

The Economic Cost of Fatal Occupational Injuries in the United States

by

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Thesis

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ABSTRACT

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Occupational injuries claimed the lives of over 30,000 American workers from 1990-1995 as reported through the National Traumatic Occupational Fatalities (NTOF) surveillance system. Estimates of the value of these lives have been calculated, but nearly all studies present an aggregate value, which sheds no light on the variations in costs for different case or worker characteristics.

This project developed a user-friendly computer program to calculate the cost of fatal occupational for exclusive use by the National Institute for Occupational Safety and Health (NIOSH). The model estimates comprehensive national costs for all occupational fatal injuries reported through NTOF, nearly \$30 billion for 1980-1995, and specific estimates for the burden on selected groups and characteristics of the fatality. This model provides a new reliable basis for targeting and evaluating the effectiveness of investments in prevention of occupational fatalities for use by NIOSH researchers—economic risk.

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Chapter 1

Introduction

1.1 PROBLEM

...from the time of Hammurabi attempts have been made to establish the “value” of the lives of different classes of people, primarily for the purposes of punishment and restitution. A prince would be worth so many peasants in the harsh calculation of early justice, and no justification would be provided other than that of power and tradition. With the spread of markets, however, people came to think in terms of the calculus of wealth, and the idea dawned that prices could set the value not only of the things people own and use, but of life itself (Dorman, 1996, p. 51).

While economists investigated means to value life, safety and health officials have been examining and tracking the health outcomes of the American worker since the 1890's. However, it wasn't until the passage of the Occupational Safety and Health (OSH) Act (Public Law 91-596) in 1970 that a systematic national approach existed “to assure so far as possible every working man and woman in the Nation safe and healthful working conditions (29 U.S. Code [USC] 671).” The Act devised a three-pronged program to meet this mandate. The Department of Labor housed two of these prongs, the Occupational Safety and Health Administration (OSHA) and the Bureau of Labor Statistics (BLS). OSHA was created as the regulatory arm equipped to promulgate and enforce standards. The Bureau of Labor Statistics was deemed as the statistical arm to determine the number of occupational injuries and illnesses on a routine basis. Finally, The National Institute for Occupational Safety and Health (NIOSH), housed in the Department of Health and Human Services, was charged with conducting research to identify the causes of work-related injuries and diseases, to evaluate the hazards of work practices and new technologies, to develop ways to control these hazards, and to work in conjunction with OSHA by making recommendations for occupational safety and health standards.

Since the implementation of the OSH Act, these three agencies have helped the safety and health environment see marked improvement. Both fatal and nonfatal work-related injury rates have declined and illness research has nearly eliminated deadly diseases such as brown lung disease and liver cancer from vinyl chloride exposure. Despite these improvements, workplace hazards continue to plague the American worker. Each day an average of 9,000 workers sustain disabling injuries on the job and 16 die from such injuries. Work-related diseases take the lives of another 137 Americans daily (National Institute for Occupational Safety and Health [NIOSH], 2000). According to one team of researchers, the problem translated into over \$155 billion in direct and indirect costs, or 3% of Gross Domestic Product in 1994 (Leigh, et al., 2000). Occupational injury and illness costs the American public more than AIDS, circulatory diseases, or cancer.

The responsibility of a public health agency is to promote health and quality of life through prevention and control of disease, injury, and disability. The Division of Safety Research (DSR) within NIOSH narrows the focus to the study of occupational injury and fatality. Traditionally, DSR has defined risk in physical terms and focused on identifying the characteristics and magnitude of injuries and fatalities in the United States and mechanisms to prevent or ameliorate those injuries. Selecting research paths are determined by a number of methods or dictated by stakeholders. Employees, employers, other government agencies, labor organizations, and Congress have all requested specific research. However, DSR has never pursued research areas based directly on either the economic loss associated with the injury or fatality or by the economic improvements afforded by such research. This is, in large part, due to a lack of available specific cost data.

This lack of cost data also prohibits meaningful evaluation of the economic efficiency or equity that stems from work within DSR. Equity and efficiency considerations are key in policy evaluation. The extent that NIOSH research measures the maximum amount of goods and services from the human and other resources in society must be measurable to defend the public resource expenditures. Similarly, it is crucial when allocating resources in a time of reduced federal dollars that changes in what group(s) of workers are able to consume what share of total production and in the equity of labor force participation is measured. Furthermore, Viscusi and Hamilton (1996) have asserted that government agencies commissioned to protect public health used much of their resources to reduce small risks at great expense while more appreciable and more easily moderated risks continue. They believe that society spends 90

percent of its resources to reduce the last 10 percent of risk. Without cost measurement of the effectiveness of the research conducted within NIOSH, the truth of this assumption can not be known.

This project developed a standardized method for calculating cost consequences that can be coupled with cost analysis to enhance the majority of research conducted within DSR. This project provides policy makers a tool to systematically examine current and potential programs using standard economic measures. It provides comprehensive national estimates for the economic burden of all occupational fatal injuries. The calculated costs from this research can be incorporated into evaluative tools such as cost utility, cost effectiveness, cost benefit, and decision analysis to assist in allocating limited resources more effectively. This model also provides an additional basis, economic risk, for targeting and evaluating the effectiveness of investments in prevention of occupational fatalities. Researchers within NIOSH are afforded a new tool capable of presenting economic costs as supporting the need for their individual research proposals.

This project is unique because it calculates costs based on individual characteristics and aggregates to a national cost thereby allowing for calculating costs by specific characteristics. It will provide national and state estimates for the economic burden of selected groups such as specific industries, occupation groups, minority workers, older workers, and teenage workers. The model was designed to allow for yearly updates, scenario analysis, and the potential for linking to other fatal or non-fatal databases.

1.2 RESEARCH OBJECTIVES

The overarching goal of this study is to develop a user-friendly computer program for installation on a personal computer to calculate the cost of traumatic occupational fatal injury by the attributes of the deceased worker and by characteristics surrounding the fatal incident. Two objectives must be met to accomplish this goal.

The first objective is to determine the economic theory of cost measurement that best suits the needs of the National Institute for Occupational Safety and Health given its mission to improve the safety and health for all workers in the United States. Economic theory provides a number of alternative methods to calculate the cost of injury and fatality. However, no single method has been adopted in measuring the cost of occupational fatal injuries. This study will examine the more popular approaches adopted within the public health environment as well as approaches commonly adopted in other disciplines but not currently used within the health care field. These approaches can be collapsed into two major categories: cost-of-illness and willingness-to-pay. The cost-of-illness approach measures cost in terms of the value of lost output associated with reduced productivity of the fatally injured worker. The willingness-to-pay approach measures value by determining how much individuals are willing to pay for a safer and healthier work environment. More specifically for this study, it is the willingness-to-pay to save a life.

The second objective is to develop a program to calculate the lifetime cost to society of a single year (or multiple years), by characteristic of fatal occupational injury that can be aggregated to a total burden on society. Equally important is the ability to update this program as new years of fatality data become available. The program must be sufficiently easy to understand and operate to allow for universal use throughout NIOSH.

1.3 THESIS OVERVIEW

This study is presented in five chapters; the first being the introduction. The following paragraphs briefly describe the remaining chapters.

A discussion of theoretical approaches to calculating the cost of a human life is contained in Chapter 2. This chapter discusses cost-of-illness and willingness-to-pay methods for deriving the value of life. A review of the literature summarizing previous studies on the cost of an occupational injury or fatality is also found in this chapter.

The theoretical model and data sources are presented in Chapter 3. The source for each model variable is named and described. The computer application used to run the model is also described in this chapter.

Results of the model calculations are captured in Chapter 4. Chapter 5 presents conclusions, discusses the limitations of the study, and presents potential future research.

Chapter 2

Theory

2.1 INTRODUCTION

Calculations of economic loss or burden can be based on a number of theoretical models. While various approaches have been discussed, no consensus has been reached among economists or policy analysts. Two approaches are dominant among the methods used to calculate the costs of injury, illness, or premature death: Cost-of-illness and willingness-to-pay. Both methods have strengths and weaknesses. The following sections briefly describe the theories underlying the approaches, present studies conducted using the methods, and finally describe the strengths and weaknesses of each.

2.2 COST-OF-ILLNESS

The Cost-of-illness (COI) method estimates the value of an occupational injury, illness, or fatality by summing the value of two components: direct and indirect costs. Direct costs consist of the actual dollar expenditures associated with the injury or illness and include the value of all goods, services, and other resources that are consumed. They are the value of those resources that could have been used elsewhere if the injury or illness had not occurred. The most prominent direct costs are health care costs, which include physician's visits, prescription medicines, physical therapy, ambulance service, and hospitalization fees. Other direct costs include insurance administration costs, vocational rehabilitation, attendant care, and nursing home expenditures. These costs can be incurred in the present time or at some point in the future.

Indirect costs in this model are measured using an aggregative statistical-based approach, the human-capital method. This method values health according to the economic productivity of the worker. Calculating the full economic or productivity loss requires determining the sum of the discounted value of all lost present and future productivity of the worker, both market and non-market. Market loss is the value of the decedents' lost future earnings. Non-market loss represents the present and future value of goods and services they would have produced in the home. While these values can be calculated net of consumption and taxes, the majority of recent studies are computed as gross estimates (Kuchler & Golan, 1999).

A variation of this method measures only the "frictional" portion of economic loss (Koopmanschap et al., 1995). In this method, only the time required for a replacement for the injured worker to be hired and trained to produce at the pre-injury level or the time for the worker to return to work and produce at the pre-injury level is considered as a productivity loss. This method is primarily useful in measuring loss from a corporate perspective.

The theoretical underpinnings of human capital have been explored by many researchers and expressed in slightly differing terms. According to Dorman (1996), this method draws from the economic theory that, in general competitive equilibrium, a worker's wage is equal to his marginal product. Therefore, the present value of lost future wages is an appropriate measure of the value of economic output lost due to premature death. It then follows that this is as logical a measure of the social cost of occupational fatalities as any. Similarly, Hodgson and Meiners (1982) state that the human capital methodology assumes that earnings reflect productivity—the value of each worker's contribution to output is measured by the marginal value of output from the last-hired worker. Therefore, it is a measure of resources lost and unavailable for other uses. Robinson (1986) traces the origins of the human capital approach to economic doctrine from the beginning of the 19th to the middle of the 20th centuries. Here, government policy should operate to increase the wealth of the nation, which the Department of Commerce measures as national income. Because of this link, this method has been referred to as "output accounting" approach (Institute of Medicine, 1981).

Early studies reported by Hu and Sandifer (1981) for the National Center for Health Services Research include the 1950 Malzberg study which has been considered the first formal COI study measuring the indirect costs of mental illness, a 1956 study by Reynolds on the cost of road accidents, and a 1958 study on the cost of mental illness by Fein. Studies in the 1960's included Mushkin's examination of health as an investment in 1962, Klarman's 1964 study on syphilis control, and finally the work by Rice in 1966, which detailed the framework and procedures used as the basis for many of the current studies. This method was also employed in regulatory and program analysis during

the 1970's—1972 examples include the U.S. Office of Science and Technology examining the "Cumulative Regulatory Effects on the Costs of Automotive Transportation" and the U.S. Department of Transportation National Highway Safety Administration measuring the "Societal Costs of Motor Vehicle Accidents." Cooper and Rice (1976) prepared national estimates for the cost of all diseases, and Berk, Paringer & Mushkin (1978) exemplified studies that improved upon these methods during the 1970's. According to Hu and Sandifer, in the last 20 years, studies using the COI approach have topped 200. Unfortunately, many of these studies have been limited to selected diseases or populations. Comparability of these studies is further limited by the use of differing data sources and methods, as well as the extent to which they have captured all possible direct and indirect costs.

In 1987 Congress directed the National Highway Safety Administration (NHTSA) and the Centers for Disease Control (CDC) trauma research program to jointly design a study to measure the impact of injury and disability on the United States. The study was conducted by the Institute for Health and Aging of the University of California and The Johns Hopkins University Injury Prevention Center. This research built upon the human capital theory developed by Becker (1975) and adopted the Rice methods of the 1960's. The work not only presented the aggregate and per capita lifetime costs of injury to society by cause of injury, but also made recommendations for strategies to reduce the impact of injury (Rice, et al. 1989).

More recently, a single investigator has conducted numerous studies measuring the burden of occupational injury on the U.S. society. Ted Miller has been responsible for many studies, books, and journal articles. (Miller, 1989; Miller, 1990; Rossman, Miller, & Douglass, 1991; Miller, et al., 1991; Miller, Cohen, & Rossman, 1993; Miller, Pindus & Douglass, 1993; Miller & Galbraith, 1995; Miller, Pindus, Douglass & Rossman, 1995; Miller, 1997; Miller, et al., 1998). The National Highway Traffic Safety Administration, the Consumer Product Safety Commission, NIOSH, Environmental Protection Agency, and the National Safety Council have used his methods, providing some consistency of cost estimation throughout federal agencies. His methods expand standard COI by including intangible costs estimated through willingness-to-pay methods. Miller's most recent work is sponsored by a NIOSH grant and on completion will calculate the cost of injury and illness based on the BLS annual survey of occupational injury and illness. Estimates will be generated for those incidents involving days away from work and will be presented by worker and case characteristic.

Perhaps the most quoted source on the COI approach is work done by Leigh, Markowitz, Fahs, Shin, and Landigan completed in 1996. They were the first to concurrently evaluate the magnitude of the occupational injury and illness problem and the cost simultaneously from a societal perspective. However, total costs were derived first, and then individual estimates were derived for subsets of the aggregated totals. Building upon this work, the first comprehensive estimate of occupational injury and illness (Leigh, et al., 2000) has just been published.

While widely adopted in the safety and health research community, the COI method has critics. Many economists reject national income as a welfare measure and conclude that COI is an inadequate measure of the social cost of premature death (Kuchler & Golan, 1999). Furthermore, when the key assumptions of the marginal productivity theory--labor markets are competitive and firms behave to maximize profits-- are not met, the human capital approach is flawed. Values are generally higher for men than women, for whites than workers of color, and for middle-aged workers than for either older or younger workers (Rice, et al., 1989; Hodgson & Meiners, 1982; Dorman, 1996). Hodgson suggests that because of this phenomenon, the method measures not the value of life but rather the value of output as measured by earnings. Therefore, the relevant shortcomings are associated with imperfections in the labor market that create earnings that differ from the value of output. Well-documented examples include discrimination in hiring and earnings associated with age, race, sex, or ethnic background and the differences in pay levels between union and nonunion workers. For example, Kuchler and Golan (1999) conclude that COI estimates would indicate that a disease that strikes only males is more severe than a disease that strikes only females strictly because of the variation in earnings between the two populations based on a 1972 study by Cooper and Brody (1976). Services that are not reimbursed in the market, such as household production and volunteer workers, are also problematic. Further complications result because calculation of expected future incomes requires assumptions concerning promotion potential and occupational mobility, as well as changes in broader economic conditions that could also affect future earnings. Additionally, foregone earnings do not account for the value that individuals place on their own lives. Finally, COI does not account for psychosocial costs such as pain and suffering

that is associated with occupational injury and illness.

2.3 WILLINGNESS-TO-PAY

2.3.1 Compensating Wage Differentials

Adam Smith's claim that workers in a competitive labor market would receive compensating wage differentials for all disagreeable aspects of their jobs, including the risk of injury or death, was accepted in economic theory as well as common law (Dorman, 1996). In 1852, John Stuart Mill in the third edition of *Principles of Political Economy* refuted Smith's position by asserting that if the supply of labor was so great that desirable workers have limited choices of available work, then the undesirable laborer must take whatever he can get. Thus, the hardships and earnings are now in an inverse relationship, just the opposite of any arrangement in a just society. (as cited in Dorman, 1996, p. 33).

An underlying assumption of the scenario described by Adam Smith is that workers in the labor market know and understand the risks associated with jobs and that they will work only the jobs that are within the limits of their risk tolerance. This implies that workers are willing to accept a certain level of job-related risk in return for a specific level of compensation. Additionally, a perfectly competitive labor market would require establishment of equilibrium prices for each job characteristic that is equal to its marginal cost (Folmer & van Ierland, 1989).

Most compensating-wage literature employs some form of hedonic wage equation to determine the relationship between wages and personal characteristics of the worker and the job. Worker characteristics such as wealth, age, sex, education, experience, union membership, and health are viewed as important because they affect the firm's demand for the individual worker, the worker's preferences, and other labor opportunities available to the worker (Kuchler & Golan, 1999). Individual worker preferences are partially determined by the labor market's demand for their particular skills. Job characteristics affecting safety levels include the fatality risk of the job, the nonfatal risk of the job, worker compensation benefits that are payable in case of injury on the job, and annuity benefits that are payable in the event of a fatal accident (Kuchler & Golan, 1999). The individual worker preferences and job-related characteristics combined with labor supply and demand create the wage premiums observed in the market.

