether a case involved any days away from work or days of job transfer or restricted work, or both, beyond the day of injury or onset of illness.

Summary information on the number of injuries and illnesses is copied by these employers directly from their recordkeeping logs to the survey questionnaire. The questionnaire also asks for the number of employee hours worked (needed in the calculation of incidence rates) as well as average employment (needed to verify the unit's employment-size class).

Besides injury and illness counts, survey respondents are asked to provide additional information for a subset of the most serious nonfatal cases logged, namely, those that involved at least 1 day away from work, beyond the day of injury or onset of illness. Employers answer several questions about these cases, including the demographics of the worker disabled, the nature of the disabling condition, and the event and source producing that condition. Most employers use information from supplementary recordkeeping forms and State workers' compensation claims to fill out the SOII's "case form;" some, however, attach those forms when their narratives answer questions on the case form. Also, to minimize the burden of larger employers, sampled establishments projected to have large numbers of cases involving days away from work receive instructions on how to provide information only for a sample of those cases.

The Census of Fatal Occupational Injuries (CFOI) compiles a count of all fatal work injuries occurring in the U.S. in each calendar year. The program uses diverse State and Federal data sources to identify, verify, and profile fatal work injuries. Information about each workplace fatality (industry, occupation, and worker characteristics; equipment being used; and circumstances of the event) is obtained by cross-referencing source documents, such as death certificates, workers' compensation records, and reports to Federal and State agencies. This method assures counts are as complete and accurate as possible. For the 2005 data, over 20,000 unique source documents were reviewed as part of the data collection process. The scope of CFOI is broader than SOII, in that CFOI includes public sector workers and the self-employed.

Both the SOII and CFOI contain information about characteristics of the injury, illness or fatality. This includes the nature of the case, which describes its physical characteristics, such as a sprain or a fracture. The event or exposure, which describes the manner in which the injury or illness was inflicted, is also captured. An event might be a fall or contact with equipment, for example. Also captured are the body part affected and the source of the injury or illness. All four of these characteristics are coded according to the BLS Occupational Injury and Illness Classification System (OIICS).

SOII and CFOI provide estimates of the numbers of injuries, illnesses and fatalities incurred by workers with various attributes, such as occupation, age and gender. To better understand how the risk of workplace injury and illness varies among worker groups, it is helpful to control in some way for differences in the sizes of these groups. This is done in two ways in this paper: by calculating injury, illness and fatality rates and by including both injured and non-injured workers in logistic regressions. The injury and illness rates are simply the numbers of cases per standard unit of full-time-equivalent worker years (10,000 or 100,000 FTE in this paper).

Neither the SOII nor the CFOI collects data on the number of workers or hours worked according to worker characteristics, such as occupation, age or gender.[1] As a result, it is not possible with these data alone to calculate injury and illness rates or to control for different-sized groups of workers. For this paper, we rely on employment and hours worked estimates generated from the Current Population Survey (CPS). The (CPS) is a monthly survey of 60,000 households conducted by the Bureau of Census for the Bureau of Labor Statistics. It provides a comprehensive body of data on the labor force, employment, unemployment, and persons not in the labor force. The survey obtains information on the labor force status of each individual age 15 or older, including whether that person was employed in the preceding week, the class of the job (i.e. private wage and salary, self-employed), the industry and occupation of the worker's job and the actual hours worked. For one-fourth of the sample, actual hours worked is also obtained for a second job held by a worker.

In addition, the Annual Social and Economic (ASEC) Supplement to the Current Population Survey (CPS) is used for the multivariate analysis. The ASEC is a survey of 99,000 households conducted by the Bureau of Census for the Bureau of Labor Statistics.

[1] SOII does collect hours worked for all workers in each sampled establishment. With this data element, it is possible to calculate injury and illness rates by state, industry and establishment size.

In addition to providing the usual CPS data, the ASEC provides additional information on work experience, income, non cash benefits, and migration.

Finally, BLS employment projections data are used to measure changes in labor force characteristics that are relevant to injury and fatality rates. The projections data cover the period 2004-2014 and provide employment numbers for gender by age categories, and detailed occupation and industry. The data are estimated by first projecting an aggregate level of labor supply and demand, and then determining industry and occupation distributions. Details of the methodology can be found in Chapter 13 of the *BLS Handbook of Methods*.

These projections are used to estimate how changing mixes of worker characteristics will affect future injury rates. The predicted change in employment numbers by gender/age, occupation and industry at the level of detail used in the logistic regressions can be seen in Figure 1 through 3. The occupation and industry projections have been adjusted to match the universe of the SOII data as closely as possible. Public sector and agriculture employees were dropped from both the industry and occupation projections. In the industry projections, railroad workers were also excluded.[2]

Univariate description of projections and injury data

Industry and occupation trends

BLS projections indicate that industry and occupation employment growth from 2004 to 2014 will tend to be in jobs that have lower risk of workplace injury and illness than the average job, so that the aggregate rate of workplace injuries and illnesses should

[2] Although the projections data also has a separate category for wage and salary workers which would enable one to exclude the self-employed, there is not enough information available to exclude agriculture and the self-employed.

tend to decline. However, there are some instances of high growth in high injury and illness sectors, most notably health care.

From 2004 to 2014, employment growth will tend to be focused in the service-providing sector, including education, health care and social assistance, and professional and business services. Employment is projected to grow 17 percent over the decade in the service-providing sector, while declining by a tenth of a percent in the goods-producing sector. This trend in general implies overall safer working conditions, as workplace injury and illness rates tend to be lower in the service-providing sector. In 2005, the rate of workplace injuries and illness in the private industry goods-producing sector was 6.2 per 100 fulltime equivalent workers, while it was 4.1 in the service-providing sector.

Drilling down deeper, some of the fastest growing NAICS sectors also have relatively low workplace injury and illness rates, while some of the declining sectors have relatively high injury and illness rates. Educational services employment is projected to grow the fastest of any NAICS sector, at nearly 33 percent over the period from 2004 to 2014. This sector's private industry workplace injury and illness rate of 2.4 is about half the overall private sector rate of 4.6. In contrast, manufacturing, which accounts for 20 percent of workplace injuries and illnesses in private industry and an overall injury and illness rate of 6.3 (37 percent higher than the overall private industry rate) is projected to decline by over 5 percent from 2004 to 2014.

However, there are some significant instances where relatively high risk industries are also projected to have fast employment growth. This is particularly the case for the health care and social assistance sector, whose employment is projected to grow 30 percent over the decade, the second fastest of any sector. This sectors' private sector injury and illness rate was 5.9 per 100 fulltime equivalent workers, 28 percent higher than the overall private industry rate. Also noteworthy about this sector is that it tends to employ a large fraction of women, who sustain many of the industry's injuries and illnesses. In fact, in 2005, women sustained 80 percent of all injury and illness cases with days away from work in the private sector health care and social assistance sector, in comparison to 34 percent for all of private industry. The strong growth of this sector will imply that a growing fraction of women will be injured or become ill at the workplace.

BLS's projections for occupational growth tend to have the same implications for safety and health as the industry projections. Many of the fast growing occupations will be relatively safe white collar jobs, such as those in professional and related occupations, a large occupational group (20 percent of total employment) projected to grow 21 percent over the decade. However, growth will also be strong among service occupations, including building and grounds cleaning and maintenance and health care support occupations, some of which have higher injury and illness rates than the average job. In 2006, healthcare support occupations had the second highest rate of cases with days away from work among all occupational groups, at 279 per 10,000 workers or 2.2 times the rate for all workers. Building and grounds cleaning and maintenance occupations had the fourth highest rate of all occupational groups, at 244. Further, among occupations with at least 0.1 percent of employment, nursing aides, orderlies and attendants had the highest rate of cases with days away from work, at 526 per 100,000 workers or over 4 times the rate for all workers.

Age/Gender

Because the characteristics of workplace injuries, illnesses and fatalities vary for workers of different age, the aging of the workforce has implications for the future composition of these workplace outcomes. The SOII and CFOI data, coupled with CPS hours worked estimates, show some clear differences by age.

Figure 4 shows that nonfatal injury and illness rates tend to decline with age for men, but that they remain relatively constant for women starting from the 45-54 year old age category. Nonfatal rates drop about 8% for men between the 45-54 and 55-64 year old age groups, and about 6% between the 55-64 and 64+ age groups. While some of this difference probably reflects differences in the jobs performed by older and prime-aged men, it is also likely that this finding persists after controlling for job mix. In contrast to men, the injury and illness rate profiles is relatively flat for women 45 and older.

Results are strikingly different for fatalities. Figure 5 shows fatality rates for all workers by age category. This chart does not break out women separately, because women comprise only about 8% of all workplace fatalities and sustain few fatalities in the older age groups. The fatality rate rises with age, from 4.5 fatalities per 100,000 workers for 35-44 year olds, to 5.5 for 45-54 years olds, and 22.1 for workers over 64. This may reflect the fact that older (mainly male) workers are less likely to survive a severe workplace injury. Holding everything else constant, the sharp increase in fatality rates with age found in the data suggests that we would expect to see an increase in workplace deaths with the aging of the workforce.

Aging is also related to the types of nonfatal injuries and illnesses that occur. Table 1 shows how the natures of non-fatal cases with days away from work vary with age for men and women. For both genders, sprains and strains are by far the most frequent type of nonfatal case, overall about 41 percent of all cases in 2005. However, the percentage of cases accounted for by sprains shows an inverted-U shape with age for both men and women, peaking at the 35 to 44 year-old age category for both groups. For men, sprains decline from about 43 percent to 30 percent between the 35-44 and over 64 year-old age groups, while the decline is even more notable for women, from 48 to 32 percent.

