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The Value of a Life: New Evidence of the Relationship Between Changes in Occupational Fatalities and Wages of Hourly Workers, 1992 to 1999

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Abstract

The Environmental Protection Agency and other government agencies use the willingness-to-pay concept in labor market studies to estimate the value of a life for evaluating regulatory policies and projects. This study uses new data from the Bureau of Labor Statistics for the period 1992–1999 on industry injury and illness rates and fatality rates to examine the relationship between changes in occupational mortality rates and in hourly wages. The analysis finds that there is no statistically significant evidence that changes in occupational mortality are associated with changes in wages and, thus, there is no empirical basis for using the willingness-to-pay concept as a reliable method for valuing a life or evaluating regulatory policies.

Introduction

Gollier and Eeckhoudt (2001), building on the earlier work of Arrow (1971), Pratt (1964), and LaVallee (1968), formally derived and closely examined the complex theoretical relationship between the size of a risk and our willingness to pay for risk reduction. In a related strand of empirical research, Halek and Eisenhauer (2001), Siegel and Hoban (1982), and others found that estimated measures of relative risk aversion depend on various factors, including how wealth is measured or which demographic group is analyzed. These theoretical and empirical lines of research suggest that the use of willingness to pay for a small reduction in risk to estimate empirically the economic cost of the total risk may lack theoretical underpinnings and be subject to substantial error.

The focus of this article is on the related empirical issue of whether a higher risk of occupational mortality produces a higher wage payment. Whereas the idea that the

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higher the risk of occupational mortality, the higher the wage payment to workers is seemingly quite plausible,[1] the evidence that occupational mortality has a measurable impact on wages is at best mixed. Leigh (1991) found that whereas there was some evidence of compensating wages at the industry level, there was no statistically significant evidence at the occupational level. Moore and Viscusi (1988) and Dorsey (1983) found little or no statistically significant evidence of higher wages for higher occupational mortality rates. Miller (1990) and Viscusi (1992) reviewed numerous studies and found positive and statistically significant estimated coefficients on the mortality rates. Leigh and Garcia (2000) argued that the statistical evidence of correlations between the level of wages and mortality rates found in most previous studies is "fragile" and fraught with data problems. They concluded that because the pattern for white-collar and blue-collar workers follows similar inter-industry wage differentials, the apparent differences in the levels of industry wage rates are not due to differences in mortality rates. Other studies, especially studies designed to discern the value of a human life by estimating the incremental compensation workers receive for taking more risky employment (herein referred to as the willingness-to-pay concept), find a very large range of estimates of the incremental compensation associated with higher mortality rates. [2]

This article uses new data from the Bureau of Labor Statistics for the period 1992–1999 on industry accident and fatality rates and examines the relationship between changes in occupational mortality rates and changes in wages of hourly workers. This focus on the statistical relationship between changes in mortality rates and industry wage rates over a number of years avoids many of the data problems that trouble studies of the correlation of the wage rate level and the mortality rate level. If the idea that changes in mortality rates affect wage rates is correct, then the recent period when fatal accidents have declined significantly would seem an ideal period to test the hypothesis by examining whether or not the decline in mortality rates has tended to produce the decline in wages predicted by an association between higher risk and higher wages. Whereas the industry data we use have potential problems due to the lumping together of union and nonunion workers and white-collar and blue-collar hourly workers of various occupations, the focus on year-to-year changes in wages and mortality should minimize statistical problems. In addition, we control for nonfatal accident and illness rates. To focus on industries in which a large number of fatalities or injuries and illnesses might be expected, we restricted our empirical analysis to the mining, construction, and manufacturing sectors. The rationale for these choices and the specific advantages and disadvantages of our methodology are discussed more fully in later sections. As will be shown, our analysis finds no support for the view that higher mortality rates produce higher wage rates.