The initial model assumes that all workers have identical skills and preferences, the unit cost of furnishing occupational safety is constant and exogenous, worker utility functions are well-behaved (exhibiting appropriate separability and diminishing marginal returns), all relevant information is available to all parties without cost, and nothing is lost by considering a given firm in isolation from the rest of the economy (partial equilibrium). The individual's utility function (u) begins as follows:

$$u=u(w,s) \quad u_w, u_s > 0 \quad (1)$$

where w is the compensation received and s is the safety level on the job. Labor market analysis requires that employers provide each worker with the same level of utility based on the "going rate"; therefore, $u = u_0$ for all workers. At the same time, firms seek to set employment and output levels to maximize profit. Given output levels, this is an optimal way to minimize labor costs subject to the utility constraint, $u = u_0$. Regardless of the number of workers an employer chooses to hire, each employer must solve the following constrained minimization equation

$$\min Z = w + ks + \lambda(u_0 - u[w,s]) \quad (2)$$

where k is the constant unit cost of s per worker. Minimizing over w and s and rearranging the terms of the first-order conditions yields the characteristic result

$$\frac{u_w}{u_s} = \frac{1}{k} \quad (3)$$

The left side of this equation is the ratio of the marginal utility an employee would obtain from an increase in earnings to the marginal utility of an increase in safety. The right side of the equation is the cost of a unit increase in wages to the employer divided by the cost of supplying one unit increase in safety. The ratio of marginal costs equals the ratio of the marginal utilities. Furthermore, the first of these is the slope of a line for the tradeoff between wages and safety for a specified level of employer expenses. The latter is the slope of a worker's indifference (equal utility) curve u_0 where it clears the market. The solution is a tangency that is the slope of the indifference curve where it just touches the lowest iso-cost curve.

Early problems gaining access to micro-level data, required to accurately calculate compensating wage differentials, have hindered the acceptance of estimations generated using this approach. Ideally, subjective measures of risk would be reflected from the employee's and the employer's viewpoints for each job. The normal proxy is to use national data sets that provide information on several thousand workers and their occupations (Kuchler & Golan, 1999). Viscusi (1993) examined 24 labor-market studies and discovered that most of the estimates based on data for all injuries were between \$25,000 and \$50,000, with the severe type injuries requiring greater wage-risk trade-offs.

According to Viscusi (1993) and Fisher et al. (1989), the most successful applications of the compensating wage approach are empirical studies that include detailed worker and job characteristic variables, especially those that measure specific job-related risk (as opposed to occupational-related risk or general categories of risk). The labor-market studies reviewed by Fisher et al. (1989) estimate the range of the implicit value of life between \$1.6 and \$8.5 million (1986 dollars). Viscusi (1993), found the figures to be centered on the \$3 to \$7 million (1990 dollars) range. Viscusi views the estimates calculated from wage equations as more reliable than those calculated from structural models. A 1979 study by Viscusi produced an implicit value of life estimate of \$4.1 million (1990 dollars). Furthermore, a 1988 study by Viscusi and Moore produced an implicit value of life estimate range of \$2.5 - \$7.3 million in 1990 dollars (Viscusi, 1992).

Critics of the compensating-wage approach argue that its assumptions concerning the labor market do not reflect characteristics of the actual labor market. The compensating wage method assumes that workers have complete information concerning the extent and consequences of on-the-job risks, that labor markets are strictly competitive, and that insurance markets are actuarially correct so that risks can be accurately assessed. (Kuchler & Golan, 1999). Additionally, this approach does not consistently account for confounding job characteristics, such as prestige of the firm or job title, alternative work schedules, and a workplace focused on insuring quality of work life, that some workers may substitute for wages to compensate for risk (Kuchler & Golan, 1999). Furthermore, compensating-wage models consider all risks to be the same. It can be argued that not all fatality risks represent the same utility loss. For instance, a worker may view death by fire as much more painful than immediate death in a motor vehicle incident, thereby creating different values for those deaths. People are usually less willing to accept involuntary risk than risk that is voluntarily assumed through contract of employment. Consequently, compensating-wage studies probably underestimate society's aversion to risk that is not contracted for.

The most common criticism of compensating-wage approaches is that comparison of studies is almost impossible because of heterogeneity problems. This stems partly, from the large fluctuations in value of life estimates generated within the typical population, high-risk blue-collar males, used for compensating-wage studies. Therefore the application of the results of a compensating-wage study to the general population is inappropriate.

The most striking observation that emerges from the compensating wage literature is the sensitivity of value-of-life estimates to the characteristics of the study population and to the level and type of risk. As a result, the general applicability of these estimates is questionable. "The value of life is not a universal constant, but reflects the wage-risk trade-off pertinent to the preferences of the workers in a particular sample" (Viscusi, 1993, p. 1930). Therefore, compensating wage studies indicate a range for implicit value-of-life measures but caution should be exercised in

making general conclusions about the value of life.

2.3.2 Contingent Valuation

The contingent valuation method (CVM) asks respondents to state their willingness-to-pay (WTP) or willingness-to-accept (WTA) given a hypothetical situation describing how a change in morbidity will be accomplished as well as describing how payment for this change would be made. The value is measured in terms of a utility function through the use of WTP and WTA compensation in addition to measures of consumer's surplus. WTP measures estimate the compensating variation for welfare improvement and equivalent variation for decreases in welfare. The reverse is true for WTA--equivalent variation for welfare improvements and compensating variation for welfare decreases. This Hicksian measure is a dollar measure of preference that is equivalent to a change in income combined with a change in condition with no change in the respondent's utility level. The estimates are based on purely subjective choices made by the respondent--consistent with the concepts of economic utility.

These four welfare measurements can be derived through six individual steps. These steps are:

- 1) Setting up the hypothetical situation;
- 2) Obtaining bids;
- 3) Estimating mean willingness-to-pay and/or willingness-to-accept;
- 4) Estimating the bid curves;
- 5) Aggregating the data; and
- 6) Evaluating the activity.

In step one, a sample of individuals is given a detailed description of a hypothetical market for the amenity, in this case, good health. The respondent is also given the method of payment, such as income tax, property tax, or direct payment into a trust fund. What groups or members of society, if not all, will be responsible for paying this bill will also be outlined at this point. Bids can be obtained in a number of ways, but all ask the respondent to state their maximum WTP or minimum WTA to forego the improvement. Examples of these bid mechanisms include bidding game, closed-ended referendum, payment card, and open-ended question. After all bids are made, an average is calculated. Consideration is given to acceptance of outlying bids such as zero or extraordinarily high bids before continuing. The fourth step involves estimating the bid curve, which is usually accomplished through regressing the bids against independent variables, such as age, sex, education, and income. The next step allows for aggregating the mean bids to a population total value figure. Hanley and Spash (1995) suggest that three decisions are now relevant: identifying the population of interest, determining the mathematical method for aggregation--either simply by multiplying the mean by the population size or using weighted least squares, and selecting a time period for aggregation. Finally, the process and estimates should be evaluated for representativeness, accuracy, comparability with other studies, and possible biases.

CVM was originally proposed to estimate the benefit of a recreation area in Maine by R. Davis in his article "Recreation planning as an economic problem" published in the *Natural Resources Journal* in 1963. During the 1970's and 1980's this theoretical approach saw many empirical and theoretical refinements. During these years, studies fell mainly into two categories. The first measured the willingness-to-pay for health improvements, while the second measured reductions in the hazard itself under the assumption that respondents could measure their own dose-response functions. Studies measuring the WTP for health improvements included Jones-Lee (1976), Loehman et al. (1979), Loehman and De (1982), Berger,et al. (1987), and Rowe and Chestnut (1984). Brookshire et al. (1979) and Schulze et al. (1983) used the second method in their studies.

The number of CVM studies increased steadily throughout the 1980's and 1990's. However, they typically involved valuation of reducing less-severe symptoms and offer little comparability across studies because of differences in reporting and differences in the symptoms being evaluated (Kenkel et al., 1994). In a 1997 study by Diener et al. (1998), eight CVM studies with empirical results were reviewed. Nearly 90% of these studies conducted a cost-benefit analysis. Of these studies, 37 involved specific diseases--such as respiratory diseases, cardiovascular disease, or cystic fibrosis screening, or symptoms. None were studies dealing with the overall burden regardless of disease or dealing with injury rather than disease. However, in 1993 a Swiss pilot study by Christe (1995) was conducted to determine the human costs generated by road accidents. Loss of life, physical and mental suffering of the victim and

mental suffering of the victim's relatives were the human cost measured. The results indicated, among other difficulties, the need for extensive questionnaire redesign and an intermediate stage to allow a respondent to properly consider risk levels and risk reductions. The author concluded, "Whatever the improvements that could be made to the questionnaire, we must nevertheless realise that a number of problems will not be solvable."

A dominant criticism of this methodology is that the demand for health or life in the extreme may not be accurate because the transactions are hypothetical in nature--not requiring the respondent to actually give up cash or any other tangible good. Additionally, Mitchell and Carson (1989) report that systematic biases exist for three primary reasons. First, there is strategic or compliance biases because respondents have strong incentives to misrepresent their WTP. Second, there can be misperception of the scenario; finally, there is bias when the scenario offers implied value cues to assist the respondent in deciding on their WTP.

On a positive note, Viscusi (1993) argues that contingent value is a better measure because these studies estimate the respondent's utility function. It can therefore avoid some of the estimation problems (specifically heterogeneity) found in other WTP methods by modeling a value-of-life as a function of income and non-marginal changes in risk. Furthermore, CVM studies are not limited by the ability to acquire market data.

In addition to the theoretical models named above, one additional attempt at deriving the most accurate measure of the value of a life was considered before a final selection was made. Landefeld and Seskin (1982) proposed a compromise of the two theories. First, the human capital approach was expanded to derive the present value of non-labor income losses such as interest from capital holdings. At the same time, the calculations excluded the value of non-market activities. Second, the present value of labor and non-labor income was adjusted by a risk-aversion factor. This factor represents an individual's willingness-to-pay to avoid financial losses that are connected with risks to life. While some researchers have adopted this method under the assumption that it presents improved estimates (Roberts & Foegeding, 1991, Buzby & Roberts, 1995), many of the limitations associated with both theories are embodied in this combined method.

2.4 THEORY SELECTION

Strengths and weaknesses of each theoretical model that could be employed to measure the cost of occupational traumatic fatalities were examined. The cost-of-illness approach was selected as the best approach for use in this proprietary NIOSH model for the following four reasons. First, according to renowned researchers in the field, this method is considered to be the most appropriate for a public health agency to select (Rice, et al., 1989; Haddix, et al. 1996). In addition, it is the most frequently used method to determine judgements in wrongful deaths. Therefore, adopting this conceptual model will make these estimates relevant to current policies and practices of the tort system (King and Smith, 1988; Dorman, 1996). Secondly, adopting this method is the most pragmatic in that data are reliable, easily acquired, and most often free of charge (Rice, et al., 1989). Calculating national estimates using the willingness-to-pay approach is extremely labor intensive and requires expensive surveys as well as significant developmental work prior to implementation. Furthermore, the WTP estimates are subject to great variability based on the respondent's economic status and their physical and mental condition at the time of the survey. Thirdly, computations are easy to perform and easy to understand by those who are not economists. This is particularly meaningful for NIOSH because economists represent less than 1% of the staff. Finally, COI is a measure of the impact of a premature death on society (Kuchler & Golan, 1999) rather than the value of an individual's value of reducing the risk of fatal injury. For this study, the ex-post outcome or impact was the desired outcome.

Chapter 3

Methods

3.1 Model

For this study the cost-of-illness theoretical approach was employed. The indirect lifetime cost of an occupational fatal injury is derived by calculating the present value of future earnings summed from the year of death until the decedent would have reached age 67, accounting for the probability of survival were it not for the premature death. Mathematically this is represented as follows:

$$PVF = \sum P_{y,s} (y+1) [Y_{s,j}(n) + Y_s^h(n)] (1+g)^{n-y} / (1+r)^{n-y} \quad (1)$$

where:

PVF	=present discounted value of loss due to occupational fatal injury per person
$P_{y,s}$ (y+1)	=probability that a person of race r, sex s, and age y will survive to age y+1
y	=age of the individual at death
s	=sex of the individual
n	=age if the individual had survived
$Y_{s,j}(n)$	=median annual earnings of an employed person of sex s, occupation j, and age n (includes benefits and life-cycle wage growth adjustment)
$Y_s^h(n)$	=mean annual imputed value of home production of a person of sex s and age n
g	=wage growth rate attributable to overall productivity
r	=real discount rate (3%)

Combining these indirect costs with direct costs yield the overall lifetime cost of an occupational fatal injury. For this study, medical expenses were used to estimate the direct cost associated with the fatality.

The model presented here calculates incidence-based costs, the lifetime cost of all injuries occurring in a given year regardless of what year the costs are accrued, rather than prevalence-based costs. The incidence basis was selected as it best measures possible savings from prevention efforts to avoid additional fatalities (Dickie & Gerking, 1991), and in recent years has been widely adopted (Miller, et al., 1995; Rice, et al., 1989; Leigh, et al, 2000). Because this model addresses only fatalities, the significant problem of estimating the varying medical costs over time associated with a prevalence basis identified by Miller, et al. (1995) was eliminated. Nearly nine of ten of the fatalities captured in the NTOF system occurred within one day of the injury event; therefore, medical expenses were included in the first year calculations only.

The model builds on a model first developed by Dorothy Rice in 1965 (Rice, 1965). However, because this new model calculates the cost of known fatalities, several assumptions were made to modify the Rice model. First, because the decedents were known to be employed at the time of death, the participation rate in the labor force was eliminated. Because the retirement age of workers has increased over time, calculations were ceased after age 67; however, one iteration of the indirect cost calculation was performed to account for the associated loss of productivity for victims older than 67 at the time of death. Finally, the model employed constant dollars to allow for aggregation across differing years of death.

Two assumptions concerning wage growth were made. Deaths were assumed to be uniformly distributed by month and as a result, the wage growth rate was reduced by one-half in the first year. Second, because the model forecasts the decedent's wages for up to 50 years into the future, a long-term economic growth rate was employed.

3.2 Data Sources

3.2.1 Fatality Number and Characteristics

Data for traumatic occupational injury deaths used in this analysis were taken from the National Traumatic Occupational Fatalities (NTOF) surveillance system for the years 1980 through 1995 (NTOF, 1980-1995). This

census, maintained by NIOSH, collects death certificates from the vital statistics reporting units in the 50 States, New York City, and the District of Columbia on an annual basis. This system consists of all U.S. death certificates with a positive response to the "Injury at Work" box for workers 16 years of age or older for whom an external cause of death was an injury according to the International Classification of Diseases-9th Edition (ICD-9), codes E800-E999 (World Health Organization, 1977). The data for this study are for the civilian workforce.

Limitations of death certificates used to ascertain work-related fatality information have been described elsewhere (Bell et al., 1990; Jenkins, et al., 1993; Russell & Conroy, 1991; Stout-Wiegand, 1988; Stout & Bell, 1991). Most relevant to this study is a lack of specificity in employment information on the death certificate (Bell et al., 1990; Jenkins, et al. 1993). A further limitation for part of the study period is the absence of national guidelines for completion of the "Injury at Work?" item on the death certificate at the time of data collection (Jenkins et al., 1993; Russell & Conroy, 1991). Operational guidelines for the determination of work injuries were developed by NIOSH and disseminated nationwide in 1993. Despite these limitations, death certificates have been shown to identify, on the average, 80% of work-related fatalities nationally, (Jenkins et al., 1993; Stout & Bell, 1991). Therefore, fatality counts used in the cost calculations presented in this paper should be considered the minimum number of work-related injury fatalities that occurred during the study period.

Worker and case characteristics selected from this system for use in the model included: age, sex, occupation, and race of the worker; employer industry; external cause of death; state of death; and year of death. Employment information from the death certificate was coded from the "usual" industry and occupation entries on the death certificate. The 1987 Standard Industrial Classification (SIC) system was used to group industry into 11 division-level categories (Executive Office of the Presidency, 1987). Occupation was categorized into 11 major divisions according to the 1980 and 1990 Bureau of the Census Occupational Classification System (U.S. Department of Commerce, 1982, 1992).

3.2.2 Probability of Survival

Productivity losses were adjusted by the probability that the individual would have remained in the labor market were it not for the premature death that resulted from an occupational event or exposure. The probability estimates used in this study were developed by the National Center for Health Statistics, Division of Vital Statistics. This agency used data from the 1990 Census of Populations and deaths occurring in the United States to U.S. residents for 3 years, 1989-91 (U.S. Department of Health and Human Services, 1997). These current life tables were based on a complete count of resident deaths in the United States during those years. Separate probabilities were calculated for each sex within the white population, the population other than white, and the black population. The initial survival table presented the number of persons in the sample surviving to exact age x . The percent of persons who, having attained age x , will survive to age $x + t$ was calculated by dividing $x+t$ by x and multiplying by 100. The probability of survival by sex and race can be found in Appendix A.