The decline in sprains for older workers is in part made up by an increase in fractures. The percent of cases with days away from work accounted for by fractures tends to increase with age for both men and women, with a more noticeable increase for women. Whereas only about 4 percent of cases with days away from work are fractures for women age 25 to 34, that percentage rises to 14 percent for women workers age 55 to 64 and over 18 percent for women over age 64. This result is consistent with the increasing incidence of osteoporosis in older women. However, the increase is also apparent for men. Fractures account for 8 percent of all cases with days away from work for men aged 35 to 44. That percentage increases to nearly 11 percent among males aged 45 to 54 and 13 percent for men over 64. In sum, the cross-sectional evidence for sprains and fractures suggests that, everything else equal, we expect that the aging workforce will lead to a decline in sprains and a growth in fractures as a percent of all cases with days away from work.

The SOII data provide information about the event that resulted in a nonfatal injury or illness. Table 2 shows that the most frequent event category overall is bodily reaction and exertion, which includes those events that lead to sprains and strains.

Consistent with the declining importance of sprains and strains for older workers, bodily reaction and exertion becomes less important as an event leading to injury and illness for older workers. Instead, consistent with the age profiles for fractures, there is striking evidence of the growing importance of falls for older workers. For women age 45 to 54, 28 percent of injuries and illnesses resulted from falls. That percentage increases to 41.3 percent for women age 55 to 64 and 51.0 percent for women over 64. Similarly, while falls account for 19.3 percent of events for men age 45 to 54, that percentage rises to 35.5 for men over 64. These data suggest that the aging of the workforce will be accompanied by a growing frequency of fall-related workplace injuries and illnesses.

The data on non-fatal injuries and illnesses display another age-related pattern. The median days away from work increases almost monotonically with age from only 3 days for the youngest group of workers to 12 for workers 65 years or older (Figure 6). While the high median for older workers in part reflects a mix of injuries and illnesses weighted more heavily toward more severe categories, such as fractures, it is also the case that older workers remain out of work for longer periods of time for any given nature of injury or illness. For example, the median days away from work for a fracture for workers age 25 to 34 is 21, while it increases to 28 for workers 55 to 64. Similarly, the median days away from work for a sprain is 11 for workers 55 to 64, up from 7 days for workers in the 25 to 34 age category. What is apparent is that either older workers suffer more severe injuries and illnesses or that they take longer to recover for an equivalent condition. This finding is consistent with the higher fatality rate for older workers.

In sum, the aging of the workforce is likely to be accompanied by an increase in the fraction of longer duration and more severe injury and illness cases and by an increase in the rate of workplace death. These prognostications, of course, are based on cross-sectional comparisons that do not control for the different jobs that workers hold at different ages. A more rigorous multivariate analysis is pursued in the following section.

Multivariate analysis and implications of projections

Creation of data set for analysis

The multivariate analysis combines data from the SOII or CFOI with data from the CPS. By stacking these datasets, a universe of both injured and non-injured workers is obtained that contains information on age, gender, industry and occupation of all workers combined with detailed information on worker injuries and illnesses or fatalities from the SOII and CFOI respectively. The universe for the multivariate analysis for workplace injury and illness and for fatality projections was largely determined by the SOII data, namely no self-employed, private household workers, federal, state nor local government workers. While the SOII does have information on employees of farms with greater than 10 employees, all agriculture was excluded from the analysis as this restriction based on the number of employees at a farm could not be applied to the CPS data. Additionally, all employees of railroads were dropped from the analysis as information on gender is not available for this industry in the SOII data. From the CPS, all people over the age of 16 who worked in the previous year for a private firm were included. To maintain comparability between the nonfatal and fatal analyses, the scope of the CFOI was restricted to be the same as that of SOII.

In order to create a dataset incorporating the injury and illness data while maintaining the representativeness of the CPS, the weights need to be adjusted in the stacked data. There are many potential ways to adjust the stacked data to restore representativeness. The weighting scheme used here sums both the CPS and SOII weights for occupation by sex by age cells.[3] The CPS observations are then down-weighted by the SOII total for a given cell. The following equations detail the methodology.

$W_{O,S}^{SOII} = \sum_{O}\sum_{S} w_{O,S}^{SOII}$ Total of SOII weights for occupation O and sex/age S

$W_{O,S}^{CPS} = \sum_{O}\sum_{S} w_{O,S}^{CPS}$ Total of CPS weights for occupation O and sex/age S

$w_{O,S}^{new} = w_{O,S}^{CPS}(1-\frac{W_{O,S}^{SOII}}{W_{O,S}^{CPS}})$ New weight is down-weighted by SOII total for that cell.

The occupation by sex by age cells are defined in the same way that they are for the regressions as described below.

Because the CFOI is a census, there are no weights. In the stacked CFOI/CPS dataset, the CFOI observations are given a weight of 1 and the CPS observations are given their supplement weight. While in the stacked SOII/CPS data it was necessary to adjust the CPS weights to reflect the possibility that some CPS workers were injured, there is no overlap between the CPS and the fatalities data.

[3] An earlier version of this paper used an alternative weighting scheme in which workers in the CPS who received worker’s compensation were dropped and weights on the SOII observations were adjusted so that they maintained their proportional value but summed to the value of the dropped CPS observations. The results using this weighting scheme are qualitatively very similar to the results below.

Modeling

In order to determine the impact that changes in the labor force have on injury, illness and fatality numbers, a series of regressions were run on a set of employee characteristics common to the CPS, SOII, CFOI, and employment projections data. The characteristics of employees used to measure labor force changes are gender by age, occupation and industry. There are 22 gender by age categories, 22 two-digit occupations, and 16 major industries.[4] The advantage to this multivariate approach is that one can separately examine the impact of age, for example, while holding the industry and occupation mix constant. The multivariate approach would be impossible outside of the regression framework as the gender by age by occupation by industry cells required in a tabular analysis would quickly become too thin for any meaningful analysis. As is shown below, results projecting the impact of age on the injury and illness numbers are much lower when controlling for industry and occupation than those which do not control for them.

The primary dependent variable of interest, worker injury or illness, is a zero/one variable, therefore the regressions are estimated as logits. Beyond these top level equations, logistic regressions were also estimated by the most common natures and events causing injury or illness. These results highlight the fact that changing age, occupation and industry mixes have different impacts on different types of work-related conditions. In order to get a sense of the impact of changing labor force characteristics on the severity of cases, the number of days away from work was also used as a

[4] The gender by age categories are males 16-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, and 65 and over, and the same for females. The occupation and industry categories roughly follow two-digit SOC and NAICS codes respectively. NAICS 55 was not included in the analysis as it is underrepresented when the Census Industry codes on the CPS are converted to NAICS codes.

dependent variable in a ordinary least squares regression. Finally, a logistic regression was estimated for fatalities.

Following the initial estimation, the marginal effect of each independent variable was calculated for each equation. The marginal effect was then multiplied by the change in the share of employees represented by that category measured using the projections data. These results are then multiplied by the total level of employment in 2004 and represent the estimated change in the number of injuries and illnesses given a change in the distribution of employment holding the total labor force fixed. While the labor force is expected to grow by 17 million over the time period in question, the results abstract away from overall growth in order to focus on distributional changes.

Projections of injury, illness and fatality changes

Table 3 displays the marginal effects for a subset of the logistic regression results for nonfatal injuries and illnesses regressed on gender and age in the first column and gender, age, occupation and industry in the second column. These results highlight the importance of controlling for the full set of covariates when examining the impact of gender and age on injury and illness statistics. In the first column, men appear more likely to receive workplace injuries or illness than women in all age categories. In the second column, the difference in the coefficients between men and women are much smaller. In fact, older women are more likely to receive workplace injuries and illnesses than older men. The difference between the two columns is likely due to the different occupations and industries in which men and women work. Men are more likely to receive workplace injuries and illnesses because they work in occupations and industries with higher injury and illness rates.

Using the marginal effects from the regression in column 2, and multiplying by the change in the share of workers in each of the gender, age, occupation and industry categories given from the employment projections data, we find that changes in the gender and age composition of the labor force lead to an estimated drop in the number of injuries and illnesses by about 2000, holding the total labor force constant at the 2004 level. The estimated change due to occupation is a drop of 30,000 and the change due to industry is an increase of just over 100. The net total change is therefore a decrease of 32,000. This represents a small fraction of total employment but a larger fraction of injuries and illnesses, which numbered 1.2 million for this sample in 2005. Compared with the earlier univariate results, it is still true that older men are less likely to receive injuries and illnesses than their younger counterparts after age 30. The multivariate results, however, show an increase in the probability of injury or illness for men between the ages of 16 and 30 whether or not one controls for occupation and industry. Differences between the univariate and regression results for younger workers are likely due to the lack of adjustment for hours in the regression analysis. An hours adjustment is not possible in the regression analysis due to the lack of information on the hours for injured or ill workers in the SOII.

While gender and age are important in predicting the probability of injury and illnesses, there are competing forces which cancel each other out leading to a small net change. Partially, this is due to an increase in both younger and older workers in the labor force. In addition, as is shown below, gender and age changes have different effects on different types of injuries and illnesses. The drop due to changes in occupations is due to a drop in the share of workers in production occupations --who have a high injury and illness rate--partially offset by a modest increase in the number of injuries and illnesses to healthcare support workers. Industry is not a powerful predictor of injury or illness. However, underlying the nearly zero net change is a modest increase in injuries and illnesses in the Health Care and Social Assistance industry offset by small decreases in Manufacturing, Wholesale and Retail trade.