[1] The writings of Adam Smith (1776) provide the earliest foundation of the willingness-to-pay literature where he finds that the more dangerous the occupation, the higher the wage. In Chapter X, part I, he writes, "The wages of labor vary with the ease or hardship, the cleanliness or dirtiness, the honourable or dishonourableness of employment . . . A journeyman blacksmith, though an artificer, seldom earns so much in twelve hours as a [labourer] does in eight. His work is not quite so dirty, is less dangerous . . ."

[2] See, for example, Fisher, Chestnut, and Violette (1989). See also, Miller (1990), where he provides a "judgmentally best estimate of the value of life in sound wage-risk studies" ranging from approximately $700,000 to $9 million.

WILLINGNESS TO PAY AS A MEASURE OF THE VALUE OF A HUMAN LIFE

Because of the mixed empirical evidence for the view that mortality rates affect wages, the economic and legal literature has devoted considerable discussion to the willingness-to-pay concept as a means for estimating the value of a human life.[3] Selected empirical estimates of the value of a human life based on the willingness-to-pay concept have been used to support public policy decisions involving safety and environmental regulations and other governmental decisions potentially affecting the probabilities of loss of life. For example, the Environmental Protection Agency (EPA), based on their review of numerous value of a statistical life studies, recently recommended a life value of $6.3 million (1999 dollars) in its policy recommendations on groundwater regulations.[4] The Department of Transportation and other government agencies use similar estimates of the value of a statistical life in evaluating regulatory effects.[5] Some state courts have adopted the willingness-to-pay concept as one measure of the legal value of a human life in cases of wrongful death and personal injury, referred to under the rubric of "hedonic damages."[6]

ESTIMATES OF THE VALUE OF A LIFE

The typical statistical approach used to estimate the value of a life is based on labor studies of how much more workers are paid to accept jobs in more dangerous occupations such as underground coal mining.[7] Using such studies, proponents of the willingness-to-pay concept estimate the value of a human life by dividing the additional dollars people are willing to accept for the increased risk of death by the corresponding increase in the probability of death. The use of small increases in wages and small increases in the probability of death implicitly assume that linear extrapolation is the appropriate method of estimating the value of a life and that the appearance of marginally higher wages is due to the increased risk of death and not to omitted economic variables.

After reviewing more than 30 of such labor market and value of a life studies, Miller (1990) estimated the consensus value of a life at approximately $2.2 million in 1988

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[3] A summary of the labor market studies of the value of life and their problems can be found in Viscusi (1993).

[4] U.S. Environmental Protection Agency (2000).

[5] See, e.g., Adler and Posner (2000).

[6] See, for example, Jennings and Jennings (2000). Recently some state courts, including two district courts of appeal in California, have disapproved the use of hedonic damages and have ruled that testimony related thereto is inadmissible. On January 31, 1996, one California appellate court concluded that "After full briefing and oral argument we conclude the trial court order striking the claim for hedonic damages was correct." Two years later, the Second District Court of Appeal, in *Loth v. Truck-A-Way* (60 Cal. App. 4th 757, 70 Cal. Rptr. 2d 571 (1998) in remanding for a new trial, concluded that "the expert's testimony on hedonic damages was inadmissible as a matter of law and its admission was prejudicial."

[7] Studies on how much people are willing to pay for additional safety and safe behavior from such items as air bags, smoke detectors, and larger tires have also been used to provide estimates of the value of a human life. However, such studies are fraught with so many empirical and theoretical problems and the range of estimates derived from such studies is so large that their use for both policy and legal decisions has been extremely limited.

dollars. Although Miller did discuss several potential biases from the differences between perceived and actual risk estimates and other economic factors, he concluded that the estimates of the value of a human life could be "credibly used in prospective benefit-cost analyses" and would "provide guidance to the court on the reasonable range of value for total damages" (Miller, 1990).