3.2.3 Wages

The wage component of the cost model consists of four parts: base wage, benefits, economy-wide productivity growth, and life-cycle wage growth. Each component was derived separately and is discussed individually in the next four sections.

Death certificates collect only the occupation of the worker and not the wage or salary. Therefore, the base wage for this model is an estimate or expected value of the earnings of the decedent established by the decedent's occupation at the time of death. Also because of the lack of detailed information, the model assumes that the decedent had worked full-time in that occupation and would not have changed jobs between the time of death and retirement age. The base wage is derived from the Current Population Survey (CPS), a monthly household survey of the non-institutional population 16 years of age collected by the Bureau of the Census for the Bureau of Labor Statistics (U.S. Department of Labor [BLS], 1980-1998). This population-based survey includes wage and salaried workers, the self-employed, and all agricultural workers.

The Bureau of the Census defines wages or salary as the total income received for work carried out as an employee during a given year. It includes salary, wages, tips, armed forces pay, commissions, piece-rate premiums, and cash

bonuses earned prior to deductions such as taxes, bonds, pensions, and union dues. Also included is net income from an individual's own business, professional enterprise, or partnership, as well as from a farm operation conducted by individuals on their own account, such as an owner, renter, or sharecropper. For net income calculations, gross receipts include the value of all goods sold, services performed, payments from government farm programs, money received from farm equipment rental to others, and farm property rental. Expenses include items such as costs of goods and supplies, rent, heat, power, depreciation charges, wages and salaries paid, business or farm taxes (not personal income taxes), interest on farm mortgages; and farm building repairs. For self-employed farmers, the value of farm commodities used for family living are not included as part of net income.

Occupation and industry are classified using the 1980 and 1990 Census of Population: Alphabetic Index of Industries and Occupations from the Bureau of Census (U.S. Department of Commerce, 1982; U.S. Department of Commerce, 1992). Base wages were enumerated by detailed occupations and sex and defined as median annual earnings before taxes and other deductions. Where data were not available for a specific detailed occupation, wages from the next hierarchical level were substituted. These data were presented in current dollars and adjusted for inflation using the All Urban Consumer Price Index (CPI-U) for a base year of 1992 (U.S. Department of Labor [BLS], 2000). (See Appendix B for Wage Data and Appendix F for CPI-U.)

3.2.4 Benefits

To more closely represent the market value of the worker, the value of employee benefits was added to the base wage. These data were taken from the U.S. Chamber of Commerce annual survey of employee benefits administered to a sample of employers based on the distribution of U.S. employment (U.S. Chamber of Commerce, 1981-1996). The sample includes both public and private sector employers selected to represent a scientific cross-section of U.S. business by industry, size of firm and geographical region. Mean estimates of benefits were calculated using data from hourly paid and salaried employees. The average benefits for department stores during 1980 and 1982 were selected as a proxy for the unavailable department store benefits for 1981.

Benefits as a percent of payroll for this study include the employer's share of legally required payments, retirement and savings plan payments; life insurance and death benefits payments; medical and medically-related benefit payments; and miscellaneous benefit payments such as employee education expenditures, child care, and discounts on goods and service purchased from company by employee. To avoid double counting, categories of paid rest periods, lunch periods, wash-up time, travel time, clothes changing time, get-ready time, etc., and payments for time not worked such as paid vacations, holidays, sick leave, or State or National Guard duty are excluded. These values were presented as nominal before-tax dollars for each industry group. The benefit amounts were adjusted for inflation by the CPI-U to a base year of 1992. (See Appendix C.)

3.2.5 Economy-Wide Productivity Growth

This growth element employs the Employment Cost Index (ECI) to estimate how much wages will rise in concert with the growth of the U.S. economy as a whole (U.S. Department of Labor [BLS], 2000). The ECI measures the change in the cost of labor and includes both changes in wages and salaries as well as employee benefits costs.

This index is based on establishment surveys of compensation costs that cover all occupations within the private and public sector. The surveys of approximately 5,000 establishments exclude farms, households, the self-employed, and the Federal Government. The 1987 Standard Industrial Classification (SIC) system was used to classify establishments by industry in the most current surveys (Executive Office of the President, 1987). After the sample is drawn, probability proportional to size sampling is used to select occupations in each of the sampled establishments. That is, a fixed number of occupations are selected in each establishment using a process that gives occupations with greater employment a greater chance of selection.

The ECI uses the current-cost approach--annual costs are calculated based on the current price of benefits and current plan provisions. The annual cost is divided by the annual hours worked to derive the cost per hour worked for each benefit. Productivity growth rate is held constant at the average of the percent changes in the ECI from 1976 to 1997. This percent is an inflation free change in wages and represents an annual proxy for a change in productivity.

3.2.6 Life-Cycle Wage Growth

To account for the final component of wage growth, estimates of the life-cycle growth, or the salary growth due to experience of the individual worker, were employed. This rate was based on mean wages from the historical income tables of the Current Population Survey (CPS) for the years 1980 through 1998 (U.S. Department of Labor [BLS], 1980-1998). Mean wages were presented in constant dollars by sex, race, and age group for each year. The rate of change for mean wages was determined for each sex and race within a specific age group. Wages for the initial age group (x) was subtracted from the wages of the next age group (x+1) and divided by the initial age group wage: $(x+1)-x/x$. This process was repeated for male and female within each race category. For this study, it was assumed that the salary growth rate is constant within age groups—equal increments for each year of age within that age group. (See Appendix D for Life-Cycle Wage Growth Rates.)

3.2.7 Household Production

These non-market losses were derived from time-diary data captured in The National Human Activity Pattern Survey (NHAPS) study commissioned by the Environment Protection Administration (EPA) (Triplett's work as cited in Expectancy Data, 2000). This two-stage Mitofsky-Waksberg random digit telephone dial sample design was used in the survey that covered the period from September 17, 1992 to October 1, 1994. Quarterly samples, stratified by the four major census regions (Northeast, Midwest, South, and West) and day of week (weekend versus weekday), were drawn with a total sample of 14,908 households yielding 9,386 interviews. The University of Maryland's Research Center conducted the survey interviews and requested the following for each activity the respondent performed during a 24-hour period: start and end time of the activity, actual description of the activity, location where activity occurred, and whether smoking occurred during the activity. The activities were initially coded into 11 broad categories and then into 91 micro-categories and 82 locations.

Expectancy Data regrouped these data into five super-categories: household production, providing care, hygiene and personal care, leisure, and employment and education (Expectancy Data, 2000). Further refinement classified these categories into economic allocation of work and leisure. Finally household production time was defined as activities that could produce benefit for all members of the household--housework; food cooking and cleanup; outdoor chores, plants, and animals; home and auto maintenance; and obtaining goods and services. Providing care includes childcare; child guidance; playing with children; transporting children; and, providing care to others. This sub-category was defined as the time spent providing services that are channeled toward one or more persons. The market replacement value of this time was reported in 1998 dollars and based on the hourly wages plus the employer's legally required benefit costs from the Bureau of Labor Statistics' Occupational Employment Statistics (OES) survey and the employer compensation cost report. Values of time for each sub-category were from a shorter list of the OES occupations that more accurately correlate with those activities involved in household production or providing care. Finally, daily values were distributed by age and sex for each sub-category (Expectancy Data, 2000). For this study values of household production and providing care were combined within each age and gender category and multiplied by 365 to obtain annual values. Dollar values were adjusted for inflation using the CPI-U. (See Appendix E for Household Production and Appendix F for CPI-U.)

3.2.8 Discount Rate

For public health evaluations, which normally assume a societal perspective, the social discount rate--the rate at which society as a whole is willing to exchange present costs for future benefits-- is appropriate. This implies that the discount rate should be consistent with the shadow-price-of-capital or the real riskless rate (Lipscomb, 1989). However, the value of the real riskless rate is difficult to determine. Over the years, discount rates selected for social analysis have varied from 1% to 10% (Rice et al., 1989, U.S. Department of Health and Human Services [DHHS], 1996), with the most common rate being 5% (Haddix et al., 1996). The Panel on Cost-Effectiveness in Health and Medicine (The Panel), under the auspices of the Public Health Service, recommended a 3% real discount rate, a rate exclusive of adjustment for inflation. The World Bank in 1993 concurred stating that this rate represented only the time preference. (DHHS, 1996) Because this rate is suggested for all agencies within Health and Human Services, it was selected for the initial calculations in this model.

Literature suggests that the use of a constant discount rate may be appropriate for streams of costs that occur in the

same period (U.S. Environmental Protection Agency [EPA], 2000; Shefrin & Thaler, 1988; Thaler, 1985; Harvey, 1994); it may well be inappropriate for streams that span many years. (Torries, 1998; Belzer, 2000, Schelling, 2000). Methods to accommodate what may be changes in the time value of money include proportional discounting that take the form of $a(t) = [b/b+t]$ (DHHS, 1996). OMB issued guidelines in 1994 that called for discount rates from 2.1% for a 3-year time frame to 2.5% for 7-year time frame to 2.8% for a 30-year time period. However, The Panel disagrees by stating that adopting a non-constant discount rate would “abandon a fundamental tenet of welfare economics—namely, the stability of preferences”. (DHHS, 1996) Furthermore, there is little consensus in the economic literature on social discounting for long-term flows, particularly those that span more than one generation. (EPA, 2000)

As was the case in determining the value of the discount rate, the recommendations of the Panel was accepted for this study and a constant discount rate employed. Additionally, for these calculations, cash flows were assumed to occur at the beginning of each time interval.

3.2.9 Inflation Adjustments

In addition to determining the real discount rate, costs must be standardized to one time unit to ensure that all costs are comparable regardless of the year of occurrence. Cost data were converted to base year dollars. The Consumer Price Index (CPI)--specifically the all urban consumer and medical care indices-- was used to make these conversions in the model (U.S. Department of Labor [BLS], 2000).

The CPI, a fixed-quantity price index, measures the average change in prices for a fixed set of goods and services and is calculated monthly by the Bureau of Labor Statistics (BLS). Prices are derived by sampling the prices of selected goods, including food, clothing, shelter and fuels, transportation, medical services, and then repricing that sample of selected goods at different intervals. The medical care index is comprised of two components--medical care commodities and medical care services. These components include professional medical services, hospital and related services, prescription drugs, and nonprescription medical equipment and supplies. These Laspeyres indices are defined by BLS as “the ratio of the cost of the base-period basket at this month’s prices to the actual cost of the base-period basket in the base period--or the ratio of the costs of purchasing a set of items of constant quality and constant quantity in two different time periods (BLS, 2000).” (See Appendix F for All Urban Consumer Index and Appendix G for the CPI-Medical Care.)

3.2.10 Medical Costs

The single nominal value for medical costs in 1998 dollars of \$11,276 was obtained from the Detailed Claims Information (DCI) database from National Council on Compensation Insurance (Detailed Claims Information, 1992-1995). This database provides estimates of the costs of injury and fatality to workers based on a nationally representative sample. The administrative data collected from state worker’s compensation experiences contain information on injuries with lost workdays. Because each State varies in the requirements for worker’s compensation payment, the number of days lost prior to inclusion in this database ranges from two to seven days. However, this limitation does not affect the reporting on information for work-related fatalities. For this study, the mean of medical costs for fatalities over a four-year period from the DCI was used. The dollar value was adjusted to 1992 dollars using the CPI-Medical Care Index.

3.3 Computer Application Program

After the theoretical approach was selected and the data sources identified and acquired for this model, the next step was developing a computer program that could be easily used by DSR staff whose computer skill levels varied widely. The program was developed using PowerBuilder, a development tool for a graphical environment. The application uses menus and windows with controls such as buttons and check boxes to perform specific operations. PowerScript language is used for writing script such as commands, functions, and statements that will trigger a process in response to an event. Finally, PowerBuilder allows for cross-platform--both UNIX and Windows--development and use.

The cost model contains an initial selection screen that includes eight variables. Options for each variable selected from the initial screen will appear on individual screens. The choices made on these screens will form the query that

is developed by the PowerBuilder/C++ program. The selected variable names and the number of subjects fitting the requirements of the query are displayed prior to calculation. This allows the user to revise the query or run the calculation for the current number of subjects. The last screen displays the variable(s) chosen for inclusion in the query and the results of the cost calculation—overall costs, the number of subjects, average costs, and median costs.

Conceptually, this computer program needed to be loaded on personal computers that were not always state-of-the-art. Therefore, the system requirements needed to conform to the oldest of the personal computers that were identified to have the program installed. Systems requirements for operating this model consist of a minimum of 64MB of RAM, a Pentium II processor, and Windows NT. See Appendix H for the user's guide.

Chapter 4

Results

This chapter presents the components of the computer application program. It also presents information on operational issues such as speed and ease of use of the program. The second section presents the results of the estimation process through the application program. Finally, estimations of the cost of traumatic occupational fatalities by selected characteristics are presented.

4.1 Computer Application Program

This computer application program is capable of producing estimates of the total, mean, and median lifetime costs of occupational traumatic fatal injuries as captured within the National Traumatic Occupational Fatalities (NTOF) system (See Tables 4.1-4.13). The program allows the user to select up to eight variables to estimate the societal burden of premature work-related deaths. Each variable represents a characteristic of the fatality in differing degrees of detail. The eight variables are: year of death; age, sex, and race of the decedent; the state where the death certificate was issued, the industry that employed the decedent; the usual occupation of the decedent; and the external cause of death. These variables can be selected in numerous combinations to derive the estimate of interest. See Appendix H for an example of estimating the cost of traumatic occupational fatalities based on selected characteristics.

Estimates were created for every major characteristic by year to ensure that the estimates would be produced and would be reasonable in magnitude. Selected estimations were derived more than once to ensure repeatability of the estimate. The program was launched on three different computers with selected estimates derived and compared.

On average, the program calculated the estimated cost of a year of fatalities in six minutes; a rate of approximately 1000 fatalities per minute. The windows-based application program is extremely user friendly. Staff from the Division of Safety Research within NIOSH were requested to read the user manual and attempt to calculate costs independently. On average, staff completed the user manual in 3-5 minutes. They identified the characteristics of the estimation desired prior to entering the program. All staff derived the appropriate estimation without assistance.

4.2 Cost-of-Illness Estimates

The overall goal of this study was to produce a user-friendly computer program capable of producing estimates. It was not intended to be a study or analysis of the cost estimates. However, to ensure that the program was functioning correctly, cost estimates for all major characteristics by year were derived. The following is meant to be only a cursory analysis of those resulting costs. Future studies will be responsive to the need for a thorough investigation of the relationship between the cost of fatalities and the associated characteristics as well as trend analysis.

Over the sixteen-year period of 1980 through 1995, NTOF reported 93,243 fatal occupational traumatic injury deaths, ranging between the high of 7,330 in 1980 and the low of 5,031 in 1992 (Appendix Table 4.A.1). The total lifetime cost to society of these premature deaths ranged between the most burdensome in 1980 at just over \$2.5 billion, to the least burdensome in 1992 at nearly \$1.5 billion. The total cost for all 16 years was nearly \$30 billion (1992 dollars). Generally, the higher the number of fatalities, the greater the societal burden. However, there are several exceptions such as the number of fatalities is greater in 1987 than 1983, but the total cost is larger in 1983 than in 1987.

The mean lifetime costs ranged from \$342,274 in 1980 to \$287,631 in 1995 and the median lifetime costs ranged from \$316,947 in 1980 to \$257,362 in 1995. 1990 and 1991 experienced the fewest number of fatalities and also the lowest mean and median costs. In all years, the median cost of an occupational fatality is less than the mean cost which is indicative of a positively skewed distribution—there are costs on the higher end that are disproportionately increasing the mean value. Overall the mean lifetime cost for the period was \$316,937 and the median was \$289,423. As expected, the estimated cost—including total, mean, and median—of fatal occupational injuries to

women was lower than the cost of fatalities to males (Appendix Table 4.A.2). This was true in all years. However, the difference between the male and female mean cost diminished by nearly 10% in the latter years. As was the case in the overall estimates, the mean cost was generally greater than the median cost for each year and sex (Appendix Table 4.A.3). The exceptions occurred in 1980 and 1984 for females, where the mean cost was less than the median cost.

Similarly, those decedents identified as white experienced the highest total lifetime costs for these years (Appendix Table 4.A.4). Costs ranged by race from a low of just over \$1-1/2 million for the Native American classification to about \$24 billion for the white classification. The mean and median costs showed a somewhat different pattern (Appendix Table 4.A.5). Overall, the estimated mean and median costs for those decedents identified as Native American were the highest—339,786 and 315,567 respectively. Overall, mean and median costs for the black and Asian classifications were lower than the white classification. The relationship was sustained for the black classification in each year, but varied between Asians and whites. Because nearly 10% of the fatalities did not have a race identified on the source documentation, and the classification structure changed in 1990, these estimates by race may have some error in them.