The affect of the changing labor force varies when looking at different injury and illness types separately. Figure 7 shows the top seven nature of injury and illness categories plus an additional all other category to capture the remaining conditions. As can be seen in the figure, one category, sprains, strains and tears, accounts for over 40% of all cases, followed by bruises, cuts, fractures, pain including back pain, illness, multiple injuries, and other. A logistic regression was run separately for each nature of injury or illness, the marginal effects calculated, and then the projections applied in order to compute the results shown in Figure 8.

The changing gender and age make up of the labor force has limited impact on the different natures except in sprains, where there is a large decrease, and fractures and multiple injuries, where there are large increases. The increase in fractures and multiple injuries is due to the predicted increase in the age of the labor force and particularly the increased share of the labor force represented by older women.   Changes in the occupation distribution uniformly lead to lower numbers of injuries and illnesses regardless of the nature. The impact of the changes in industry is limited with an exception of the increase in the number of pain injuries which is due to an increased share in the Health Care and Social Assistance industry.

Age, gender, industry and occupation changes also affect injury and illness rates differently depending on the event that caused the condition. Figure 9 shows the five most common events leading to injury and illness with an additional all other category capturing the remaining injuries. The distribution of events is less skewed than the nature of injury or illness distribution shown above. Bodily reaction and exertion is the most common event followed by contact with objects and equipment, falls, transportation accidents, and exposure to harmful substances or environments.

The results of applying the projections to the marginal effects estimated from a logistic regression on each of the event categories is displayed in Figure 10. The decrease in cases resulting from bodily reaction and exertion is due to an almost equal drop in cases correlated with occupation and gender and age differences. The projected decrease in the share of production occupations explains the occupation component, while a fall in the share of middle aged workers explains the drop in the sex and age component. Similarly the fall in contact related cases is also due to the drop in production occupations. The increase in cases resulting from falls is due primarily to the increase in the share of older women in the labor force, but also due to aging more generally. Age, gender, industry and occupation are not strong predictors of cases due to exposure, transportation accidents, or other events.

While the above calculations focus on determining the impact of the changing labor force on workplace injuries and illnesses by projecting changes in the number of cases, an alternative is to determine the impact on the number of days away from work. As mentioned above, older workers are associated with longer injury and illness durations. However, in the projections data, while the share of older workers increases, the share of middle aged workers decreases. Both of these groups have higher than average durations, so the net increase in the number of days away from work due to gender and age changes is small at 0.3 days. While this projected change might seem small in light of the earlier figure 6 showing the median duration by age, these results additionally control for occupation and industry, further minimizing the role of age and gender. Occupation changes have little effect on the projected days away from work, with a decrease of .01 days. However, industry has more explanatory power with a projected decrease in days away from work of 0.2 days.

A separate regression was run to determine the impact of changes in the labor force on workplace fatalities. As mentioned above fatalities occur predominately among men, and more so among older workers. Due to the limited number of workplace fatalities among women, the age categories were not separated by gender. Table 4 reports the marginal effects from the logistic regression of fatalities on age in column 1 and fatalities on age, occupation, and industry in column 2. Including occupation and industry dummies mitigates the impact of age on fatalities, but only by a small amount.

After calculating the marginal effects and multiplying by the change in the share for each characteristic as given by the projections data, the net effect of labor force changes on workplace fatalities is a drop of 7 fatalities on a base of 3700 fatalities in the restricted scope 2005 data. Changes in the gender and age make up of the labor force lead to a predicted increase of 62 fatalities, while occupation changes lead to a decrease of 74 fatalities and industry changes lead to an increase of 5 fatalities.

The fatality projections based on gender and age merit some comment. While fatality rates do rise steeply with age, the modest predicted increase of 62 fatalities with the aging of the workforce stems from an offset. There is an increase in the share of workers older than 50; but there is also a decline in the share of workers age 35 to 50. This latter decline leads to a drop in fatalities that offsets the increase in fatalities from the growth of the share of workers age 50 plus.

Other Issues

The preceding sections of this paper have focused on the impact that changes in the age, gender, occupational and industrial mix of the labor force may have on injury and illness statistics. The focus on these attributes of workers is in part due to the known relationships between these characteristics and the probability of injury and illness, but also because they are easily measurable in the SOII, CFOI and complementary datasets which enable calculation of incidence rates. Beyond these basic worker characteristics, there are a host of other labor market trends that are likely to have an impact on workplace injuries, illnesses and fatalities which are not easily measurable. A sampling of these trends, their likely impact on injury, illness and fatality data, and the measurement issues involved are discussed below.

The Growth of Contract and Alternative Forms of Work

The Bureau of Labor Statistics projects that several industries providing contract workers will be among the fastest growing from 2004 to 2014. During that time period, BLS projects that the Employment Services industry will be the second largest source of employment growth in the economy, adding nearly 1.6 million jobs and rising to 5.1 million employees by 2014. [Berman (2005)] This industry includes the Temporary Help Services and Professional Employer Organizations industries.[5] BLS also projects

[5] Establishments in the temporary help services industry supply workers to host businesses for limited periods of time. The temporary help workers remain employees of the temporary help establishments,

that the Facilities Support Services industry will be the sixth fastest growing industry, though the number of jobs added is only 54 thousand.

These industries and others provide a wide variety of employees to the host businesses. Many of these employees are in relatively safe white collar occupations. However, other workers provided from these industries perform hazardous work and their numbers are projected to grow. For instance, material moving workers comprise over one-fifth of the Employment Services industry and that occupation is projected to add 236,000 jobs during between 2004 and 2014. Labor and freight, stock and material movers have a high rate of workplace injuries and illnesses at 3.6 times the rate for all private industry workers. (USDL Release 07-1741) Other contract workers work in hazard jobs such as cleaning the insides of petroleum containers.

Critics of the use of temporary and contract workers contend that they are being used in order for the host to circumvent the high costs (especially workers' compensation insurance) associated with certain forms of risky work. Further, they contend that temporary and contract workers may be at increased risk as they are less likely to recognize hazards or to be familiar with the temporary workplace. [NIOSH 2002] Conversely, some contract workers may be particularly knowledgeable about the job risks that they face, as they perform specialized tasks frequently.

The growing use of contract and other forms of alternative labor creates problems both for workplace safety and health outcomes and surveillance owing to uncertainties about supervisory roles. Safety and health may be compromised to the extent that contract workers are supervised by the supplying company, whose supervisors are not

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though these establishments do not provide direct supervision. Employee leasing establishments, part of the professional employer organization industry, acquire and lease back employees of their clients and serve as the employer of the leased employees.

familiar with the risks of a temporary worksite. Job safety may be compromised even when workers are supervised by an employee of the host, as that supervisor may not be familiar with the skills of the temporary and contract workers under his supervision. However, as a report from the National Institute for Occupational Safety and Health notes (NIOSH 2002), empirical studies of the impact of contract and other forms of alternative work are scarce, so the impact of these new forms of work is not clear.

What is clearer is that the growth of contract work renders more difficult the task of measuring workplace safety and health. The two workplace safety and health programs of the Bureau of Labor Statistics treat contract workers somewhat differently. In either case, however, it is difficult to relate contract workers to the worksites where they work and, hence, to get a clear picture of the safety and health of these worksites.

The Survey of Occupational Injuries and Illnesses (SOII), which tracks nonfatal cases, obtains its information from logs and supplementary records that employers maintain according to regulations of the Occupational Safety and Health Administration (OSHA). OSHA rules state that records for contract employees are to be maintained by the employer who supervises the employee, in many cases the contracting company. Specifically, regulations require a host employer to record an OSHA-recordable injury or illness of contract workers who are supervised on a day-to-day basis, even when such employees are not carried on the employer's payroll. The regulations spell out that "day-to-day" supervision occurs when "in addition to specifying the output, product, or result to be accomplished by the person's work, the employer supervises the details, means, methods and processes by which the work is to be accomplished." (29 CFR 1904.31)

In many cases, the host employer does not provide the supervision described in the regulations. Instead that supervision is provided by the contracting company. In that case, data on contract employees do not provide information about the safety records of particular job sites. Instead, contracting industry data provide information about the safety records of all job sites and host industries at which the contractors work. In addition, contracting industry data provide information not only about contractors, but also about other employees of the contracting industry who are not contractors.

The issue of supervision may create some ambiguity about who has the recordkeeping role. While we have no empirical evidence, it is conceivable that some contractor injuries may go unrecorded on OSHA logs due to this ambiguity.

The Survey of Occupational Injuries and Illnesses has another limitation when it comes to contract workers. The scope of SOII is limited to private industry and state and local government in some states. Among other groups, SOII excludes the self-employed. Many of these workers are contractors and thus, their safety experience is not captured in SOII.

The Census of Fatal Occupational Injuries (CFOI) approaches the collection of workplace fatality data in a different manner than SOII and also treats contractors differently. CFOI obtains information about workplace injury fatalities from multiple source documents, including death certificates, workers' compensation reports, OSHA fatality investigations, police reports and even the press. CFOI data compilers collate the information to rule out duplication and to identify unique fatalities that are work-related and due to traumatic occupational injury.

In CFOI, contract workers are reported as being in the industry that employs them. Typically, that means the industry of the company that actually pays that employee, i.e., the contracting company. Therefore, it would be rare for a contract employee to be identified in the industry of the host company. Consequently, like the SOII, CFOI does not provide data about specific worksites or about the industry of the worksites where contract workers work. Instead, CFOI data for the contracting industries provide estimates of the job risk at all the worksites and industries where contractors in a particular contracting industry work.

The practice of assigning contracting employees to the employing industry has received attention from time to time. For example, the 2005 CFOI includes the fatalities from the BP refinery plant explosion in Texas City. CFOI does not show these fatalities in the refining industry, but rather in the construction, engineering and wholesale electrical equipment industries.