Critics of the use of hedonic damages and the willingness-to-pay concept have attacked through several avenues. Frankel and Linke (1992), building on the work of Broome (1978), pointed to the distinction between the willingness to accept payment for a small risk and the value of an entire life. They noted the potential problem of assuming that each person's individual perception of risk is an accurate measure of the actual risk. They discussed how, if we follow the logic behind the willingness-to-pay concept, the decisions of many people to smoke or not use their car's seat belts could be used to argue that the values of such lives are quite low. It is this sensitivity of the estimate of the value of the human life to the particular situation of willingness to pay that may account for the large variance in estimates found in various studies.[8] The large variance in these studies raises serious questions about the reliability of such estimates in the minds of critics. Others, including especially Havrilesky (1993), point to a variety of other problems, including the irrelevance of low incremental risk valuation of a whole life, the irrelevance of an anonymous statistical life in legal issues involving a specific individual, and the potential for serious social misallocations, as well as the potential for statistical inaccuracy of small risk valuations and the high variance of the estimates. Gollier and Eeckhoudt (2000) formally show the theoretical conditions when the use of the willingness to pay for a small reduction in risk can and cannot simply be extrapolated to estimate the value of the full risk. More general conceptual problems with the willingness-to-pay concept have been noted by Jennings and Jennings (2000) and elsewhere.

Notwithstanding the mixed empirical evidence and theoretical and empirical criticisms of using willingness-to-pay estimates as the basis for valuing a life, the idea of estimating the value of a life based on our willingness to pay, possibly because of the ease of calculation and the appearance of simplicity, has many advocates and is commonly cited in government studies and court proceedings. Viscusi (2000) argues that much of its popularity may lie "not so much from belief in its economic validity" but in the high dollar estimates that can be used to bolster arguments of plaintiffs, government agencies, and various interest groups.

THE DATA

Before detailing the data and our empirical results, we should note that the higher death rates in employment might be expected to be highly correlated with higher injury rates. Since on-the-job injury is far more common than death, any occurrence of higher wages should be partitioned in some fashion between death and injury. However, many empirical studies typically estimate the value of a life only by examining the relationship between mortality rates and pay without allocating any of the wage

[8] In his review of 67 studies, even after omitting 20 studies, Miller (1990) provided a mean estimate of $2.2 million with a one standard deviation value of $0.65 million (in 1989 dollars).

differential to the incidence of injury and other omitted variables.[9] Without a proper empirical division between the marginal contributions of injury and death, any estimate of the value of a life from death rates alone would seem flawed. Our study considers changes in wages as they relate to changes in both injury rates and death rates and offers new empirical evidence of the degree to which changes in workplace fatalities have been associated with corresponding changes in real wages of hourly workers during the period 1992 to 1999.

To help shed light on the issue, we examined wage, death, and injury and illnesses rate data for various industries for the period 1992 to 1999. All of the data come from the Bureau of Labor Statistics. Most of the data were taken from the Bureau's public ftp server.[10] Fatality data were obtained from the Census of Fatal Occupational Injuries, available on the Bureau of Labor Statistics' web site, http://www.bls.gov/. The fatality data were combined with employment data to obtain fatality rates for each year in question. The employment and wage data were taken from the Occupational Employment Statistics Survey, while the injuries and illnesses data were taken from the Survey of Occupational Injuries and Illnesses.[11] All wage data were adjusted to constant 1982–1984 dollars, using the Consumer Price Index for Urban Wage Earners and Clerical Workers.

These data come from a time period when rates of both injury and death were declining for most industry classifications we examined. From 1989 to 1997, the total recordable cases of injury and illnesses in manufacturing and construction declined from the 1989 levels of approximately 13 per hundred for manufacturing and 14 per hundred for construction to approximately 10 per hundred in both sectors a decade later, with average declines of 30 percent (Webster, 1999). Because the declines in injuries and fatalities are the most consistent and the largest experienced in the last quarter century,[12] the data provide a valuable opportunity to test directly the hypothesis that decreasing death and injury rates produce lower wage rates.