The greatest number of fatalities occurred in the 25-34 year old age group, as did the highest total lifetime cost (Appendix Table 4.A.6). The fewest number of fatalities occurred to those in the 16-19 year old age group, while the lowest total cost was found in the 65 and over age group. For each year, the highest mean and median costs were associated with the 16-19 year old group for all years combined and separately (Appendix Table 4.A.7). For all years, the lowest mean and median costs were found in the 65 and over age group. Furthermore, the mean and median lifetime costs constantly decreased as the age advanced, dropping by nearly 95% from the 16-19 year old age group to the 65+ age group.

During this time period, the highest total lifetime costs of occupational traumatic injury was seen in the construction industry—nearly \$6 billion, or nearly 20% of the overall burden both in costs and number of fatalities (Appendix Table 4.A.8). An additional 20% of the overall cost and number of fatalities was found in the transportation and public utilities industry division. In every industry division, with the exception of the agriculture, forestry, and fishing (agriculture) industry, the proportion of all fatalities mirrored the proportion of overall costs. For the agriculture industry, workers experienced 11% of the overall fatalities, but contributed only 7% to the overall costs (Appendix Table 4.A.9). The 1980-1995 combined mean costs for the agriculture division, the manufacturing division, the retail trade division, the finance, insurance, and real estate (FIRE) division, and the services division had lower mean costs than estimated for all industries. The same pattern held true for median costs. Generally, the mean cost for an industry division was higher than the median cost for that same industry division in each year. Additionally, the industry divisions' mean and median costs in 1980 were generally higher than in 1995. However, the median cost of a fatality in agriculture and FIRE were lower in 1995 than in 1980; the mean was lower for FIRE in 1995 than in 1980; finally, the mean cost was stable for agriculture between 1980 and 1995.

The total lifetime cost of traumatic occupational fatal injury for these years ranged from just over \$500 million for those employed in the administrative support occupations, including clerical classification, to nearly \$7 billion for those employed in precision production, craft, and repair occupations (Appendix Table 4.A.10). The second highest total cost was found in transportation and material moving occupations, with a total of just over \$5 billion, also ranked second in the number of fatalities. All categories showed a decrease in total cost from 1980 to 1995 except executive, administrative, and managerial occupations moving from nearly \$129 million to just under \$139 million respectively. The highest mean and median lifetime costs were in the unknown classification (Appendix Table 4.A.11). This mean cost was nearly 3 times greater than the estimate for farming, forestry, and fishing occupations (farmers), which was the lowest for all categories; the median for the unknown category was over 4 times greater than that of farmers. The highest mean value for each occupation group occurred in varying years; 3 in 1980, 2 in 1981, and 1 each in 1983-1989 and 1994. Nearly all categories saw a lower lifetime mean and median estimate in 1980 than in 1995. The exceptions included professional specialty occupations and farming, forestry, and fishing occupations with higher median costs and services occupations with a higher mean cost.

Motor vehicle incidents had the highest overall total lifetime costs of fatal injury, accounting for nearly 25% of the

burden for all incidents during 1980-1995 (Appendix Table 4.A.12). An additional 8% of the overall burden is associated with the remaining three transportation incident categories (air, rail, and water) totally just under \$9 billion dollars. The category of homicide had the second highest total costs with costs at just under \$4 billion. The estimated mean cost of the air transportation incident category was \$435,990, a value higher than any other single category (Appendix Table 4.A.13). With one exception, the suicide category, the mean cost declined from 1980 to 1995. For suicide, not only did the mean value increase, but, unlike any other category, the highest cost was estimated for the year 1995. The year that the highest mean value occurred varied by category, seven in 1980, six in 1981, and one each in 1982, 1985, 1986, 1988, 1989, and 1995.

Because of uncertainty in the appropriate discount rate, further sensitivity analyses were conducted using the same ranges as previous researchers—from 0 to 10%. The lower bound reflects what happens in the absence of any time preference of money; the upper bound can be thought of as a ceiling on the real consumption rate in current markets. Appendix Table 4.A.14 presents estimates using 0, 5, and 10-percent discount rates respectively. The 0% discount rate estimations are 3-1/2 times larger than the 3% discount rate. The 3% rate is approximately twice that of the 5% rate and 5-times higher than the 10% rate. Furthermore, the choice of the discount rate can affect the relationship between the estimated costs of specific groups. For example, employing a 0% discount rate yields a mean cost of \$2,080,491 per case for the 16 to 19 years old age group and a mean cost of \$53,405 per case for the 65 and older age group. By contrast, selecting a 5% discount rate yield costs of \$374,051 for the 16-19 year old age group and \$41,488 for the older age group. Finally, using a 10% discount rate yields a mean cost of \$126,365 per case for the younger age group and \$41,006 for the 65 and older age group. The difference between the value of a fatality for an older and younger worker diminishes as the discount rate is increased.

4.3 Appendix to Chapter 4

Table 4.A.1. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by Year, 1980-1995
(1992 Dollars)

Year	Number of Fatalities	Total Cost	Mean Cost	Median Cost
All Years	93,243	29,552,161,697	316,937	289,423
1980	7,330	2,508,868,265	342,274	316,947
1981	7,054	2,396,027,572	339,669	312,612
1982	6,372	2,095,498,767	328,860	303,861
1983	5,781	1,881,829,697	325,520	301,040
1984	6,109	2,032,549,668	332,714	313,131
1985	6,180	2,026,075,386	327,844	302,324
1986	5,616	1,850,946,084	329,584	307,306
1987	5,808	1,852,418,978	318,943	293,010
1988	5,707	1,793,657,108	314,291	291,663
1989	5,671	1,759,026,129	310,179	288,736
1990	5,382	1,663,312,387	309,051	283,341
1991	5,215	1,557,521,155	298,662	276,864
1992	5,031	1,471,328,798	292,453	264,875
1993	5,281	1,561,447,336	295,673	270,151
1994	5,399	1,575,198,789	291,758	259,817
1995	5,307	1,526,455,578	287,631	257,362

Table 4.A.2. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by Sex and Year, 1980-1995
(1992 Dollars)

Year of Death	Male		Female	
	Number of Fatalities	Total Cost	Number of Fatalities	Total Cost
All Years	87,163	27,915,441,091	6,074	1,634,409,014
1980	6,902	2,392,676,394	428	116,191,871
1981	6,671	2,292,255,616	383	103,771,957
1982	6,001	2,000,034,463	371	95,464,304
1983	5,458	1,792,956,620	323	88,873,077
1984	5,754	1,929,845,455	355	102,704,213
1985	5,795	1,923,410,538	385	102,664,848
1986	5,250	1,750,293,541	366	100,652,543
1987	5,423	1,747,850,863	385	104,568,115
1988	5,331	1,690,470,384	376	103,186,724
1989	5,278	1,649,958,035	393	109,068,094
1990	5,033	1,572,388,988	349	90,923,400
1991	4,832	1,451,288,583	381	105,213,610
1992	4,687	1,383,918,136	343	87,033,576
1993	4,903	1,459,646,073	378	101,801,263
1994	4,963	1,458,554,086	433	115,729,157
1995	4,882	1,419,893,316	425	106,562,262

Note: Because the sex of six decedents was not identified on the death certificates, the sum of male and female fatalities do not equal the total number of fatalities.

Table 4.A.3. Number and Average Lifetime Costs of Occupational Traumatic Fatal Injury by Sex and Year, 1980-1995 (1992 Dollars)

Year of Death	Male			Female		
	Number of Fatalities	Mean Cost	Median Cost	Number of Fatalities	Mean Cost	Median Cost
All Years	87,163	320,267	292,375	6,074	269,083	250,214
1980	6,902	346,664	318,265	428	271,476	273,986
1981	6,671	343,615	314,995	383	270,945	262,554
1982	6,001	333,284	308,518	371	257,316	241,451
1983	5,458	328,501	304,208	323	275,149	265,181
1984	5,754	335,392	314,797	355	289,308	289,377
1985	5,795	331,909	306,305	385	266,662	246,500
1986	5,250	333,389	312,002	366	275,007	263,057
1987	5,423	322,303	296,999	385	271,605	261,903
1988	5,331	317,102	294,006	376	274,433	259,581
1989	5,278	312,610	290,601	393	277,527	256,940
1990	5,033	312,416	286,520	349	260,526	221,913
1991	4,832	300,349	278,018	381	276,151	254,428
1992	4,687	295,267	266,911	343	253,742	226,793
1993	4,903	297,705	272,896	378	269,316	241,566
1994	4,963	293,886	261,704	433	267,273	243,571
1995	4,882	290,843	260,828	425	250,735	224,385

Note: Because the sex of six decedents was not identified on the death certificates, the sum of male and female Fatalities do not equal the total number of fatalities.

Table 4.A.4. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by Age Group and Year, 1980-1995 (1992 dollars)

Year of Death	16-19 Years		20-24 Years		25-34 Years		35-44 Years	
	Number	Total Cost	Number	Total Cost	Number	Total Cost	Number	Total Cost
All Years	3,400	2,331,153,807	10,012	5,951,623,048	24,109	10,620,917,091	20,184	6,092,423,351
1980	445	313,048,377	1,051	647,739,148	1,842	826,880,913	1,281	387,321,302
1981	367	260,329,320	988	605,843,675	1,896	843,529,887	1,190	358,774,909
1982	293	200,508,172	843	511,766,259	1,641	724,075,018	1,204	363,819,451
1983	249	165,847,506	721	426,955,391	1,472	656,789,335	1,193	362,651,214
1984	233	158,638,380	786	475,086,438	1,644	735,569,944	1,237	380,167,116
1985	207	143,884,633	728	436,329,465	1,682	754,192,535	1,331	405,263,306
1986	231	160,527,697	614	366,318,220	1,519	678,985,708	1,201	375,484,110
1987	199	135,332,140	615	372,006,465	1,550	693,200,808	1,217	372,885,327
1988	189	131,122,844	568	325,841,752	1,550	685,851,092	1,230	374,213,761
1989	170	118,147,698	509	296,181,297	1,561	680,402,777	1,257	384,395,206
1990	184	127,169,783	495	288,841,943	1,403	611,426,621	1,242	372,221,166
1991	129	85,960,679	445	252,932,401	1,332	567,695,751	1,290	385,593,749
1992	119	77,112,725	408	229,088,960	1,241	537,830,981	1,274	372,188,845
1993	120	81,641,180	410	237,703,975	1,294	557,816,998	1,351	403,737,482
1994	129	84,759,870	444	254,328,160	1,296	557,679,668	1,346	391,429,591
1995	136	87,122,803	387	224,659,499	1,186	508,989,055	1,340	402,276,816

Table 4.A.4. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by Age Group and Year, 1980-1995 (1992 dollars), continued

Year of Death	45-54 Years		55-64 Years		65+ Years	
	Number	Total Cost	Number	Total Cost	Number	Total Cost
All Years	15,983	2,946,053,778	12,633	1,313,946,373	6,922	296,044,247
1980	1,176	207,645,815	1,026	105,529,504	509	20,703,207
1981	1,178	210,953,483	963	97,852,183	472	18,744,114
1982	1,068	189,458,308	865	87,054,173	458	18,817,386
1983	939	169,395,844	805	83,624,189	402	16,566,217
1984	971	178,434,733	824	87,019,685	414	17,633,371
1985	939	173,588,499	895	95,632,967	398	17,183,981
1986	917	173,199,082	747	79,329,894	387	17,101,373
1987	913	169,697,220	857	89,224,151	457	20,072,866
1988	939	174,657,854	795	82,987,867	436	18,981,938
1989	970	180,490,988	777	80,411,495	427	18,996,667
1990	942	174,362,571	692	70,662,015	424	18,628,288
1991	926	173,624,844	692	73,775,031	401	17,938,701
1992	945	172,273,619	627	65,233,714	417	17,599,954
1993	1,001	193,433,253	673	68,576,182	432	18,538,267
1994	1,055	195,886,597	700	73,438,359	429	17,676,544
1995	1,104	208,951,068	695	73,594,964	459	20,861,373

Table 4.A.5. Number and Average Lifetime Costs of Occupational Traumatic Fatal Injury by Age Group and Year, 1980-1995 (1992 dollars)

Year of Death	16-19 Years				20-24 Years				25-34 Years				35-44 Years			
	Number	Mean Cost	Median Cost	Number	Mean Cost	Median Cost	Number	Mean Cost	Median Cost	Number	Mean Cost	Median Cost	Number	Mean Cost	Median Cost	Number
All Years	3,400	685,633	669,231	10,012	594,449	569,742	24,109	440,537	423,736	20,184	301,844	289,740				
1980	445	703,479	711,703	1,051	616,307	600,309	1,842	448,904	438,906	1,281	302,359	296,733				
1981	367	709,344	728,989	988	613,202	606,012	1,896	444,900	436,373	1,190	301,492	299,408				
1982	293	684,328	678,800	843	607,077	591,186	1,641	441,240	430,839	1,204	302,176	295,574				
1983	249	666,054	633,426	721	592,171	578,713	1,472	446,188	434,331	1,193	303,983	295,193				
1984	233	680,851	663,674	786	604,436	579,687	1,644	447,427	431,575	1,237	307,330	295,856				
1985	207	695,095	671,757	728	599,354	567,853	1,682	448,390	423,003	1,331	304,480	289,838				
1986	231	694,925	677,224	614	596,609	559,858	1,519	446,995	428,682	1,201	312,643	298,663				
1987	199	680,061	629,586	615	604,889	571,655	1,550	447,226	426,486	1,217	306,397	292,220				
1988	189	693,772	716,192	568	573,665	551,945	1,550	442,485	427,416	1,230	304,239	290,008				
1989	170	694,986	687,379	509	581,889	546,454	1,561	435,876	418,380	1,257	305,804	290,601				
1990	184	691,140	654,761	495	583,519	549,772	1,403	435,799	417,743	1,242	299,695	286,520				
1991	129	666,362	654,225	445	568,387	538,198	1,332	426,198	407,425	1,290	298,910	285,423				
1992	119	648,006	634,652	408	561,493	523,050	1,241	433,385	411,815	1,274	292,142	276,372				
1993	120	680,343	683,072	410	579,766	553,548	1,294	431,080	401,403	1,351	298,843	284,318				
1994	129	657,053	627,316	444	572,811	543,992	1,296	430,308	407,134	1,346	290,810	273,426				
1995	136	640,609	602,816	387	580,516	553,589	1,186	429,164	406,343	1,340	300,207	284,021				

Table 4.A.5. Number and Average Lifetime Costs of Occupational Traumatic Fatal Injury by Age Group and Year, 1980-1995 (1992 dollars), continued

Year of Death	45-54 Years			55-64 Years			65+ Years		
	Number	Mean Cost	Median Cost	Number	Mean Cost	Median Cost	Number	Mean Cost	Median Cost
All Years	15,983	184,324	175,541	12,633	104,009	99,616	6,922	42,769	39,462
1980	1,176	176,570	170,636	1,026	102,855	99,616	509	40,674	39,106
1981	1,178	179,078	175,758	963	101,612	98,480	472	39,712	38,081
1982	1,068	177,395	171,195	865	100,641	97,294	458	41,086	38,934
1983	939	180,400	174,339	805	103,881	101,913	402	41,209	39,050
1984	971	173,764	176,657	824	105,606	99,361	414	42,593	38,920
1985	939	184,865	175,664	895	106,852	102,496	398	43,176	36,074
1986	917	188,876	180,261	747	106,198	102,082	387	44,190	38,275
1987	913	185,868	177,300	857	104,112	100,069	457	43,923	40,165
1988	939	186,004	176,550	795	104,387	100,608	436	43,537	40,370
1989	970	186,073	175,996	777	103,490	98,661	427	44,489	42,934
1990	942	185,098	172,748	692	102,113	98,240	424	43,935	41,139
1991	926	187,500	175,662	692	106,611	98,946	401	44,735	41,191
1992	945	182,300	170,827	627	104,041	99,387	417	42,206	39,533
1993	1,001	193,240	179,267	673	101,896	96,934	432	42,913	39,846
1994	1,055	185,674	173,416	700	104,912	99,763	429	41,204	38,876
1995	1,104	189,267	177,808	695	105,892	102,418	459	45,450	41,586

Table 4.A.6. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by Industry Division and Year, 1980-1995 (1992 Dollars)