The practice of assigning decedents to the contracting industry does have the shortcoming of not providing site-specific fatality data. However, it does have the benefit of allowing the fatality counts to be aligned with employment data which is based on employing industry. In this way, it is possible to calculate fatality rates.

It is important to note that, at the present time, CFOI does not identify whether or not a particular decedent was a contract worker. In some cases, it may be able to determine this from the source documents. For example, OSHA fatality investigation reports will identify contractors. However, many workplace fatalities are not identified from OSHA fatality reports and the other source documents may not provide the needed information to determine whether a particular worker is a contract worker. It may be that the best way to study the issue of contract worker fatalities is by means of a specific follow-back of fatality cases that focuses on whether or not the worker was a contract worker.

Unlike SOII, the scope of CFOI does include the self-employed. Thus, CFOI will include the deaths of those self-employed workers who are contractors.

Alternative workplaces and flexiplace

Access to technology complementary to telework has increased dramatically since the 1990s, while at the same time the costs of both the equipment and communications have fallen. These factors have enabled a greater number of workers to telework due to both the increased communications access and the number of jobs suitable for telework. BLS data show that the number of workers who usually did some work from home as part of their primary job increased through the 1990s, from 19.9 million in 1991 to 21.4 million in 1997. However, this number has since leveled off, with 20.7 million workers doing work from home in 2004, the most recent data available. While the overall numbers of telecommuters may not yet reflect these changes in the underlying economy, the number of potential telecommuters has undoubtedly been increasing.

Like alternative employment relationships, teleworking and alternative workplaces weaken employer monitoring of the OSH environment, potentially increasing injuries and illnesses. Alternative workplaces may also increase the challenge of properly measuring both injuries and illnesses and worker exposure to risk. According to OSHA rules (Directive number CPL 2-0.125), OSHA will not conduct inspections of employees' home offices nor will they hold employers liable for employees' home offices.

However, employers who are required to keep OSHA logs are required to keep records of injuries and illnesses which occur in a home office.

Alternative work schedules, long and intermittent shifts, flexitime

Alternative work schedules, including shift work and compressed work schedules, result in work at irregular times, more intermittency of work, and longer periods of work. All of these may affect work rhythms and fatigue, increasing injuries. Night work may be associated with riskier working environments, due to poor lighting and crime. Research on the impact of work hours on the probability of injury consistently find that the hour of work matters. Pergamit (2005) uses the NLSY to run logistic regressions of injury on a series of dummies describing a worker's schedule including the shift and hours worked. He finds that workers who work non-day shifts have a 22-27% higher likelihood of injury.[6] Forston (2004) using Texas Worker's Compensation and a different approach finds that inherent features of night work that cannot be explained by age, occupation, industry or fatigue lead to higher injury rates.

The percentage of workers with flexible worker hours has been increasing from the mid 1980s while the percentage of workers working non-day shifts has been decreasing.[7] Both of these changes are likely closely related to changes in the mix of occupations and industries prevalent in the labor market. Professional services are more likely to offer flexible schedules and have become a larger part of the labor market. Conversely, the mining and manufacturing industries are more likely to have night shifts and are shrinking industries. However, there are also labor market trends working in the opposite direction. Healthcare workers are more likely to have alternative shifts than

[6] Non-day shifts include evening shifts, night shifts, rotating and split shifts, and irregular work schedules.
[7] See "Workers on Flexible and Shift Schedules in 2004" BLS Economic News Summary.

other workers and are a growing part of the labor market. While shifts in industry and occupation shares may explain the changes in the proportion of the labor force working different work schedules, research has shown that the higher rate of injury in non day-shifts cannot be explained by industry and occupation alone. That is, there are factors inherent in non-day shifts that increase workplace injury and illness risk.

Further research on the impact of different shifts may be possible, as the BLS Survey of Occupational Injuries and Illnesses now captures information about the day and time of injury or illness and the hours on the shift before onset. These data may be combined with information from the American Time Use Survey.

New workplace practices.

The past two decades have witnessed the adoption of a variety of new workplace practices that involve quality and process management initiatives. These initiatives have been given a variety of names, such as high performance and high involvement work systems, flexible workplaces, total quality management and lean production. They involve a number of practices, including shifting decision making downward to teams of workers, job rotation, process simplification to eliminate wasted time and motion, just-in-time methods and a continuing emphasis on quality. (NIOSH 2002)

In principle, involving workers in decision making and focusing on process should have beneficial effects on worker safety and health. Workers can identify sources of job risk and work to reduce or eliminate these. Further, job rotation can be used to change the tasks of workers suffering from repeated trauma disorders. Critics, however, contend that quality and process initiatives reduce worker autonomy and control and that the productivity gains obtained through the initiatives come from a speedup and intensification of work. These critics also contend that job rotation moves workers to new tasks for which they are not well trained. The result is worsened worker safety and health, particularly in the form of increased incidence of cumulative trauma disorders and stress. (Fairris, Brenner, and Ruser (2004))

Initial research on this topic was in the form of case studies largely in the automotive industry. Among the limited cross-industry empirical work, Fairris and Brenner (2001) match industry-level measures of cumulative trauma disorders (CTDs) from SOII to a separate survey of workplace practices conducted by Osterman. They find the use of quality circles (but no other workplace practice) was positively associated with CTDs.

Research by Brenner, Fairris and Ruser (2004) extends the work of Fairris and Brenner using establishment-level data on workplace transformations (e.g., quality circles, work teams and just-in-time production) matched to measures of cumulative trauma disorders (CTDs) at the same establishments. The data on workplace transformations was obtained from the 1993 Survey of Employer Provided Training, while the data on CTDS came from the 1993 Survey of Occupational Injuries and Illnesses. The research found that just-in-time approaches to production and quality circles are both positively and statistically significantly associated with rates of cumulative trauma disorders across establishments. Further, the quantitative impact on CTDs of these two workplace practices was sizeable, ranging from 20 to 65 percent of the mean CTD rate, depending on sample and estimating specification.

Finally, related interesting work by Askenazy and Caroli (2006) uses data for French workers. They find that the use of quality norms and job rotation is associated with greater mental strain and more occupational injuries; though, while the probability of a “benign” injury is 25 to 40 percent higher for workers involved in these two practices, the effect on serious injuries is never statistically significant. Further, the impact of “regular collective discussion on work organization” seems to be associated with higher occupational risks. Askenazy and Caroli hypothesize that this positive relationship may stem from endogeneity—discussions are more likely when there are more safety problems. They do note, however, that their results suggest that these discussions do not result in a safer workplace.

The evidence presented above suggests that new workplace practices may result in more occupational injuries, CTDs, and job stress. However, it must be noted that the body of literature on this topic is not extensive. Indeed, the National Institute for Occupation Safety and Health (NIOSH) states that additional research is needed to determine whether these workplace practices have a beneficial or detrimental impact of worker safety and health. NIOSH further notes that since “these workplace systems are seldom implemented in a standardized fashion, their effects on worker safety and health may depend on their specific characteristics and the implementation process.” (NIOSH 2002) Further study will also require better measurement of the incidence of these workplace practices, as the US has only an ad hoc series of surveys that lack common definitions (Handel and Levine (2006)) and these surveys are now somewhat dated.

Conclusions

Using existing workplace safety and health data and BLS projections, we are able to assess the impact of certain labor market trends on workplace safety and health.

Specifically, we are able to assess the impact of changes from 2004 to 2014 in the labor force distributions by age, gender, industry and occupation.

The analysis suggests that labor force shifts between 2004 and 2014 will have perceptible impacts on the frequency and distribution of workplace injuries and illnesses. Aging of the workforce (and gender shifts) will result in an increase in more severe injuries, such as fractures and fatalities, while falls will become a more frequent event associated with workplace injury. The median duration of an injury or illness will also rise slightly. Decreases in the number of production workers will likely lead to decreases in the number of injured and ill. However, the growing number of jobs in healthcare will work to increase the number of injured and ill, particularly among women.

The data generally do not permit us to estimate the impact of other important labor force trends, such as the growth in contract labor, alternative forms of work, alternative workplaces and hours, and new workplaces. However, the literature provides hypothetical effects and sometimes empirical evidence that we have summarized in the paper. In general, the effect of these various trends on workplace safety and health is ambiguous, though the cited literature seems to suggest that new workplace practices (such as just-in-time inventories, quality circles and possibly job rotation) are associated with more job stress, cumulative trauma disorders and occupational injuries.

Beyond impacting workplace safety and health outcomes, emerging labor market trends also affect the ability to monitor workplace safety and health. One important area is the growing use of contract labor. The current BLS occupational safety and health surveillance systems for nonfatal workplace injuries and illnesses and for workplace fatal injuries do not permit the estimation of injury, illness and fatality rates according to the location of work performed. Thus, with these surveillance systems, we are not able to measure the job risks at the worksites of employers hosting contract workers. Monitoring and measuring safety and health also becomes more difficult as more work is performed at alternative worksite, such as at home.