To study the changes in wages, fatality rates, and injury and illness rates, we could have regressed each of the three variables against the year of the observation (from 1992 to 1999) for each industry considered. The slopes of the regression lines would

[9] Frankel and Linke (1992, p. 242) in addressing problems of data limitations and omitted variable problems in value of life studies find that "A related difficulty involves a failure in many studies to control for one or more important factors, most notably job injury (as distinct from fatality) and the quality of work."

[10] ftp://ftp.bls.gov/pub/time.series The wage data were taken from the following files on the ftp server: ee.data.21.TotsAHECurr (Unseasonal, Total private, Goods prod, Mining, Construction, Average Hourly Earnings) and ee.data.22.ManufactureAHECurr (Unseasonal, Manufacturing, Average Hourly Earnings). Employment data were taken from ee.data.7.TotsAECurr (Unseasonal, Total, Tot private, Goods prod, Mining, Construction, All Employees) and ee.data.8.ManufactureAECurr (Unseasonal, Manufacturing, All Employees). The injury rate data were taken from sh.data.1.AllData.

[11] See the Appendix for the Bureau of Labor Statistics' description of the surveys.

[12] Fatalities are generally much less common than illness or injury. For example, for the period from 1992 through 1997, the annual fatality rate is about 14.3 per 100,000 workers in construction whereas the injury rates during this period averaged approximately 10,000 incidences per 100,000 workers, a ratio of one fatality per 700 injuries (Webster, 1999).

then be the rate of change in the wages per year, the rate of change in the fatality rate per year, and the rate of change in the injury and illness rate per year. Note that an industry with a high wage rate or a large fatality rate might more easily have a large absolute change in those rates that would tend to give that industry undue weight in the subsequent analysis. To avoid this problem we used the percentage changes in the rates rather than the absolute changes. To do so, we took the natural logarithms of all the rates available to us and then regressed the natural logarithms of the wages, fatality rates, and injury and illness rates against the year of observation. The slopes of the regressions are then related to the percentage change in the rates as follows:

$$\text{yearly percentage change in rate} = (e^b - 1)(100\%),$$

where b is the slope of the regression line. For example, if the slope of the regression of the logarithm of fatality rates in the year of observation is −.05, the estimated yearly percentage change in the fatality rate would be −4.877 percent, indicating that the fatality rate was declining at the rate of 4.877 percent a year. Note that for small values of the slope, the slope and the yearly percentage change in the rate are close in value. Also, by using regression, we are not just looking at the compound rate of change between the first value (in 1992) and the last value (in 1999), but are estimating the overall trend in the rates over the 8-year period.

THE INDUSTRIES

All the data from the Bureau of Labor Statistics are broken down by industry using Standard Industrial Classification (SIC) codes. SIC codes could be at any of three levels, each one a subset of the higher level. For example, the industry with SIC 2000 is food and kindred products, 2030 is preserved fruits and vegetables, and 2050 is bakery products, whereas 2035 is pickles, sauces, and salad dressings, and 2052 is cookies and crackers. Thus, cookies and crackers are a part of bakery products that in turn is a part of food and kindred products. When the Bureau of Labor Statistics reports data, they do not report for every industry. Some of the reasons for not reporting include: insufficient data (e.g., not enough fatalities), insufficient numbers of workers in an industry, one firm employs more than 60 percent of the workers in an industry, and publication of the data might disclose confidential information.[13] On the other hand, whether data are reported for a particular industry or not, they will still be included in the broader industry level of which that particular industry is a part (e.g., cookies and cracker data will always be included in the bakery products data).

This presents a problem for the researcher: which industries should be included? On the one hand, it would seem desirable to include as much data as possible, using every industry. On the other hand, since a lower level industry like cookies and crackers is included in a higher level industry like bakery products, if the data for the lower level industry are reported, including the higher level industry in the analysis gives the lower level industry an extra weight that it may not deserve. If the lower level industry is the major part of the higher level industry, then the same data point is essentially being included twice. Also, since our desire is to look at the effect of

[13] BLS Handbook of Methods, Bureau of Labor Statistics, 1997 (Chapter 9, Occupational Safety and Health Statistics, Publication Guidelines).

changes in the fatality rates and the injury and illness rates on wage rates, the more specific the industry, the more clearly we should be able to see any effect. Looking at the broader industry would tend to make it more difficult to observe any effects because of the possible masking effect of the inclusion of multiple industries. For these reasons, we only used industries that do not include any lower-level industries. Thus, if cookies and crackers are included, bakery products will not be; bakery products will be included only if each of its lower level (sub) industries does not have data reported.