Year	All Industries		Agriculture, Forestry, and Fishing		Mining		Construction		Manufacturing	
	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost
All Years	93,243	29,552,161,697	10,716	2,103,672,840	3,992	1,756,958,581	17,131	5,732,102,788	14,028	4,224,031,459
1980	7,330	2,508,868,265	817	156,134,784	414	216,391,506	1,270	460,244,332	1,135	373,706,820
1981	7,054	2,396,027,572	792	153,081,335	505	259,585,815	1,230	425,115,606	1,089	355,918,833
1982	6,372	2,095,498,767	744	140,936,621	368	185,265,060	1,087	392,706,590	948	294,132,358
1983	5,781	1,881,829,697	657	128,455,935	289	131,622,809	1,034	367,147,425	884	271,823,913
1984	6,109	2,032,549,668	716	157,271,805	357	164,737,306	1,112	382,184,083	967	314,143,212
1985	6,180	2,026,075,386	747	152,027,683	276	128,751,382	1,190	405,085,945	926	289,762,108
1986	5,616	1,850,946,084	651	139,330,957	218	89,961,301	1,102	385,290,586	891	270,614,565
1987	5,808	1,852,418,978	700	133,566,363	174	69,614,329	1,197	410,880,489	898	273,926,470
1988	5,707	1,793,657,108	644	123,731,994	162	62,432,865	1,097	355,150,272	885	264,849,207
1989	5,671	1,759,026,129	683	130,418,371	193	72,889,973	1,102	363,212,899	866	253,769,731
1990	5,382	1,663,312,387	603	124,578,017	219	80,314,421	1,076	357,110,862	838	241,528,312
1991	5,215	1,557,521,155	615	125,326,437	174	63,449,469	892	277,535,556	793	223,868,499
1992	5,031	1,471,328,798	598	112,323,372	147	52,820,935	890	276,054,114	736	200,891,751
1993	5,281	1,561,447,336	608	110,253,877	169	61,532,492	885	274,459,657	713	195,265,891
1994	5,399	1,575,198,789	585	110,013,790	168	57,549,021	966	290,271,324	727	201,932,373
1995	5,307	1,526,455,578	556	106,221,499	159	60,039,897	1,001	309,653,048	732	197,897,416

Table 4.A.6. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by Industry Division and Year, 1980-1995 (1992 dollars), continued

Year	Transportation and Public Utility		Wholesale Trade		Retail Trade		Finance, Insurance, and Real Estate		Services		Public Administration		Not Classifiable	
	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost
All	15,591	5,190,605,989	2,737	886,933,699	8,622	2,449,671,685	1,271	358,906,780	10,055	3,114,962,328	4,343	1,545,994,220	4,757	2,188,321,328
1980	1220	434,852,817	195	68,422,809	625	178,932,500	75	20,305,103	714	225,942,045	323	117,028,042	542	256,907,508
1981	1,137	400,434,584	193	72,346,429	618	174,312,786	91	27,452,195	641	207,502,667	312	112,630,191	446	207,647,130
1982	1,078	372,460,344	164	55,565,029	567	156,486,682	71	19,840,651	649	191,015,545	284	96,747,276	412	190,342,612
1983	961	319,608,372	170	57,257,863	484	137,456,281	72	23,473,859	597	192,169,337	290	103,675,441	343	149,138,462
1984	1,041	369,930,888	176	56,476,555	460	126,403,801	84	22,396,496	590	185,772,232	262	95,478,329	344	157,754,960
1985	1,099	390,645,908	182	59,307,109	506	144,469,394	63	17,406,459	621	199,970,049	249	92,458,360	321	146,190,990
1986	938	324,671,871	167	57,866,252	439	135,857,396	76	21,746,323	563	183,135,816	270	98,193,396	301	144,277,622
1987	918	317,062,483	158	57,760,176	489	138,461,194	84	24,476,616	595	183,155,367	283	100,514,535	312	143,000,955
1988	969	319,388,399	172	57,800,899	497	159,386,802	73	21,756,733	635	197,867,805	295	108,215,944	278	123,076,188
1989	985	312,560,131	152	45,893,248	471	143,564,818	77	24,729,606	625	201,783,056	254	93,945,407	263	116,258,888
1990	847	273,269,237	167	54,448,124	544	161,258,156	75	19,584,445	606	191,212,447	213	68,623,630	194	91,384,735
1991	853	268,464,007	169	47,596,507	579	168,901,441	89	26,747,454	656	192,790,782	183	60,894,139	212	101,946,864
1992	828	256,398,586	153	48,172,421	573	152,883,144	76	19,719,162	596	178,216,817	246	84,595,868	188	89,252,630
1993	925	294,782,182	169	50,811,254	634	177,507,956	85	21,013,984	642	189,355,950	261	97,044,881	190	89,419,212
1994	897	278,359,399	177	50,575,050	631	165,572,675	88	22,871,987	678	201,732,140	273	98,052,800	209	98,268,230
1995	895	257,716,781	173	46,633,974	505	128,216,659	92	25,385,707	647	193,340,273	345	117,895,981	202	83,454,342

Table 4.A.7. Mean and Median Lifetime Costs of Occupational Traumatic Fatal Injury by Industry Division and Year, 1980-1995 (1992 Dollars)

Year	All Industries		Agriculture, Forestry, and Fishing		Mining		Construction		Manufacturing		Transportation and Public Utilities	
	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost
All Years	316,937	289,423	196,311	154,859	440,120	428,910	334,604	317,831	301,114	276,232	332,923	304,861
1980	342,274	316,947	191,107	130,725	522,685	536,970	362,397	347,514	329,257	299,148	356,437	330,674
1981	339,669	312,612	193,285	143,907	514,031	535,794	345,622	321,327	326,831	302,635	352,185	339,816
1982	328,860	303,861	189,431	136,270	503,438	500,953	361,276	352,978	310,266	282,668	345,511	322,698
1983	325,520	301,040	195,519	147,577	455,442	456,261	355,075	336,522	307,493	286,634	332,579	310,922
1984	332,714	313,131	219,653	175,593	461,449	466,777	343,691	337,079	324,864	304,791	355,361	329,830
1985	327,844	302,324	203,518	160,378	466,491	469,536	340,408	321,718	312,918	289,603	355,456	331,118
1986	329,584	307,306	214,026	169,180	412,667	413,285	349,628	339,735	303,720	280,261	346,132	331,159
1987	318,943	293,010	190,809	143,858	400,082	420,230	343,259	339,658	305,041	278,446	345,384	318,591
1988	314,291	291,663	192,130	151,625	385,388	397,337	323,747	308,882	299,265	281,312	329,606	307,079
1989	310,179	288,736	190,949	149,618	377,668	365,972	329,594	321,637	293,037	284,706	317,320	284,366
1990	309,051	283,341	206,597	180,004	366,733	361,883	331,887	323,864	288,220	263,919	322,632	286,520
1991	298,662	276,864	203,783	181,721	364,652	348,549	311,139	301,737	282,306	263,443	314,729	291,360
1992	292,453	264,875	187,832	160,464	359,326	355,297	310,173	286,977	272,951	249,875	309,660	273,456
1993	295,673	270,151	181,339	151,956	364,098	324,660	310,124	302,056	273,865	250,896	318,683	285,851
1994	291,758	259,817	188,058	158,646	342,554	304,712	300,488	279,967	277,761	247,720	310,323	271,903
1995	287,631	257,362	191,046	159,821	377,609	328,249	309,344	287,574	270,352	248,875	287,952	253,593

Table 4.A.7. Mean and Median Lifetime Costs of Occupational Traumatic Fatal Injury by Industry Division and Year, 1980-1995 (1992 Dollars), continued

Year	Wholesale Trade		Retail Trade		Fire, Insurance, and Real Estate		Services		Public Administration		Not Classified	
	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost
All Years	324,053	308,982	284,119	256,480	282,381	253,982	309,792	284,308	355,974	344,323	460,021	444,702
1980	350,886	360,622	286,292	260,041	270,735	227,926	316,445	285,970	362,316	368,164	473,999	456,038
1981	374,852	362,277	282,060	243,660	301,672	253,012	323,717	304,266	360,994	360,306	465,577	477,972
1982	338,811	330,212	275,991	246,129	279,446	237,356	294,323	270,729	340,659	351,350	461,997	444,668
1983	336,811	325,027	284,001	255,769	326,026	318,361	321,892	289,151	357,502	353,054	434,806	412,069
1984	320,890	312,273	274,791	253,817	266,625	273,788	314,868	280,809	364,421	364,501	458,590	445,026
1985	325,863	318,898	285,513	243,760	276,293	213,545	322,013	288,573	371,319	375,557	455,424	435,592
1986	346,505	342,668	309,470	286,611	286,136	285,615	325,286	305,465	363,679	357,431	479,328	492,554
1987	365,571	354,379	283,152	247,740	291,388	252,909	307,824	285,760	355,175	329,247	458,336	432,393
1988	336,052	330,889	320,698	288,202	298,037	287,862	311,603	290,450	366,834	343,016	442,720	413,047
1989	301,929	256,221	304,809	279,700	321,164	308,094	322,853	303,515	369,864	352,077	442,049	411,740
1990	326,037	307,821	296,430	264,292	261,126	259,539	315,532	294,130	322,177	295,472	471,055	444,459
1991	281,636	273,507	291,712	267,459	300,533	272,190	293,888	273,543	332,755	307,905	480,881	489,893
1992	314,852	271,227	266,812	258,051	259,463	215,478	299,022	282,381	343,886	325,772	474,748	474,506
1993	300,658	291,232	279,981	257,213	247,233	188,761	294,947	276,357	371,819	341,190	470,627	484,811
1994	285,735	261,688	262,397	234,716	259,909	237,202	297,540	263,187	359,168	345,055	470,183	435,236
1995	269,561	241,552	253,894	231,888	275,932	235,570	298,826	262,131	341,727	324,365	413,140	349,619

Table 4.A.8. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by Occupation Division and Year, 1980-1995 (1992 Dollars)

Year	All Occupations		Exe/Adm/ Management		Professional Specialty		Technical Support		Sales		Clerical		Services	
	Number	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
All	93,243	29,552,161,697	5,776	2,076,810,714	3,710	1,430,976,312	2,393	1,115,080,675	6,364	1,677,831,882	1,943	557,476,200	6,650	1,939,009,143
1980	7,330	2,508,868,265	351	128,750,322	284	103,768,395	197	85,951,905	451	120,952,204	124	34,624,624	475	136,748,586
1981	7,054	2,396,027,572	369	133,500,758	266	105,045,744	181	81,982,592	432	116,999,252	134	39,994,725	446	129,544,729
1982	6,372	2,095,498,767	357	123,505,292	239	92,311,127	150	68,386,513	414	107,348,504	119	36,053,851	432	123,071,598
1983	5,781	1,881,829,697	352	126,014,139	218	90,504,006	145	64,086,493	384	100,799,941	118	36,878,947	387	111,696,780
1984	6,109	2,032,549,668	319	116,268,866	214	80,964,099	149	66,882,765	362	91,249,546	106	31,031,249	388	116,445,663
1985	6,180	2,026,075,386	356	131,976,273	244	98,826,107	171	92,448,368	390	103,749,635	128	37,668,357	388	115,514,171
1986	5,616	1,850,946,084	317	124,874,126	223	87,173,485	140	69,539,039	315	91,124,471	124	37,239,948	411	122,331,759
1987	5,808	1,852,418,978	353	133,265,166	207	80,614,407	145	69,193,415	361	96,604,516	124	41,069,445	427	123,194,295
1988	5,707	1,793,657,108	370	131,425,623	202	78,367,327	139	70,983,037	359	109,284,484	118	34,978,242	426	125,337,257
1989	5,671	1,759,026,129	340	128,898,602	216	87,052,805	160	72,996,072	361	98,358,153	137	38,357,444	412	126,979,715
1990	5,382	1,663,312,387	386	152,904,289	196	78,290,562	139	61,120,688	360	91,648,907	118	28,843,954	389	105,767,578
1991	5,215	1,557,521,155	373	130,060,786	237	86,616,429	138	63,100,310	401	106,572,195	97	28,481,597	395	109,026,331
1992	5,031	1,471,328,798	331	115,101,987	227	84,891,190	129	54,886,713	436	111,037,265	105	30,333,887	384	112,413,175
1993	5,281	1,561,447,336	387	126,137,891	251	96,978,698	125	61,259,366	466	122,156,793	106	28,148,362	413	122,140,628
1994	5,399	1,575,198,789	393	135,172,073	240	91,910,457	144	71,392,472	469	118,128,003	155	41,549,884	446	129,857,982
1995	5,307	1,526,455,578	422	138,954,521	246	87,661,474	141	60,870,927	403	91,818,013	130	32,221,684	431	128,938,896

Table 4.A.8. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by Occupation Division and Year, 1980-1995 (1992 Dollars), continued

Year	Farmers		Crafts		Operatives		Transportation		Laborers		Unknown		Miscellaneous	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
All	12,361	2,385,178,277	19,291	6,889,037,331	4,523	1,390,285,963	16,246	5,106,833,049	10,230	3,126,020,500	2,362	1,388,534,212	1,394	469,087,439
1980	920	175,584,227	1,533	609,687,795	375	127,817,317	1,257	443,483,100	931	317,636,639	248	157,290,660	184	66,572,490
1981	887	166,252,849	1,581	621,766,357	358	129,073,117	1,240	434,241,610	775	257,576,186	207	124,189,521	178	55,860,131
1982	862	159,739,285	1,393	532,927,854	312	101,975,599	1,029	350,266,640	727	236,081,694	207	120,989,314	131	42,841,495
1983	801	160,459,014	1,159	436,181,104	272	86,732,146	1,042	335,460,157	638	210,110,207	141	80,164,399	124	42,742,364
1984	839	181,401,218	1,292	494,533,512	297	99,929,019	1,139	386,167,235	711	225,915,739	163	97,892,288	130	43,868,467
1985	883	176,328,751	1,265	470,091,957	303	92,489,981	1,097	359,629,340	720	229,078,020	145	85,006,411	90	33,268,015
1986	786	168,802,790	1,171	420,774,951	255	78,754,979	963	313,440,111	653	206,267,103	149	92,279,333	109	38,343,991
1987	839	159,272,739	1,162	410,168,130	285	85,902,306	954	313,975,977	706	222,025,478	157	87,152,166	88	29,980,937
1988	771	150,518,118	1,180	399,755,555	247	79,178,353	1,053	328,479,772	629	186,199,068	135	76,972,683	78	22,177,590
1989	796	151,621,362	1,129	387,269,542	285	86,959,895	995	291,932,038	609	178,564,639	146	84,215,971	85	25,819,890
1990	696	138,299,349	1,152	403,428,262	268	75,728,000	947	278,607,671	597	174,684,020	112	65,835,571	22	8,153,537
1991	701	135,160,559	1,073	346,341,414	267	73,264,670	899	262,690,278	484	135,501,607	118	70,893,076	32	9,811,904
1992	672	121,753,616	1,013	330,562,122	242	65,852,581	853	65,852,581	503	132,552,748	118	65,699,163	18	6,920,587
1993	665	116,579,239	1,075	348,191,280	230	60,806,573	941	60,806,573	470	132,872,274	113	64,492,707	39	13,556,724
1994	638	111,708,758	1,034	325,632,035	252	73,123,920	915	73,123,920	557	144,278,715	119	66,899,220	37	14,267,535
1995	605	111,696,403	1,079	351,725,461	275	72,697,507	922	72,697,507	520	136,676,363	84	48,561,729	49	14,901,782

Table 4.A.9. Mean and Median Lifetime Costs of Occupational Traumatic Fatal Injury by Occupation Division and Year, 1980-1995 (1992 Dollars)

Year	All Occupations		Executive/Admin/Manager		Professional Specialty		Technical Support		Sales		Clerical		Service	
	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost
All	316,937	289,423	359,559	313,899	385,708	353,493	465,976	448,409	263,644	232,321	286,915	263,223	291,580	279,683
1980	342,274	316,947	366,810	297,491	365,382	317,311	436,304	464,246	268,187	231,509	279,231	261,536	287,892	280,424
1981	339,669	312,612	361,791	328,865	394,909	376,892	452,942	444,023	270,832	221,206	298,468	281,580	290,459	282,756
1982	328,860	303,861	345,953	296,856	386,239	369,608	455,910	470,753	259,296	228,258	302,974	270,433	284,888	282,033
1983	325,520	301,040	357,995	337,528	415,156	393,551	441,976	443,079	262,500	234,496	312,533	305,811	288,622	281,069
1984	332,714	313,131	364,479	315,836	378,337	347,168	448,878	431,712	252,071	223,948	292,748	271,078	300,118	314,050
1985	327,844	302,324	370,720	305,332	405,025	376,454	540,634	526,758	266,025	231,809	294,284	258,407	297,717	301,088
1986	329,584	307,306	393,925	357,558	390,912	350,677	496,707	497,787	289,284	274,528	300,322	297,712	297,644	280,755
1987	318,943	293,010	377,522	326,567	389,442	338,620	477,196	436,881	267,603	229,382	331,205	327,421	288,511	275,258
1988	314,291	291,663	355,204	305,848	387,957	380,156	510,669	465,933	304,414	274,858	296,426	283,717	294,219	282,333
1989	310,179	288,736	379,114	340,256	403,022	382,299	456,225	432,525	272,460	231,246	279,981	255,559	308,203	295,390
1990	309,051	283,341	396,125	339,384	399,442	376,937	439,717	410,566	254,580	225,368	244,440	216,285	271,896	251,842
1991	298,662	276,864	348,688	307,905	365,470	333,311	457,249	436,821	265,766	252,403	293,625	280,671	276,016	267,459
1992	292,453	264,875	347,740	297,683	373,970	352,046	425,478	386,705	254,673	236,532	288,894	244,888	292,743	278,297
1993	295,673	270,151	325,938	293,629	386,369	354,098	490,075	419,737	262,139	230,739	265,551	265,009	295,740	261,245
1994	291,758	259,817	343,949	316,622	382,960	339,065	495,781	442,652	251,872	224,047	268,064	246,099	291,161	278,493
1995	287,631	257,362	329,276	282,139	356,347	317,802	431,709	416,878	227,836	198,610	247,859	218,276	299,162	279,683

