WORKERS' COMPENSATION POLICY REVIEW

In This Issue:

Summary of the Contents

John Ruser is the author of an article examining the economic incentives for prevention of occupational injuries and fatalities. One source of incentives is higher wages paid to workers to compensate them for workplace risks, which encourages employers to improve safety in order to reduce the risk premium. Another source is experience rating in workers' compensation programs, which rewards employers with lower insurance premiums when benefits paid to injured workers decline. A final source is government intervention and in particular the establishment and enforcement of safety standards. Dr. Ruser provides a comprehensive review of the theories underlying each of these sources of economic incentives for safety and of the empirical studies that have tested the theories.

The second article examines the employers' costs of workers' compensation based on the latest data from the Bureau of Labor Statistics. For employers in the private sector, as shown in the figure below, costs as a percentage of payroll dropped for the second year in a row. The costs in 2007 in the private sector were 2.26 percent of payroll, down from the recent peak of 2.47 percent of payroll in 2005 and well below the record high of 2.99 percent of payroll reached in 1994. Costs for employers in the state and local government sector were also down for the second year in a row, reaching 1.61 percent of payroll in 2007. For all non-federal employers, the costs were 2.15 percent of payroll in 2007, which also represented the second consecutive year of decline.

Figure A - Workers' Compensation Costs as a Percentage of Gross Earnings, Private Industry Employees, 1986-2007

Source: Tables 1, 2, 3, 4, and 5.
Note: Data for 2002-2007 are annual averages; data for earlier years are for March.

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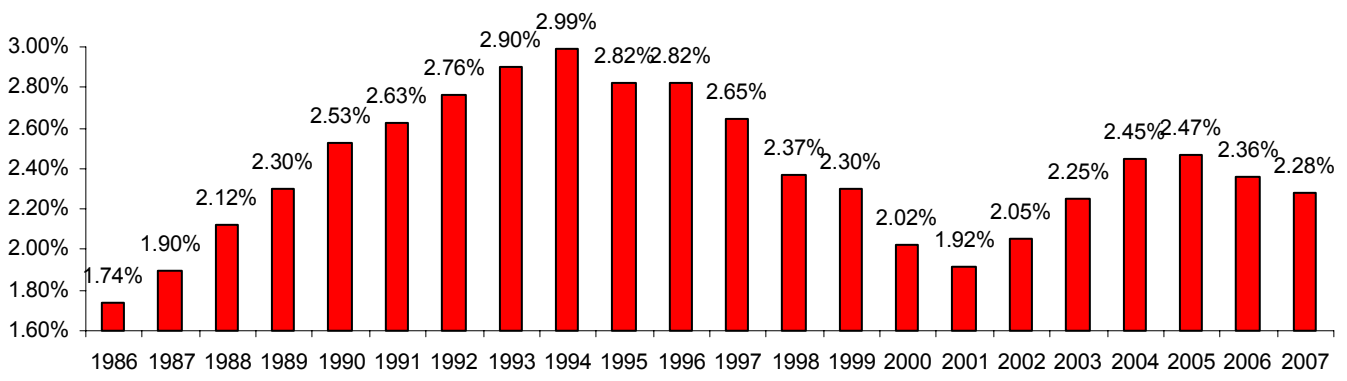
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Economic Incentives Influencing Occupational Risk Prevention

by John W. Ruser

INTRODUCTION

While occupational injuries are random events, they are affected by the activities of various "actors," including workers, firms, and government. Workers and firms respond to a variety of economic incentives that influence their safety activities, while government can alter these incentives. Collectively, the analysis of these incentives and their outcomes forms the economics of occupational safety and health.

This paper reviews the theoretical and empirical literature on the economics of occupational safety and health. The paper discusses certain occupational risk-related costs that influence firms' safety decisions. These include wage premiums paid to attract workers to risky jobs, insurance premiums for workers' compensation insurance, government fines for safety violations, and injury-related costs such as workplace disruptions and loss of worker-specific job skills. The paper also discusses certain factors that affect workers' decisions about whether to choose risky jobs, about how careful to be on the job, and about how long to remain off work during recovery from injury or illness. These factors influencing worker decisions include the wage-risk premium, pain and suffering from injuries, and income benefits paid during out-of-work recovery periods. Finally, the influence of government is also discussed in this paper, focusing on the regulation of occupational risk through the enactment and enforcement of safety and health standards and the mandate of workers' compensation insurance systems.

The main message of this paper is that economic incentives play an important role in occupational risk prevention. The empirical literature suggests that workers and firms respond to economic incentives in making safety decisions. In some cases, these incentives improve safety, but in other cases they have an adverse affect on safety.

About the Author

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John Ruser received a B.A. in Economics, Cum Laude from Princeton University, and an M.A. in Economics and a Ph.D. in Economics from the University of Chicago, where he specialized in Labor and Industrial Organization.

Dr. Ruser has published widely on occupational safety and health and on workers' compensation, including studies of compensating wage differentials, the effect of deregulating workers' compensation insurance markets, the effect of OSHA inspections on reported injuries, and the impact of experience rating in workers' compensation on occupational injuries. He is a member of several professional organizations, including the American Economic Association, the Society of Labor Economists, and the Workers' Compensation Research Group.

John Ruser's career and range of publications made him the ideal person to prepare an overview of the literature on "Economic Incentives Influencing Occupational Risk Prevention." The article was originally published in the *Proceedings of the Fourth International Conference on Occupational Risk Prevention*, which was edited by P. Mondelo, M Mattila, W. Karwowski, and A. Hale and published in 2006. The article is reprinted with the permission of the ORP. Because John Ruser is a federal employee, his article is not subject to copyright. I appreciate the willingness of John to allow the *Workers' Compensation Policy Review* to publish his informative article.

The outline of the paper is as follows. First, the paper describes the theory of the production of safety, in which workers and firms both provide inputs that determine the level of safety output produced. Second, the paper surveys theoretical and empirical work on how the labor market operates to provide safety incentives through compensating wage differentials associated with high risk jobs. Third, the incentives created by the workers' compensation insurance system are reviewed. Fourth, the paper discusses the modest impact of government safety inspections in the US and Canada. Fifth, before concluding, the paper reviews other economic factors that influence the level of workplace safety over time and across firms.

THE PRODUCTION OF SAFETY

While workplace injuries occur at random, the actions of employers, workers, and government can influence the incidence, severity, and duration of injuries. These actions and their impacts on injuries can be understood using the economist's framework of markets and the "theory of production."[1] In general, this theory explains the production of any good or service in terms of production technology and of "inputs," such as capital, labor, energy, and materials. In the context of this paper, the product is "safety," an unobservable good that affects injury outcomes. This safety is jointly produced in firms along with their market products (cars, electricity, haircuts, etc.). Like any good, the quantity of safety produced is subject to market supply and demand.

Employers, workers, and possibly government provide inputs into the safety production process. As more safety inputs are used in the production of safety, the quantity of safety produced increases, lowering the incidence, severity, and duration of injuries. Employers invest in safety inputs in the form of safety equipment, protective devices installed on equipment, worker safety training, monitoring of workplace conditions, and safety departments staffed by experts. Workers make decisions as whether to work at a risky job, how much safety effort and attention to bring to the job, whether to use provided safety equipment, and whether to pay attention during safety training. Governments may directly provide safety inputs, for example by giving safety information to workers and firms. Or, governments may influence the safety decisions made by workers and firms through safety standards or the mandate of a workers' compensation insurance system.

Both employers and workers respond to the costs and benefits of safety. For example, higher fines imposed by government for safety violations found during the inspection of a factory should raise the cost of injury to employers and lead them to invest in more safety. As another example, more generous workers' compensation income benefits may reduce the cost of injury to workers, resulting in less care being taken on the job. Any factor that raises the benefit or reduces the cost of safety will lead either the worker or the firm to provide additional safety inputs. Governments can influence these cost-benefit decisions by affecting the costs and benefits that both workers and firms see.

Many of the incentives that affect the inputs into the production of safety and that affect the true safety level may also affect incentives for reporting injuries. That is, changes in reported injuries (that are captured in injury surveys or administrative data) may arise without any change in the underlying level of safety. For example, employers may have incentives to keep injured workers on the job so that they don't have to pay higher future workers' compensation insurance premiums. Some of the studies of data reviewed in the following pages of this paper will describe efforts to separate reporting effects from true safety effects.

The following three sections of this paper discuss three areas of the economics of occupational safety and health that have received the most attention in the academic literature: compensating wage differentials for risk, workers' compensation insurance, and government regulation. Each of these three factors affects the costs and benefits of safety that either workers or firms see. Before the conclusion, another section briefly discusses some other topics in the economics of occupational safety and health.

THEORY OF COMPENSATING WAGE DIFFERENTIALS

In his famous 1776 book the "Wealth of Nations," the Scottish economist Adam Smith wrote "The wages of labour vary with the ease or hardship, the cleanliness or dirtiness, the honorableness or dishonourableness of the employment."[2] This famous quotation neatly encapsulates a theory that became known as "the theory of compensating wage differentials."

This theory can be most easily understood with a simple example. Suppose two jobs (Job 1 and Job 2) are identical, except that Job 2 has a higher risk of death than Job 1. The theory suggests that fully informed workers will only work at Job 2 if they receive a higher wage than at Job 1. The difference between the wage at Job 2 and Job 1 is known as a compensating wage differential, because the higher wage compensates for the higher risk of death.

Chart 1. Relationship Between Wage and Job Risk for a Hypothetical Job.

Wage
(W)

W(p)

Risk
(p)
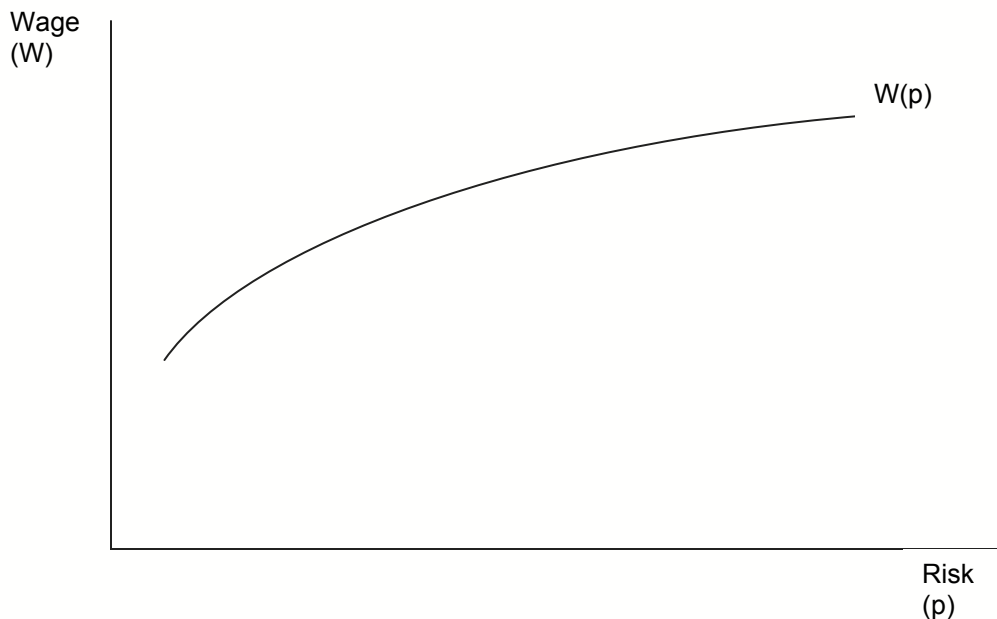
The theory of compensating wage differentials has developed into a complex theory regarding the decisions of workers to select different jobs and of firms to select different technologies.[3] The theory assumes that workers differ in their concern about job risks (that is, they differ in "risk aversion"). While (nearly) no worker likes job risk, for a variety of economic, demographic and taste reasons, some workers are more willing than others to face that risk. The theory predicts that these less risk-averse workers require smaller compensating wage differentials to work at riskier jobs than do more risk-averse workers. The theory also predicts that less risk-averse workers will choose to work at riskier jobs than will more risk-averse workers. Thus, workers tend to sort among different jobs according to their preference for risk.

The theory also has implications for the decisions of firms to invest in job safety. A given firm has a certain cost of safety. According to the theory of compensating wage differentials, if the firm does not invest in that safety, then it must pay a higher wage than if it does invest in that safety. The firm will make a choice. It will invest in safety if the wages it saves over time exceed the costs of the new investment in safety.

Just like workers differ in their preference for job risk, firms differ in their costs of safety. Some firms, perhaps because they are small or have older plants, will find it more costly to invest in safety than will other firms. The theory of compensating differentials predicts that firms with higher safety costs will be less likely to invest in that safety and thus will have higher accident rates.

Thus, theory predicts that both workers and firms make choices about safety that are driven by differences in wages associated with different levels of job risk. Less risk-averse workers and firms with higher safety costs are more likely to be associated with riskier workplaces, that are, everything else equal, also associated with higher wages. In contrast, relatively risk-averse workers and firms that face lower safety costs will be associated with safer workplaces that pay lower wages. The result is market equilibrium where different levels of job risk are associated with different levels of wages. This market equilibrium can be graphically represented by a curve that shows the level of wages associated with different levels of injury or fatality risk, such as Chart 1.

Estimating wage-risk trade-offs

This paper focuses on the economics of occupational risk prevention (ORP). The implications of the theory of compensating wage differentials for ORP are that workers and firms choose different levels of risk in response to wage differences. However, there is very little work that actually focuses on how these incentives directly affect occupational risk behavior. Instead, the literature has tended to focus on estimating whether there are in fact wage-risk trade-offs that are observ-

able in the labor market. If there are, this is indirect evidence of the influence of these trade-offs on safety decisions.

There is a large body of empirical economics literature that measures the relationship between risk and wages that appears in the labor market. In looking across different jobs, the theory predicts that there is a positive relationship between job risk and wages. Of course, a variety of other factors also affect the level of wages besides job risk. Therefore, in order to estimate the wage-risk relationship that actually exists in the economy, multivariate statistical analysis is used that holds constant all other factors that might influence wages. This analysis typically utilizes data on individual workers and their jobs, along with their wages, and the injury and fatality rates associated with their industries or occupations. The analysis estimates an equation that explains wages in terms of worker, firm, and job characteristics, including injury and fatality rates. What is obtained from this equation is an estimate of how much observed wages change with unit changes in job risk. For example, a given statistical analysis might find that annual wages increase $50 with an increase in the fatality rate of 1 death per 100,000 workers.

For fatality risk, the change in wages is typically expressed in terms of the "value of a statistical life" or VSL. This is calculated from the statistical analysis as follows. Suppose, as in the example above, that a statistical analysis determines that a worker receives $50 annually for an increase in the annual risk of death of one worker in 100,000. Then one worker would give up $50 for a similar reduction in fatality risk and 100,000 workers will collectively give up $5,000,000. Among these 100,000 workers, a drop in the fatality risk of one in 100,000 results in one fewer death. So, workers are willing to give up $5 million for that one fewer death and the value of a statistical life is $5 million.

But why do economists express wage-risk trade-offs in terms of the value of a statistical life? It is because this information can be used to make public policy decisions. The value of a statistical life is an indicator of the amount that society is willing to pay to avoid the loss of a statistical life. This is a measure of the societal benefit from saving a statistical life. This information can be balanced against costs of saving a statistical life (reducing the probably of death) to decide whether a particular government safety standard passes a cost-benefit test and, hence, whether that standard should be adopted.

It is important to distinguish between the value of a statistical life and the value of a real life. The value of a statistical life measures the implicit amount that society is willing to pay to reduce the occurrence of one anonymous death. This is very different from the case of an actual life-saving situation. Society may be willing to spend a larger sum of money in a situation where a particular individual faces a known, high probability risk of death. For example, society might be willing to spend more to extract a miner trapped in a mine.

Empirical estimates of the value of a statistical life

There is a large body of empirical research on estimating the value of a statistical life (VSL). While many of the studies have been conducted of the US labor market (particularly studies conducted before 1990), more recently research has extended to labor markets in other countries. Perhaps the most inclusive survey of this literature is Viscusi and Aldy (2003), who reported that studies of U.S. labor markets typically show VSLs in the fairly wide range of $4 million to $9 million. Studies of Canadian labor markets typically show VSLs in the range of $3 to $6 million. According to Viscusi and Aldy (2003), studies of other countries tend to be broadly consistent with the estimates in the US and Canada, though these international estimates tend to be somewhat lower for reasons explained below.

The relatively wide range of VSL estimates might be explained in part simply because of different data sets and different estimation methodologies. However, there are also reasons to expect that different workers have different values of a statistical life. Thus, different studies that focus on different groups of workers might reach different conclusions about the VSL. More recent empirical literature has examined some of the factors that lead to these differences, focusing on gender, age, union status, income, and institutional features of the labor market.

Income. One important determinant of VSL is income. Economists postulate that people tend to demand more of most goods as income increases (so-called "normal goods"). Economists assume that safety is also a normal good, so that the demand for safety increases as income increases (Viscusi, 1978). Viscusi and Aldy's review of the VSL literature indicated that developing countries tend to have lower VSLs than do developed countries. This result is consistent with the fact that income levels are lower in developing countries. Conducting a meta analysis of studies of the relationship between income and VSL, Viscusi and Aldy concluded that a 10 percent increase in income is associated with a 5 to 6 percent increase in the VSL.

Unions. It has been hypothesized that unions may affect VSLs in several ways. Unions may bargain on

behalf of workers for workplace safety in addition to wages and benefits, and these unions may represent the workers in the firm who place a greater value on safety improvements. Also, incentives to negotiate for safety by individual workers will be lower than for a union, because individual workers who don't participate in the negotiation can "free ride" on the efforts of the negotiators. Collective action by unions can overcome this free-rider problem. Thus, union bargaining could mean higher demand for safety, resulting in greater compensating wage differentials for risk. Third, if workers underestimate job risks, they will not demand sufficient wage premiums. Unions may be able to take advantage of collective information-sharing cost savings to provide information about job risks that is not available to non-union workers. Unions may also negotiate for information to be adequately provided to workers.

The empirical literature from the US labor market strongly supports these hypotheses. Nine of ten studies reviewed by Viscusi and Aldy (2003) found higher wage-risk premiums for union workers than for non-union workers. In fact, several of these papers failed to find a compensating differential for risk for non-union workers. Interestingly, the research on labor markets from other countries does not provide such strong findings. The results were decidedly mixed in studies of labor markets in the UK, Canada, India, and South Korea. However, Kniesner and Leeth (1991) did find higher VSLs in Australia than in the US, a result they attributed to the higher rate of unionization in Australia.

Age. Worker demographic characteristics may affect risk aversion, the demand for safety and hence the observed wage-risk trade-off. Age is one of the demographic factors that might be important. It would seem that as a person ages, he/she would attach a lower value of life. In fact, Viscusi and Aldy (2003) reported that "numerous analyses have shown that the VSL is a decreasing function of age." For example, Rosen (1988) estimated that a 48 year old person has a VSL that is 10 percent less than that of a 36 year old person.

However, recent research (Kniesner et al., 2006) suggested that the VSL may have an inverted U-shape with age, meaning that the VSL first increases with age and then decreases with age. In this research, the peak of the value of life occurred at age 50 and the VSL for a 50 year old was roughly 2.5 times as great as the VSL for a worker age 18 to 21. Even though the VSL declined with age for those over 50, it was still over 2 times as great for workers of age 57 to 65 than for workers of age 18 to 21. The innovation in this study was that the researchers accounted for the connection between the VSL and consumption of goods. VSL rises with consumption, while consumption rises and then falls over the life-cycle.