An additional research problem is that many industries do not have a large number of fatalities. In some years, the Bureau of Labor Statistics did not report fatalities for any industry with less than four fatalities, and in other years it did not report fatalities for any industry with less than five. Thus it was difficult to decide how to treat those missing values. One possibility would be to put in an estimated number of average fatalities, say 1 or 2, for all the years that the fatalities were not reported. We decided not to substitute estimated fatalities for the missing data. If we had chosen an arbitrary value and if an industry had several years without reported fatalities, apparent changes in death rates in those years would be due solely to changes in the level of employment.

SOME RESULTS

Before proceeding, we first eliminated any industry that did not have reported fatalities for every year in question, leaving 57 industries. We then eliminated any industry that contained a lower level industry that was still included. This left 39 industries under study. Finally, we ran a regression of the rate of change of the natural logarithm of the inflation-adjusted average hourly earnings (i.e., the slope of the regression of the natural logarithm of the inflation-adjusted average hourly earnings on the year of observation) on the rate of change of the fatality rate and rate of change of the injury and illness. The regression equation is as follows:

$$\begin{aligned}&\text{(slope of lnAHE)}\\&\quad = \underset{(0.0029)}{-0.0009} + \underset{(0.0215)}{0.0025}\text{(slope of lnFatalities)} - \underset{(0.0476)}{0.0743}\text{(slope of lnInjuries)}\end{aligned}$$

where (slope of lnAHE) is the slope of the natural logarithm of average real hourly earnings regressed on year, (slope of lnFatalities) is the slope of the natural logarithm of fatal injuries rates; and (slope of lnInjuries) is the slope of the natural logarithm of injury and illness rates. The standard deviations of the coefficients are shown in parentheses.

If the risk inherent in an industry (either because of the level of fatalities or the level of nonfatal injuries and illnesses) has an effect on the wages in that industry, then those industries in which either the fatality rate or the injury and illness rate were falling the fastest should have wages falling fastest. Similarly, if there is an effect of risk on wages, industries in which the fatality rate or injury and illness rate were rising should show rising wages.

Looking at the regression equation, we see the three coefficients. The constant, −0.0009, shows that, for an industry with no change in the level of fatalities (slope of lnFatalities is zero) and no change in the level of injuries and illnesses (slope of lnInjuries and

Illnesses is zero), inflation-adjusted wages were virtually unchanged over the period from 1992 to 1999 (adjusted wages were actually falling at a rate of 0.09 percent a year). More importantly, the coefficient of the rate of change of fatalities, 0.0025, shows that for an industry whose injury and illness rate is not changing but whose fatality rate is increasing at a rate of $e^1 - 1 = 1.718$, or 172 percent a year, inflation-adjusted wages were rising at the rate of 0.25 percent a year. Although, there may never be an industry in which fatalities would increase by 172 percent a year, for an industry in which fatalities were increasing at a rate of roughly 5 percent a year (slope of 0.05, rate of change of 5.13 percent), inflation-adjusted wages would be rising at the rate of 0.0125 percent (0.05×0.0025) a year.

The positive coefficient of the rate of change of fatalities is consistent with the theory of greater pay for greater risk. However, the increase in pay is both minuscule and statistically insignificant. Note that for injuries and illnesses the coefficient is negative and of a greater magnitude. The negative sign of the coefficient implies that for those industries with the greatest increases in injury and illness rates (and no change in fatality rates), wages are falling the fastest!