Table 4.A.9. Mean and Median Lifetime Costs of Occupational Traumatic Fatal Injury by Occupation Division and Year, 1980-1995 (1992 Dollars), continued

Year	Farmers		Crafts		Operatives		Transportation		Laborers		Unknown		Miscellaneous	
	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost
All	192,960	162,793	357,111	339,750	307,381	291,162	314,344	290,665	305,574	301,570	587,864	699,279	336,505	306,888
1980	190,852	139,899	397,709	375,655	340,846	317,853	352,811	324,245	341,178	349,586	634,237	755,386	361,807	346,419
1981	187,433	147,294	393,274	370,431	360,539	343,293	350,195	326,038	332,356	331,651	599,949	720,320	313,821	262,769
1982	185,312	145,894	382,576	371,768	326,845	314,405	340,395	321,852	324,734	322,938	584,489	699,279	327,034	264,490
1983	200,323	170,798	376,343	366,043	318,868	293,285	321,939	301,247	329,326	323,213	568,542	709,836	344,696	313,364
1984	216,211	181,299	382,766	366,317	336,461	327,595	339,041	329,830	317,744	323,702	600,566	707,612	337,450	334,677
1985	199,693	165,578	371,614	350,463	305,247	279,164	327,830	317,389	318,164	318,898	586,251	705,731	369,645	318,336
1986	214,762	180,025	359,330	351,802	308,843	292,375	325,483	313,111	315,876	313,810	619,324	745,744	351,780	333,711
1987	189,836	155,081	352,985	354,887	301,412	277,982	329,115	318,591	314,484	316,033	555,109	629,586	340,692	308,587
1988	195,225	166,556	338,776	329,937	320,560	319,122	311,947	289,627	296,024	299,211	570,168	679,982	284,328	266,670
1989	190,479	164,489	343,020	336,587	305,122	298,577	293,399	261,156	293,210	301,662	576,822	678,512	303,763	264,675
1990	198,706	181,734	350,198	335,347	282,567	272,457	294,200	270,304	292,603	292,171	587,818	698,922	370,615	376,044
1991	192,811	174,560	322,779	306,179	274,400	247,111	292,203	280,270	279,962	277,244	600,789	694,029	306,622	248,342
1992	181,181	160,464	326,320	315,567	272,118	258,611	280,567	255,837	263,524	248,607	556,773	636,314	384,477	400,497
1993	175,307	153,081	323,899	302,880	264,376	246,287	284,938	267,891	282,707	282,606	570,732	634,633	347,608	326,576
1994	175,092	154,707	314,925	301,439	290,174	272,890	274,620	246,532	259,028	251,479	562,178	649,626	385,609	387,255
1995	184,622	159,035	325,974	303,143	264,355	260,989	270,858	252,135	262,839	242,896	578,116	688,223	304,118	255,147

Table 4.A.10. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by Race and Year, 1980-1995 (1992 Dollars)

Year	All Races		White		Black		Native American		Asian Pacific Islanders	
	Number	Total Cost	Number	Total Cost	Number	Total Cost	Number	Total Cost	Number	Total Cost
All Years	93,243	29,552,161,697	75,630	24,137,376,396	10,252	2,965,564,521	477	162,077,866	1,660	522,591,458
1980	7,330	2,508,868,265	5,951	2,054,029,130	838	260,780,267	28	9,879,466	83	28,781,052
1981	7,054	2,396,027,572	5,790	1,989,849,054	737	219,531,531	27	10,264,766	98	31,836,606
1982	6,372	2,095,498,767	5,229	1,741,891,553	656	188,770,442	29	10,480,505	101	32,842,760
1983	5,781	1,881,829,697	4,680	1,527,370,820	594	178,406,095	37	11,012,082	88	28,241,074
1984	6,109	2,032,549,668	4,930	1,665,164,888	628	178,301,410	28	10,647,052	101	30,487,639
1985	6,180	2,026,075,386	4,915	1,627,474,633	688	209,552,800	49	15,629,214	109	35,236,617
1986	5,616	1,850,946,084	4,495	1,501,432,314	614	181,379,357	16	3,791,142	88	29,198,680
1987	5,808	1,852,418,978	4,551	1,458,439,788	687	204,311,543	28	12,761,041	82	24,654,592
1988	5,707	1,793,657,108	4,406	1,396,078,749	584	168,236,965	28	10,533,111	76	23,875,210
1989	5,671	1,759,026,129	4,348	1,351,819,438	643	185,529,120	36	12,179,072	85	27,280,686
1990	5,382	1,663,312,387	4,484	1,395,082,269	611	176,764,356	27	7,351,127	120	36,252,645
1991	5,215	1,557,521,155	4,281	1,272,917,681	616	178,770,670	29	10,026,140	141	46,202,431
1992	5,031	1,471,328,798	4,199	1,233,114,142	531	143,632,854	23	7,057,290	121	35,898,120
1993	5,281	1,561,447,336	4,388	1,300,235,695	589	162,650,024	30	10,339,399	136	43,235,527
1994	5,399	1,575,198,789	4,513	1,320,739,074	626	171,539,247	33	10,589,094	116	34,321,573
1995	5,307	1,526,455,578	4,470	1,301,737,168	610	157,533,774	29	9,537,365	115	34,246,246

Note: During the years 1980-1989, the Other category included those decedents whose Race was classified as Hispanic. Beginning in 1990, Hispanic was no longer a selection for Race.

Table 4.A.10. Total Lifetime Cost of Occupational Traumatic Fatal Injury by Race and Year, 1980-1995
 (1992 Dollars), continued

Year	All Races		Unknown		Other	
	Number	Total Cost	Number	Total Cost	Number	Total Cost
All Years	93,243	29,552,161,697	873	266,859,945	4,351	1,497,565,579
1980	7,330	2,508,868,265	63	17,931,619	367	137,466,731
1981	7,054	2,396,027,572	53	14,543,310	349	130,002,305
1982	6,372	2,095,498,767	58	15,103,442	299	106,410,066
1983	5,781	1,881,829,697	49	15,405,966	333	121,393,659
1984	6,109	2,032,549,668	32	7,454,703	390	140,493,975
1985	6,180	2,026,075,386	32	8,049,814	387	130,132,307
1986	5,616	1,850,946,084	46	14,174,806	357	120,969,785
1987	5,808	1,852,418,978	23	6,056,283	437	146,195,731
1988	5,707	1,793,657,108	82	25,258,773	531	169,674,300
1989	5,671	1,759,026,129	22	8,401,141	537	173,816,672
1990	5,382	1,663,312,387	140	47,861,990	0	0
1991	5,215	1,557,521,155	116	38,299,078	32	11,305,155
1992	5,031	1,471,328,798	79	24,448,813	78	27,177,580
1993	5,281	1,561,447,336	39	13,336,226	99	31,650,466
1994	5,399	1,575,198,789	9	3,267,240	102	34,742,562
1995	5,307	1,526,455,578	30	7,266,741	53	16,134,285

Note: During the years 1980-1989, the Other category included those decedents whose Race was classified as Hispanic. Beginning in 1990, Hispanic was no longer a selection for Race.

Table 4.A.11. Mean and Median Lifetime Costs of Occupational Traumatic Fatal Injury by Race and Year, 1980-1995 (1992 Dollars)

Year	All Races		White		Black		Native American		Asian Pacific Islanders	
	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost
All Years	316,937	289,423	319,150	290,731	289,267	266,393	339,786	315,567	314,814	284,608
1980	342,274	316,947	345,157	316,963	311,194	293,571	352,838	360,327	346,760	330,663
1981	339,669	312,612	343,670	316,451	297,872	274,631	380,177	339,958	324,863	292,509
1982	328,860	303,861	333,092	308,518	287,760	265,647	361,397	364,095	325,176	282,622
1983	325,520	301,040	326,378	301,136	300,347	274,304	297,624	315,848	320,921	307,267
1984	332,714	313,131	337,762	317,517	283,919	260,930	380,252	362,839	301,858	277,233
1985	327,844	302,324	331,124	304,061	304,583	278,860	318,964	291,120	323,272	307,366
1986	329,584	307,306	334,023	312,953	295,406	277,632	236,946	235,810	331,803	316,492
1987	318,943	293,010	320,466	293,916	297,397	277,070	455,751	410,122	300,666	273,328
1988	314,291	291,663	316,859	293,735	288,077	267,901	376,183	366,898	314,148	272,546
1989	310,179	288,736	310,906	287,259	288,341	273,424	338,308	266,483	320,949	281,293
1990	309,051	283,341	311,125	284,582	289,303	268,060	272,264	265,968	302,105	275,362
1991	298,662	276,864	297,341	274,580	290,212	273,649	345,729	257,068	327,677	287,573
1992	292,453	264,875	293,669	266,395	270,495	248,394	306,839	274,119	296,679	265,680
1993	295,673	270,151	296,316	270,151	276,146	259,631	344,647	293,409	317,908	285,853
1994	291,758	259,817	292,652	260,719	274,024	240,729	320,882	332,547	295,876	277,986
1995	287,631	257,362	291,216	260,646	258,252	235,472	328,875	309,883	297,793	258,049

Table 4.A.11. Mean and Median Lifetime Costs of Occupational Traumatic Fatal Injury by Race and Year, 1980-1995 (1992 Dollars), continued

Year	All Races		Unknown		Other	
	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost
All Years	316,937	289,423	305,681	284,391	344,189	327,000
1980	342,274	316,947	284,629	247,175	374,569	355,117
1981	339,669	312,612	274,402	237,626	372,499	362,601
1982	328,860	303,861	260,404	207,243	355,887	341,764
1983	325,520	301,040	314,407	273,849	364,546	350,227
1984	332,714	313,131	232,959	213,897	360,241	343,985
1985	327,844	302,324	251,557	204,222	336,259	324,768
1986	329,584	307,306	308,148	305,404	338,851	328,602
1987	318,943	293,010	263,317	208,702	334,544	308,394
1988	314,291	291,663	308,034	245,832	319,537	295,632
1989	310,179	288,736	381,870	344,756	323,681	313,468
1990	309,051	283,341	341,871	323,987	0	0
1991	298,662	276,864	330,164	307,407	353,286	307,022
1992	292,453	264,875	309,479	294,237	348,431	294,114
1993	295,673	270,151	341,955	334,104	319,702	293,199
1994	291,758	259,817	363,027	364,854	340,613	317,559
1995	287,631	257,362	242,225	219,197	304,420	288,298

Note: During the years 1980-1989, the Other category included those decedents whose Race was classified as Hispanic. Beginning in 1990, Hispanic was no longer a selection for Race.

Table 4.A.12. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by External Cause of Death Group and Year, 1980-1995 (1992 Dollars)

Year	All Cause Groups		Air Transportation		Drowning		Electrocution		Explosion		Falls		Fires	
	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost
All Years	93,243	29,552,161,697	3,257	1,420,020,117	1,357	482,754,781	6,230	2,561,812,902	2,343	826,542,893	9,062	2,594,481,596	1,585	503,869,511
1980	7330	2,508,868,265	281	116,697,893	108	40,494,237	575	254,160,566	201	73,147,832	701	217,034,297	160	52,489,416
1981	7054	2,396,027,572	262	107,442,527	88	33,190,630	509	223,299,483	254	100,677,073	699	222,904,415	113	32,891,084
1982	6372	2,095,498,767	251	106,768,104	98	37,813,332	498	212,529,110	162	59,418,582	608	188,772,080	119	34,390,625
1983	5781	1,881,829,697	199	85,028,087	99	34,309,678	439	186,904,202	166	57,143,861	545	156,747,019	85	28,067,585
1984	6109	2,032,549,668	236	101,709,631	102	34,320,875	484	202,690,753	159	60,707,842	567	169,690,649	156	53,153,453
1985	6180	2,026,075,386	232	110,795,129	76	30,553,090	399	170,089,313	199	73,792,352	635	182,331,235	136	41,490,861
1986	5616	1,850,946,084	200	91,773,763	77	28,639,537	439	187,098,686	134	45,710,548	523	157,232,151	92	32,984,906
1987	5808	1,852,418,978	224	96,722,977	86	33,582,347	406	170,575,210	110	34,156,919	575	158,378,671	78	24,366,004
1988	5707	1,793,657,108	163	79,595,812	66	20,647,685	381	150,028,532	133	50,243,226	570	156,238,961	109	31,076,936
1989	5671	1,759,026,129	191	85,950,002	93	32,896,742	329	124,642,499	159	52,223,115	553	159,322,574	87	33,215,238
1990	5382	1,663,312,387	141	57,155,686	77	26,318,143	320	131,833,594	143	52,756,090	585	168,662,857	87	26,319,283
1991	5215	1,557,521,155	162	67,193,887	96	34,066,763	311	117,603,349	112	32,886,079	491	127,992,575	118	38,734,388
1992	5031	1,471,328,798	180	78,517,496	66	21,592,085	270	101,904,759	105	33,304,324	446	118,093,234	53	15,682,729
1993	5281	1,561,447,336	188	86,661,427	82	28,961,561	274	104,466,629	102	34,934,005	476	120,990,541	46	14,618,612
1994	5399	1,575,198,789	178	80,621,313	79	25,492,609	294	110,888,010	99	33,027,991	552	143,077,907	77	25,153,220
1995	5307	1,526,455,578	169	67,386,383	64	19,875,467	302	113,098,207	105	32,413,054	536	147,012,430	69	19,235,171

Table 4.A.12. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by External Cause of Death Group and Year, 1980-1995 (1992 Dollars), continued

Year	Flying Object/ Caught in		Homicide		Machine		Motor Vehicle		Nature/ Environment		Other Causes	
	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost
All Years	2,172	705,193,221	12,836	3,910,908,969	12,331	3,369,489,065	21,699	6,855,013,009	2,387	679,712,385	2,618	711,766,583
1980	203	75,836,450	911	272,914,920	979	289,239,355	1,638	568,986,734	173	56,333,212	225	64,239,529
1981	187	65,608,478	932	283,398,673	1,024	308,512,953	1,542	518,513,981	174	50,891,523	159	45,946,064
1982	141	48,304,511	853	244,652,878	956	273,852,315	1,325	437,149,328	159	51,604,386	129	39,754,097
1983	151	51,926,486	717	215,704,794	798	231,278,268	1,333	432,419,277	151	44,669,256	143	42,582,281
1984	155	50,234,838	657	200,450,650	815	244,763,443	1,522	505,547,619	143	44,111,369	115	33,173,650
1985	139	47,054,149	748	238,306,725	837	245,183,379	1,423	461,714,255	120	31,566,163	164	48,248,746
1986	140	49,816,722	679	214,431,074	771	217,295,127	1,245	413,504,518	136	39,059,345	151	39,971,371
1987	137	41,240,295	673	216,690,759	825	217,899,286	1,350	439,674,082	161	44,382,794	140	40,149,721
1988	152	46,774,125	713	231,162,603	739	196,417,423	1,406	437,671,413	157	43,482,965	167	40,285,066
1989	134	41,481,292	692	220,957,410	745	198,438,233	1,460	441,452,680	140	39,866,952	107	29,211,620
1990	128	37,724,011	735	222,553,749	699	178,329,433	1,300	407,248,937	123	37,146,443	137	34,946,148
1991	99	30,104,642	899	286,938,670	678	172,924,025	1,103	318,690,312	126	33,310,875	178	47,111,589
1992	100	31,466,389	887	257,753,860	664	163,885,334	1,129	324,642,536	157	42,213,271	181	51,910,805
1993	91	25,322,478	949	290,253,965	623	148,263,279	1,268	379,078,501	159	40,678,488	189	49,039,050
1994	115	33,769,166	926	274,225,535	580	139,983,731	1,336	382,752,371	155	40,045,709	190	48,567,912
1995	100	28,529,189	865	240,512,704	598	143,223,481	1,319	385,966,465	153	40,349,634	243	56,628,934

Table 4.A.12. Number and Total Lifetime Cost of Occupational Traumatic Fatal Injury by External Cause of Death Group and Year, 1980-1995 (1992 Dollars), continued