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Figure 1

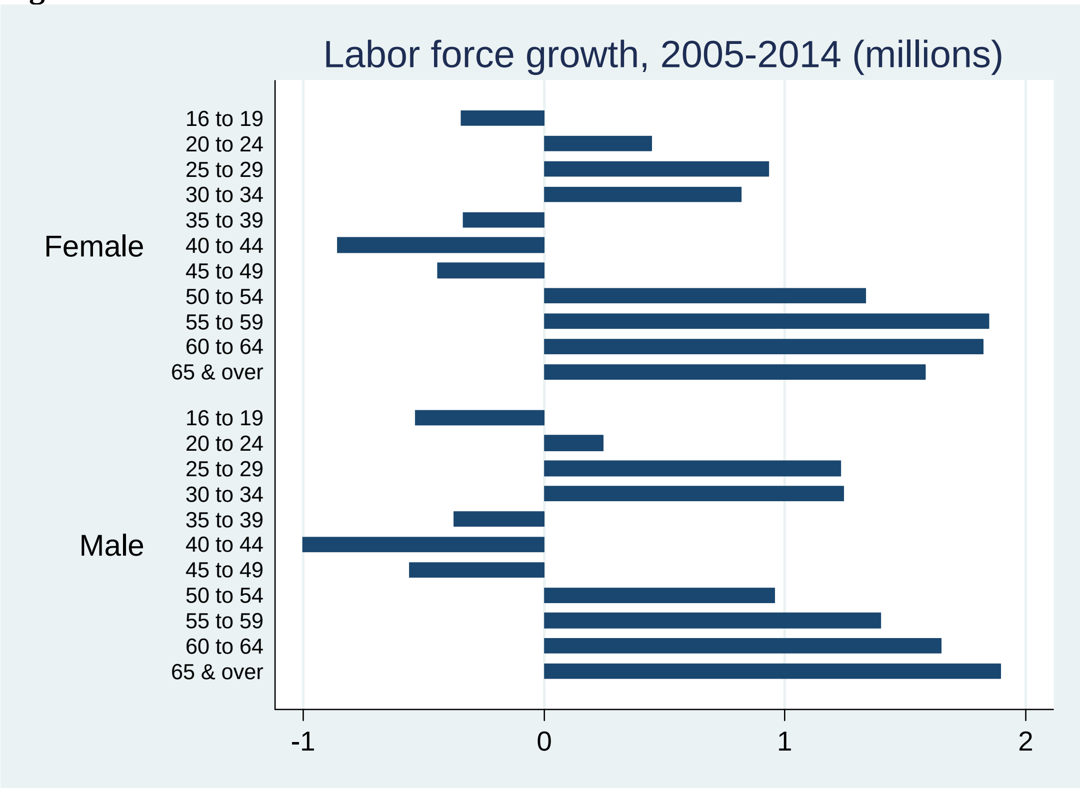


Figure 2

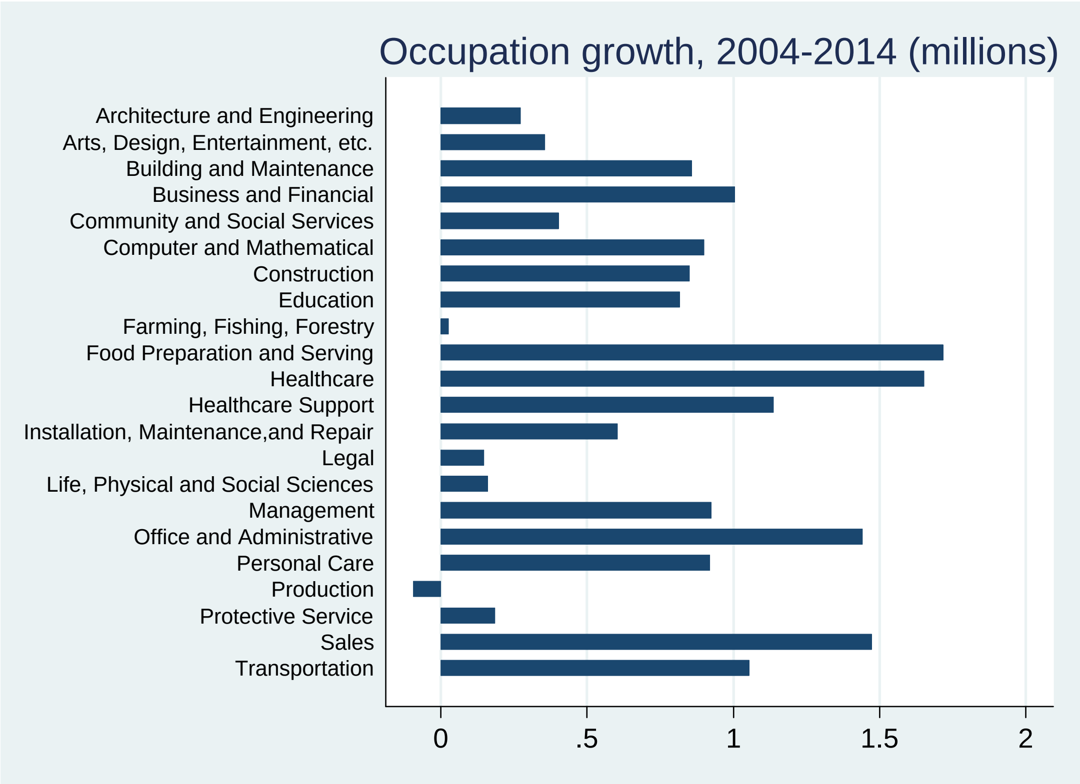


Figure 3

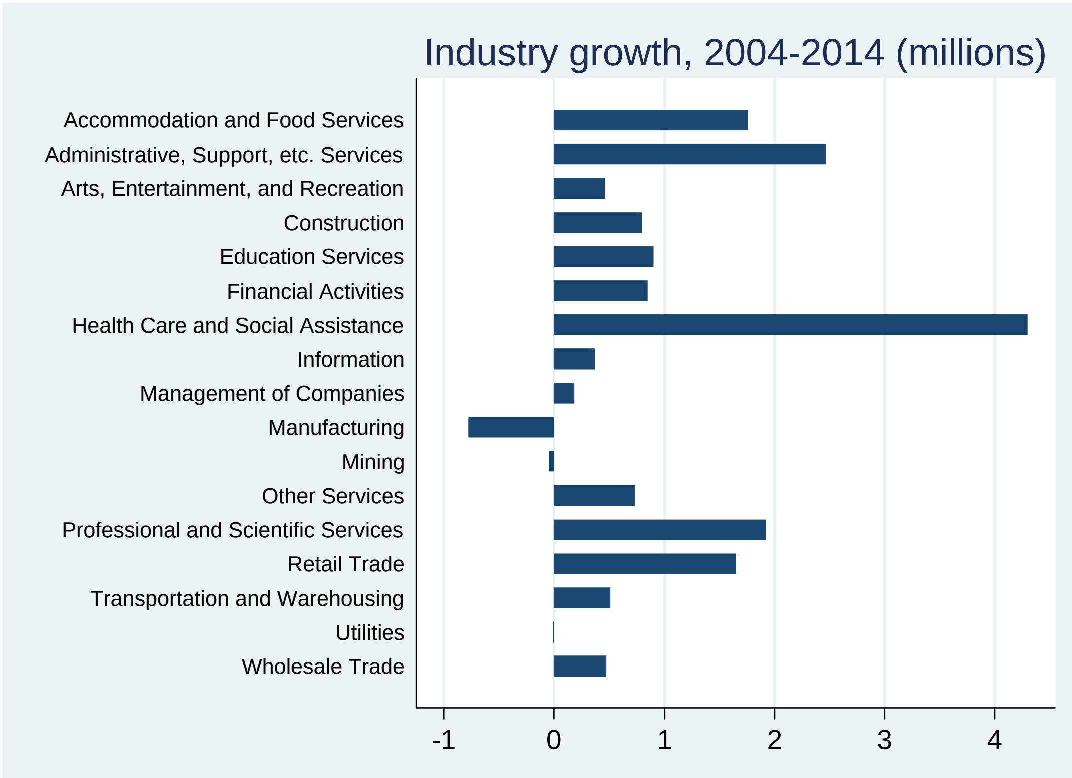
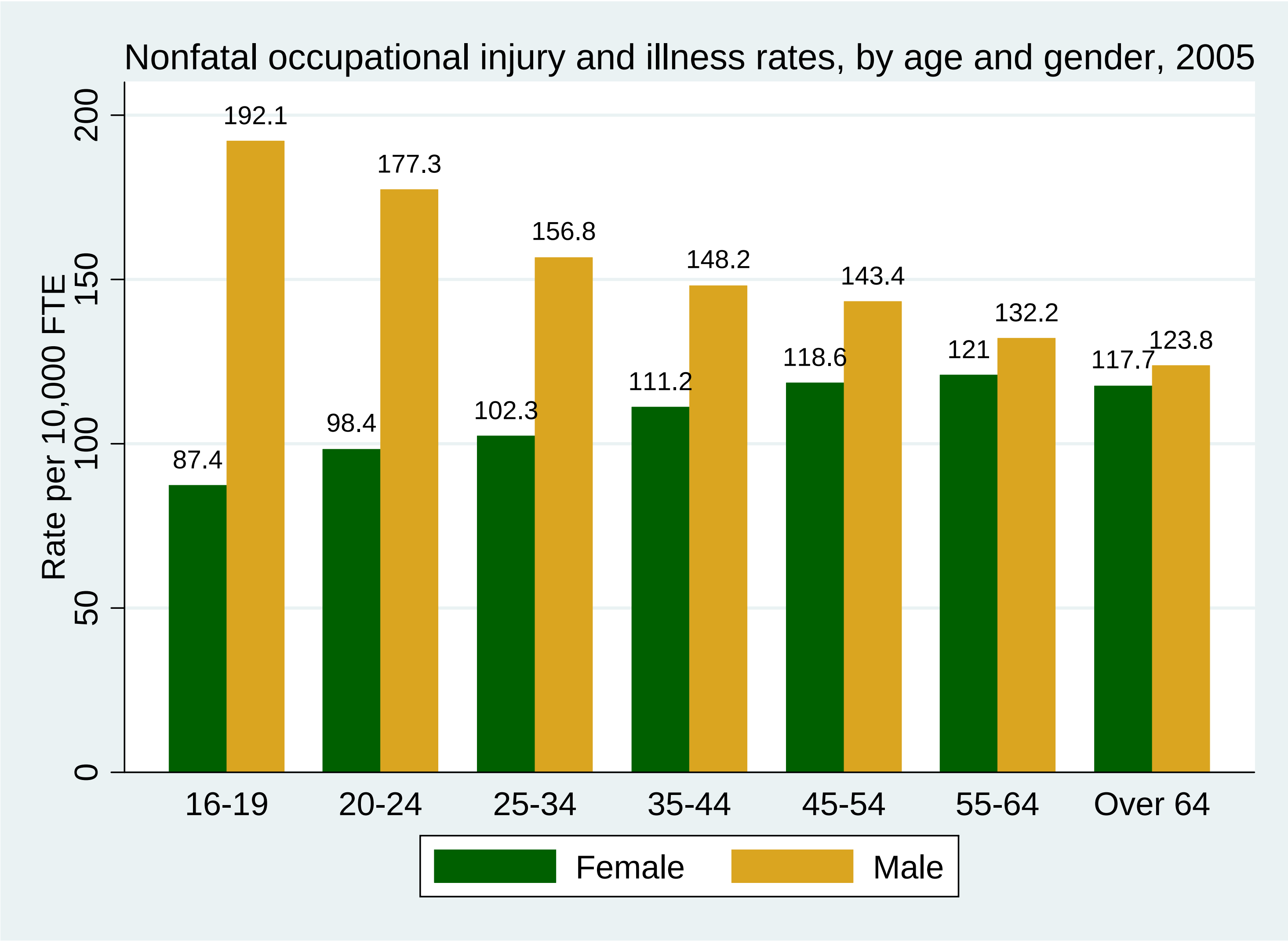
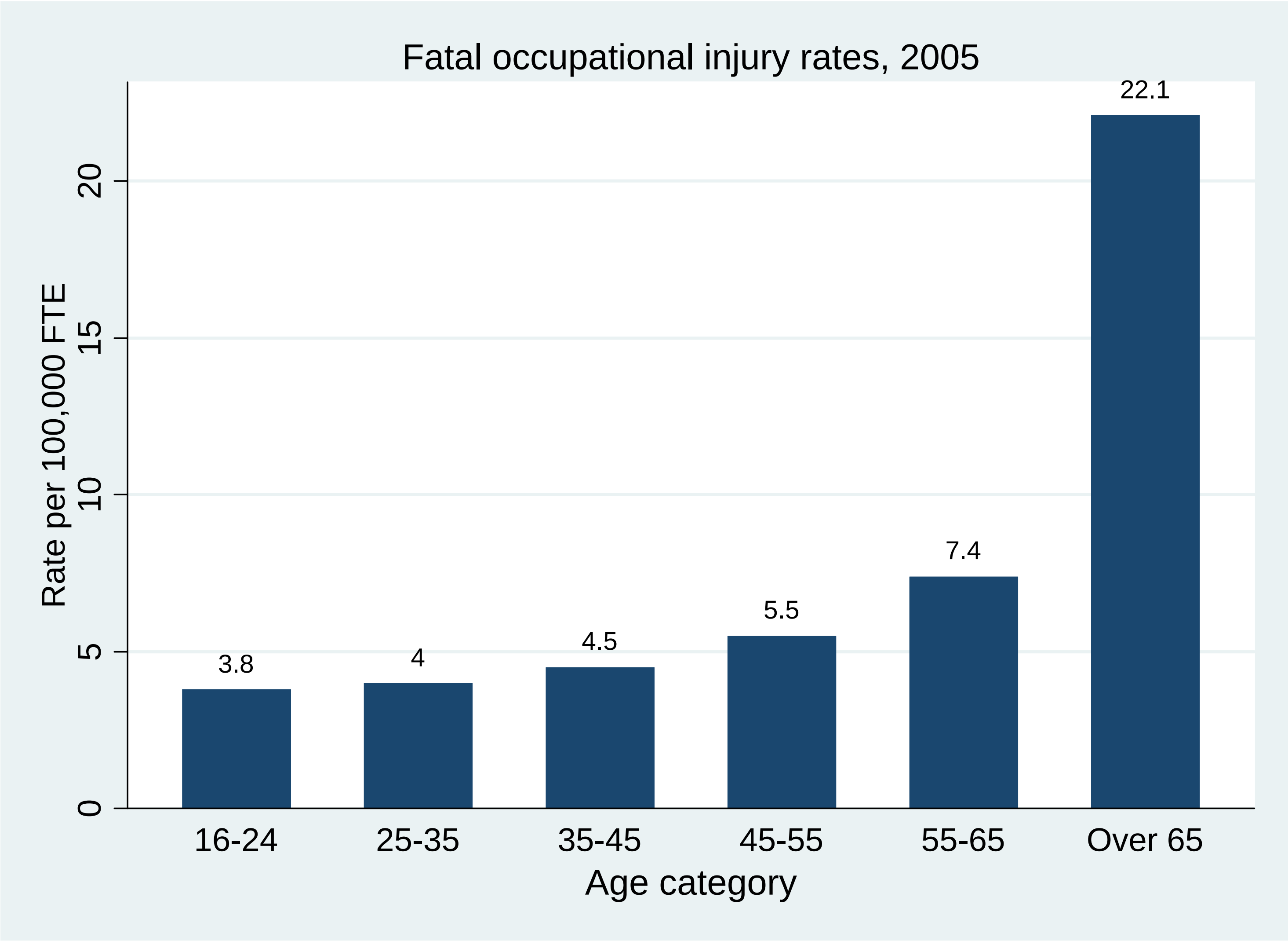

Industry growth, 2004-2014 (millions)
Accommodation and Food Services
Administrative, Support, etc. Services
Arts, Entertainment, and Recreation
Construction
Education Services
Financial Activities
Health Care and Social Assistance
Information
Management of Companies
Manufacturing
Mining
Other Services
Professional and Scientific Services
Retail Trade
Transportation and Warehousing
Utilities
Wholesale Trade
-1
0
1
2
3
4

Figure 4



Nonfatal occupational injury and illness rates, by age and gender, 2005
Rate per 10,000 FTE
0
50
100
150
200
192.1
177.3
156.8
148.2
143.4
132.2
123.8
87.4
98.4
102.3
111.2
118.6
121
117.7
16-19
20-24
25-34
35-44
45-54
55-64
Over 64
Female
Male

Figure 5



Fatal occupational injury rates, 2005
Rate per 100,000 FTE
0
5
10
15
20
3.8
4
4.5
5.5
7.4
22.1
16-24
25-35
35-45
45-55
55-65
Over 65
Age category

Table 1

Distribution of occupational injuries and illnesses by nature, gender and age, 2005

Men	All ages	16 to 19	20 to 24	25 to 34	35 to 44	45 to 54	55 to 64	Over 64
Total	814250	29550	93610	203510	207320	175250	81170	16180
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Sprains	39.3%	24.5%	33.4%	40.4%	42.7%	41.0%	39.4%	30.3%