Although the signs of the coefficients of the regression equation were mixed, none of the coefficients was statistically significant. We cannot conclude that rising risk leads to increasing wages. In fact, the usual F-test for overall significance showed no relationship between the rate of change of wages and either the rates of change in fatalities or injuries and illnesses ($n = 39$, $F = 1.23$, $p = 0.303$). Figures 1 and 2 illustrate the lack of any meaningful relationship of changes in wages with either changes in fatalities or in injuries and illnesses.

FIGURE 1
The Relationship Between Changes in Fatalities and in Wages

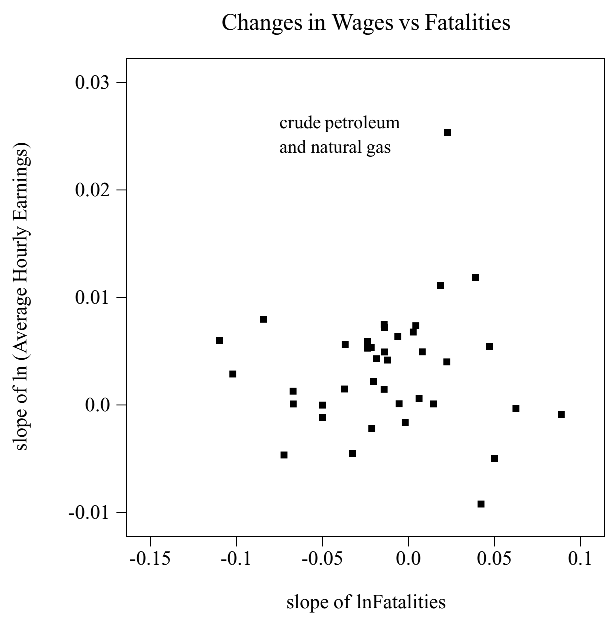
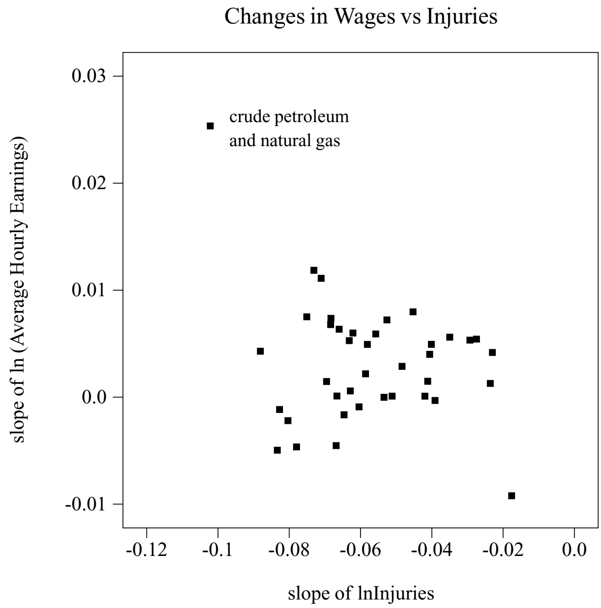