Gender. Gender may also affect estimated VSLs, due to gender differences in risk aversion. In the US, there have only been a very few studies of this source of variation in VSLs, owing to the lack of published gender-specific injury and fatality rates. Leeth and Ruser (2003) reported that, overall, men but not women earned a pay premium for bearing additional workplace fatality risk. This disparity in results largely occurred because of the occupational distribution of workers. When the statistical analysis was separated by occupational category, the researchers found both men and women earning a compensating wage differential for fatal injury risk in blue-collar jobs and neither men nor women earning a wage differential in white collar jobs. The overall weak results for women reflect the fact that women tend to be found in white collar jobs. The weak results for white collar jobs may reflect the low level of fatality risk in these jobs, coupled with relatively low variation in risk across jobs, making it difficult for the statistical analysis to discern results for white collar workers.

Labor market features. Kniesner and Leeth (1991) hypothesized that the wide variation in estimated VSLs might reflect different aspects of the labor markets of different countries. One feature is the extent of unionization, whose influence was described above. Another feature is the strength of attachment of workers to firms. As compared to the US, the Japanese labor market is characterized by long-term attachment of workers to firms and low worker mobility between firms. Low mobility, that is, a lack of worker sorting between jobs of different risk, may result in the absence of compensating wage differentials. Consistent with this hypothesis, Kniesner and Leeth (1991) found no evidence in Japan of compensating wage differentials for job fatalities.

Empirical estimates of compensating wage differentials for non-fatal risk

Some of the empirical economics literature has also looked at the wage premiums associated with higher risk of non-fatal injury. These studies measured the implicit value of a statistical injury. Complicating the comparison of results across studies is that non-fatal injuries can vary greatly in nature and in severity. In the US, for example, studies have differed in whether the injury included only injuries that resulted in lost workdays or all injuries recorded on government forms (including many that involved no lost workdays).

Viscusi and Aldy (2003) reported on 31 studies of the US labor market and 8 studies from outside the US that found statistically significant relationships between nonfatal injuries and wages. The estimated implicit val-

ues of a statistical injury varied widely in these studies, reflecting both estimating methodology and the risk measures that were used. Viscusi and Aldy concluded that most US studies have estimates in the range of $20,000 to $70,000 per injury.

As discussed earlier, different workers attach different values to life and injury. Those who are less risk averse will attach lower values. Some interesting research sought to identify people with weaker risk aversion as indicated by their non-work activities. For instance, one might presume that a smoker or a person who does not wear a seatbelt is less risk averse than a non-smoker or a seatbelt wearer. The former people would require smaller wage premiums to work at risky jobs. In fact, several studies, including Viscusi and Hersch (2001), found that smokers have lower wage premiums for risk than do non-smokers. In addition, Hersch and Pickton (1995) found that the implicit value of a lost-workday injury was twice as high for non-smokers who wore seatbelts than for smokers who did not wear seatbelts.

As with fatality risk, compensating wage differentials for non-fatal risk may vary with worker demographics. Gender has been found to be important. Leeth and Ruser (2003) found that both men and women earned compensating wage differentials for nonfatal injury risk, but wage compensation was over three times larger for women than men. Consistent with this pattern, Hersch (1998) found strong evidence of compensating differentials for women (value of injury estimates ranging from $23,800 to $35,200), but surprisingly, none for men.

Criticisms of the compensating differential literature

While most economists accept the results of the compensating differentials literature, there are those who are skeptical of the results. Some question the reliability of the statistical methodology, while others point to possible biases in the estimates.

Some critics question the rationality assumption underlying worker choice (Leigh, 1991; Dorman, 1996). The simplest form of the theory and the empirical results assume that workers are fully informed and rational. However, if workers underestimate job risks, then they will not demand sufficiently large wage premiums for risk and the estimated value of a statistical life will be too low. Leigh (1991) cited studies showing that workers, particularly younger workers, underestimate their risk from motor vehicle crashes. In addition to underestimating risk, irrational workers may be overconfident about their ability to avoid risk, they may make

errors in ranking jobs with different risk and they may improperly process information.[4]

There are a couple of additional criticisms of the statistical methodology that have opposite implications for the bias in value of life and injury estimates. First, the risk measures that are matched to data on individual workers are the risks faced by groups of workers (usually by industry). The risk measures do not necessarily accurately measure the risks faced by each worker in the data. This "errors in variables" measurement problem leads to a downward bias in the estimated wage-risk trade-off.

Second, some critics believe that the measured compensating wage differentials do not reflect true wage-risk tradeoffs. Instead these critics argue that risk measures are correlated with other job characteristics, so that the measured wage differentials actually reflect other unmeasured interindustry differentials (Leigh, 1995; & Dorman and Hagstrom, 1998). Dorman and Hagstrom (1998) argued that noncompetitive elements of the US labor market are sufficiently strong to overcome the market mechanisms that generate compensating differentials. The problem with this criticism is that many compensating differential studies control for unmeasured effects of industry and occupation and still find differentials. For example, Leeth and Ruser (2003) frequently obtained statistically significant wage differentials even after controlling for both industry and occupation.

INCENTIVE EFFECTS OF WORKERS' COMPENSATION INSURANCE

Workers' compensation – Institutional Details[5]

This section will discuss the institutional details of workers' compensation insurance in the United States. While this would seem to provide a rather narrow focus from an international standpoint, it is important to note that the characteristics of workers' compensation in many countries are similar to those in the United States. Thus, the implications of the US workers' compensation system for occupational risk prevention will carry over to other countries.

Workers' compensation insurance is legislated by individual state laws (and a Federal law to cover Federal employees). These laws make employers liable for all of an injured workers medical expenses and a portion of lost wages. The laws also provide for rehabilitation services and the payment of income benefits to dependents in the case of a workplace fatality. The employer is generally liable to pay these benefits for

any injury that arises out of and in the course of employment, regardless of who is at fault.[6] The liability imposed on the employer is exclusive, in the sense that the injured worker cannot sue for additional compensation.

Some large firms and groups of smaller firms are able to self-insure their liabilities. Generally, however, employers are required to purchase insurance to cover their potential liabilities. In 6 states, the insurance is provided by monopoly state funds. The remaining 44 states provide that insurance be purchased from a private insurance carrier or, in 12 states, from a state fund that competes with the private carriers. The procedures for calculating insurance premiums are similar across nearly all states.

In calculating premiums, the workers of a firm are first placed into one or more of approximately 600 industrial-occupational classifications. On the basis of these classifications, the firm is assigned "manual rates," which are premium rates that reflect the average loss conditions found in each classification. "Manual premiums" are then calculated by multiplying the manual rate by the payroll of workers in the classification. These manual premiums are summed for all classifications to arrive at the manual premium for the firm.

The actual premiums paid by the smallest firms are simply these manual premiums. The vast majority of all employers in the US pay unmodified manual premiums, though these employers only account for a small fraction of all employment covered by workers' compensation.

If the manual premium exceeds a given amount, then the premiums are "experience-rated." In this case, the manual premium is modified to reflect the firm's own past injury loss experience. In the US, the premium of an experience-rated firm is a weighted average of the manual premium and the firm's actual loss experience, where the weight placed on actual loss experience grows with firm size. That is, the extent to which a firm's actual premium reflects its own injury losses depends on the size of the firm. Small experience-rated firms pay premiums that largely reflect the manual premiums. In contrast, large experience-rated firms pay premiums that largely reflect their own loss experience and not the average loss experience. The weight placed on the firm's own loss experience is termed the "degree of experience-rating." In the economic theory described below, it plays an important role in generating incentives for firms to invest in safety.

The foregoing describes the way that premiums are set for firms that purchase insurance from private carri-

ers or state funds. Firms that self-insure bear all of the costs of workers' compensation benefits directly, resembling full experience-rating. However, simulations by Victor (1982) have shown that fully experience-rated premiums can provide stronger incentives for safety than does self-insurance.

With respect to benefits, all state laws require nearly 100 percent coverage of medical expenses and further stipulate that injured workers must receive at least some minimum cash benefits related to lost earnings. Whether as compensation for lost earnings from temporary or permanent injury, or to survivors in the event of death, cash benefits are generally paid weekly and, subject to a minimum and maximum, are a fraction (usually two-thirds) of the workers' weekly pre-injury earnings. For temporary disabilities, and sometimes for other disabilities as well, benefits are paid following a short waiting period, which ranges from two to seven days depending on the state. If the injury lasts longer than a period known as the retroactive period, the worker is also paid benefits for the waiting period.

Economic theory of workers' compensation

Economic theory predicts that the characteristics of the workers' compensation system affect the behavior of workers and employers in ways that alter observed injury and claim incidence, duration, and costs. Collectively, the impact of insurance on injury outcomes is termed "moral hazard."

Workers' compensation can affect both true safety incentives and incentives to report injuries. There are offsetting incentive effects that influence the true level of safety. More generous benefits may weaken workers' incentives to self-protect (take care on the job and take care while recuperating from an injury), resulting in an increase in the incidence and severity of resulting injuries.

Conversely, more generous benefits may increase incentives for firms to invest in safety, as these more generous benefits are passed along to firms in the form of higher premiums. However, this firm incentive depends on the extent that premiums are tied to a firm's own loss experience. If a firm simply pays a manual premium that is not tied to its own loss experience, then higher workers' compensation benefits provide no additional incentive to avoid injuries (of course, other factors will provide this incentive). This is because the firm cannot lower its premium by investing in extra safety. However, the stronger is the link between a firm's own loss experience and the premium it pays, that is, the greater the degree of experience-rating, then the stronger is the incentive for the firm to invest in safety to reduce its premiums.

Therefore, economic theory is uncertain about the impact of workers' compensation on the true level of safety. While it weakens workers' incentives to avoid injury and to recuperate, it may strengthen the incentives of firms to invest in safety.

Workers' compensation may also alter incentives for reporting injuries without changing the true level of safety. Like the true safety incentives, the reporting incentives work in opposite directions for workers and for firms. Specifically, more generous benefits may increase workers' incentives to report off-the-job injuries as occurring on-the-job, to report injuries that don't exist, and to exaggerate the severity of injuries. All of these increase the reported incidence and severity of injuries. Conversely, more generous benefits may cause firms to resist filing claims for injuries that have occurred. They may also cause firms to place injured workers on light duty either to avoid workers' compensation claims or to bring workers back to work earlier. These firm incentives decrease the reported incidence and severity of injuries. Like the firm's true safety effect, the extent to which firms resist filing claims and bring workers back to work earlier will depend on the extent to which premiums are experience-rated. Butler and Worrall (1991) termed these reporting effects "claims-reporting moral hazard."

Workers' compensation insurance – Empirical Evidence

Injury and claim incidence. A number of empirical studies have measured the effect of workers' compensation on the incidence of occupational injuries and claims.[7] These studies analyzed both workers' compensation claims data and injury rate data. The studies generally find that an increase in benefits is associated with an increase in the incidence of claims and injuries. This supports the contention that the incentive effects for workers tend to dominate those for firms.

A group of studies have analyzed the injury rate data collected by the Bureau of Labor Statistics (BLS).[8] These data distinguish between injuries that involve lost workdays and injuries that have no lost workdays. The results of studies with these data generally showed that higher benefits increased the rate of lost-workday injuries more than the rate of injuries without lost workdays. Chelius (1982) found that a 10 percent increase in benefits increased the rate of lost workday cases by 1.2 percent, while increasing the rate of cases not involving lost workdays by only 0.7 percent (an effect that was not statistically significant). Ruser (1985) found that a 10 percent increase in benefits increased the rate of lost workday cases between 1.2 and 3.1 percent depending on the model specification, while the increase

for all cases (including those without lost workdays) was between 0.6 and 2.8 percent.

Similar results have been found in workers' compensation claims data. For example, in aggregate data for 35 states in the 1970s, Butler and Worrall (1983) found that a 10 percent increase in benefits was associated with a 4 percent increase in claims. Similarly, Chelius and Kavanaugh (1988) examined a particular case where workers' compensation benefits were reduced. They found that this resulted in a decline in workers' compensation claims.

Beyond these overall results, further research has focused on a variety of issues, including whether experience-rating strengthens firms incentives for safety and whether it is possible to separate reporting and true safety incentives.

Evidence tends to support the hypothesis that experience-rating strengthens firms' economic incentives for safety, but not all research is conclusive. Among the stronger results, Ruser (1985, 1991) showed that higher benefits raised injury rates less in larger, more experience-rated firms. Ruser (1991) analyzed BLS injury rates for separate establishments (individual businesses or plants). Depending on the statistical model, he found that an increase in weekly benefits of 10 percent increased injury rates by 3.8 to 7.7 percent in establishments with fewer than 100 employees. In contrast, this benefit increase raised injury rates by at most 1.8 percent in establishments with more than 500 workers. Ruser interpreted this as evidence that experience rating in larger firms strengthens incentives for safety, counterbalancing the worker disincentive effect.

Utilizing the same basic methodology as Ruser, Worrall and Butler (1988) also found confirming evidence that "experience-rating matters" in workers' compensation data from the state of South Carolina. They obtained stronger evidence for permanent partial disabilities than for temporary total disabilities.[9]

However, not all researchers are convinced that experience-rating provides strong firm incentives for safety. In two separate studies, Chelius and Smith (1983, 1993) failed to find empirical support for the hypothesized incentive effect of experience-rating. They provided a variety of explanations for their negative results. Among these, they noted that the premium adjustments due to experience rating tend to be relatively small and, owing to the way that premiums are calculated, premium savings from safety appear several years in the future. Also, since the formula for calculating experience-rating is complicated, they questioned whether employers understand the financial incentives.

A potential shortcoming of the studies of Ruser and others is that they analyze outcomes such as injury or claims incidence that are influenced both by changes in safety and in reporting. Critics of the experience-rating hypothesis argue that, even when supported by evidence, it may result not from reductions in true safety, but merely from firm's activities to reduce reported injuries. In an interesting study of experience-rating, Thomason and Pozzebon (2002) analyzed data they collected from 450 firms in the Canadian province of Quebec. These data provided information directly about firms' activities both to improve the safety and health conditions at the workplace and to manage claims.[10] Claims management involves activities that can reduce the cost of injury and disease to the firm without necessarily affecting workplace health and safety. These include activities taken to speed the injured worker's return to work and activities to challenge the worker's claim for benefits. In general, the statistical analysis of Thomason and Pozzebon supported the hypothesis that experience-rating causes employers both to improve workplace health and safety and to engage in more aggressive claims management.

Attempts to address empirically the distinction between true safety incentives and claims-reporting moral hazard have also focused on differences in possible reporting of different types of injuries. One strain of the literature focuses on the impact of workers' compensation on fatalities as compared to non-fatal injuries. The rationale is that it is more difficult to misreport a work-related fatality as opposed to a non-fatal injury. In contrast to the bulk of the literature on non-fatal injuries, Moore and Viscusi (1990) and Ruser (1993), using data from a census of death certificates and the BLS injury data respectively, found that death rates generally declined with benefits. They inferred that this reflected a true safety effect, whereas there was no claims-reporting effect.

Other studies have started from the hypothesis that worker-generated claims-reporting moral hazard is more likely to occur for injuries that are hard to diagnose or whose work-relatedness is hard to establish. The implication is that more generous benefits increase the frequency of hard-to-diagnose injuries, such as back sprains, relative to easier-to-diagnose injuries like fractures and cuts. An implicit assumption needed to generate such a result empirically is that the effects of workers' compensation on true safety incentives and on firm-generated claims-reporting moral hazard are the same for all types of injuries.

The evidence on the effect of higher benefits on the relative frequency of hard-to-diagnose injuries is not unanimous, but tends to support the hypothesis of worker-generated claims-reporting moral hazard. In three manufacturing plants, Robertson and Keeve (1983) found that a higher maximum benefit increased the number of subjectively-verified injuries and claims such as back sprains and pain, but there was no effect of higher benefits on lacerations and fractures. In contrast, Welland (1986), studying workers' compensation claims data for six states in 1976, found that more generous weekly benefits decreased the proportions of sprains and contusions, but increased the proportions of easily diagnosed amputations, burns, fractures, and scratches. In state level workers' compensation claims data, Butler, Durbin, and Helvacian (1996) found that higher benefits increased the relative frequency of sprains and strains and decreased the frequency of cuts. Anomalously, they also found that the proportion of fractures increased with benefits. Finally, in BLS injury rate data, Ruser (1998) found that more generous benefits increased hard–to-diagnose back sprains and carpal tunnel syndrome relative to cuts and fractures.

Three studies examine the issue of the timing of reported injuries. Smith (1990) argued that workers' compensation creates incentives for workers to report hard-to-diagnose off-the-job injuries as having occurred on the job. Since there are more off-the-job hours preceding Mondays and the days after long weekends (referred to collectively as "Mondays") than before regular Tuesdays through Fridays, more off-the-job injuries occur prior to Mondays. Then, hard-to-diagnose injuries will be disproportionately reported on Mondays compared to other regular workdays. Consistent with this hypothesis, Smith showed in workers' compensation claims data that a greater proportion of sprains and strains relative to fractures and cuts were reported earlier in the work week and work shift than at other work times.

Contrary to Smith, two other studies failed to find a Monday effect. Using Minnesota workers' compensation claims data, Card and McCall (1996) showed that workers who were less likely to have health insurance coverage were not more likely to report injuries on Monday compared to other days, as would be expected if workers' use workers' compensation to provide health insurance. They also showed that the wage-replacement rate did not exert an independent effect on the probability of Monday injuries. Finally, Ruser (1998) found that higher benefits raised the reporting of all injuries on Mondays, but did not raise the probability of a Monday-reported back sprain relative to Monday-reported cut or fracture.

In sum, the empirical literature tends to support that hypothesis that more generous workers' compensation

benefits induce more reported injuries and claims, particularly for injuries that are hard to diagnose or relate to the workplace. Workers' incentives tend to dominate those of firms. However, experience-rating does tend to enhance firms' incentives both to invest in safety and to engage in claims management to reduce claims.

Injury and claim duration. In addition to the rather voluminous literature on the impact of workers' compensation on injury and claims incidence, there is also a literature on duration, measured generally in terms of the number of lost workdays. This literature tends to find that higher benefits are associated with longer time away from work (termed an "out of work spell").

Meyer et al. (1995) analyzed the impact of an increase in the maximum income benefit in two states, Kentucky and Michigan. They found that a 10 percent increase in benefits was associated with a 3 to 4 percent increase in the duration of an out of work spell. Other researchers have found larger impacts, including Gardner (1991) who found that a 10 percent increase in benefits in Connecticut led to a nearly 10 percent increase in duration and Krueger (1990), who found that this benefit increase resulted in an over 16 percent increase in duration in Minnesota.

It is important to note that even if workers' incentives to remain off the job dominate firms' incentives to bring workers back to work, it is not a priori certain that more generous benefits will result in longer average durations. Smith (1992), Meyer et al. (1995) and Ruser and Pergamit (2004) argued that there are two effects. On the one hand, more generous benefits provide incentives for workers to remain off the job longer (termed "malingering"). On the other hand, as indicated previously, more generous benefits may induce workers to report more injuries and claims. If these injuries tend to be minor, then more generous benefits result in a larger number of short duration injuries and claims. This "compositional" effect would tend to reduce average durations. Ruser and Pergamit (2004) found some evidence to support this effect. Counter to most results, they found that a 10 percent increase in the weekly benefit lowered the duration of all workers' compensation claims by over 5 percent. However, when claims of 7 days or longer where examined, there was no effect of higher benefits, suggesting that "compositional" effects were weaker and malingering effects stronger for more severe injuries.