Bruises	7.9%	12.5%	8.7%	8.1%	7.1%	7.3%	7.5%	11.6%
Cuts	10.0%	20.9%	16.1%	11.2%	8.2%	6.9%	7.7%	8.8%
Fractures	8.4%	6.4%	7.2%	8.1%	7.8%	9.0%	10.6%	12.5%
Pain	7.6%	5.3%	6.8%	6.9%	8.2%	8.2%	8.8%	7.2%
All other	26.7%	30.5%	27.8%	25.3%	26.1%	27.6%	26.0%	29.7%

Women	All ages	16 to 19	20 to 24	25 to 34	35 to 44	45 to 54	55 to 64	Over 64
Total	415880	11970	39990	86200	103540	105800	53410	10860
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Sprains	43.5%	44.0%	41.4%	45.0%	47.8%	43.5%	37.0%	31.8%
Bruises	10.3%	13.3%	10.7%	9.8%	9.1%	10.8%	11.1%	12.4%
Cuts	4.8%	9.5%	7.4%	5.0%	4.1%	4.3%	3.9%	5.6%
Fractures	6.6%	4.0%	4.1%	3.8%	4.8%	6.9%	14.2%	18.8%
Pain	9.3%	7.9%	9.4%	10.7%	9.2%	8.7%	9.0%	1.7%
All other	25.5%	21.2%	27.0%	25.7%	25.0%	25.9%	24.7%	29.7%

Table 2

Distribution of occupational injuries and illnesses by event, gender and age, 2005

Men	All ages	16 to 19	20 to 24	25 to 34	35 to 44	45 to 54	55 to 64	Over 64
Total number	814250	29550	93610	203510	207320	175250	81170	16180
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Contact with objects and equipment	31.8%	49.9%	43.3%	34.5%	28.0%	27.6%	26.2%	22.9%
Falls	17.8%	12.5%	14.0%	15.1%	17.9%	19.3%	23.7%	35.5%
Bodily reaction and exertion	38.4%	21.3%	29.8%	38.5%	41.8%	42.6%	39.4%	28.0%
Exposure to harmful substances or environments	4.0%	7.5%	5.3%	4.3%	3.7%	3.6%	2.7%	3.1%
Transportation accidents	5.4%	3.8%	5.1%	5.1%	6.3%	4.6%	5.8%	8.9%
All other	2.5%	5.0%	2.4%	2.6%	2.3%	2.3%	2.2%	1.3%