FIGURE 2
The Relationship Between Changes in Injuries and in Wages

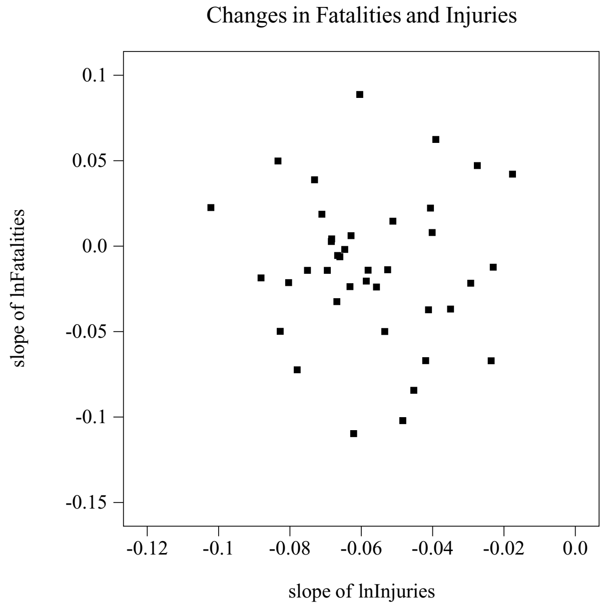


Another interesting feature of the data was that the rate of change in fatalities was not correlated with the rate of change in injuries and illnesses. The correlation coefficient was just −0.041, showing that the rate of change in fatalities is only slightly negatively correlated with the rate of change in injuries and illnesses. In fact, the correlation is not statistically significant, showing that changes in the rate of fatalities tend to be independent of changes in the rate of injuries and illnesses (see Figure 3). Since these variables are uncorrelated, we can safely examine the relationship between the rate of change in wages and each of the explanatory variables separately.

Looking at Figures 1 and 2, we can see that there is one industry, crude petroleum and natural gas, which stands out from the others and has a large influence on the estimated slopes. Without this industry, it is clear that the estimated coefficient of changes in fatalities would be less than the 0.0025 shown previously. Similarly, the estimated coefficient of changes in injuries would be less negative than the −0.0743 shown previously. The major features of this industry are that during this period wages rose at a rate twice that of any other industry, total employment fell precipitously, and total fatalities remained essentially constant. We suspect that the decline in employment explains much of the increase in wages (i.e., last hired, first fired).

It should be noted that in many ways it is not surprising that we did not find a statistically significant relationship between changes in the fatality rate and in the wage rate. Consider a purely hypothetical example where we assume the existence of a return trade-off for risking one's life and where workers in a hypothetical industry with an annual fatality rate of 40 deaths per million workers each receive an additional $200 per year for the risk of job-related mortality (or an implied value of a statistical

FIGURE 3
The Relationship Between Changes in Injuries and in Fatalities



life of $5 million). If the hypothetical industry then became safer and the fatality rate declined by 25 percent to 30 deaths per million, the appropriate risk payment of $200 would fall to $150 per year. Given 2,000 hours of work per year, the 25 percent decline in death rates should only be expected to produce an hourly wage reduction of 2.5 cents.

The hypothetical example discussed above illustrates that even if fatalities fall significantly, wages should be expected to decline very little. The problem of estimating the value of a life from wage data requires accurately estimating the decline in wages so as to generate the value of a life. However, if our estimate is off only slightly, the estimated value of the life will change significantly. For example, with the same 25 percent decline in fatality rates, an estimated change in wages of 0.10 percent would imply a value of a life of $10 million, while an estimated change of 0.01 percent would imply a value of a life of only $1 million. Since annual changes in wages are affected by numerous economic factors other than fatality rates, the statistical problem of accurately estimating the portion of any wage change due to declining fatality rates is truly daunting.

CONCLUSION

The evidence for the period 1992 to 1999 when industry death rates declined significantly provides little empirical support for the view that increases in occupational mortality rates are associated with higher wages. The study finds no statistically significant coefficients on mortality rates or illness and injury rates. These findings add to a growing body of evidence that questions the estimates of the value of a human life based on a supposed relationship between occupational mortality rates and wages.

We suspect that underlying the inability of researchers to meaningfully estimate the value of a human life from occupational fatality rates is the reality that occupational fatalities are now quite low. Rates of occupational fatalities have declined nearly 95 percent since the 1920s so that now the rate of accidental deaths at home is nearly three times as great as rate of work-related deaths.[14] Although workers and employers continue to seek increased safety in the workplace and further improvements should be expected, the current fatality rates are so low and their individual causes so often random that statistical attempts to measure how fatalities affect wages are unlikely to meet with success. Wages and wage changes are influenced by a multitude of factors and attempts to parse out any systematic impact due to occupational fatalities are at best problematic. Alternative attempts to support the hypothesis by selecting a few occupations or workplace situations are subject to serious bias and a variety of statistical problems that preclude their use as meaningful research. Given the variety of statistical problems associated with trying to measure accurately the portion of any annual wage change associated with changes in fatality rates, we are frankly surprised that estimates of the value of a life based on occupational fatalities and wages have ever been used.