Year	Poisoning		Rail Transport		Struck by Falling Object		Suffocation		Suicide		Unknown		Water Transportation	
	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost	Number	Cost
All	1,455,552	173,947	661	212,317,496	5,983	1,764,887,175	1,711	591,400,519	3,154	950,236,832	594	191,556,063	1,808	667,982,892
1980	119	46,352,707	74	27,255,534	476	156,589,440	148	58,327,533	151	45,996,743	54	19,384,393	153	73,387,473
1981	121	53,962,011	43	12,828,004	442	149,180,460	140	53,439,805	164	48,676,372	66	21,677,367	135	62,986,671
1982	92	37,829,410	46	13,555,439	426	136,258,874	131	48,644,180	197	57,406,446	57	17,057,632	124	49,865,095
1983	80	35,426,006	45	15,990,038	383	117,110,682	100	33,877,791	167	49,280,160	40	12,319,716	140	50,900,806
1984	110	47,481,875	45	16,433,811	407	125,038,412	115	43,833,892	182	55,871,368	24	7,928,012	115	35,407,524
1985	101	42,045,595	34	12,473,133	430	127,137,584	132	46,537,411	222	65,388,433	19	5,817,504	133	45,334,468
1986	84	31,238,478	44	14,863,752	428	129,590,413	118	43,281,709	189	55,479,948	73	24,806,426	93	34,167,610
1987	89	33,625,684	56	17,660,605	420	121,404,286	122	45,770,244	242	75,886,834	25	8,352,810	89	31,899,448
1988	97	35,977,935	35	11,147,057	350	106,644,123	109	40,353,735	212	65,410,829	28	9,134,261	120	41,364,422
1989	111	39,539,935	45	13,296,991	371	100,069,219	86	29,643,488	206	66,584,455	26	7,978,787	136	42,229,205
1990	77	28,780,530	29	10,272,856	355	100,681,808	101	29,803,875	185	56,917,392	35	11,984,985	125	43,876,566
1991	61	20,597,342	29	8,933,300	341	91,632,128	75	21,289,834	198	59,648,468	30	9,283,549	108	38,579,381
1992	80	27,141,831	25	7,930,818	286	70,643,967	79	23,867,435	197	55,347,072	25	7,520,678	101	37,910,174
1993	74	23,785,022	46	12,416,080	295	83,466,802	81	22,238,074	208	55,538,351	30	8,012,516	100	32,721,956
1994	90	28,558,788	36	10,069,878	310	80,787,436	82	23,797,189	205	62,592,892	26	7,718,198	69	24,068,933
1995	69	19,830,798	29	7,190,200	263	68,651,541	92	26,694,324	228	73,995,207	36	12,579,229	67	23,283,160

Table 4.A.13. Mean and Median Lifetime Costs of Occupational Traumatic Fatal Injury by External Cause of Death Group and Year, 1980-1995 (1992 Dollars)

Year	All Cause Groups		Air Transport		Drowning		Electrocution		Explosion		Falls		Fires	
	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost
All Years	316,937	289,423	435,990	411,757	355,751	321,510	411,206	397,521	352,771	334,393	286,303	250,311	317,899	299,954
1980	342,274	316,947	415,295	423,056	374,947	352,123	442,018	418,395	363,920	340,687	309,607	248,357	328,059	295,674
1981	339,669	312,612	410,086	381,734	377,166	348,404	438,702	432,871	396,366	388,210	318,890	277,837	291,072	194,101
1982	328,860	303,861	425,371	413,943	385,850	364,779	426,765	416,524	366,781	355,712	310,480	263,769	288,997	278,772
1983	325,520	301,040	427,277	409,792	346,562	316,804	425,750	418,835	344,240	333,819	287,609	244,633	330,207	320,425
1984	332,714	313,131	430,973	409,078	336,479	319,518	418,783	409,921	381,810	377,404	299,278	262,402	340,727	345,510
1985	327,844	302,324	477,565	450,535	402,014	380,773	426,289	414,586	370,816	348,035	287,136	244,029	305,080	303,265
1986	329,584	307,306	458,869	454,619	371,942	350,408	426,193	412,722	341,123	332,716	300,635	258,557	358,532	378,888
1987	318,943	293,010	431,799	397,979	390,492	334,971	420,136	402,618	310,517	298,178	275,441	244,413	312,385	286,170
1988	314,291	291,663	488,318	445,689	312,844	266,555	393,776	376,447	377,769	354,655	274,103	238,973	285,110	268,279
1989	310,179	288,736	450,000	416,535	353,728	306,458	378,853	372,105	328,447	315,709	288,106	267,267	381,784	381,509
1990	309,051	283,341	405,359	367,983	341,794	316,051	411,980	413,380	368,924	347,107	288,313	268,763	302,520	300,898
1991	298,662	276,864	414,777	383,803	354,862	329,916	378,146	366,649	293,626	269,933	260,677	243,198	328,258	311,337
1992	292,453	264,875	436,208	428,795	327,153	293,619	377,425	362,563	317,184	293,154	264,783	222,643	295,901	272,023
1993	295,673	270,151	460,965	410,005	353,190	347,072	381,265	347,595	342,490	316,538	254,182	230,055	317,796	263,453
1994	291,758	259,817	452,929	415,281	322,691	289,575	377,170	355,058	333,616	300,663	259,199	235,579	326,665	326,319
1995	287,631	257,362	398,736	353,397	310,554	287,729	374,497	357,403	308,696	277,291	274,277	249,071	278,771	246,960

Table 4.A.13. Mean and Median Lifetime Costs of Occupational Traumatic Fatal Injury by External Cause of Death Group and Year, 1980-1995 (1992 Dollars), continued

Year	Flying Object/ Caught In		Homicide		Machine		Motor Vehicle		Nature/Environment		Other	
	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost
All Years	324,675	296,058	304,683	279,125	273,254	230,370	315,914	291,256	284,756	250,642	271,874	234,104
1980	373,579	341,745	299,577	275,158	295,444	247,829	347,367	328,843	325,626	298,472	285,509	214,452
1981	350,847	307,223	304,076	273,393	301,282	254,144	336,261	317,604	292,480	246,685	288,969	250,043
1982	342,585	307,236	286,815	259,356	286,456	231,199	329,924	313,360	324,556	265,733	308,171	280,077
1983	343,884	313,068	300,844	280,723	289,822	253,224	324,396	297,162	295,823	270,114	297,778	259,388
1984	324,096	289,201	305,100	287,167	300,323	266,558	332,160	316,156	308,471	281,056	288,467	235,879
1985	338,519	331,118	318,592	287,053	292,931	249,662	324,465	308,404	263,051	231,894	294,200	246,603
1986	355,834	360,350	315,804	294,172	281,835	241,640	332,132	317,427	287,201	242,036	264,711	204,342
1987	301,024	284,760	321,977	290,665	264,120	209,607	325,685	303,498	275,670	248,860	286,784	258,208
1988	307,725	258,110	324,211	304,205	265,788	227,436	311,288	288,972	276,962	244,933	241,228	205,556
1989	309,562	259,130	319,303	297,915	266,360	231,246	302,365	273,649	284,764	271,008	273,006	227,338
1990	294,719	287,016	302,794	280,415	255,121	222,721	313,268	279,626	302,004	284,053	255,081	164,719
1991	304,087	289,423	319,175	294,553	255,050	223,697	288,930	267,026	264,372	233,030	264,672	244,465
1992	314,664	289,622	290,591	262,622	246,815	208,758	287,549	261,680	268,874	236,908	286,800	271,623
1993	278,269	236,774	305,852	283,345	237,983	200,589	298,958	272,408	255,840	205,709	259,466	227,612
1994	293,645	248,102	296,140	270,385	241,351	188,408	286,491	248,100	258,359	230,466	255,621	232,165
1995	285,292	269,448	278,049	247,234	239,504	207,954	292,261	258,049	263,723	240,973	233,041	198,156

Table 4.A.13. Mean and Median Lifetime Costs of Occupational Traumatic Fatal Injury by External Cause of Death Group and Year, 1980-1995 (1992 Dollars), continued

Year	Poisoning		Rail Transportation		Struck by Falling Object		Suffocation		Suicide		Unknown		Water Transportation	
	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost	Mean Cost	Median Cost
All Years														
1980	389,519	373,160	368,318	344,768	328,969	283,944	394,105	418,801	304,614	274,721	358,970	328,625	479,657	426,017
1981	445,967	435,774	298,326	206,540	337,512	314,383	381,713	342,664	296,807	251,477	328,445	308,593	466,568	399,078
1982	411,189	349,389	294,683	242,230	319,857	285,604	371,330	388,287	291,403	263,611	299,257	303,859	402,138	331,941
1983	442,825	430,333	355,334	344,848	305,772	279,568	338,778	336,522	295,091	268,072	307,993	283,619	363,577	342,894
1984	431,653	432,288	365,196	390,236	307,220	279,957	381,164	356,164	306,986	273,043	330,334	303,715	307,892	265,012
1985	416,293	372,658	366,857	362,383	295,669	257,204	352,556	328,423	294,452	254,286	306,184	297,151	340,861	285,830
1986	371,887	339,099	337,813	268,237	302,781	267,688	366,794	359,707	293,545	270,015	339,814	280,261	367,394	334,336
1987	377,817	363,085	315,368	279,079	289,058	249,197	375,166	374,738	313,582	274,512	334,112	363,475	358,421	312,188
1988	370,907	360,866	318,487	315,141	304,697	276,233	370,218	348,638	308,542	273,475	326,224	308,850	344,704	333,277
1989	356,216	355,392	295,489	243,490	269,728	238,771	344,692	320,001	323,226	305,390	306,876	269,520	310,509	278,923
1990	373,773	342,694	354,236	355,889	283,611	257,171	295,088	278,298	307,662	271,765	342,428	328,608	351,013	269,426
1991	337,661	286,005	308,045	301,300	268,716	251,626	283,864	287,695	301,255	267,045	309,452	237,769	357,216	314,913
1992	339,273	306,995	317,233	297,713	247,007	217,618	302,119	253,292	280,950	259,603	300,827	216,747	375,348	319,765
1993	321,419	307,418	269,915	272,160	282,938	257,581	274,544	268,983	267,011	246,882	267,084	235,096	327,220	275,512
1994	317,320	287,170	279,719	263,071	260,605	242,671	290,210	257,241	305,331	267,778	296,854	291,621	348,825	300,589
1995	287,403	236,190	247,938	198,932	261,032	236,628	290,156	265,076	324,540	296,075	349,423	332,083	347,510	277,122

Table 4.A.14. Total Lifetime Cost of Occupational Traumatic Fatal Injury by Year and Discount Rate, 1980-1995
 (1992 Dollars)

Year	3% discount rate	0% discount rate	5% discount rate	10% discount rate
All Years	29,550,787,999	105,879,476,602	15,330,590,048	6,311,624,917
1980	2,508,824,083	8,795,690,647	1,309,204,934	522,548,269
1981	2,395,739,620	8,432,503,234	1,247,476,062	498,380,223
1982	2,095,470,107	7,414,457,722	1,090,065,476	439,819,736
1983	1,881,814,252	6,697,614,042	977,148,961	396,948,950
1984	2,032,427,408	7,228,553,940	1,054,398,223	426,083,531
1985	2,026,016,626	7,242,905,880	1,049,623,072	427,184,582
1986	1,850,789,249	6,626,132,419	958,582,402	390,934,897
1987	1,852,249,394	6,627,130,332	961,792,764	396,696,452
1988	1,793,500,762	6,441,775,539	929,613,340	384,069,552
1989	1,758,994,199	6,348,604,236	910,545,457	378,639,711
1990	1,663,206,692	5,994,182,154	862,040,601	358,992,232
1991	1,557,424,730	5,660,091,355	805,777,494	340,024,828
1992	1,471,328,798	5,356,908,116	761,127,702	322,516,407
1993	1,561,404,850	5,696,360,200	806,867,697	342,029,368
1994	1,575,189,599	5,734,368,314	815,145,922	345,487,204
1995	1,526,407,630	5,582,198,472	791,179,941	341,268,975

Chapter 5

Summary and Conclusions

The model presented in this thesis provides estimates of the economic cost of occupational traumatic injury fatalities to society. It is a viable means to obtain estimates of the costs of these traumatic occupational fatalities by selected characteristics. Overall, the model estimated the cost of an occupational fatality at just over \$315,000 in 1992 dollars. Generally, estimates were higher for younger workers than older workers, higher for white workers than workers of other races, and higher for male workers than female workers.

5.1 DISCUSSION

The first objective of this research was to determine the appropriate theory for use in the Division of Safety Research within the National Institute for Occupational Safety and Health. Appropriateness was determined by the availability of the data, the ease of deriving the estimates, the ability of the user to understand and accept the estimates, and the ability to derive the estimates within the current budgetary framework of the institute. Finally, the theory had to be generally accepted by researchers in the field of occupational safety and health.

The second objective was to develop a computer-based model to calculate these estimates. To be successful, the program must calculate values in reasonable time, be relatively easy to operate, and be compatible with the current software programs used in the Division.

The overall goal of the study, to develop a user-friendly computer program for installation on a personal computer to calculate the cost of traumatic occupational fatal injury by the attributes of the deceased worker and by characteristics surrounding the fatal incident, was accomplished.

5.1.1 Theoretical Model

Gathering the necessary data for this model proved to be labor intensive. The majority of time spent was attributable to the efforts to identify and examine data for the model. Therefore, the amount of time and labor to update data for the maintenance of the model should decrease over time. This method still required less time and money to arrive at cost estimations than would alternative theoretical approaches. Additionally, the majority of the data is in the public domain and therefore available without cost.

As documented in the literature, researchers have used several methods to calculate the value of life. For this study, the cost-of-illness method was employed. There is sufficient support in the safety and health community to support the selection of this theoretical approach.

For example, The U.S. Department of Agriculture states:

“Any COI can be disaggregated to examine the direction of the economic flows resulting from illness and premature death. If this step is taken, the COI approach can reveal not just the magnitude, but the distributional consequences of illness. COI is therefore a useful tool for gauging the extent and distribution of the costs of adverse health outcomes. It is a first step in deciphering the economic distortions triggered by illness and premature death.” (Kuchler & Golan, 1999)

The National Institute of Health (NIH) uses COI estimates routinely for congressional testimony, in scientific publications to support increases of funding for health research, and as a tool to allocate research dollars among competing research projects. NIH has submitted Congressional reports showing estimates of the societal cost impact of selected diseases in 1995, 1997, and 2000. On page four of their latest report, they state “COI estimates can provide order of magnitude indicators of the economic burden of particular diseases.....COI estimates can help decision-makers in Congress and in the Administration anticipate and respond to public interests” (Varmus, 2000).

The RAND Institute gave a similar, but more convincing testimony on the acceptability of COI when they stated ...the human capital approach invariably produces much smaller estimates for the value of life than the theoretically more well-grounded, willingness-to-pay concept....However, because the courts have allowed only the latter (cost-of-illness) approach, using another approach would make our research irrelevant to any major public policy issues... (King and Smith, 1988).

In a 2000 response to criticism in *Injury Prevention*, Dorothy Rice reaffirmed her position regarding the appropriateness of using the cost-of-illness approach. She states that COI estimates “translate the adverse effects of diseases or injuries into dollar terms, the universal language of decision makers and the policy arena”. Furthermore, “Cost of illness studies provide an important guide and resource for policy development, priority setting, and management of public health.” (Rice, 2000, p. 2)

As for NIOSH, the theoretical model has been widely accepted and understood during initial discussions with economic researchers as well as with middle and executive management. The full extent of implementation is yet to be known.

5.1.2 Computer Application Program

The ease of modification is perhaps the greatest strength of the program. The program is designed with each element required for calculation as a separate database. Wages and benefits can be updated by adding an additional column of data to the existing file or replaced completely by changing the address found in the execution program. Updates for traumatic occupational fatalities are accomplished in a similar manner. Additionally, the discount rate can be altered with ease.

The computer program has the flexibility to calculate estimates of the lifetime cost of occupational injury sufficiently robust for economic analysis. The program can express the estimates in dollar values ranging from 1980 nominal dollars to 2000 nominal dollars. The program can employ various discount rates to accommodate either differing assumptions concerning the value of time or changes in the economy that would alter the “true” value of time. The program is also sufficiently simplistic and equipped with safeguards to reduce the incident of error by users who are not familiar with economic concepts or have limited computer skills. Finally, the program adheres to the NIOSH pledge of confidentiality by not allowing the cost of fewer than 3 fatalities to be estimated.

5.1.3 Estimates

In addition to the computer applications program accomplishing the goals of this study, the estimates derived are well within the norms of previous research efforts. Unfortunately, there are few studies that separate mortality and morbidity estimates or separate injury and illness estimates. However, the overall values and estimates where limited to a subsection of the population examined in those few studies, proved to be reasonably comparable to the results found in this study. Where differences were found, they were readily explained.