Women	All ages	16 to 19	20 to 24	25 to 34	35 to 44	45 to 54	55 to 64	Over 64
Total number	415880	11970	39990	86200	103540	105800	53410	10860
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Contact with objects and equipment	18.8%	29.5%	24.4%	20.7%	17.5%	17.6%	14.7%	17.5%
Falls	26.5%	23.1%	21.3%	20.7%	22.2%	28.0%	41.3%	51.0%
Bodily reaction and exertion	42.3%	34.5%	38.1%	42.7%	48.0%	44.5%	34.3%	25.8%
Exposure to harmful substances or environments	4.5%	8.7%	6.8%	5.9%	4.0%	3.7%	2.6%	2.1%
Transportation accidents	4.1%	1.6%	4.7%	5.5%	4.5%	3.1%	3.4%	2.7%
All other	3.8%	2.5%	4.8%	4.5%	3.7%	3.2%	3.6%	0.9%

Figure 6

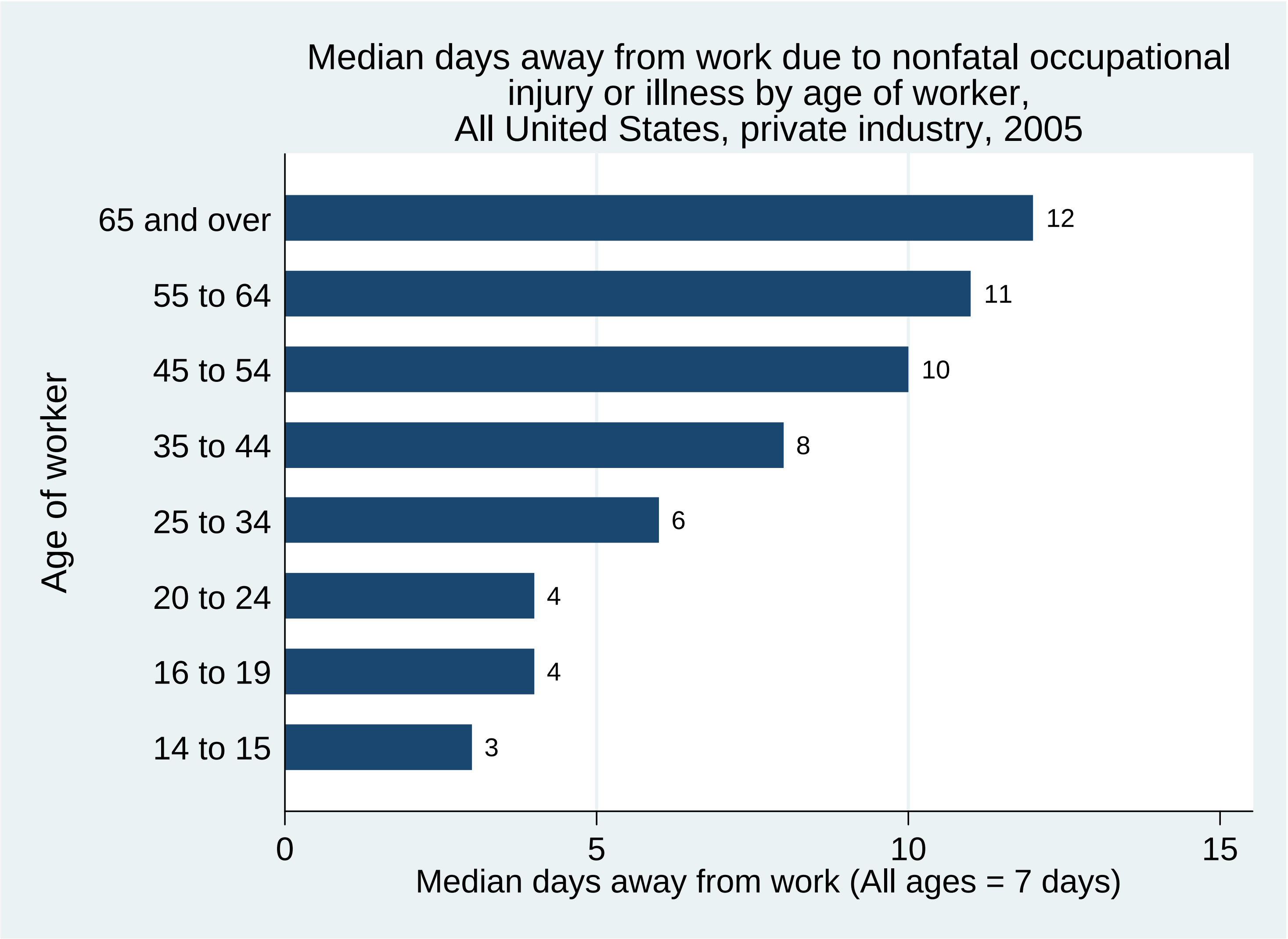

Median days away from work due to nonfatal occupational injury or illness by age of worker, All United States, private industry, 2005
Age of worker
65 and over
55 to 64
45 to 54
35 to 44
25 to 34
20 to 24
16 to 19
14 to 15
12
11
10
8
6
4
4
3
0
5
10
15
Median days away from work (All ages = 7 days)

Table 3: Logisitic Regression of Injury on Worker Characteristics

Male	(1)	(2)
16-19	0	0
20-24	0.0041	0.0022
	(0.0008)**	(0.0000)**
25-29	0.0038	0.0028
	(0.0007)**	(0.0000)**
30-34	0.0052	0.0039
	(0.0008)**	(0.0000)**
35-39	0.0042	0.0032
	(0.0007)**	(0.0000)**
40-44	0.0048	0.0034
	(0.0008)**	(0.0000)**
45-49	0.0043	0.0034
	(0.0008)**	(0.0000)**
50-54	0.0033	0.0028
	(0.0007)**	(0.0000)**
55-59	0.0022	0.0022
	(0.0007)**	(0.0000)**
60-64	0.001	0.0019
	(0.0007)	(0.0000)**
65+	0.0012	0.0011
	(0.0008)	(0.0000)*
Female		
16-19	-0.0059	-0.0024
	(0.0003)**	(0.0000)**
20-24	-0.0031	0.0002
	(0.0004)**	(0.0000)**
25-29	-0.0022	0.0017
	(0.0005)**	(0.0000)**
30-34	-0.0018	0.0023
	(0.0005)**	(0.0000)**
35-39	-0.0008	0.0033
	(0.0005)	(0.0000)**
40-44	-0.0007	0.0031
	(0.0005)	(0.0000)**
45-49	-0.0006	0.0033
	(0.0006)	(0.0000)**
50-54	0.0001	0.0042
	(0.0006)	(0.0000)**
55-59	-0.0012	0.0026
	(0.0005)*	(0.0000)**
60-64	-0.0013	0.0021
	(0.0007)	(0.0000)**
65+	-0.0012	0.0026
	(0.0007)	(0.0008)**
Occupation		X
Industry		X
Observations	260121	260121