As with injury and claims incidence, there is evidence that experience-rating strengthens firms' incentives to shorten out-of-work durations. Chelius and Kavanaugh (1988) found that the severity of injuries declined in a particular college after that institution switched to self-insurance. In a broader set of Minnesota data, Krueger (1990) found that the duration of temporary total spells was about 10 percent shorter in self-insured firms than in privately insured firms. Krueger did note, however, that this result might arise not only because self-insured firms have greater incentives to bring workers back to work, but also because the group of firms that self-insure might have injuries that are less severe than privately insured firms, even after controlling for observable covariates.

Benefits also seem to have different effects on duration depending on the type of injury. Dionne and St-Michel (1991) found in Quebec data that higher benefits increased the duration of hard-to-diagnose back injury cases, but had no effect on durations of objectively determined contusions, amputations, and fractures.

Extensions. The foregoing indicates that higher benefits are associated with longer duration workers' compensation claims. This would suggest that an appropriate strategy for inducing workers to return to work earlier would be to reduce benefits. This would be an erroneous strategy, as there is evidence that earlier return to work is associated with a higher probability of subsequent out-of-work spells. Butler et al. (1995) reported that Ontario workers receiving higher benefits were less likely to experience multiple absences from work, perhaps because longer initial absences from work resulted in more complete recoveries.

In addition to income benefits, a variety of other administrative and legal factors may influence the incidence and duration of claims and injuries. Filing for workers' compensation benefits is costly, while the success of a claim is uncertain. Any administrative or legal change that increases the cost or reduces the expected benefit of a claim may result in fewer claims and greater care-taking by workers. In response to rapidly increasing medical costs, a variety of US states passed laws in the 1990s that restricted the worker's choice of doctor, reduced the compensability of certain injury cases, increased fraud detection, and capped legal fees. Despite the intent of these laws, Ruser and Pergamit (2004) were not able to detect a reduction in injuries or claims after the laws' enactments.

GOVERNMENT INTERVENTION

Government can affect workplace safety and health in a variety of different ways. First, it can provide the rules under which workers' compensation insurance operates. The incentive effects of workers' compensation were just discussed. Second, government can directly intervene in workplace safety through the estab-

lishment and enforcement of safety standards and through the provision of safety information. This latter channel of influence, emphasizing the US case, will be the focus of this section.

Occupational Safety and Health Act

Prior to 1970, US workplace safety and health was the purview of state and local government authorities. In that year, the US Congress passed the Occupational Safety and Health Act, which established the US Occupational Safety and Health Administration (OSHA) to regulate workplace safety in most of the private sector.[11] OSHA was given the task of establishing and enforcing workplace safety and health standards and to provide compliance training. Under the law, each state was given the opportunity to opt out of OSHA purview if the state could demonstrate that its own safety and health program was at least as stringent as OSHA. 21 states maintain their own programs for the private sector, including some larger states such as California and Michigan.

OSHA conducts different types of inspections: random inspections focused on large establishments in high risk industries, and inspection focused on establishments that have been identified through referrals, complaints, or the occurrence of a fatality or catastrophe. In Fiscal Year 2004 (October 2003 through September 2004) OSHA conducted 39,167 inspections, of which 55 percent (21,576) were random inspections targeted toward high hazard industries. OSHA also provides outreach, education and compliance assistance, including free workplace consultations. It reported 31,334 consultations in Fiscal Year 2004. State partner agencies conducted an additional 57,866 inspections, of which 59 percent (34,116) were targeted at high hazard industries. While these inspection and consultation numbers appear high, it is important to remember that the US had well over 7 million private sector establishments during this time period.

Effectiveness of OSHA

Since its creation, a number of studies have sought to determine whether OSHA is effective in reducing occupational injuries and illness. Most of these studies, summarized below, concluded that OSHA has had little or no effect. A small number of studies, conducted by the same researchers, came to a different conclusion; though even these researchers concluded that OSHA's effectiveness at injury reduction has declined over time.

The empirical OSHA studies focus on several different avenues through which OSHA inspections might reduce injuries: the number of inspections, the number of violations cited, and the size of monetary fines assessed for violations. The studies also distinguish between general and specific deterrence effects. General deterrence effects arise as a firm reacts to changes in the general safety inspection environment; that is, the probability that an inspection will occur, the average number of violations detected, and the average fine per violation. Specific deterrence effects arise when a specific establishment is inspected. Specific deterrence effects answer the questions: how do injury rates change when a given establishment is inspected, when a violation is detected or when a fine is assessed?

In principle, general deterrence effects can be detected by relating injury rates (at the level of the individual establishment or for a group of establishments) to aggregate measures of inspections, violations, and fines. Similarly, in principle, specific deterrence effects can be detected by examining the injury rates of specific establishments that are and are not inspected, cited for violations or fined. The difficulty is that inspections tend to focus where there are problems, either on high risk industries or on establishments that may or have had problems. Thus, a simple correlation between inspection activities and injury rates will tend to show that inspections raise injuries. Sophisticated statistical techniques, whose description is beyond the scope of this paper, must be utilized to account for the jointly endogenous nature of injuries and inspections.

As stated earlier, the bulk of the earlier empirical investigations could find little or no effect of OSHA. In an analysis of OSHA's general deterrence effect in manufacturing from 1973 to 1983, Viscusi (1986) concluded that OSHA's influence was quite modest, reducing injuries by about 1.5 to 3.6 percent or 1 to 2 injuries per 1,000 workers. In a series of papers, Smith (1979), McCaffrey (1983), and Ruser and Smith (1991) measured the effect of OSHA on inspected firms (measuring a specific deterrence effect) and reached similar conclusions. For example, Ruser and Smith concluded that "there is little evidence to suggest that OSHA inspections in the early 1980s were effective in reducing the lost-workday injury rate" (page 234).

The apparently poor performance of OSHA can be explained in at least three ways. First, given the relatively small number of inspections, the low size of monetary fines and the relatively large number of potential establishments to be inspected, the probability of an inspection with a large fine is low. Employers may not find it cost-effective to respond to the weak incentives stemming from a low probability event and may remain in noncompliance with standards. Second, some researchers believed that the OSH Act is flawed, because it emphasizes standards for capital equipment

when most injuries are caused by the complex interaction of labor, equipment, and the workplace environment. Bartel and Thomas (1985) found support for this second hypothesis, showing that, while OSHA inspections had a significant effect in reducing violations, this did not translate into a lower injury rate. Third, the apparently poor performance of OSHA may reflect the fact that firms generally maintain safe work environments, perhaps in response to other economic incentives. Thus, OSHA inspections would not be expected to cause much improvement in safety.

It may be, however, that the previously cited studies were simply not sensitive enough to detect OSHA's effects on injuries. More recent studies, using a more sophisticated methodology and better data, provide stronger evidence of OSHA inspection effectiveness. These studies focused on OSHA effectiveness once an inspector has detected a violation. Analyzing manufacturing plants from 1979 to 1985, Gray and Scholz (1993) found that inspections imposing penalties induced a 22 percent decline in injuries and a 20 percent decline in lost workdays in inspected plants in the three years following inspections.

However, the inspection effects reported by Gray and Scholz (1993) declined over time. Utilizing a consistent methodology over several time periods, Gray and Mendeloff (2005) found that the impact of an OSHA penalty inspection declined from 19 percent in 1979-85 to 11 percent in 1987-91 and a statistically insignificant 1 percent in 1992-98. The researchers had a difficult time explaining this decline. But they did plausibly speculate that "increases in workers' compensation costs in the 1980s may have led employers to pay more attention to safety hazards, reducing the incremental incentives to improve safety provided by OSHA inspections." (Gray and Mendeloff, 2002, p. 19). This explanation is consistent with the third explanation provided above.

Effectiveness of safety regulation in Canada

While the previous section has reviewed the evidence regarding the US safety enforcement regime, there is also some limited evidence from Canada. There appear to be few or no studies of other countries. Lanoie (1992a) examined the effect of the creation of Quebec's Commission de la Santé et Sécurité du Travail (CSST), by comparing industry injury rates after the creation of CSST (1981-87) with those before CSST (1974-1980). He found significant declines in all accidents in four industries after CSST was created: construction (-4.7%), manufacturing of transport equipment (-5%), manufacturing of electrical products (-1.1%) and

miscellaneous manufacturing industries (-3.9%). Further, Lanoie (1992b) found some evidence that the frequency of injuries (but not the severity) declined with inspections. Lanoie estimated that a 1 percent increase in the inspection rate was associated with a long run decrease in the frequency of accidents of .21 to .30 percent. However, Lanoie (1992b) found no effect of certain innovative CSST policies such as compulsory prevention programs, the right of workers to refuse hazardous tasks, and the creation of joint employer-worker safety committees.[12] In Alberta, Canada over 1987-1992, Auld et al. (2001) found little evidence that Alberta Occupational Health and Safety reduced the risk of accident and injury on construction worksites. However, on-site safety inspections did reduce the probability of death in some construction sub-industries.

OTHER ECONOMIC INFLUENCES

The previous three sections of this paper have discussed three areas of the economics of occupational safety and health that have received the most attention in the literature. Other economic influences affect occupational safety and health. These include economies of scale in the production of safety, short run macroeconomic fluctuations in business conditions, and a long-run trends.

Economies of scale

The data clearly indicate that, holding everything else constant, larger establishments (businesses or plants) are safer. In part, this may reflect the incentives created by workers' compensation insurance pricing discussed previously. However, this also likely reflects what economists term "economies of scale" in the production of safety. Simply put, larger firms may have lower costs of producing safety and, therefore, may be more likely to invest in safety. These lower costs come about in part because certain operations have relatively the same costs regardless of the size of the business. Setting up a safety department of one person has the same cost, regardless of whether a business has ten people or a thousand. It is more likely that the thousand person business will set up the safety department than will the 10 person business. Similarly, safety training is relatively the same cost, regardless of whether it is provided to ten people or one hundred. Again, the large business is more likely to offer that training.

Economic Cycles

Changes over time in injuries are associated with short run macroeconomic fluctuations. Research has shown that workplace injuries tend to fluctuate with macroeconomic business cycles, rising with economic

upturns and falling with downturns (Smith, 1973). Three sources have been identified for this relationship. First as businesses increase production during a business cycle upswing, they increase the use of overtime hours. This causes fatigue and lapses in judgment that result in increased injuries. Second, as the business upswing becomes better established, employers both recall workers who were previously laid-off and hire new workers. The previously laid-off workers will tend to be the youngest and least experienced of the "experienced" workforce, while newly hired workers will be unfamiliar with the employer's plant and equipment. Research has shown that less experienced workers tend to have higher injury rates, so that the increased use of them during an economic upturn will show up as an increase in the aggregate injury rate. Third, to meet increased demand for output, firms may also bring into service previously surplused equipment. This equipment will tend to be older and may be relatively unprotected by safety devices. Workers may also be less familiar with this equipment. For these reasons, higher injury rates may be associated with the use of surplused equipment as compared to equipment that is used on a daily basis.

Long run trends

Over the long run, it is clear that the rate of workplace injuries has tended to decline. This reflects at least three factors: growing wealth and income, the increased price of labor relative to capital, and technological progress.

Growing income leads to an increased demand for goods, including nicer cars, bigger houses, more leisure (less working time), better health, and greater safety on the job. Thus, as an economy grows and its population becomes wealthier, the demand for safety increases. This operates through the mechanism of compensating wage differentials described earlier. As workers become wealthier, they demand larger compensating wage differentials to bear the same amount of risk (Viscusi, 1978). Employers see that risk is becoming more expensive, so they invest in more safety equipment to reduce their wage costs. This shows up over time as reductions in injuries.

Over time, the wages that workers are paid has increased, even relative to inflation. Economists attribute this growing wage to increased worker productivity, arising from increases in the amount of human capital that workers have acquired from education and training. Since the wage rate equates to worker productivity, the wage also indicates how much is lost due to production delays when a worker is injured. Wages are also positively related to costs associated with hiring and training

a replacement worker. Thus, growing wages mean growing injury costs for employers. Firms will invest in additional safety in order to avoid these costs.

Technological progress in equipment and computer technology also has increased the productivity of capital equipment. In some industries, for example, auto manufacturing and mining, this has resulted in the heavier use of capital equipment in production. Fewer workers are needed to produce the same amount of output and the workers tend to be higher skilled machine operators who are less likely to be in high injury risk situations. For these reasons, the long run substitution of capital for unskilled labor has resulted in a decline in injuries.

Finally, safety has improved through technological progress in its production. Like every other aspect of the production process, there is continual innovation in techniques for ensuring safety in the workplace.

CONCLUSIONS

This paper has discussed how economic incentives affect occupational safety decisions of workers and firms, and how government can influence those incentives. Workers and firms respond to the costs and benefits of workplace safety that are generated by workers' compensation insurance, government regulation, and the market. Workplace safety is a "product" that is produced by worker and firms using safety "inputs." The amount of inputs utilized is related to the costs and benefits of using them.

Workers' compensation insurance, established by law, creates safety incentives in firms to the extent that premiums are tied to the accident loss experience of those firms ("experience-rating"). But income benefits paid to workers can weaken workers' safety incentives by reducing the costs of injuries to workers. The empirical literature suggests that these adverse worker incentives tend to dominate firm safety incentives, so that more generous income benefits lead to more frequent and longer duration injuries and claims. However, it is possible that this is in part a reporting, rather than a true safety effect.

The evidence for the US and Canada suggests that government safety inspections have not been very effective in improving workplace safety. Two explanations that have been given for this are that 1) the low probability and size of fines create weak safety incentives and 2) the safety standards are not effective in reducing injuries. However, it is also possible that firms are largely in compliance with safety standards owing to incentives generated by workers' compensation insurance and the market.

The market has an influence on workplace safety, even absent government intervention through regulation and the establishment of workers' compensation insurance. Economic theory suggests that workers who are knowledgeable about job risks demand wage premiums to work at riskier jobs (compensating wage differentials). In deciding whether to invest in safety, firms compare savings in wage premiums against the cost of extra safety. Workers decide whether to work at a particular job based on whether the wage-risk premium is sufficient to compensate for the risk on that job. Consistent with this theory, data from a variety of countries provide empirical evidence of compensating wage differentials.

Finally, other economic factors influence injury and claims variations across firms and over time. Everything else equal, larger firms tend to be safer than smaller ones. This is because larger firms can spread some relatively-fixed safety costs over a larger number of workers ("economies of scale"). Injury rates tend to increase with upswings in the economy, as workers work more overtime (leading to fatigue), and as firms both hire less experienced, riskier workers and utilize obsolete equipment that might not have the most up-to-date safety devices. Over time, injury rates tend to decline reflecting the increasing cost of labor, substitution of capital for labor, improvements in safety technology, and higher incomes that raise the demand for safety.

ENDNOTES

1. For an early paper on the production of safety, see Oi (1974).

2. As cited in Viscusi and Aldy (2003).

3. The classic paper on this topic is Rosen (1974).

4. To the extent that workers' perceptions of risk differ from reality, then the study of compensating differentials can be improved by utilizing perceived risk values. Gegax, Gerking, and Schulze (1991) estimated compensating wage differentials using perceived workplace death rates directly collected from workers in a survey. They found wage-risk trade-offs for union and blue-collar workers, though these estimates were lower than comparable ones obtained using industry fatality rates. They also did not find statistically significant results for white-collar and non-unionized workers.

5. The text in this section draws heavily from Ruser (1985).

6. However, states have instituted certain exclusions, such as the case where the worker is under the influence of alcohol or drugs.

7. Many of these studies are reviewed in Smith (1992).

8. These data measure the annual number of new injury cases per 100 full-time workers.

9. The result for temporary total disabilities is not statistically significant.

10. Variables to measure health and safety practices included: presence of in-house safety personnel, hiring of a safety consultant, safety duties performed by safety personnel, presence of a worker-employer safety committee and the number of meetings held by that committee, safety training time provided to employees, and firm expenditures on personal protective equipment. Claims management practices included: presence of in-house claims management personnel or the hiring of a claims management consultant, the extent to which the firm has placed disabled workers on temporary assignments, the number of compensation claims resulting in a formal dispute.

11. In 1969, the US Congress passed the Mine Safety and Health Act to cover the mining sector. Other groups of workers outside the jurisdiction of OSHA include transportation workers, many public sector employees, and the self-employed.

12. A recent study provides an explanation why the policy of employee right to refuse hazardous work may have no effect. Harcourt & Harcourt (2000) reported that the right to refuse was restricted. Employees had to satisfy many conditions to qualify for protection from employer discipline after refusing work.

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Workers' Compensation Costs for Employers 1986 to 2007

by John F. Burton, Jr.

The employers' costs of worker' compensation as a percent of payroll decreased in 2007. This is the second year of declining costs after four years of consecutive increases. The decline in employers' costs relative to payroll occurred for workers in the private sector, for workers in the state and local government sector, and for all non-federal employees.

These findings are based on data from the Bureau of Labor Statistics (BLS), which recently released information on the employers' costs of workers' compensation in December 2007. Similar information is available for private sector employees for each March between 1986 and 2001, as shown in Tables 1 and 2. The tables also provide information on the employers' costs of workers' compensation for each March between 1991 and 2001 for state and local government employees and for all non-federal employees.

The BLS has published data on the employers' costs of workers' compensation in the private sector, the state and local government sector, and for all non-federal employers on a quarterly basis since March 2002, as shown in Tables 3, 4, and 5. These quarterly data have been used to calculate the annual averages of workers' compensation costs for 2002 to 2007 included in Tables 3 to 5.

Tables 1 to 5 present information on two measures of the employers' costs of workers' compensation: in costs per hour worked (which is how the BLS reports the data) and in costs as a percentage of payroll (which were calculated for this article). Information on the BLS survey and the methodology used to prepare the information in this article are contained in Appendix A.

ANNUAL DATA

The analysis in this section uses the BLS March data (from Tables 1 and 2) as the measures of workers' compensation costs through 2001 since those March results are the only data for those years. For 2002 to 2007, the analysis relies on the annual averages of BLS data (from Tables 3, 4, and 5) as the measure of workers' compensation costs for those years.[1]

Workers' Compensation Costs As A Percent of Payroll

For reasons explicated in the concluding section, I believe the most useful measure of employers' expenditures on workers' compensation is workers' compensation costs as a percent of payroll.

Private Sector Employees. The employers' costs of workers' compensation as a percent of gross earnings (payroll) for private sector employees from 1986 to 2007 are shown in Figure A and in Panel A of Tables 1 to 5. Employers' expenditures on workers' compensation in private industry represented 1.74 percent of payroll in 1986, increased in each of the next eight years until peaking at 2.99 percent of payroll in 1994, and

Figure A - Workers' Compensation Costs as a Percentage of Gross Earnings, Private Industry Employees, 1986-2007
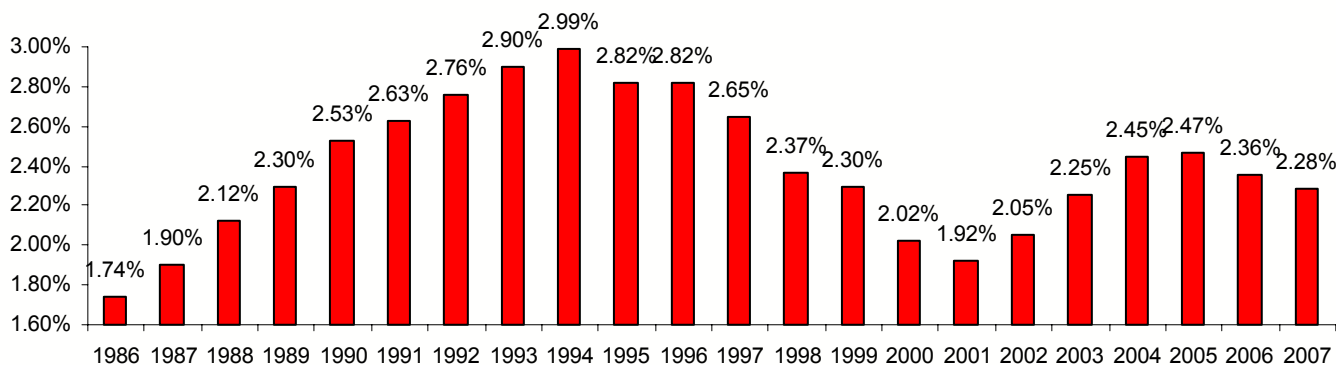
Source: Tables 1, 2, 3, 4, and 5.