To the extent there is no evidence of a measurable impact of higher occupational mortality risk on higher wages, there is no empirical basis for using the willingness-to-pay concept as a reliable method for valuing a human life. We believe that courts, government regulatory agencies, federal and state legislation, and other governmental decisions concerning the important issue of the value of a life would be better served by abandoning any reliance on willingness-to-pay estimates of the value of a human life. Instead, estimates of the value of a human life predicated on the present value of lifetime compensation, household services, and other contributions provide alternative, and more reliable, means for valuing a human life.

APPENDIX

Descriptions of the Bureau of Labor Statistics' Surveys

The three surveys that were the sources of our data are conducted by the Bureau of Labor Statistics. A partial description of each follows, quoted directly from the Bureau of Labor Statistics web site.

Census of Fatal Occupational Injuries[15]

"The Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI) produces comprehensive, accurate, and timely counts of fatal work injuries. CFOI is a Federal-State cooperative program that has been implemented in all 50 States and the District of Columbia since 1992. To compile counts that are as complete as possible, the census uses multiple sources to identify, verify, and profile fatal worker injuries. Information about each workplace fatality—occupation and other worker characteristics, equipment involved, and circumstances of the event—is obtained by cross-referencing the source records, such as death certificates, workers' compensation reports, and Federal and State agency administrative reports. To ensure that fatalities are work-related, cases are substantiated with two or more independent source documents, or a source document and a follow-up questionnaire."

[14] "Have a Nice Day!," Exhibit 2, Federal Reserve Bank of Dallas Annual Report 2000.
[15] http://www.bls.gov/iif/oshfat1.htm.

Occupational Employment Statistics[16]

"The Occupational Employment Statistics (OES) program conducts a yearly mail survey designed to produce estimates of employment and wages for specific occupations. The OES program collects data on wage and salary workers in nonfarm establishments in order to produce employment and wage estimates for over 700 occupations. Data from self-employed persons are not collected and are not included in the estimates. The OES program produces these occupational estimates by geographic area and by industry. Estimates based on geographic areas are available at the National, State, and Metropolitan Area levels. The Bureau of Labor Statistics produces occupational employment and wage estimates for over 400 industry classifications at the national level. The industry classifications correspond to the 2- and 3-digit Standard Industrial Classification (SIC) industrial groups.

The OES program surveys approximately 400,000 establishments per year, taking three years to fully collect the sample of 1.2 million establishments. To reduce respondent burden, the collection is on a three-year survey cycle that ensures that establishments that employ fewer than 250 workers are surveyed at most once every three years. The estimates for occupations in nonfarm establishments are based on OES data collected for the reference months of October, November, or December."

The Survey of Occupational Injuries and Illnesses[17]

"The Survey of Occupational Injuries and Illnesses is a Federal/State program in which employer's reports are collected annually from about 176,000 private industry establishments and processed by State agencies cooperating with the Bureau of Labor Statistics. Summary information on the number of injuries and illnesses is copied by these employers directly from their record-keeping logs to the survey questionnaire. The questionnaire also asks for the number of employee hours worked (needed in the calculation of incidence rates) as well as its average employment (needed to verify the unit's employment-size class).

Occupational injury and illness data for coal, metal, and nonmetal mining and for railroad activities were provided by the Department of Labor's Mine Safety and Health Administration and the Department of Transportation's Federal Railroad Administration. The survey excludes all work-related fatalities as well as nonfatal work injuries and illnesses to the self employed; to workers on farms with 10 or fewer employees; to private household workers; and, nationally, to federal, state, and local government workers.

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[16] http://www.bls.gov/oes/oes_emp.htm.
[17] http://www.bls.gov/iif/oshsum1.htm.

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