Robust standard errors in parenthese
* significant at 5%; ** significant at 1%

Figure 7

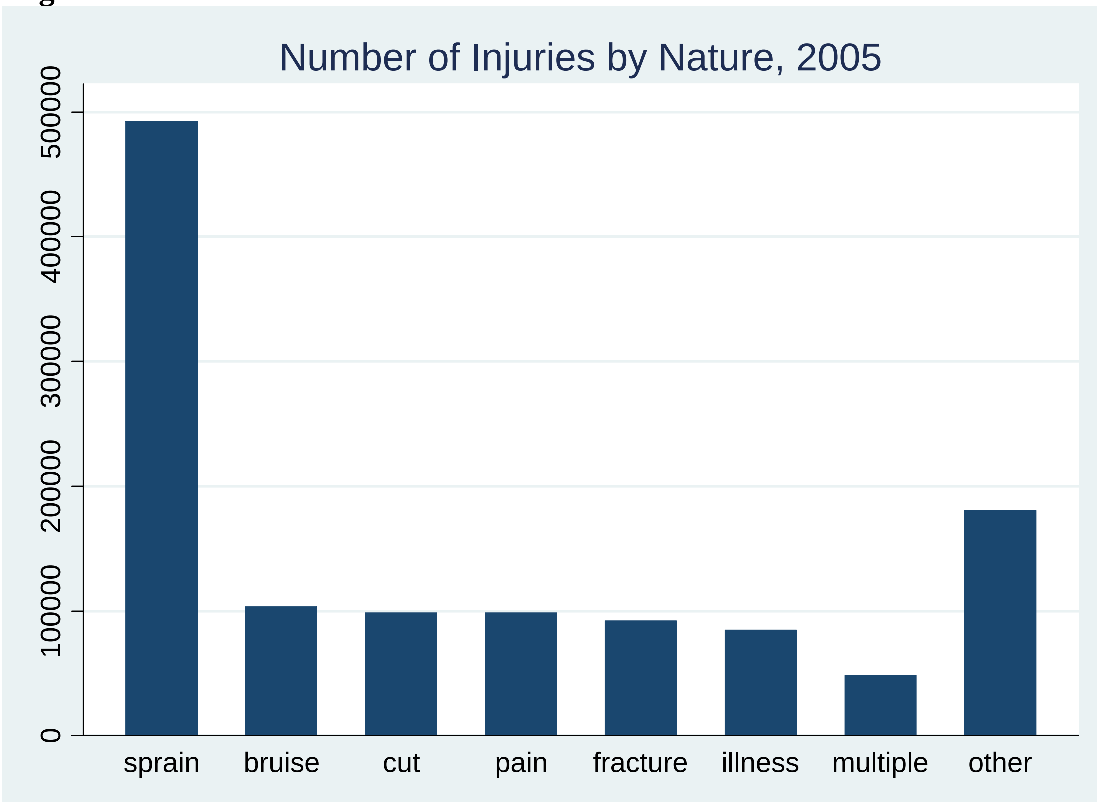


Figure 8

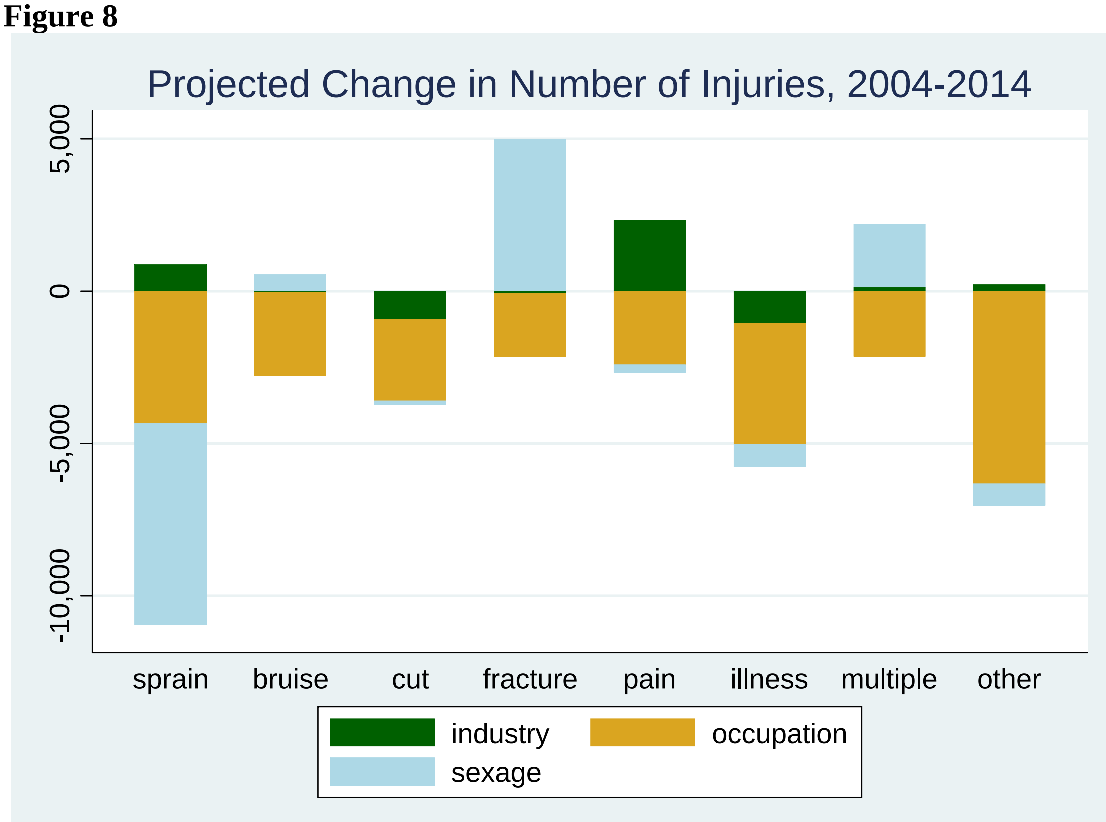


Figure 9

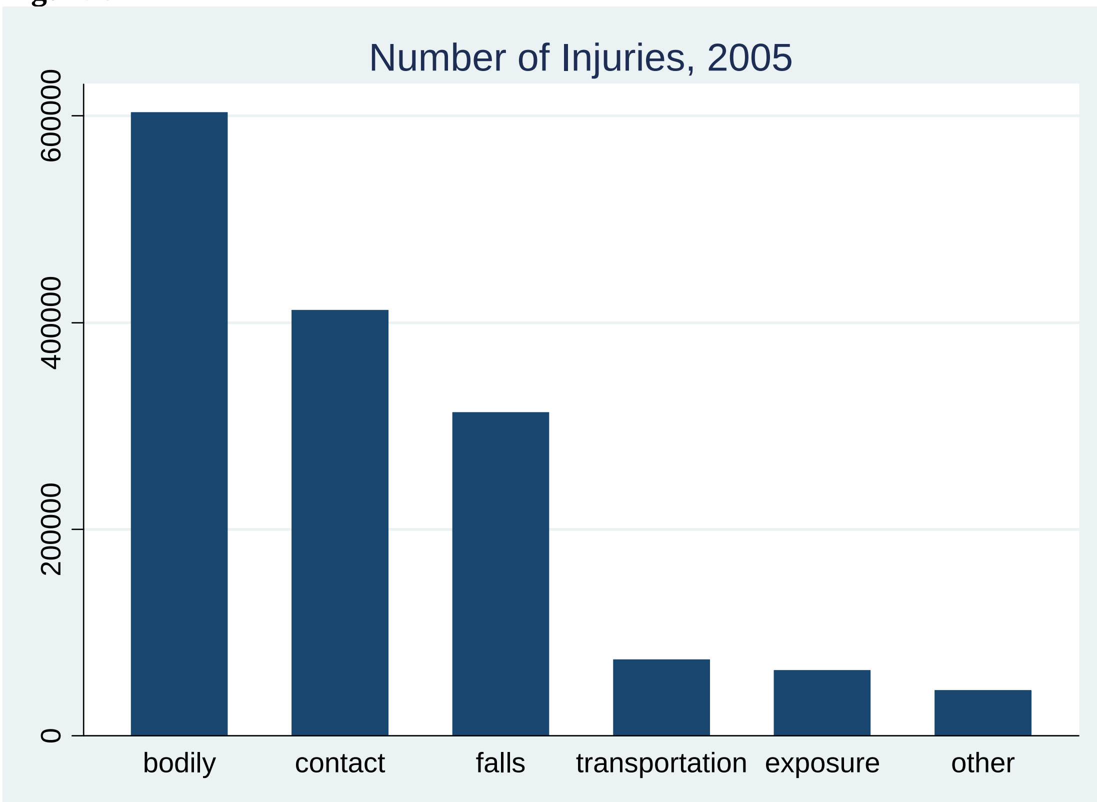


Figure 10

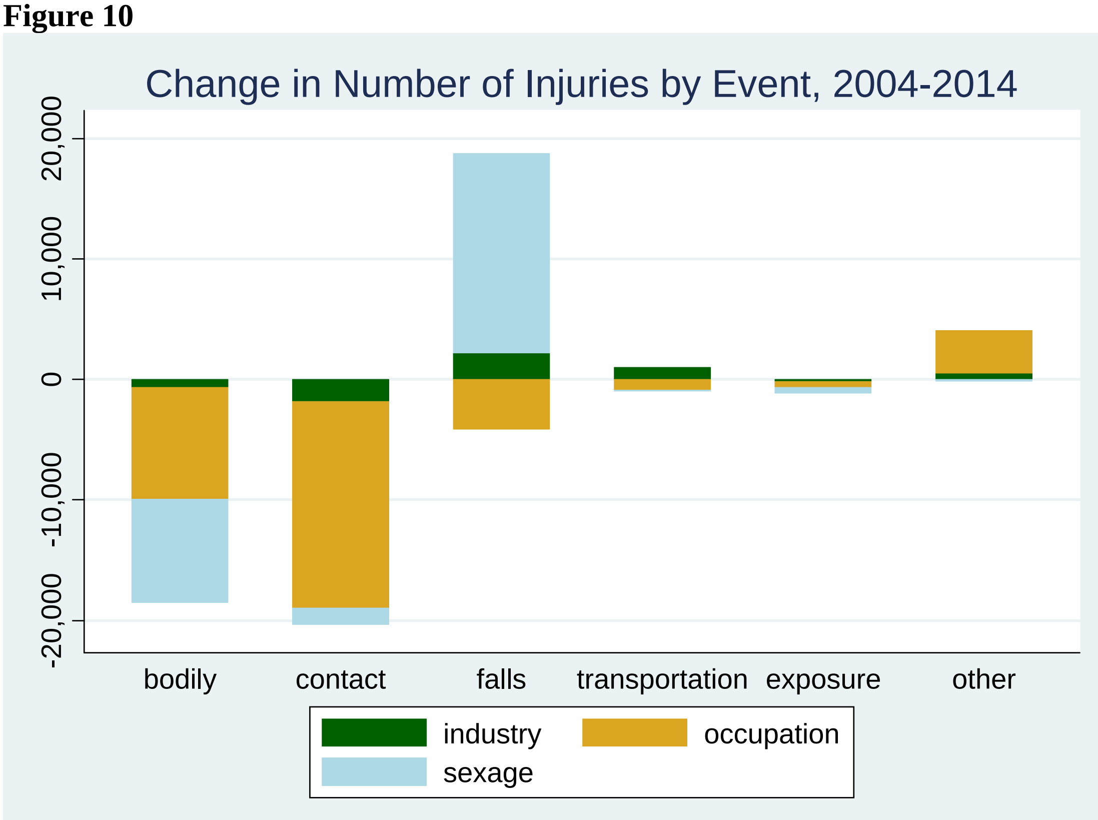


Table 4: Logistic Regression of Fatalities on Worker Characteristics

	(1)	(2)
16-19	0	0
20-24	0.0000101	0.0000005
	(.00000)*	(.00000)
25-29	0.0000186	0.0000028
	(.00001)**	(.00000)
30-34	0.0000222	0.0000039
	(.00001)**	(.00000)*
35-39	0.0000201	0.0000031
	(.00001)**	(.00000)
40-44	0.0000277	0.0000057
	(.00001)**	(.00000)**
45-49	0.0000327	0.0000080
	(.00001)**	(.00000)**
50-54	0.0000316	0.0000082
	(.00001)**	(.00000)**
55-59	0.0000399	0.0000115
	(.00001)**	(.00000)**
60-64	0.0000414	0.0000143
	(.00001)**	(.00000)**
65+	0.0000556	0.0000175
	(.00001)**	(.00000)**
Industry		X
Occupation		X
Observations	84492	84492

Robust z statistics in parentheses

* significant at 5%; ** significant at 1%