Note: Data for 2002-2007 are annual averages; data for earlier years are for March.

Table 1 - Total Remuneration, Wages and Salaries, and Workers' Compensation, March 1986-1993
(In Dollars Per Hours Worked)

Panel A: Private Industry Employees		1986	1987	1988	1989	1990	1991	1992	1993
(1)	Total Remuneration	13.25	13.42	13.79	14.28	14.96	15.40	16.14	16.70
(2)	Gross Earnings	10.90	11.08	11.32	11.72	12.24	12.55	13.06	13.43
(3)	Wages and Salaries	9.67	9.83	10.02	10.38	10.84	11.14	11.58	11.90
(4)	Paid Leave	0.93	0.93	0.97	1.00	1.03	1.05	1.09	1.11
(5)	Supplemental Pay	0.30	0.32	0.33	0.34	0.37	0.36	0.39	0.42
(6)	Benefits Other Than Pay	2.36	2.35	2.47	2.56	2.72	2.85	3.07	3.26
(7)	Insurance	0.73	0.72	0.78	0.85	0.92	1.01	1.12	1.19
(8)	Retirement Benefits	0.50	0.48	0.45	0.42	0.45	0.44	0.46	0.48
(9)	Legally Required Benefits	1.11	1.13	1.22	1.27	1.35	1.40	1.47	1.55
(9A)	Workers' Compensation	(0.19)	(0.21)	(0.24)	(0.27)	(0.31)	(0.33)	(0.36)	(0.39)
(10)	Other Benefits	0.02	0.02	0.02	0.02	*	*	0.02	0.04
(11)	Workers' Compensation as Percent of Remuneration	1.43%	1.56%	1.74%	1.89%	2.07%	2.14%	2.23%	2.34%
(12)	Workers' Compensation as Percent of Gross Earnings	1.74%	1.90%	2.12%	2.30%	2.53%	2.63%	2.76%	2.90%

Panel B: State and Local Employees							1991	1992	1993
(1)	Total Remuneration						22.31	23.49	24.44
(2)	Gross Earnings						17.48	18.40	19.07
(3)	Wages and Salaries						15.52	16.39	17.00
(4)	Paid Leave						1.75	1.80	1.86
(5)	Supplemental Pay						0.21	0.21	0.21
(6)	Benefits Other Than Pay						4.84	5.08	5.36
(7)	Insurance						1.63	1.84	2.02
(8)	Retirement Benefits						1.85	1.82	1.87
(9)	Legally Required Benefits						1.34	1.40	1.44
(9A)	Workers' Compensation						(0.26)	(0.28)	(0.30)
(10)	Other Benefits						0.02	0.02	0.03
(11)	Workers' Compensation as Percent of Remuneration						1.17%	1.19%	1.23%
(12)	Workers' Compensation as Percent of Gross Earnings						1.49%	1.52%	1.57%

Panel C: All Non-Federal Employees							1991	1992	1993
(1)	Total Remuneration						16.45	17.27	17.88
(2)	Gross Earnings						13.30	13.89	14.29
(3)	Wages and Salaries						11.81	12.33	12.68
(4)	Paid Leave						1.16	1.20	1.22
(5)	Supplemental Pay						0.33	0.36	0.39
(6)	Benefits Other Than Pay						3.16	3.38	3.59
(7)	Insurance						1.10	1.23	1.32
(8)	Retirement Benefits						0.65	0.67	0.70
(9)	Legally Required Benefits						1.39	1.46	1.53
(9A)	Workers' Compensation						(0.32)	(0.35)	(0.38)
(10)	Other Benefits						0.02	0.02	0.04
(11)	Workers' Compensation as Percent of Remuneration						1.95%	2.03%	2.13%
(12)	Workers' Compensation as Percent of Gross Earnings						2.41%	2.52%	2.66%

Notes: See Notes for Tables 1-5.

Sources: Data in rows (1), (3) to (5), and (7) to (10) of Panels A, B, and C:
1986-1990: U.S. Department of Labor, 2000b, Tables 140, 150, 158, 165, 169
1991-1993: U.S. Department of Labor, 2000b, Tables 1, 3, 5, 17, 19, 21, 33, 35, 37, 49, 51, 53, 65, 67, 69, 81, 83, 85, 97, 99, 101, 112, 114, 116, 126, 128, 130

Table 2 - Total Remuneration, Wages and Salaries, and Workers' Compensation, March 1994-2001
(In Dollars Per Hours Worked)

Panel A: Private Industry Employees		1994	1995	1996	1997	1998	1999	2000	2001
(1)	Total Remuneration	17.08	17.10	17.49	17.97	18.50	19.00	19.85	20.81
(2)	Gross Earnings	13.69	13.81	14.19	14.69	15.19	15.62	16.37	17.16
(3)	Wages and Salaries	12.14	12.25	12.58	13.04	13.47	13.87	14.49	15.18
(4)	Paid Leave	1.11	1.09	1.12	1.14	1.16	1.20	1.28	1.37
(5)	Supplemental Pay	0.44	0.47	0.49	0.51	0.56	0.55	0.60	0.61
(6)	Benefits Other Than Pay	3.39	3.29	3.31	3.29	3.31	3.38	3.48	3.65
(7)	Insurance	1.23	1.15	1.14	1.09	1.10	1.13	1.19	1.28
(8)	Retirement Benefits	0.52	0.52	0.55	0.55	0.55	0.57	0.59	0.62
(9)	Legally Required Benefits	1.60	1.59	1.59	1.62	1.63	1.65	1.67	1.73
(9A)	Workers' Compensation	(0.41)	(0.39)	(0.40)	(0.39)	(0.36)	(0.36)	(0.33)	(0.33)
(10)	Other Benefits	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02
(11)	Workers' Compensation as Percent of Remuneration	2.40%	2.28%	2.29%	2.17%	1.95%	1.89%	1.66%	1.59%
(12)	Workers' Compensation as Percent of Gross Earnings	2.99%	2.82%	2.82%	2.65%	2.37%	2.30%	2.02%	1.92%

Panel B: State and Local Employees		1994	1995	1996	1997	1998	1999	2000	2001
(1)	Total Remuneration	25.27	24.86	25.73	26.58	27.28	28.00	29.05	30.06
(2)	Gross Earnings	19.71	19.48	20.16	20.90	21.53	22.19	23.08	23.94
(3)	Wages and Salaries	17.57	17.31	17.95	18.61	19.19	19.78	20.57	21.34
(4)	Paid Leave	1.94	1.95	1.99	2.06	2.11	2.17	2.26	2.34
(5)	Supplemental Pay	0.20	0.22	0.22	0.23	0.23	0.24	0.25	0.26
(6)	Benefits Other Than Pay	5.57	5.38	5.56	5.69	5.76	5.81	5.97	6.13
(7)	Insurance	2.15	2.03	2.07	2.09	2.15	2.22	2.38	2.56
(8)	Retirement Benefits	1.90	1.78	1.90	1.95	1.94	1.91	1.84	1.73
(9)	Legally Required Benefits	1.49	1.55	1.56	1.61	1.63	1.64	1.70	1.78
(9A)	Workers' Compensation	(0.31)	(0.31)	(0.31)	(0.30)	(0.30)	(0.30)	(0.31)	(0.34)
(10)	Other Benefits	0.03	0.02	0.03	0.04	0.04	0.04	0.05	0.06
(11)	Workers' Compensation as Percent of Remuneration	1.23%	1.25%	1.20%	1.13%	1.10%	1.07%	1.07%	1.13%
(12)	Workers' Compensation as Percent of Gross Earnings	1.57%	1.59%	1.54%	1.44%	1.39%	1.35%	1.34%	1.42%

Panel C: All Non-Federal Employees		1994	1995	1996	1997	1998	1999	2000	2001
(1)	Total Remuneration	18.30	18.21	18.68	19.22	19.76	20.29	21.16	22.15
(2)	Gross Earnings	14.58	14.62	15.05	15.59	16.11	16.57	17.33	18.14
(3)	Wages and Salaries	12.95	12.98	13.36	13.85	14.30	14.72	15.36	16.07
(4)	Paid Leave	1.23	1.21	1.24	1.27	1.30	1.34	1.42	1.51
(5)	Supplemental Pay	0.40	0.43	0.45	0.47	0.51	0.51	0.55	0.56
(6)	Benefits Other Than Pay	3.72	3.59	3.64	3.63	3.66	3.73	3.83	4.00
(7)	Insurance	1.37	1.28	1.27	1.23	1.25	1.29	1.36	1.46
(8)	Retirement Benefits	0.73	0.70	0.75	0.75	0.75	0.76	0.77	0.78
(9)	Legally Required Benefits	1.58	1.58	1.59	1.62	1.63	1.65	1.67	1.73
(9A)	Workers' Compensation	(0.39)	(0.38)	(0.38)	(0.38)	(0.35)	(0.35)	(0.33)	(0.34)
(10)	Other Benefits	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
(11)	Workers' Compensation as Percent of Remuneration	2.13%	2.09%	2.03%	1.98%	1.77%	1.72%	1.56%	1.53%
(12)	Workers' Compensation as Percent of Gross Earnings	2.67%	2.60%	2.52%	2.44%	2.17%	2.11%	1.90%	1.87%

Notes: See Notes for Tables 1-5.

Sources: Data in rows (1), (3) to (5), and (7) to (10) of Panels A, B, and C:
1994-1999: U.S. Department of Labor, 2000b, Tables 1, 3, 5, 17, 19, 21, 33, 35, 37, 49, 51, 53, 65, 67, 69, 81, 83, 85, 97, 99, 101, 112, 114, 116, 126, 128, 130
2000: U.S. Department of Labor, 2000c, Tables 1, 3, and 5.
2001: U.S. Department of Labor, 2001, Tables 1, 3, and 5.

Table 3 - Total Remuneration, Wages and Salaries, and Workers' Compensation, Quarterly March 2002 - December 2003
(In Dollars Per Hours Worked)

Panel A: Private Industry Employees	March 2002	June 2002	Sept. 2002	Dec. 2002	2002 Average	March 2003	June 2003	Sept. 2003	Dec. 2003	2003 Average
(1) Total Remuneration	21.71	21.83	22.01	22.14	21.92	22.37	22.61	22.84	22.92	22.69
(2) Gross Earnings	17.86	17.94	18.05	18.16	18.00	18.26	18.41	18.59	18.61	18.47
(3) Wages and Salaries	15.80	15.90	16.00	16.08	15.95	16.15	16.31	16.46	16.49	16.35
(4) Paid Leave	1.44	1.44	1.45	1.47	1.45	1.47	1.46	1.48	1.48	1.47
(5) Supplemental Pay	0.62	0.60	0.60	0.61	0.61	0.64	0.64	0.65	0.64	0.64
(6) Benefits Other Than Pay	3.86	3.89	3.95	3.98	3.92	4.11	4.20	4.25	4.31	4.22
(7) Insurance	1.40	1.42	1.45	1.46	1.43	1.52	1.57	1.59	1.62	1.58
(8) Retirement Benefits	0.63	0.62	0.63	0.64	0.63	0.67	0.67	0.68	0.70	0.68
(9) Legally Required Benefits	1.80	1.82	1.84	1.85	1.83	1.89	1.93	1.95	1.96	1.93
(9A) Workers' Compensation	(0.35)	(0.37)	(0.38)	(0.38)	(0.37)	(0.40)	(0.41)	(0.42)	(0.43)	(0.42)
(10) Other Benefits	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
(11) Workers' Compensation as Percent of Remuneration	1.61%	1.69%	1.73%	1.72%	1.69%	1.79%	1.81%	1.84%	1.88%	1.83%
(12) Workers' Compensation as Percent of Gross Earnings	1.96%	2.06%	2.11%	2.09%	2.05%	2.19%	2.23%	2.26%	2.31%	2.25%

Panel B: State and Local Employees	March 2002	June 2002	Sept. 2002	Dec. 2002	2002 Average	March 2003	June 2003	Sept. 2003	Dec. 2003	2003 Average
(1) Total Remuneration	31.29	31.20	31.89	32.32	31.68	32.62	32.99	33.62	33.91	33.29
(2) Gross Earnings	24.83	24.72	25.17	25.46	25.05	25.66	25.96	26.26	26.43	26.08
(3) Wages and Salaries	22.14	22.00	22.40	22.68	22.31	22.85	23.14	23.42	23.56	23.24
(4) Paid Leave	2.43	2.45	2.49	2.49	2.47	2.51	2.52	2.55	2.58	2.54
(5) Supplemental Pay	0.26	0.27	0.28	0.29	0.28	0.30	0.30	0.29	0.29	0.30
(6) Benefits Other Than Pay	6.46	6.47	6.72	6.85	6.63	6.96	7.02	7.36	7.48	7.21
(7) Insurance	2.82	2.85	2.96	3.02	2.91	3.12	3.16	3.32	3.39	3.25
(8) Retirement Benefits	1.74	1.72	1.81	1.84	1.78	1.85	1.86	1.99	2.03	1.93
(9) Legally Required Benefits	1.84	1.84	1.89	1.92	1.87	1.93	1.94	1.98	1.99	1.96
(9A) Workers' Compensation	(0.34)	(0.35)	(0.36)	(0.37)	(0.36)	(0.36)	(0.37)	(0.38)	(0.38)	(0.37)
(10) Other Benefits	0.06	0.06	0.06	0.07	0.06	0.06	0.06	0.07	0.07	0.07
(11) Workers' Compensation as Percent of Remuneration	1.09%	1.12%	1.13%	1.14%	1.12%	1.10%	1.12%	1.13%	1.12%	1.12%
(12) Workers' Compensation as Percent of Gross Earnings	1.37%	1.42%	1.43%	1.45%	1.42%	1.40%	1.43%	1.45%	1.44%	1.43%

Panel C: All Non-Federal Employees	March 2002	June 2002	Sept. 2002	Dec. 2002	2002 Average	March 2003	June 2003	Sept. 2003	Dec. 2003	2003 Average
(1) Total Remuneration	23.15	23.20	23.44	23.66	23.36	23.93	24.19	24.48	24.59	24.30
(2) Gross Earnings	18.91	18.92	19.09	19.24	19.04	19.39	19.57	19.76	19.80	19.63
(3) Wages and Salaries	16.76	16.78	16.93	17.06	16.88	17.17	17.35	17.52	17.56	17.40
(4) Paid Leave	1.59	1.59	1.60	1.62	1.60	1.63	1.63	1.64	1.65	1.64
(5) Supplemental Pay	0.56	0.55	0.56	0.56	0.56	0.59	0.59	0.60	0.59	0.59
(6) Benefits Other Than Pay	4.24	4.26	4.35	4.41	4.32	4.54	4.64	4.73	4.78	4.67
(7) Insurance	1.61	1.63	1.67	1.69	1.65	1.77	1.81	1.86	1.88	1.83
(8) Retirement Benefits	0.80	0.78	0.80	0.82	0.80	0.85	0.86	0.88	0.90	0.87
(9) Legally Required Benefits	1.80	1.82	1.85	1.86	1.83	1.89	1.93	1.95	1.96	1.93
(9A) Workers' Compensation	(0.35)	(0.36)	(0.38)	(0.38)	(0.37)	(0.39)	(0.41)	(0.42)	(0.42)	(0.41)
(10) Other Benefits	0.03	0.03	0.03	0.04	0.03	0.03	0.04	0.04	0.04	0.04
(11) Workers' Compensation as Percent of Remuneration	1.51%	1.55%	1.62%	1.61%	1.57%	1.63%	1.69%	1.72%	1.71%	1.69%
(12) Workers' Compensation as Percent of Gross Earnings	1.85%	1.90%	1.99%	1.98%	1.93%	2.01%	2.10%	2.13%	2.12%	2.09%

Note See Notes for Tables 1-5.

Sour Data in rows (1), (3) to (5), and (7) to (10) of Panels A, B, and C:

March 2002: U.S. Department of Labor, 2002a, Tables 1, 3, and 5.
June 2002: U.S. Dept. of Labor, 2002b, Tables 1, 3, and 5.
September 2002: U.S. Dept. of Labor, 2002c, Tables 1, 3, and 5.
December 2002: U.S. Dept. of Labor, 2003a, Tables 1, 3, and 5.

March 2003: U.S. Dept. of Labor, 2003b, Tables 1, 3, and 5.
June 2003: U.S. Dept. of Labor, 2003c, Tables 1, 3, and 5.
September 2003: U.S. Dept. of Labor, 2003d, Tables 1, 3, and 5.
December 2003: U.S. Dept. of Labor, 2004, Tables 1, 3, and 5.

Table 4 - Total Remuneration, Wages and Salaries, and Workers' Compensation, Quarterly March 2004 - December 2005
(In Dollars Per Hours Worked)

Panel A: Private Industry Employees	March 2004	June 2004	Sept. 2004	Dec. 2004	2004 Average	March 2005	June 2005	Sept. 2005	Dec. 2005	2005 Average
(1) Total Remuneration	23.29	23.41	23.76	23.90	23.59	24.17	24.24	24.34	24.71	24.37
(2) Gross Earnings	18.80	18.84	19.13	19.21	19.00	19.37	19.44	19.49	19.84	19.54
(3) Wages and Salaries	16.64	16.71	16.96	17.02	16.83	17.15	17.21	17.23	17.51	17.28
(4) Paid Leave	1.50	1.49	1.52	1.53	1.51	1.54	1.54	1.55	1.61	1.56
(5) Supplemental Pay	0.66	0.64	0.65	0.66	0.65	0.68	0.69	0.71	0.72	0.70
(6) Benefits Other Than Pay	4.50	4.56	4.64	4.70	4.60	4.80	4.80	4.86	4.88	4.84
(7) Insurance	1.65	1.66	1.68	1.70	1.67	1.76	1.76	1.78	1.81	1.78
(8) Retirement Benefits	0.80	0.82	0.85	0.88	0.84	0.90	0.88	0.90	0.89	0.89
(9) Legally Required Benefits	2.01	2.04	2.07	2.08	2.05	2.10	2.12	2.14	2.14	2.13
(9A) Workers' Compensation	(0.45)	(0.47)	(0.47)	(0.47)	(0.47)	(0.48)	(0.48)	(0.49)	(0.48)	(0.48)
(10) Other Benefits	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
(11) Workers' Compensation as Percent of Remuneration	1.93%	2.01%	1.98%	1.97%	1.97%	1.99%	1.98%	2.01%	1.94%	1.98%
(12) Workers' Compensation as Percent of Gross Earnings	2.39%	2.49%	2.46%	2.45%	2.45%	2.48%	2.47%	2.51%	2.42%	2.47%

Panel B: State and Local Employees	March 2004	June 2004	Sept. 2004	Dec. 2004	2004 Average	March 2005	June 2005	Sept. 2005	Dec. 2005	2005 Average
(1) Total Remuneration	34.21	34.13	34.72	35.16	34.56	35.50	35.46	36.16	36.55	35.92
(2) Gross Earnings	26.59	26.44	26.78	27.07	26.72	27.25	27.18	27.56	27.86	27.46
(3) Wages and Salaries	23.69	23.52	23.83	24.10	23.79	24.26	24.17	24.52	24.83	24.45
(4) Paid Leave	2.60	2.61	2.64	2.66	2.63	2.68	2.69	2.72	2.72	2.70
(5) Supplemental Pay	0.30	0.31	0.31	0.31	0.31	0.31	0.32	0.32	0.31	0.32
(6) Benefits Other Than Pay	7.62	7.68	7.94	8.07	7.83	8.25	8.28	8.59	8.69	8.45
(7) Insurance	3.48	3.51	3.62	3.68	3.57	3.76	3.79	3.94	3.98	3.87
(8) Retirement Benefits	2.07	2.12	2.23	2.28	2.18	2.34	2.33	2.48	2.51	2.42
(9) Legally Required Benefits	2.02	2.00	2.04	2.06	2.03	2.10	2.11	2.12	2.15	2.12
(9A) Workers' Compensation	(0.39)	(0.40)	(0.41)	(0.41)	(0.40)	(0.44)	(0.46)	(0.45)	(0.47)	(0.46)
(10) Other Benefits	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
(11) Workers' Compensation as Percent of Remuneration	1.14%	1.17%	1.18%	1.17%	1.16%	1.24%	1.30%	1.24%	1.29%	1.27%
(12) Workers' Compensation as Percent of Gross Earnings	1.47%	1.51%	1.53%	1.51%	1.51%	1.61%	1.69%	1.63%	1.69%	1.66%

Panel C: All Non-Federal Employees	March 2004	June 2004	Sept. 2004	Dec. 2004	2004 Average	March 2005	June 2005	Sept. 2005	Dec. 2005	2005 Average
(1) Total Remuneration	24.95	24.96	25.36	25.57	25.21	25.87	25.86	26.05	26.46	26.06
(2) Gross Earnings	19.97	19.95	20.24	20.37	20.13	20.56	20.55	20.65	21.02	20.70
(3) Wages and Salaries	17.71	17.70	17.96	18.07	17.86	18.22	18.21	18.28	18.59	18.33
(4) Paid Leave	1.66	1.66	1.68	1.70	1.68	1.72	1.70	1.72	1.77	1.73
(5) Supplemental Pay	0.60	0.59	0.60	0.60	0.60	0.62	0.64	0.65	0.66	0.64
(6) Benefits Other Than Pay	4.97	5.01	5.11	5.18	5.07	5.31	5.30	5.40	5.45	5.37
(7) Insurance	1.93	1.93	1.96	1.99	1.95	2.06	2.05	2.10	2.13	2.09
(8) Retirement Benefits	0.99	1.01	1.05	1.08	1.03	1.11	1.09	1.13	1.13	1.12
(9) Legally Required Benefits	2.01	2.03	2.06	2.07	2.04	2.10	2.12	2.13	2.15	2.13
(9A) Workers' Compensation	(0.44)	(0.46)	(0.46)	(0.46)	(0.46)	(0.47)	(0.48)	(0.48)	(0.48)	(0.48)
(10) Other Benefits	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
(11) Workers' Compensation as Percent of Remuneration	1.76%	1.84%	1.81%	1.80%	1.80%	1.82%	1.86%	1.84%	1.81%	1.83%
(12) Workers' Compensation as Percent of Gross Earnings	2.20%	2.31%	2.27%	2.26%	2.26%	2.29%	2.34%	2.32%	2.28%	2.31%

Notes: See Notes for Tables 1-5.

Source: **Data in Panel A:** U.S. Department of Labor, 2007, Table 9.
Data in Panel B: U.S. Department of Labor, 2007, Table 5.
Data in Panel C: U.S. Department of Labor, 2007, Table 1.

Table 5 - Total Remuneration, Wages and Salaries, and Workers' Compensation, Quarterly March 2006 - December 2007
(In Dollars Per Hours Worked)

Panel A: Private Industry Employees	March 2006	June 2006	Sept. 2006	Dec. 2006	2006 Average	March 2007	June 2007	Sept. 2007	Dec. 2007	2007 Average
(1) Total Remuneration	25.09	25.16	25.52	25.67	25.36	25.91	25.93	26.09	26.42	26.09
(2) Gross Earnings	20.17	20.20	20.52	20.62	20.38	20.88	20.87	20.96	21.25	20.99
(3) Wages and Salaries	17.73	17.77	18.04	18.11	17.91	18.34	18.32	18.42	18.67	18.44
(4) Paid Leave	1.71	1.70	1.73	1.76	1.73	1.78	1.77	1.76	1.79	1.78
(5) Supplemental Pay	0.73	0.73	0.75	0.75	0.74	0.76	0.78	0.78	0.79	0.78
(6) Benefits Other Than Pay	4.91	4.94	5.00	5.06	4.98	5.04	5.06	5.12	5.18	5.10
(7) Insurance	1.85	1.87	1.89	1.92	1.88	1.97	1.97	1.99	2.01	1.99
(8) Retirement Benefits	0.91	0.91	0.93	0.94	0.92	0.87	0.88	0.92	0.95	0.91
(9) Legally Required Benefits	2.15	2.16	2.18	2.20	2.17	2.20	2.21	2.21	2.22	2.21
(9A) Workers' Compensation	(0.47)	(0.48)	(0.48)	(0.49)	(0.48)	(0.48)	(0.48)	(0.48)	(0.47)	(0.48)
(10) Other Benefits*										
(11) Workers' Compensation as Percent of Remuneration	1.87%	1.91%	1.88%	1.91%	1.89%	1.85%	1.85%	1.84%	1.78%	1.83%
(12) Workers' Compensation as Percent of Gross Earnings	2.33%	2.38%	2.34%	2.38%	2.36%	2.30%	2.30%	2.29%	2.21%	2.28%

Panel B: State and Local Employees	March 2006	June 2006	Sept. 2006	Dec. 2006	2006 Average	March 2007	June 2007	Sept. 2007	Dec. 2007	2007 Average
(1) Total Remuneration	36.96	37.01	37.91	38.26	37.54	38.66	38.61	39.50	37.73	38.63
(2) Gross Earnings	28.21	28.21	28.83	29.05	28.58	29.24	29.13	29.68	28.35	29.10
(3) Wages and Salaries	25.01	24.96	25.53	25.74	25.31	25.90	25.73	26.26	25.04	25.73
(4) Paid Leave	2.88	2.92	2.98	2.99	2.94	3.01	3.05	3.07	2.97	3.03
(5) Supplemental Pay	0.32	0.33	0.32	0.32	0.32	0.33	0.35	0.35	0.34	0.34
(6) Benefits Other Than Pay	8.75	8.80	9.08	9.20	8.96	9.42	9.47	9.83	9.38	9.53
(7) Insurance	4.03	4.06	4.18	4.22	4.12	4.36	4.38	4.50	4.25	4.37
(8) Retirement Benefits	2.54	2.56	2.68	2.75	2.63	2.82	2.86	3.04	2.86	2.90
(9) Legally Required Benefits	2.18	2.18	2.22	2.23	2.20	2.24	2.23	2.29	2.27	2.26
(9A) Workers' Compensation	(0.46)	(0.47)	(0.46)	(0.47)	(0.47)	(0.47)	(0.48)	(0.49)	(0.43)	(0.47)
(10) Other Benefits*										
(11) Workers' Compensation as Percent of Remuneration	1.24%	1.27%	1.21%	1.23%	1.24%	1.22%	1.24%	1.24%	1.14%	1.21%
(12) Workers' Compensation as Percent of Gross Earnings	1.63%	1.67%	1.60%	1.62%	1.63%	1.61%	1.65%	1.65%	1.52%	1.61%

Panel C: All Non-Federal Employees	March 2006	June 2006	Sept. 2006	Dec. 2006	2006 Average	March 2007	June 2007	Sept. 2007	Dec. 2007	2007 Average
(1) Total Remuneration	26.86	26.86	27.31	27.54	27.14	27.82	27.75	28.03	28.11	27.93
(2) Gross Earnings	21.37	21.35	21.72	21.87	21.58	22.13	22.05	22.23	22.30	22.18
(3) Wages and Salaries	18.82	18.80	19.12	19.24	19.00	19.47	19.38	19.56	19.62	19.51
(4) Paid Leave	1.88	1.88	1.91	1.94	1.90	1.96	1.95	1.95	1.96	1.96
(5) Supplemental Pay	0.67	0.67	0.69	0.69	0.68	0.70	0.72	0.72	0.72	0.72
(6) Benefits Other Than Pay	5.49	5.51	5.59	5.67	5.57	5.70	5.70	5.79	5.81	5.75
(7) Insurance	2.18	2.19	2.22	2.26	2.21	2.33	2.32	2.35	2.34	2.34
(8) Retirement Benefits	1.15	1.15	1.18	1.21	1.17	1.16	1.17	1.22	1.24	1.20
(9) Legally Required Benefits	2.16	2.17	2.19	2.20	2.18	2.21	2.21	2.22	2.23	2.22
(9A) Workers' Compensation	(0.47)	(0.48)	(0.48)	(0.48)	(0.48)	(0.48)	(0.48)	(0.48)	(0.47)	(0.48)
(10) Other Benefits*										
(11) Workers' Compensation as Percent of Remuneration	1.75%	1.79%	1.76%	1.74%	1.76%	1.73%	1.73%	1.71%	1.67%	1.71%
(12) Workers' Compensation as Percent of Gross Earnings	2.20%	2.25%	2.21%	2.19%	2.21%	2.17%	2.18%	2.16%	2.11%	2.15%

Notes: See Notes for Tables 1-5.
 * Publication of other benefits was discontinued beginning in March 2006.

Sources: **Data in Panel A:** U.S. Department of Labor, 2008, Table 9.
 Data in Panel B: U.S. Department of Labor, 2008, Table 5.
 Data in Panel C: U.S. Department of Labor, 2008, Table 1.

then declined for seven years until reaching 1.92 percent of payroll in 2001. Costs subsequently began to increase for the next four years from 2.05 percent of payroll in 2002, 2.25 percent of payroll in 2003, 2.45 percent of payroll in 2004, and 2.47 percent of payroll in 2005 before decreasing in 2006 to 2.36 percent of payroll and in 2007 to 2.28 percent of payroll.

State and Local Government Employees. The employers' costs of workers' compensation as a percent of payroll for employees in the state and local government sector from 1991 to 2007 are shown in Figure B and Panel B of Tables 1 to 5. This sector's workers' compensation costs started at 1.49 percent of payroll in 1991, increased until reaching 1.59 percent of payroll in 1995, dropped to 1.34 percent of payroll in 2000, rebounded to 1.42 percent of payroll in 2001 and 2002, and increased to 1.43 percent of payroll in 2003, 1.51 percent of payroll in 2004, and 1.66 percent of payroll in 2005, which represents the highest cost of workers' compensation in the state and local government sector since the data series began in 1991. The costs of workers' compensation state and local government employees then decreased in 2006 to 1.63 percent of payroll and decreased again in 2007 to 1.61 percent of payroll..

All Non-Federal Employees. Workers' compensation costs for 1991 to 2007 for all non-federal employees, a category that includes private industry employees along with state and local government employees, are presented in Figure C and in Panel C of Tables 1 to 5. Workers' compensation costs for employers of all non-federal employees represented 2.41 percent of payroll in 1991, increased to a peak of 2.67 percent in 1994, declined from 1994 to 2001, when it was 1.87 percent of payroll, and then increased for four years to 2.31 percent of payroll in 2005. In 2006 the workers' compensation costs as a percent of payroll for all non-federal employees decreased to 2.21 percent and decreased again in 2007 to 2.15 percent of payroll.

Costs Per Hour Worked

An alternative measure of the employers' costs of workers' compensation is employers' expenditures on the program in dollars per hour worked.

Private Sector Employees. The employers' costs of workers' compensation in dollars per hour worked for private sector workers from 1986 to 2007 are shown in Figure D and Panel A of Tables 1 to 5. Using this measure of employers' costs, the costs in the private sector began at $0.19 per hour in 1986, increased to $0.41 per hour in 1994, declined in most years until reaching $0.33 per hour in 2000 and 2001, and then

increased to $0.37 per hour in 2002, $0.42 per hour in 2003, $0.47 per hour in 2004, and $0.48 in 2005, 2006, and 2007.

State and Local Government Employees. The employers' costs of workers' compensation in dollars per hour worked for workers in the state and local government sector from 1991 to 2007 are shown in Figure E and Panel B of Tables 1 to 5. The employers' costs of workers' compensation per hour worked in the state and local government sector were $0.26 in 1991 (the first year with data), increased to $0.31 in 1994, fluctuated in a narrow band between $0.30 and $0.31 per hour from 1994 to 2000, and then increased rapidly for six years until costs were $0.46 per hour worked in 2005. In 2006 and 2007, the costs of workers' compensation per hour worked increased slightly to $0.47 in the state and local government sector.

All Non-Federal Employees. The employers' costs of workers' compensation in dollars per hour worked for all non-federal government employees from 1991 to 2007 are shown in Figure F and Panel C of Tables 1 to 5. Workers' compensation costs per hour worked for all non-federal government employees were $0.32 in 1991 (the first year with data), increased to $0.39 in 1994, declined to $0.33 in 2000, and then increased significantly to $0.37 in 2002, $0.41 in 2003, and $0.46 per hour worked in 2004. Employers' costs for all non-federal employees increased moderately in 2005 to $0.48 per hour worked, and remained at this level in 2006 and 2007.

QUARTERLY DATA

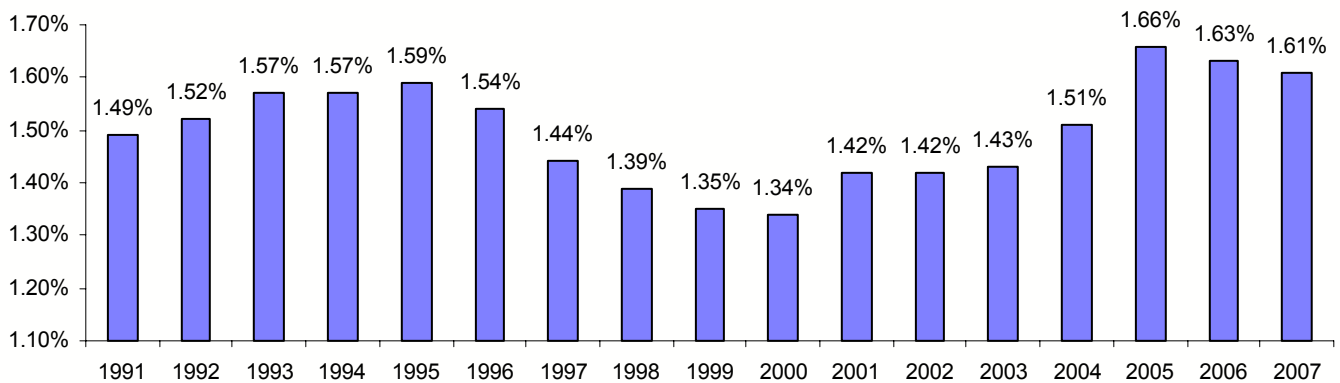## Workers' Compensation Costs as Percent of Payroll

Private sector employees. The trends in workers' compensation costs in the private sector since March 2002 are further documented in Figure G and Panel A of Tables 3 to 5, which present information on the 24 quarters of data available under the new BLS quarterly publication schedule. The employers' costs of 1.96 percent in March 2002 increased until September 2002, dropped slightly in December 2002, and subsequently resumed an increase in every quarter until June 2004, when costs represented 2.49 percent of payroll. Costs for employers in the private sector fluctuated in a relatively narrow range of 2.45 percent to 2.51 percent of payroll between June 2002 and September 2005. Costs then dropped in the last quarter of 2005, reaching 2.42 percent of payroll in December 2005. Workers' compensation costs in 2006 fluctuated between 2.33 and 2.38 percent of payroll which is consistently below the costs in the previous two years, which varied

Notes for Tables 1– 5

Notes: * = $0.01 or less

(1) Table 1 and the text of this article use the term "remuneration" in place of the term "compensation" that is used in the BLS publications, and use the term "All non-federal Employees" in place of the term "Civilian Workers" that is used in the BLS publications.

(2) Total remuneration (row 1) = gross earnings (row 2) + benefits other than pay (row 6).

(3) Gross earnings (row 2) = wages and salaries (row 3) + paid leave (row 4) + supplemental pay (row 5).

(4) Benefits other than pay (row 6) = insurance (row 7) + retirement benefits (row 8) + legally required benefits (row 9) + other benefits (row 10).

(5) Workers' compensation (row 9A) is one of the legally required benefits (row 9).

(6) Workers' compensation as percent of remuneration (row 11) = workers compensation (row 9A)/total remuneration (row 1).

(7) Workers' compensation as percent of gross earnings (row 12) = workers' compensation (row 9A)/gross earnings (row 2).

(8) Results in rows (2), (6), (11), and (12) were calculated by Florence Blum and John F. Burton, Jr.

Figure B - Workers' Compensation Costs as a Percentage of Gross Earnings, State and Local Government Employees, 1991-2007

Source: Tables 1, 2 , 3, 4, and 5.
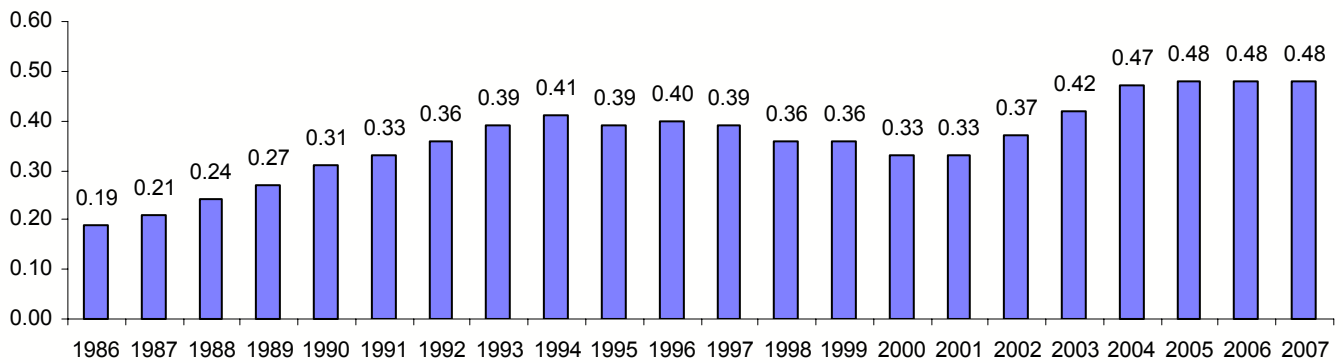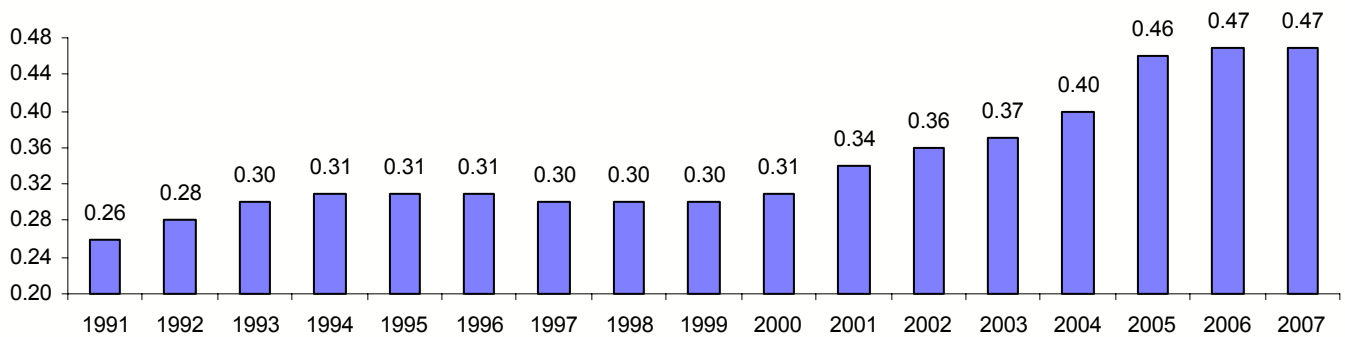**Note:** Data for 2002-2007 are annual averages; data for earlier years are for March.

Figure C - Workers' Compensation Costs as a Percentage of Gross Earnings, All Non-Federal Employees, 1991-2007
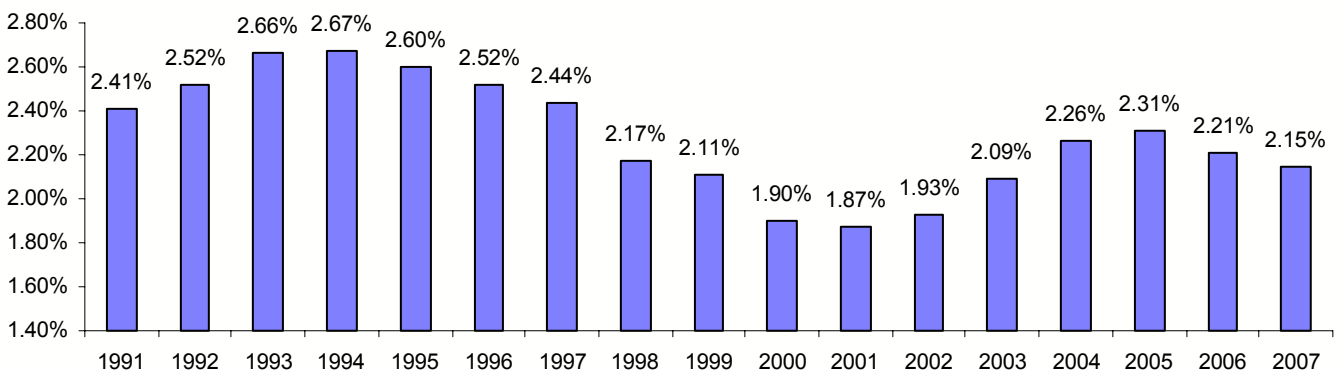
Source: Tables 1, 2, 3, 4, and 5.
Note: Data for 2002-2007 are annual averages; data for earlier years are for March.

**Figure D - Workers' Compensation Costs for Private Industry Employees,
1986-2007 (In Dollars per Hour Worked)**

Source: Tables 1, 2, 3, 4, and 5.
Note: Data for 2002-2007 are annual averages; data for earlier years are for March.
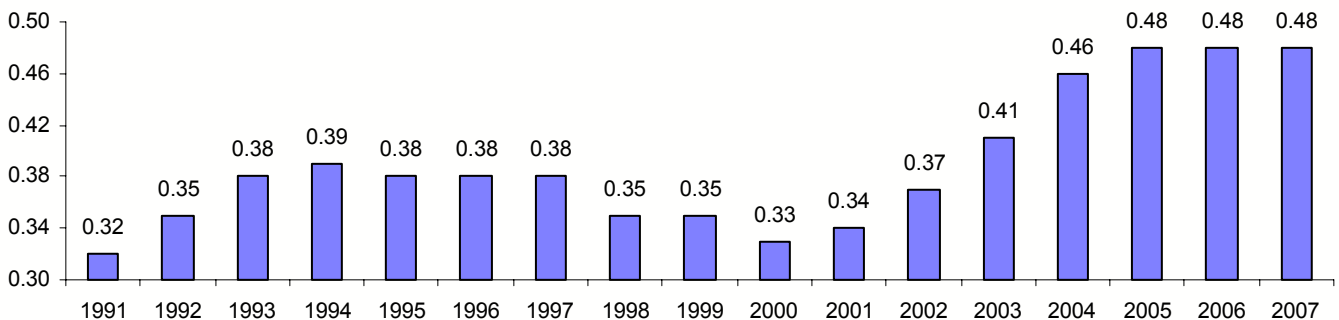
**Figure E - Workers' Compensation Costs for State and Local Government
Employees, 1991-2007 (In Dollars per Hour Worked)**

Source: Tables 1, 2, 3, 4, and 5.
Note: Data for 2002-2007 are annual averages; data for earlier years are for March.

**Figure F - Workers' Compensation Costs for All Non-Federal Employees,
1991-2007 (In Dollars per Hour Worked)**

Source: Tables 1, 2, 3, 4, and 5.
Note: Data for 2002-2007 are annual averages; data for earlier years are for March.

from 2.39 percent to 2.51 percent of payroll in the eight quarter of 2004 and 2005. Costs then dropped again in 2007. The first three quarters were relatively consistent, ranging between 2.29 and 2.30 percent of payroll. However, workers' compensation costs in December 2007 showed a dramatic decrease to 2.21 percent of payroll, the lowest level since March 2003.

State and Local Government Employees. The fluctuations in workers' compensation costs in the state and local sector in recent years are evident in the 24 quarters of data available included in Figure H and Panel B of Tables 3 to 5. The employers' costs increased from 1.37 percent of payroll in March 2002 to 1.45 percent of payroll in December 2002, dropped to 1.40 percent of payroll in March 2003, and then matched the previous peak of 1.45 percent of payroll in September 2003, before declining again to 1.44 percent of payroll in December 2003. Costs in the sector then generally increased for eight quarters, reaching a new peak of 1.69 percent of payroll in June 2005, followed by a decline to 1.63 percent of payroll in September 2005 and a rebound to the peak of 1.69 percent of payroll in December 2005. In 2006 workers' compensation costs ranged from 1.60 to 1.67 percent of payroll, somewhat below the range of 1.61 to 1.69 percent of payroll in the four quarters of 2005. Workers' compensation costs in the state and local sector in 2007 fluctuated in the first three quarters from 1.61 to 1.65 percent of payroll before declining to 1.52 percent in December 2007, the lowest level since December 2004.

All Non-federal Employees. A general trend towards higher workers' compensation costs for all non-federal employers between 2002 and mid-2004 is shown in the data in Figure I and in Panel C of Tables 3 to 5. The employers' costs of 1.85 percent of payroll in March 2002 was followed by nine quarters of generally increasing costs until costs reached 2.31 percent of payroll in June 2004. Then costs fluctuated until reaching a recent peak of 2.34 percent in June 2005, followed by three quarters of decline through March 2006, when workers' compensation costs were 2.20 percent of payroll. Costs then increased to 2.25 percent in the second quarter of 2006, followed by another three quarters of decline through March 2007 to 2.17 percent of payroll. Costs increased slightly in June 2007 to 2.18 percent of payroll before another two year decline. December 2007 costs were 2.11 percent of payroll for all non-federal employers, the lowest level since June 2003.

Workers' Compensation Costs per Hour Worked

Private Sector Employees. The quarterly data indicate that private sector employers expended $0.35 per hour on workers' compensation in March 2002 and that these expenditures increased almost every quarter until reaching $0.47 per hour in June 2004 (Figure J and Panel A of Tables 3 to 5). Since June 2004, employers' costs have varied within a narrow range, with costs at $0.47 per hour worked in December 2007.

State and Local Government Employees. The quarterly data indicate that state and local government employers expended $0.34 per hour on workers' compensation in March 2002 and that these expenditures fluctuated between $0.36 and $0.38 per hour between September 2002 and December 2003 (Figure K and Panel B of Tables 3 to 5). Cost then increased significantly in the state and local government sector during 2004 and 2005, reaching $0.47 per hour worked in December 2005. Costs in 2006 remain stable, varying between $0.46 and $0.47 per hour worked. The first three quarters of 2007 showed increasing costs, beginning with $0.47 in March, rising to $0.48 in June, and rising again to $0.49 in September. December 2007 showed a significant decrease to $0.43 per hour worked, the lowest level since December 2004

All Non-Federal Employees. The quarterly data indicate that state and local government employers expended $0.35 per hour on workers' compensation in March 2002 and that these expenditures increased in most quarters until they reached $0.48 per hour worked in June 2005. Since then, employers' workers' compensation costs for all non-federal employees have been at a plateau of $0.48 per hour worked except for two decreases to $0.47 in March 2006 and December 2007 (Figure L and Panel C of Tables 3 to 5).

## RECENT INCREASES AND DECREASES IN WORKERS' COMPENSATION COSTS

The most comprehensive set of employers represented in the BLS survey are those employing all non-federal employees. For those employers, the low point for employers' costs as a percent of payroll occurred in March 2002, when the costs represented 1.85 percent of payroll. Tables 6, 7, and 8 indicate the increases and decreases in workers' compensation costs since March 2002.

Figure G
Workers' Compensation Costs as a Percentage of Gross Earnings,
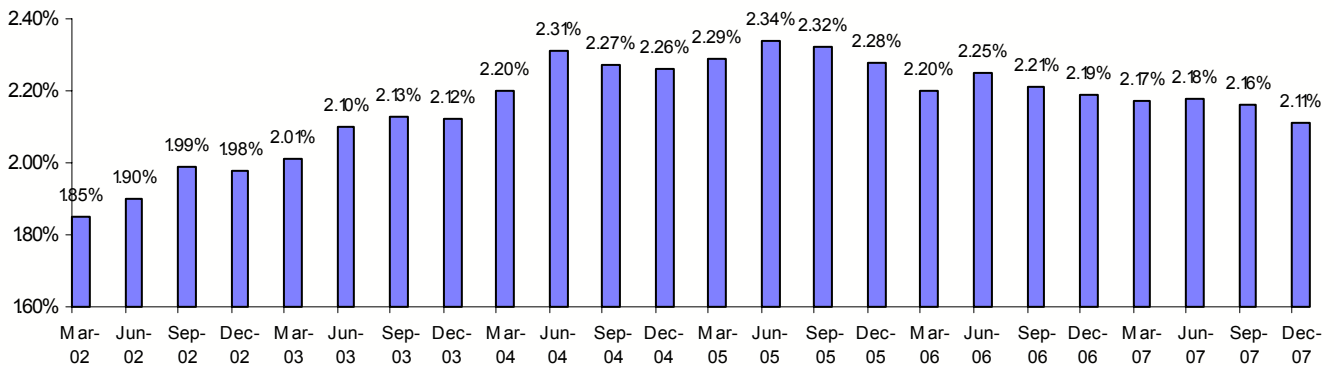**Private Industry Employees, March 2002 - December 2007**
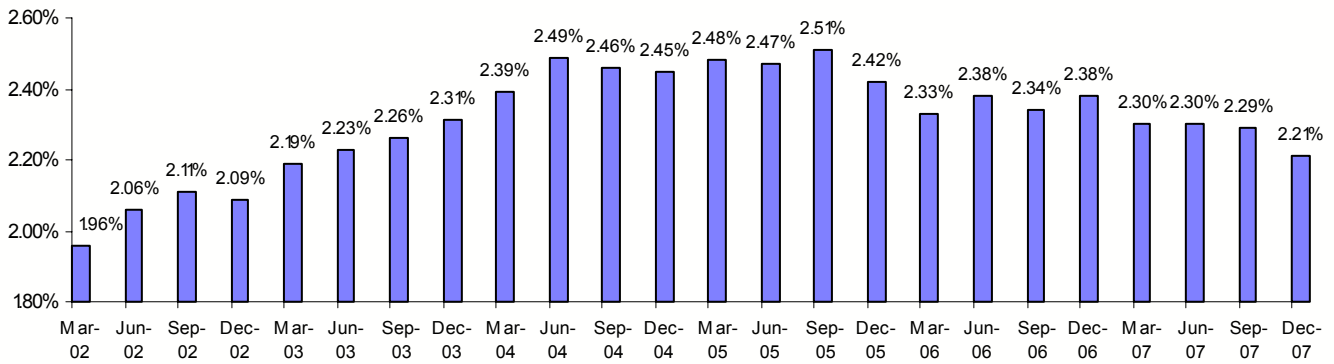
Source: Tables 3, 4, and 5.

Figure H
Workers' Compensation Costs as a Percentage of Gross Earnings,
State and Local Employees, March 2002 - December 2007
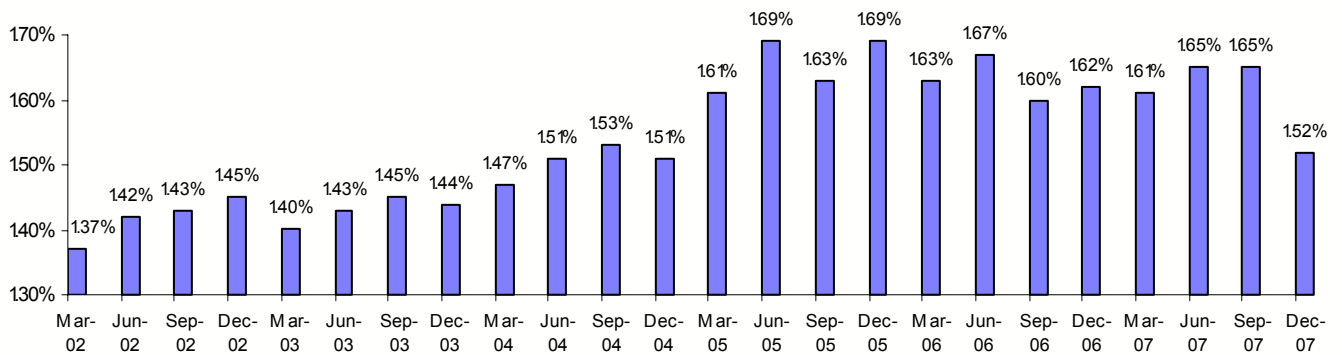
Source: Tables 3, 4, and 5.

Figure I
Workers' Compensation Costs as a Percentage of Gross Earnings,
All Non-Federal Employees, March 2002 - December 2007

Source: Tables 3, 4, and 5.

Employer's Costs as a Percent of Payroll

Private Sector Employees. The employers' costs of workers' compensation as a percent of payroll increased from 1.96 percent in March 2002 to 2.21 percent of payroll in December 2007 (Figure G and Table 6, Panel A, Column (1)). This represents a cumulative increase of costs of 12.8 percent over the twenty-four quarters (Table 6, Panel A, Column (2)). The quarterly data can also be used to calculate annual rates of increase or decrease in workers' compensation costs over the preceding year. For example, private sector employers' costs were 1.96 percent of payroll in March 2002 and 2.19 percent of payroll in March 2003, which represents an 11.7 percent increase in costs over the twelve months (Figure M and Table 6, Panel A, Column (3)). The data indicate the employers' costs of workers' compensation as a percent of payroll in the private sector were down all four quarter in 2007: the declines were 1.3 percent in March 2007, 3.4 percent in June 2007, 2.1 percent in September 2007 and 7.1 percent in December 2007 from the corresponding quarters in 2006.

State and Local Employees. The employers' costs of workers' compensation as a percent of payroll increased from 1.37 percent of payroll in March 2002 to 1.52 percent of payroll in December 2007 (Figure H and Table 7, Panel A, Column (1)). This represents a cumulative increase in costs of 10.9 percent over twenty-four quarters (Table 7, Panel A, Column (2)). The quarterly data can also be used to calculate annual rates of increase or decrease in workers' compensation costs over the preceding year. For example, state and local government sector employers' costs were 1.37 percent of payroll in March 2002 and 1.40 percent of payroll in March 2003, which represents a 2.2 percent increase in costs over the twelve months (Figure N and Table 7, Panel A, Column (3)). The data indicate the employers' costs of workers' compensation as a percent of payroll in the state and local sector were down 1.2 percent in March 2007, and then down 1.2 percent in June 2007, up 3.1 percent in September 2007 and down 6.2 percent in December 2007 from the corresponding quarters in 2006.

All Non-Federal Employees. The employers' costs of workers' compensation as a percent of payroll increased from 1.85 percent of payroll in March 2002 to 2.11 percent of payroll in December 2007 (Figure I and Table 8, Panel A, Column (1)). This represents a cumulative increase of costs of 14.1 percent over the twenty-four quarters (Table 8, Panel A, Column (2)). The quarterly data can also be used to calculate annual rates of increase in workers' compensation costs over the preceding year. For example, all non-federal employers' costs were 1.85 percent of payroll in March 2002 and 2.01 percent of payroll in March 2003, which represents an 8.6 percent increase in costs over the twelve months (Figure O and Table 8, Panel A, Column (3)). The data indicate the employers' costs of workers' compensation as a percent of payroll for all non-federal employees were down all four quarter in 2007: the declines were 1.4 percent in March 2007, 3.1 percent in June 2007, 2.3 percent in September 2007 and 3.7 percent in December 2007 from the corresponding quarters in 2006.

Workers' Compensation Costs per Hour Worked

Private Sector Employees. The employers' costs of workers' compensation per hour worked increased from $0.35 in March 2002 to $0.47 percent of payroll in December 2007 (Figure J and Table 6, Panel B, Column (1)). This represents a cumulative increase of costs of 34.3 percent over the twenty-four quarters (Table 6, Panel B, Column (2)). The quarterly data can also be used to calculate annual rates of increase in workers' compensation costs over the preceding year. For example, private sector employers' costs were $0.35 per hour in March 2002 and $0.40 in March 2003, which represents a 14.3 percent increase in costs over the twelve months (Figure P and Table 6, Panel B, Column (3)). The data indicate the employers' costs of workers' compensation in dollars per hour worked in the private sector fluctuated in 2007: the costs were up 2.1 percent in March 2007, unchanged in June and September 2007, and then down 4.1 percent in December 2007 compared to the corresponding quarters in 2006.

State and Local Employees. The employers' costs of workers' compensation per hour worked increased from $0.34 in March 2002 to $0.43 in December 2007 (Figure K and Table 7, Panel B, Column (1)). This represents a cumulative increase of costs of 26.5 percent over twenty-four quarters (Table 7, Panel B, Column (2)). The quarterly data can also be used to calculate annual rates of increase in workers' compensation costs over the preceding year. For example, state and local government sector employers' costs were $0.34 per hour worked in March 2002 and $0.36 per hour worked in March 2003, which represents a 5.9 percent increase in costs over the twelve months (Figure Q and Table 7, Panel B, Column (3)). The data indicate the employers' costs of workers' compensation in dollars per hour worked in the state and local sector were varied in 2007: the costs were up 2.2 percent in March 2007, 2.1 percent in June 2007, 6.5 percent in September 2007 and then down 8.5 percent in December 2007 compared to the corresponding quarters in 2006.

Figure J
Workers' Compensation Costs for Private Industry Employees,
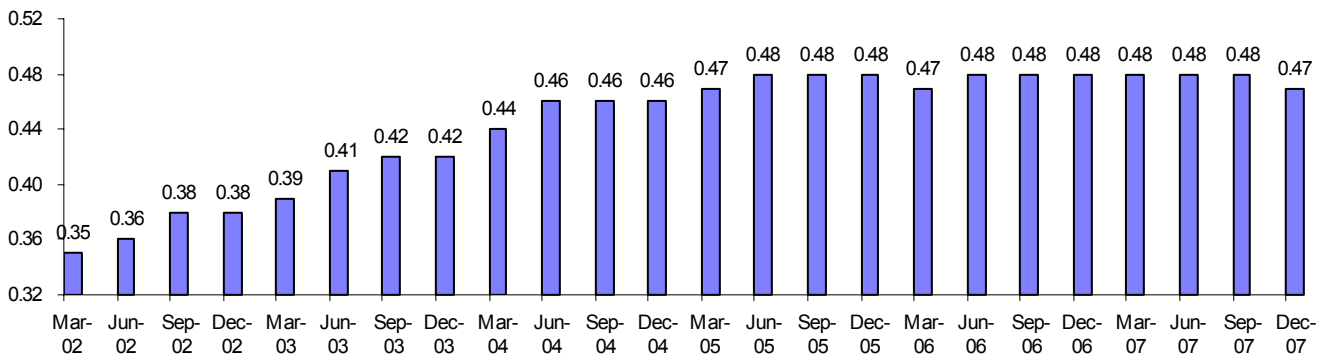**March 2002 - December 2007 (in Dollars per Hour Worked)**
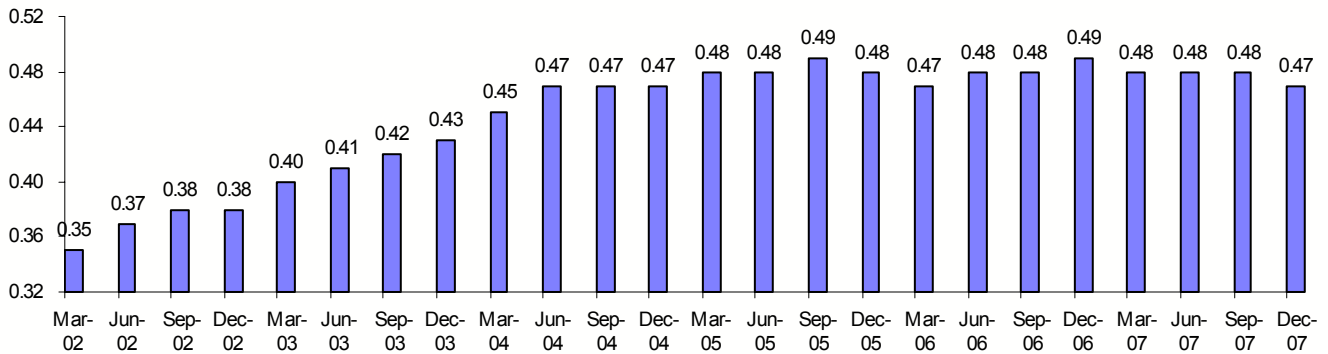
Source: Tables 3, 4, and 5.

Figure K
Workers' Compensation Costs for State and Local Employees,
March 2002 - December 2007 (in Dollars per Hour Worked)
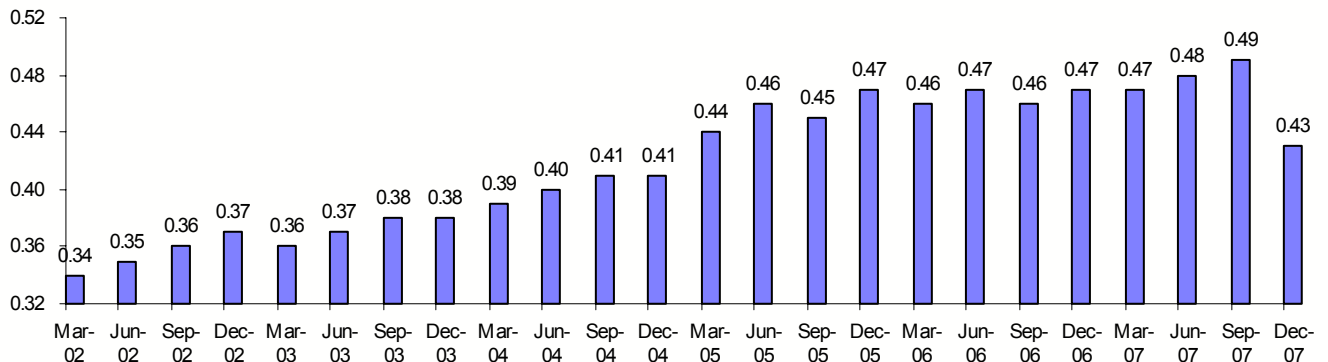
Source: Tables 3, 4, and 5.

Figure L
Workers' Compensation Costs for All Non-Federal Employees,
March 2002 - December 2007 (in Dollars per Hour Worked)

Source: Tables 3, 4, and 5.

Table 6 - Employers' Cost of Workers' Compensation Increases Since March 2002

Private Industry Employees

Panel A: As Percent of Gross Earnings (Payroll)

	Employers' Costs as % of Payroll (1)	Cumulative Increase Since March 2002 (2)	Increase Over Twelve Months (3)
March 2002	1.96		
June 2002	2.06	5.1%	
September 2002	2.11	7.7%	
December 2002	2.09	6.6%	
March 2003	2.19	11.7%	11.7%
June 2003	2.23	13.8%	8.3%
September 2003	2.26	15.3%	7.1%
December 2003	2.31	17.9%	10.5%
March 2004	2.39	21.9%	9.1%
June 2004	2.49	27.0%	11.7%
September 2004	2.46	25.5%	8.8%
December 2004	2.45	25.0%	6.1%
March 2005	2.48	26.5%	3.8%
June 2005	2.47	26.0%	-0.8%
September 2005	2.51	28.1%	2.0%
December 2005	2.42	23.5%	-1.2%
March 2006	2.33	18.9%	-6.0%
June 2006	2.38	21.4%	-3.6%
September 2006	2.34	19.4%	-6.8%
December 2006	2.38	21.4%	-1.7%
March 2007	2.30	17.3%	-1.3%
June 2007	2.30	17.3%	-3.4%
September 2007	2.29	16.8%	-2.1%
December 2007	2.21	12.8%	-7.1%

Panel B: In Dollars Per Hours Worked

	Employers' Costs in Dollars (1)	Cumulative Increase Since March 2002 (2)	Increase Over Twelve Months (3)
March 2002	0.35		
June 2002	0.37	5.7%	
September 2002	0.38	8.6%	
December 2002	0.38	8.6%	
March 2003	0.40	14.3%	14.3%
June 2003	0.41	17.1%	10.8%
September 2003	0.42	20.0%	10.5%
December 2003	0.43	22.9%	13.2%
March 2004	0.45	28.6%	12.5%
June 2004	0.47	34.3%	14.6%
September 2004	0.47	34.3%	11.9%
December 2004	0.47	34.3%	9.3%
March 2005	0.48	37.1%	6.7%
June 2005	0.48	37.1%	2.1%
September 2005	0.49	40.0%	4.3%
December 2005	0.48	37.1%	2.1%
March 2006	0.47	34.3%	-2.1%
June 2006	0.48	37.1%	0.0%
September 2006	0.48	37.1%	-2.0%
December 2006	0.49	40.0%	2.1%
March 2007	0.48	37.1%	2.1%
June 2007	0.48	37.1%	0.0%
September 2007	0.48	37.1%	0.0%
December 2007	0.47	34.3%	-4.1%

Source: Tables 3, 4, and 5, Rows (9A) and (12) of Panel A.

All Non-Federal Employees. The employers' costs of workers' compensation per hour worked increased from $0.35 in March 2002 to $0.47 in December 2007 (Figure L and Table 8, Panel B, Column (1)). This represents a cumulative increase of costs of 34.3 percent over the twenty-four quarters (Table 8, Panel B, Column (2)). The quarterly data can also be used to calculate annual rates of increase in workers' compensation costs over the preceding year. For example, all non-federal employers' costs were $0.35 per hour worked in March 2002 and $0.39 in March 2003, which represents an 11.4 percent increase in costs over the twelve months (Figure R and Table 8, Panel B, Column (3)). The data indicate the employers' costs of workers' compensation in dollars per hour worked for all non-federal employees fluctuated in 2007: the costs were up 2.1 percent in March 2007, unchanged in June and September 2007, and then down 2.1 percent in December 2007 compared to the corresponding quarters in 2006.

ANALYSIS

Employers' Costs in Historical Context

Workers' compensation costs as a percentage of gross earnings (or payroll) is the most common measure of employers' costs used in the workers' compensation literature. The rationale is that over time employer expenditures on remuneration for employees, including wages, health insurance, pensions and workers' compensation, increase. For example, between 1991 (March) and 2007 (annual), private sector employers' expenditures for workers' compensation increased from $0.33 to $0.48 per hour worked, which represents a 45 percent increase. In isolation, a 45 percent increase in workers' compensation costs per hour worked may sound like a substantial increase. However, over that same period -- between 1991 (March) and 2006 (annual) -- the gross earnings (payroll) paid by employers for private sector employees increased from $12.55 to $20.99 per hour worked (Panel A, Tables 1 and 5), which is a 67 percent increase. Workers' compensation costs per hour worked have increased less rapidly than payroll since 1991, which helps put the workers' compensation cost developments in perspective.

Another way to put in perspective the developments over time in employer expenditures on
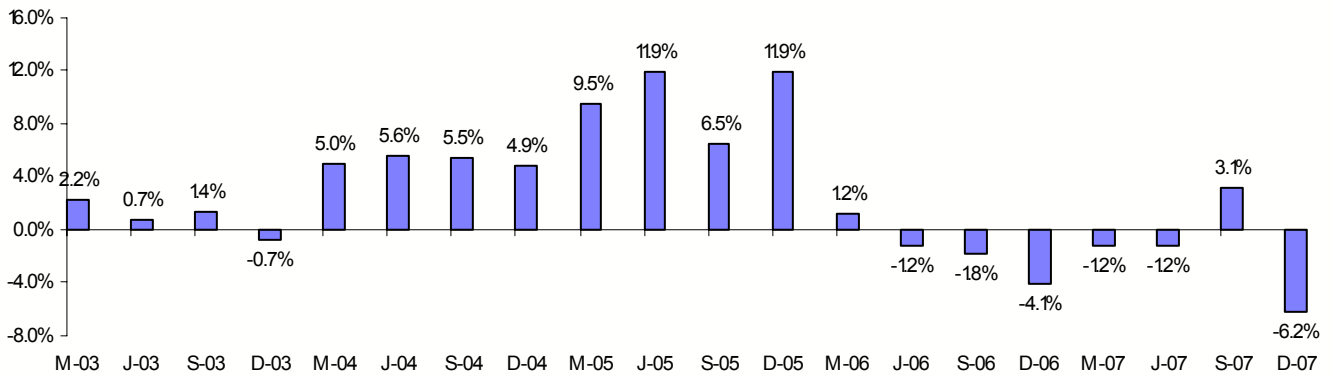
Figure M - Workers' Compensation Costs as a Percent of Payroll:
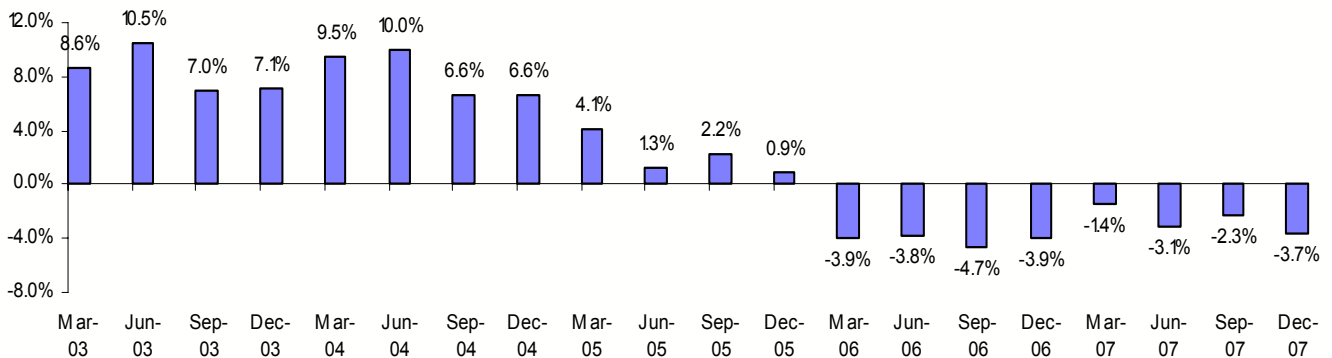**Annual Percent of Increase - Private Industry**
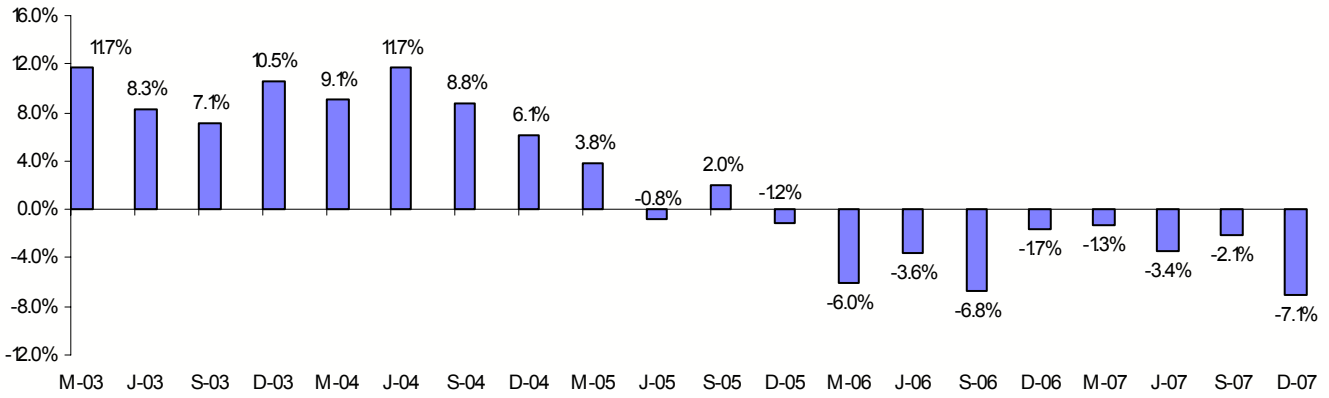
Source: Table 6, Panel A.

Figure N - Workers' Compensation Costs as Percent of Payroll:
Annual Percentage Rates of Increase - State and Local

Source: Table 7, Panel A.

Figure O - Workers' Compensation Costs as Percent of Payroll:
Annual Percentage Rates of Increase - All Non-Federal

Source: Table 8, Panel A.

Table 7 - Employers' Cost of Workers' Compensation Increases Since March 2002		
State and Local Employees		
Panel A: As Percent of Gross Earnings (Payroll)		
Employers' Costs as % of Payroll (1)	Cumulative Increase Since March 2002 (2)	Increase Over Twelve Months (3)
March 2002 — 1.37		
June 2002 — 1.42	3.6%	
September 2002 — 1.43	4.4%	
December 2002 — 1.45	5.8%	
March 2003 — 1.40	2.2%	2.2%
June 2003 — 1.43	4.4%	0.7%
September 2003 — 1.45	5.8%	1.4%
December 2003 — 1.44	5.1%	-0.7%
March 2004 — 1.47	7.3%	5.0%
June 2004 — 1.51	10.2%	5.6%
September 2004 — 1.53	11.7%	5.5%
December 2004 — 1.51	10.2%	4.9%
March 2005 — 1.61	17.5%	9.5%
June 2005 — 1.69	23.4%	11.9%
September 2005 — 1.63	19.0%	6.5%
December 2005 — 1.69	23.4%	11.9%
March 2006 — 1.63	19.0%	1.2%
June 2006 — 1.67	21.9%	-1.2%
September 2006 — 1.60	16.8%	-1.8%
December 2006 — 1.62	18.2%	-4.1%
March 2007 — 1.61	17.5%	-1.2%
June 2007 — 1.65	20.4%	-1.2%
September 2007 — 1.65	20.4%	3.1%
December 2007 — 1.52	10.9%	-6.2%

Panel B: In Dollars Per Hours Worked

Employers' Costs in Dollars (1)	Cumulative Increase Since March 2002 (2)	Increase Over Twelve Months (3)
March 2002 — 0.34		
June 2002 — 0.35	2.9%	
September 2002 — 0.36	5.9%	
December 2002 — 0.37	8.8%	
March 2003 — 0.36	5.9%	5.9%
June 2003 — 0.37	8.8%	5.7%
September 2003 — 0.38	11.8%	5.6%
December 2003 — 0.38	11.8%	2.7%
March 2004 — 0.39	14.7%	8.3%
June 2004 — 0.40	17.6%	8.1%
September 2004 — 0.41	20.6%	7.9%
December 2004 — 0.41	20.6%	7.9%
March 2005 — 0.44	29.4%	12.8%
June 2005 — 0.46	35.3%	15.0%
September 2005 — 0.45	32.4%	9.8%
December 2005 — 0.47	38.2%	14.6%
March 2006 — 0.46	35.3%	4.5%
June 2006 — 0.47	38.2%	2.2%
September 2006 — 0.46	35.3%	2.2%
December 2006 — 0.47	38.2%	0.0%
March 2007 — 0.47	38.2%	2.2%
June 2007 — 0.48	41.2%	2.1%
September 2007 — 0.49	44.1%	6.5%
December 2007 — 0.43	26.5%	-8.5%

Source: Tables 3, 4, and 5, Rows (9A) and (12) of Panel B.

workers' compensation is to compare them to payroll in each year. That workers' compensation expenditures for private sector employers represented 2.63 percent of payroll in 1991 (March) and 2.28 percent of payroll in 2007 (annual) provides information more useful than simply stating that workers' compensation costs per hour increased by 45 percent over those 17 years.

The preceding sections have documented the changes in employer expenditures on workers' compensation as a percent of payroll for three levels of aggregation of employees. For private sector employees, where the data are available since 1986, the costs increased from 1986 to 1994, declined sharply through 2001, and increased from 2001 to mid-2004. The costs were then relatively stable until the last quarter of 2005, and then declined in 2006 and 2007 (Figures A and G).

...the recent run-up in workers' compensation costs for private sector employers nonetheless means that costs as a percent of payroll in 2007 were lower than in any year between 1990 and 1999.

For state and local government employees, where the data are only available since 1991, the pattern is roughly similar to the private sector until the last few years: employers' costs increased through 1995, declined until 2000, and then increased modestly through December 2004. Then, for reasons currently unknown, workers' compensation costs as a percent of payroll significantly increased in the state and local government sector in 2005 before declining slightly in 2006 and again in 2007 (Figures B and H).

Finally, for all non-federal employees (which primarily consists of private sector employees), the data series shows an increase in employers' costs from 1991 through 1994, followed by a decline in employers' costs between 1995 and 2001. Costs then generally increased through 2005 before declining slightly in 2006 and 2007 (Figures C and I).
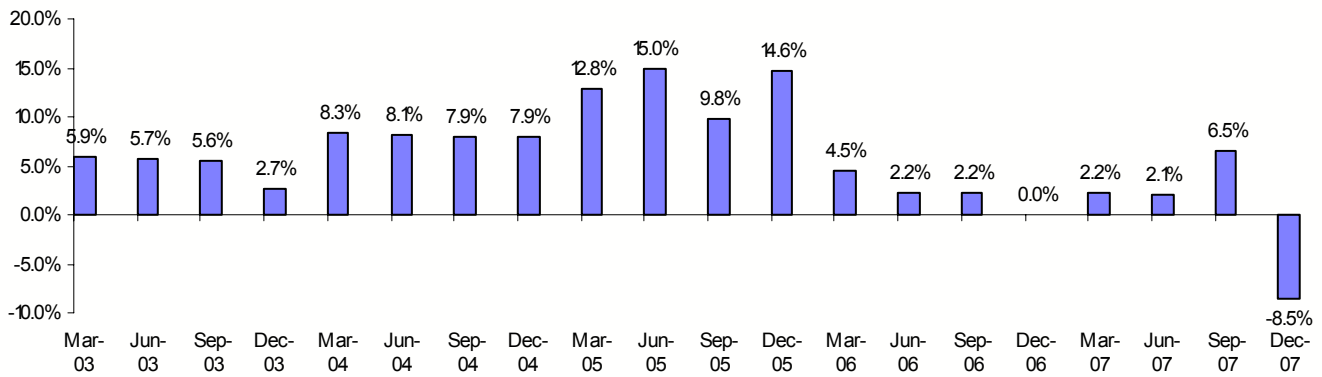
While these increases in costs after 2002 are noteworthy, the recent run-up in workers' com-

**Figure P - Workers' Compensation Costs in Dollars Per Hour Worked:
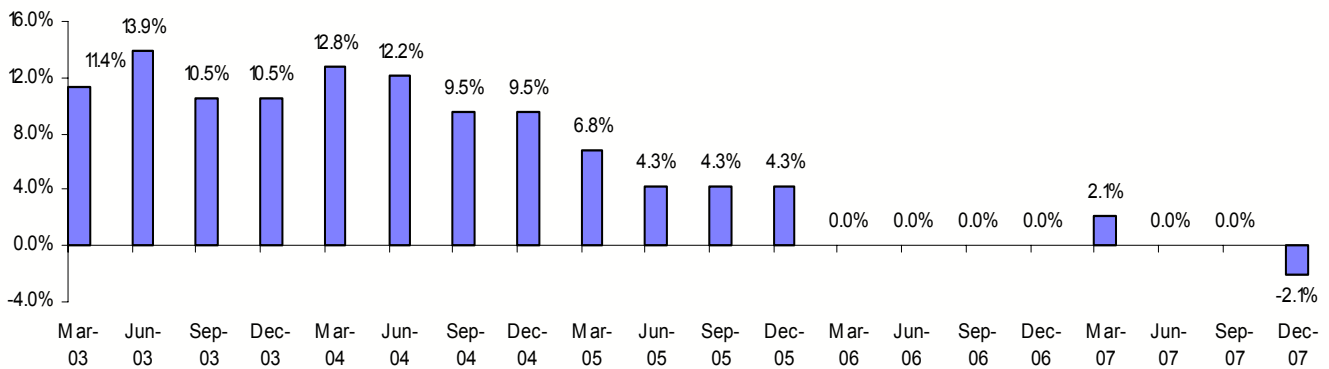Annual Percentage Rates of Increase - Private Industry**
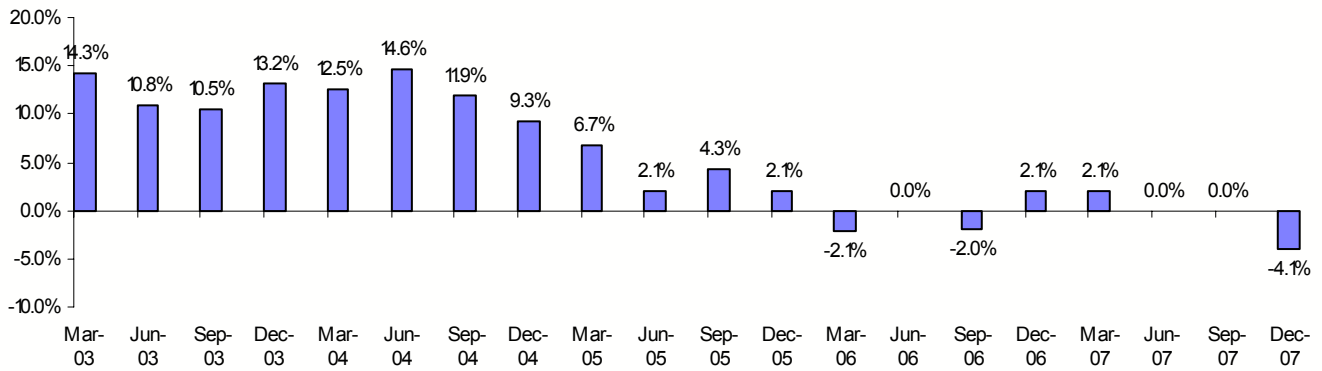
Source: Table 6, Panel B.

**Figure Q - Workers' Compensation Costs in Dollars Per Hour Worked:
Annual Percentage Rates of Increase - State and Local**

Source: Table 7, Panel B.

**Figure R - Workers' Compensation Costs in Dollars Per Hour Worked:
Annual Percentage Rates of Increase - All Non-Federal**

Source: Table 8, Panel B.

Table 8 - Employers' Cost of Workers' Compensation Increases Since March 2002

All Non-Federal Employees

Panel A: As Percent of Gross Earnings (Payroll)

	Employers' Costs as % of Payroll (1)	Cumulative Increase Since March 2002 (2)	Increase Over Twelve Months (3)
March 2002	1.85		
June 2002	1.90	2.7%	
September 2002	1.99	7.6%	
December 2002	1.98	7.0%	
March 2003	2.01	8.6%	8.6%
June 2003	2.10	13.5%	10.5%
September 2003	2.13	15.1%	7.0%
December 2003	2.12	14.6%	7.1%
March 2004	2.20	18.9%	9.5%
June 2004	2.31	24.9%	10.0%
September 2004	2.27	22.7%	6.6%
December 2004	2.26	22.2%	6.6%
March 2005	2.29	23.8%	4.1%
June 2005	2.34	26.5%	1.3%
September 2005	2.32	25.4%	2.2%
December 2005	2.28	23.2%	0.9%
March 2006	2.20	18.9%	-3.9%
June 2006	2.25	21.6%	-3.8%
September 2006	2.21	19.5%	-4.7%
December 2006	2.19	18.4%	-3.9%
March 2007	2.17	17.3%	-1.4%
June 2007	2.18	17.8%	-3.1%
September 2007	2.16	16.8%	-2.3%
December 2007	2.11	14.1%	-3.7%

Panel B: In Dollars Per Hours Worked

	Employers' Costs in Dollars (1)	Cumulative Increase Since March 2002 (2)	Increase Over Twelve Months (3)
March 2002	0.35		
June 2002	0.36	2.9%	
September 2002	0.38	8.6%	
December 2002	0.38	8.6%	
March 2003	0.39	11.4%	11.4%
June 2003	0.41	17.1%	13.9%
September 2003	0.42	20.0%	10.5%
December 2003	0.42	20.0%	10.5%
March 2004	0.44	25.7%	12.8%
June 2004	0.46	31.4%	12.2%
September 2004	0.46	31.4%	9.5%
December 2004	0.46	31.4%	9.5%
March 2005	0.47	34.3%	6.8%
June 2005	0.48	37.1%	4.3%
September 2005	0.48	37.1%	4.3%
December 2005	0.48	37.1%	4.3%
March 2006	0.47	34.3%	0.0%
June 2006	0.48	37.1%	0.0%
September 2006	0.48	37.1%	0.0%
December 2006	0.48	37.1%	0.0%
March 2007	0.48	37.1%	2.1%
June 2007	0.48	37.1%	0.0%
September 2007	0.48	37.1%	0.0%
December 2007	0.47	34.3%	-2.1%

Source: Tables 3, 4, and 5, Rows (9A) and (12) of Panel C.

pensation costs for private sector employers nonetheless means that costs as a percent of payroll in 2007 were lower than in any year between 1990 and 1999. A similar finding pertains to the employers' costs as a percent of payroll for all non-federal employers, which were lower in 2007 than in all the years between 1991 and 1998. The "odd" sector is state and local government, where the employers' costs of workers' compensation as a percent of payroll were higher in 2007 than in any other year since the data series began in 1991 – except for the record setting year of 2005 and 2006.

...both sources of data indicate that the employers' costs of workers' compensation measured as a percent of payroll substantially declined during the latter half of the 1990s.

A Comparison to Other Sources of Data on Employers' Costs

The BLS information on employers' expenditures on workers' compensation has some advantages over other sources of data on workers' compensation. One significant advantage, compared to the annual data prepared by the National Academy of Social Insurance (NASI) shown in Table 9, is timeliness: the most recent NASI data pertain to 2005 (Sengupta, Reno, and Burton 2007), while BLS data for 2007 are already available. The BLS data on employers' costs are also disaggregated by census region and division, major industry group, occupational group, establishment employment size, and bargaining status -- useful distinctions that are not available in the NASI data, which only includes data on employers' costs at the national level.[2]

The BLS data also have their limitations when compared to the NASI data. The foremost limitation of the BLS data is that they only measure costs to employers, not benefits paid to workers. The NASI data, for example, provide national and state-specific information on benefit payments that differentiate among the types of insurance arrangements (private carriers, state funds, and self-insurers) and that distinguish between medical and cash benefit payments. The NASI national data on benefits and costs also

Table 9
The Employers' Costs of Workers' Compensation
per $100 of Wages, 1980-2005, as Calculated
by the National Academy of Social Insurance

1980	$1.76
1981	1.67
1982	1.58
1983	1.50
1984	1.49
1985	1.64
1986	1.79
1987	1.86
1988	1.94
1989	2.04
1990	2.18
1991	2.16
1992	2.12
1993	2.16
1994	2.05
1995	1.82
1996	1.66
1997	1.49
1998	1.38
1999	1.35
2000	1.34
2001	1.45
2002	1.59
2003	1.74
2004	1.75
2005	1.70

Source: Sengupta, Reno, and Burton (2007),
Table 12 and Table A4.

include the federal sector, which are missing from the BLS data on costs.

The NASI data and BLS data are, to a considerable degree, complementary and, as such, both sources of information are valuable. One problem, however, is that the two data series are not entirely consistent with one another, as seen in Figure S, which began in 1991 - the first year that BLS data for the all non-federal employees are available. For example, the NASI data for 2005 (the latest year with data currently available from that source) indicate that the employers' costs of workers' compensation were 1.70 percent of covered payroll for employers in all sectors (including the federal government); the BLS data for all non-federal employees in 2005 estimates that workers' compensation costs for that group were 2.31 percent of payroll.[3] In addition, the NASI data show 1990 as the peak year during the 1990's (with employers' costs at 2.18 of payroll), while the BLS data (as shown in Figure C and Table 1) for all non-federal employees show continuing increases in workers' compensation costs as a percent of payroll through 1994, with a decrease in costs only beginning in 1995. But even though the NASI and BLS data have different peak years, both sources of data indicate that the employers' costs of workers' compensation measured as a percent of payroll substantially declined during the latter half of the 1990s.

In recent years, there are continuing differences in the peak and trough years for the two data series. The NASI data declined until 2000, then increased until 2004, and declined in 2005. The BLS data declined until 2001, increased until 2005, and then declined through 2007. It will be interesting to see whether the NASI data shows a decline in employers' costs in 2006 when those results are published later this year.

Figure S
Workers' Compensation Costs as a Percentage of Payroll,
NASI and BLS Data, 1991-2007
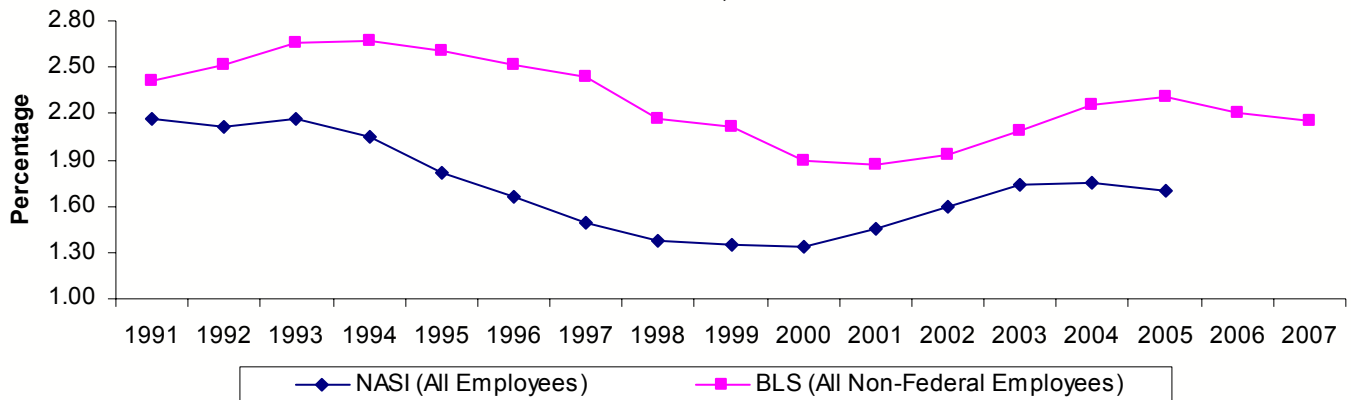
Source: Tables 1, 2, 3, 4, 5, and 9.

Appendix A
Source of the Information and Methodology

Tables 1 to 8 and Figures A through R are based on data published by the Bureau of Labor Statistics (BLS), which is a part of the U.S. Department of Labor.[4] The most recent BLS data for December 2007 are based on a national survey of about 57,600 occupations in approximately 12,200 establishments in the private sector and about 11,900 occupations in approximately 2,000 establishments in state and local government. (Sample sizes were smaller for earlier surveys.) The BLS published annual data based on the survey conducted each March from 1986 to 2001. Beginning with March 2002, the BLS has conducted the survey every quarter, and this article includes the data on workers' compensation costs through December 2007. This appendix discusses the data from March 2007 shown in Table 5 (since the March 2007 data are most comparable to the data from earlier years).[5]

The BLS data on Employer Costs for Employee Compensation (ECEC) measure the average cost per employee hour worked that employers pay for wages and salaries and various benefits, including benefits voluntarily paid as well as legally required benefits, such as workers' compensation. I have calculated workers' compensation as a percent of gross earnings (payroll) for this article, as explained below.

Data are available since 1986 for private sector employers' expenditures per hour on employees' total remuneration, and (as shown in Panel A of Tables 1 to 5) on a number of components of remuneration, including wages and salaries, paid leave, insurance, and legally required benefits (including separate information on workers' compensation).[6] Comparable data pertaining to state and local government employees (Panel B of Tables 1 to 5) and to all non-federal employees (Panel C of Tables 1 to 5) are available for the period 1991 to 2007.

The only employees not included in this BLS data series are federal government, agriculture, and household workers, who in aggregate account for only about 4 percent of all employees. Of the 96 percent of all employees who are included in the BLS data, private industry employees clearly predominate (83 percent of all employees), whereas state and local government employees account for the remaining 13 percent of all employees.[7]

Private Industry Employees

The March 2007 data for private industry employees presented in Panel A of Table 5 further explain the BLS data series. In 2007, private sector employers spent, on average, $25.91 per hour worked on *total remuneration* (row 1). The $25.91 of total remuneration included *gross earnings* of $20.88 per hour (row 2) and *benefits other than pay* of $5.04 per hour (row 6).[8] *Gross earnings*, or *payroll*, included wages and salaries ($18.34 per hour; row 3), paid leave ($1.78 per hour; row 4), and supplemental pay ($0.76 per hour; row 5). *Benefits other than pay* included insurance ($1.97 per hour; row 7), retirement benefits ($0.87 per hour; row 8), and legally required benefits ($2.20 per hour; row 9), *Workers' compensation*, which averaged $0.48 per hour worked (row 9A), is one of the legally required benefits (row 9).[9]

The BLS data in Panel A of Table 5 indicate that private sector employers' workers' compensation expenditures ($0.48 per hour) were 1.85 percent of total remuneration (row 11) and 2.30 percent of gross earnings (payroll) (row 12) in March 2007.[10]

State and Local Government Employees

The BLS data with respect to state and local government employees' remuneration are only available since 1991. There are several interesting differences between the employer expenditure patterns in the state and local government sector (Panel B of Tables 1 to 5) and in the private sector (Panel A). In March 2007, for example, the state and local sector had higher figures than the private sector for gross earnings per hour ($29.24 vs. $20.88, row 2); benefits other than pay ($9.42 vs. $5.04, row 6); and, therefore, total remuneration ($38.66 vs. $25.91, row 1). Workers' compensation costs per hour worked were slightly lower in the state and local sector ($0.47) than in the private sector ($0.48) (row 9A). However, because of the higher wages in the government sector, workers' compensation costs as a percentage of gross wages and salaries (payroll) in 2007 were considerably lower in the state and local government sector than in the private sector (1.61 percent vs. 2.30 percent, row 12), as they have been each year from 1991 to 2007.

All Non-Federal Employees

The most comprehensive variant of the BLS data, the data for all non-federal employees, is shown in Panel C of Tables 1 to 5. Available since 1991, this grouping, which is the total of private sector employees and state and local government employees, covers about 95 percent of all U.S. employees.

In March 2007, total remuneration per hour worked for all non-federal employees averaged $27.82 per hour (row 1) and gross earnings (payroll) averaged $22.13 per hour (row 2). Workers' compensation expenditures were $0.48 per hour in March 2007 (row 9A), which represented 2.17 percent of payroll (row 12).

ENDNOTES

1. Since costs increased in most months between March 2002 and December 2004, the annual averages for 2002, 2003, and 2004 exceed the employers' costs during March in those years (as shown in Tables 3 and 4), which means there is a discontinuity between the data through 2001 and the data for 2002-04. For example, if the data from March 2002 had been used in Figure A instead of the annual average for 2002, the employers' costs in the private sector would have been 1.96 percent rather than 2.05 percent.

2. The 2007 BLS data on employers' costs disaggregated by industry, occupation, census region and division, establishment size, and bargaining status will be analyzed in the March/April 2008 issue of the *Workers' Compensation Policy Review*.

3. The differences between the NASI data and the BLS data used in this article in the employers' costs of workers' compensation as a percentage of payroll are greater than is immediately obvious. The NASI data relate the employers' costs for workers' compensation only to the payroll of employers who are covered by state or federal workers' compensation programs. The costs would be a lower percentage if the base were payroll for all employers (whether covered or not), which is the base used for the BLS data.

4. Citations to the U.S. Department of Labor publications containing the data used to prepare this article are provided in the references.

5. The data are from the survey conducted in March 2007. The BLS uses the current-cost approach. That is, the costs do not pertain to the costs for the previous year. Rather, annual costs are based on the current price of the benefits and current plan provisions as of March 2007. The annualized cost of these March 2007 benefits are then divided by the annual hours worked to yield the cost per hour worked for each benefit, including workers' compensation benefits. Thus, if the annual workers' compensation premium per worker is $800 and the employee works 2,000 hours per year, the workers' compensation cost is $0.40 per hour worked. For further explanation of the BLS data, see Appendix A of U.S. Department of Labor 2000a.

6. This article uses the term "remuneration" in place of the term "compensation" that is used in the BLS publications in order to more clearly distinguish between workers' compensation and remuneration.

7. U.S. Department of Labor 2000a. See Chart 1, "Coverage of the Employment Cost Index, Total Civilian Employment, 1999." Comparable data for 2000 to 2007 should not differ much from the 1999 data.

8. The terms "gross earnings" and "benefits other than pay" are not used in the BLS publications. These terms are used here to make the base for calculating workers' compensation costs as a percentage of payroll comparable to measures used in other publications.

9. The parentheses around the workers' compensation figures in row 9A of each panel in Tables 1, 2, 3, and 4 are to show that these figures are included in the legally required benefits figures in row 9 of each panel.

10. Relating workers' compensation costs to "gross wages" (which is straight-time hourly wages plus paid leave and supplemental pay) is based on advice in an April 7, 1995 letter to me from Mr. Albert Schwenk, Supervisory Economist, Division of Employment Cost Trends, Bureau of Labor Statistics, U.S. Department of Labor. I appreciate this suggestion from Mr. Schwenk.

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