The cost of injury presented in a 1989 report to Congress (Rice, 1989), was estimated at \$307,637 (\$515,000 in 1992 dollars) per fatality using COI. There are a number of reasons the estimates are somewhat higher than reported in this study. The Rice estimate includes additional direct costs that were not included in this study (such as administrative costs and legal costs), used different sources of data, and based the value of household production on the prevailing wage for the task rather than the opportunity cost to the decedent. Additionally, the study employed annual mean earnings of the decedent that were not linked to the occupation of the decedent. Depending upon the overall distribution of lower income workers, this could have a significant influence on the total cost estimates. In addition, as evidenced in the CPS, annual mean earnings are typically much higher than median earnings that were employed in this study. Furthermore, Rice recognized and documented that the mortality cost may be overestimated for decedents with lower than average earnings. The Rice study was also used to estimate the cost of all fatal injuries, not just work-related deaths. Finally, estimations were calculated in the aggregate and then divided by the estimated number of fatalities. The effect of both differences may explain some of the difference between these two cost estimates.

A 1988 Pennsylvania study (Neumark, et al., 1991) estimated the value of fatal occupational injuries and illnesses in

that state to be between \$1.96 billion and \$2.82 billion using cost-of-illness methods. Neumark altered the retirement age, productivity growth, and the discount rate to develop three distinct estimates--\$296,000, \$388,000, and \$511,000 per fatality in 1992 dollars. None of the discount rates or the retirement ages selected matched this study. In addition to these methodological differences, his inclusion of fatal occupational illnesses created an even larger disparity between the cost estimates in the two studies. Finally, Neumark made no adjustments for individual salary growth. Despite these differences, this study's estimates of \$317,000 per fatal occupational injury compare favorably to this study.

The state of New Jersey estimated the cost of occupational injury fatalities for the year 1992 at just over \$1 million dollars per fatality (Roche, 1995). This number is substantially higher than the estimate produced by this study. One explanation is the use of New Jersey-specific costs, which are substantially higher than national costs. New Jersey employed an upward adjustment of 1.333. Considering the increase in the initial wages of the decedent, the overall impact on the final estimate will exceed that of the 1.333 adjustment factor. Additionally, the study did not account for the probability of survival from one age to the next. Furthermore, the study used wage data that was specific to age and sex but not to occupation. Age, sex, and occupation characteristics associated with fatalities within a specific state may differ from the national distribution. Depending on that distribution, the estimates could be biased either upward or downward. Finally, as seen in the prior studies, Roche included additional direct costs increasing the overall value by an estimated \$30,000-\$40,000 per fatality.

The National Safety Council (NSC) estimated that a fatal occupational injury cost \$780,000 in 1992 (National Safety Council, 1993). This estimate includes a number of additional direct costs, which include administrative expenses, property damage, police costs, travel delay costs, and employer costs for productivity losses by employers. The indirect costs were calculated in a similar fashion; however, the NSC used different data sources that could also lead to differing cost estimates. Finally, because the cost per fatality is disaggregated from an overall cost to society, the number of fatalities included in the estimate could bias the estimates upward.

In addition to specific studies, there is also anecdotal evidence that suggests this study's estimates are reasonable. For example, the highest costs are those associated with airline incidents. This high mean cost bears out the 1988 RAND study's assumptions that those traveling on airlines tend to have higher wages.

5.2 LIMITATIONS OF THE STUDY

Although this theoretical model is easy to understand, relatively easy to calculate, and the necessary data is inexpensive to acquire, it is not without limitations. The human capital measure is often criticized because it ignores one of the fundamental constructs of economic theory--the individual's preferences. Another concern of this approach is the reliance on the market earnings to represent the value of life. Using these values underestimates the value of most working minority groups and youth, if the market failures or imperfections result in an inequitable distribution of wages and salaries. If earnings are lower for a specific age group, ethnicity, or sex, such as lower wages for black compared to white workers in the same occupation, this deviation will be incorporated into the human capital measure.

This model produces a conservative, if not lower bound, estimate for lifetime economic costs of traumatic occupational fatalities. This is in part due to limitations in the specification of the model and limitations associated with the data. This study does not provide a "complete" cost of occupational fatalities in that intangible losses that are associated with premature death are not included. While intuitively appealing, the costs of these losses—pain, suffering, and emotional damage to the injured and the family—are immeasurable. (Fahs et al. 1989). Despite the claim that these losses can not be measured, researchers have attempted to derive a proxy for such costs (Miller, et al., 1995). By including such estimates, these researchers may be inappropriately intertwining theoretical models.

Many of the limitations of this study are associated with wage data or model specification for wage calculation. Second- or multiple-job information for the decedent is not available on the source documentation; therefore, the wage calculations do not account for these additional losses. The wage calculations do not include a mechanism for identifying changes in career that may have occurred had the worker lived. In addition, the wage data used in this study lacks enough specificity to accurately show the variance in burden because wage data are not distributed by

age or age group. There is an upward bias for the younger worker because a younger worker will be assigned the same median annual wage as a mid-career employee. Because of these limitations, this model will underestimate the full economic loss of premature traumatic occupational fatalities.

5.3 FUTURE RESEARCH AND MODEL ENHANCEMENTS

This study provides a user-friendly model to estimate the total, mean, and median costs of traumatic occupational fatalities that are comparable to those estimates from prior studies. However, there are a number of model enhancements and additional research that will improve the utility of these estimates.

This model calculates conservative lifetime costs of fatalities because of including a minimal number of direct cost categories. Additional direct cost categories were intentionally excluded because of their individual limitations. For example, the most recent estimates for administration costs available at the time of model specification dated to work done in the 1980's. Exploration of improving or updating the estimations for legal and administration costs, property damage, travel delay costs, and funeral and coroner costs should be undertaken. Furthermore, medical costs used for this study were a three-year average of worker's compensation claims from a sample of states. Improving the accuracy of these costs require a thorough examination of alternative sources, particularly those studies that are nearing completion such as the collaborative work between The Center for Injury Research and Control at the University of Pittsburgh and the National Public Services Research Institute.

Further improvements in the wage data should include employing state-specific estimates, values for multiple-job holders, and age-specific estimates. Additionally, the accuracy of the estimates would benefit from a comprehensive analysis of the career growth rate estimates. A longitudinal cohort study would shed needed light on the best method of deriving these estimates for the overall population.

General discussions among cost-outcome researchers have evoked concern about the accuracy and appropriateness of using a cross-sectional cohort to estimate the probability of survival. The Social Security Administration has conducted some preliminary work to address this criticism by calculating probabilities based on a longitudinal study (Ted Miller, personal communication, May 15, 2000). As these studies progress further exploration for this application should be undertaken.

Finally, the model should be expanded to reflect the lifetime costs of those fatalities found in the BLS Census of Fatal Occupational Injuries program. It has been suggested that this program is a more comprehensive measure and has been adopted by the National Safety Council as the true Census of fatalities. Research has shown that the two systems vary in the characteristics of the decedents, which will likely change the overall cost estimates. Despite the complexity of the project, it would also be useful to apply such a model to severe non-fatal occupational injuries.

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Appendix A. Probability of Survival by Age, Sex, and Race

Age	White Male	White Female	Black Male	Black Female	Other Male	Other Female
16-17	0.99898	0.99960	0.99827	0.99955	0.99847	0.99957
17-18	0.99882	0.99955	0.99795	0.99949	0.99820	0.99951
18-19	0.99873	0.99953	0.99769	0.99942	0.99799	0.99945
19-20	0.99868	0.99952	0.99748	0.99936	0.99783	0.99941
20-21	0.99864	0.99951	0.99726	0.99928	0.99766	0.99935
21-22	0.99859	0.99950	0.99702	0.99920	0.99748	0.99930
22-23	0.99855	0.99949	0.99683	0.99912	0.99733	0.99924
23-24	0.99852	0.99949	0.99670	0.99904	0.99724	0.99918
24-25	0.99850	0.99949	0.99662	0.99897	0.99717	0.99912
25-26	0.99849	0.99949	0.99656	0.99890	0.99713	0.99906
26-27	0.99847	0.99949	0.99649	0.99882	0.99708	0.99900
27-28	0.99844	0.99947	0.99637	0.99873	0.99699	0.99893
28-29	0.99838	0.99945	0.99618	0.99862	0.99685	0.99884
29-30	0.99831	0.99942	0.99593	0.99849	0.99667	0.99874
30-31	0.99823	0.99938	0.99567	0.99835	0.99649	0.99863
31-32	0.99815	0.99934	0.99542	0.99822	0.99631	0.99853
32-33	0.99807	0.99930	0.99515	0.99809	0.99611	0.99843
33-34	0.99799	0.99926	0.99487	0.99797	0.99589	0.99833
34-35	0.99790	0.99922	0.99456	0.99784	0.99565	0.99822
35-36	0.99781	0.99918	0.99423	0.99771	0.99538	0.99811
36-37	0.99770	0.99912	0.99388	0.99757	0.99511	0.99800
37-38	0.99760	0.99906	0.99355	0.99741	0.99484	0.99787
38-39	0.99750	0.99898	0.99325	0.99725	0.99462	0.99774
39-40	0.99740	0.99889	0.99298	0.99707	0.99442	0.99761
40-41	0.99729	0.99879	0.99270	0.99687	0.99421	0.99746
41-42	0.99717	0.99869	0.99238	0.99665	0.99397	0.99729
42-43	0.99702	0.99857	0.99201	0.99641	0.99369	0.99711
43-44	0.99683	0.99843	0.99159	0.99616	0.99335	0.99690
44-45	0.99659	0.99827	0.99110	0.99589	0.99295	0.99665
45-46	0.99630	0.99807	0.99054	0.99558	0.99248	0.99637
46-47	0.99596	0.99785	0.98990	0.99522	0.99195	0.99604
47-48	0.99559	0.99760	0.98919	0.99481	0.99136	0.99567
48-49	0.99521	0.99735	0.98845	0.99436	0.99074	0.99527
49-50	0.99482	0.99709	0.98768	0.99388	0.99009	0.99485
50-51	0.99436	0.99679	0.98686	0.99336	0.98939	0.99439
51-52	0.99380	0.99644	0.98596	0.99279	0.98862	0.99388
52-53	0.99317	0.99606	0.98496	0.99219	0.98775	0.99335
53-54	0.99247	0.99566	0.98381	0.99157	0.98674	0.99279
54-55	0.99169	0.99524	0.98252	0.99090	0.98559	0.99219
55-56	0.99087	0.99479	0.98115	0.99021	0.98434	0.99157
56-57	0.98996	0.99429	0.97971	0.98946	0.98302	0.99090
57-58	0.98891	0.99372	0.97819	0.98858	0.98162	0.99013
58-59	0.98769	0.99307	0.97660	0.98753	0.98016	0.98923
59-60	0.98634	0.99236	0.97494	0.98637	0.97866	0.98824
60-61	0.98497	0.99163	0.97328	0.98518	0.97716	0.98722
61-62	0.98359	0.99088	0.97158	0.98398	0.97560	0.98619
62-63	0.98212	0.99007	0.96967	0.98273	0.97387	0.98509
63-64	0.98053	0.98919	0.96750	0.98141	0.97191	0.98390
64-65	0.97882	0.98823	0.96511	0.98003	0.96975	0.98260
65-66	0.97703	0.98722	0.96261	0.97858	0.96750	0.98123
66-67	0.97517	0.98617	0.96011	0.97709	0.96525	0.97982
67-68	0.97311	0.98500	0.95756	0.97558	0.96294	0.97838

Appendix A. Probability of Survival by Age, Sex, and Race

Age	White Male	White Female	Black Male	Black Female	Other Male	Other Female
68-69	0.97074	0.98366	0.95489	0.97399	0.96050	0.97688
69-70	0.96800	0.98209	0.95199	0.97226	0.95782	0.97527
70-71	0.96491	0.98031	0.94869	0.97035	0.95476	0.97350
71-72	0.96152	0.97832	0.94500	0.96823	0.95133	0.97149
72-73	0.95785	0.97614	0.94115	0.96589	0.94770	0.96925
73-74	0.95402	0.97382	0.93745	0.96344	0.94414	0.96685
74-75	0.95007	0.97140	0.93401	0.96096	0.94079	0.96436
75-76	0.94586	0.96889	0.93069	0.95848	0.93749	0.96183
76-77	0.94125	0.96613	0.92715	0.95588	0.93397	0.95918
77-78	0.93628	0.96293	0.92325	0.95295	0.93012	0.95623
78-79	0.93080	0.95910	0.91855	0.94939	0.92556	0.95274
79-80	0.92467	0.95458	0.91287	0.94508	0.92011	0.94854
80-81	0.91754	0.94947	0.90597	0.93992	0.91356	0.94353
81-82	0.90951	0.94394	0.89831	0.93419	0.90630	0.93791
82-83	0.90109	0.93785	0.89063	0.92821	0.89894	0.93197
83-84	0.89285	0.93122	0.88422	0.92256	0.89251	0.92630
84-85	0.88481	0.92393	0.87938	0.91736	0.88727	0.92104
85-86	0.87564	0.91555	0.87485	0.91203	0.88173	0.91548
86-87	0.86478	0.90598	0.86914	0.90572	0.87493	0.90895
87-88	0.85305	0.89569	0.86204	0.89871	0.86682	0.90169
88-89	0.84073	0.88488	0.85264	0.89067	0.85667	0.89333
89-90	0.82781	0.87327	0.84088	0.88140	0.84440	0.88367
90-91	0.81383	0.85985	0.82715	0.87058	0.83023	0.87248
91-92	0.79841	0.84464	0.81249	0.85862	0.81498	0.86021
92-93	0.78227	0.82899	0.79838	0.84682	0.80001	0.84804
93-94	0.76624	0.81374	0.78776	0.83667	0.78802	0.83732
94-95	0.75107	0.79852	0.78085	0.82768	0.77939	0.82755
95-96	0.73671	0.78263	0.77341	0.81756	0.77097	0.81662
96-97	0.72086	0.76566	0.76208	0.80444	0.75952	0.80318
97-98	0.70601	0.74909	0.75018	0.79054	0.74750	0.78911
98-99	0.69131	0.73285	0.73769	0.77586	0.73487	0.77443
99-100	0.67587	0.71682	0.72458	0.76242	0.72162	0.76089

Source: National Center for Health Statistics: Vital Statistics of the United States,
Vol 1 No 1, U.S. Decennial Life Tables for 1989-91

Appendix B. Median Annual Earnings of Wage and Salary Workers Who Usually Work Full Time, by Detailed Occupation and Sex, 1980-91
 (Current Dollars)

Occupation	Male												
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	
Total	16202	17627	18738	19656	20332	21112	21788	22516	23348	24336	25220	25844	
Managerial and professional specialty occupations	22116	24063	25579	26832	28704	30316	31616	33072	34632	36036	38012	39156	
A Executive, administrative, and managerial occupations	22565	24505	26049	27560	29640	30836	32240	33644	35464	36296	38584	39416	
003 Legislators	22565	24505	26049	27560	29640	30836	32240	33644	35464	36296	38584	39416	
004 Chief executives, and general administrators, public administration	22565	24505	26049	27560	29640	30836	32240	33644	35464	36296	38584	39416	
005 Administrators and officials, public administration	21926	23812	25312	26780	27716	30368	32084	31512	32084	33800	36920	39832	
006 Administrators, protective service	22565	24505	26049	27560	29640	30836	32240	33644	35464	36296	38584	39416	
007 Financial managers	24566	26678	28359	30004	32292	35204	36556	40456	40976	44096	43524	49556	
008 Personnel and labor relations managers	25758	27973	29735	31460	35412	32812	39468	42744	40820	47268	45812	39416	
009 Purchasing managers	26482	28759	30571	32344	31564	37128	38532	36868	36868	40144	41028	43732	
013 Managers, marketing, advertising, and public relations	26439	28713	30522	32292	34996	37024	39052	41756	42328	44824	46904	46748	
014 Administrators, education and related fields	24821	26956	28654	30316	31772	33228	35932	36816	39364	42536	42588	46228	
015 Managers, medicine and health	22565	24505	26049	27560	29640	30836	32240	34372	38636	38168	40976	39416	
016 Managers, properties and real estate	17498	19003	20200	21372	19890	21320	21164	26780	26832	26000	26884	28860	
017 Postmasters and mail superintendents	22565	24505	26049	27560	29640	30836	32240	33644	35464	36296	38584	39416	
018 Funeral directors	22565	24505	26049	27560	29640	30836	32240	33644	35464	36296	38584	39416	
019 Managers and administrators, n.e.c.	23629	25661	27278	28860	30888	32032	33748	34996	36140	37128	39988	40300	
Management -related occupations	20819	22610	24034	25428	26416	26780	29380	30784	31720	31980	34112	35620	
023 Accountants and auditors	20691	22471	23887	25272	26676	26988	28808	30576	31876	32240	33488	36348	
024 Underwriters	22735	24690	26246	27768	29744	28912	32084	34112	34060	35568	38532	37752	
025 Other financial officers	22735	24690	26246	27768	29744	28912	32084	34112	34060	35568	38532	37752	
026 Management analysts	20819	22610	24034	25428	26416	30636	34996	37596	42536	45136	45656		
027 Personnel, training, and labor relations specialists	21969	23858	25361	26832	30212	28652	31512	31980	31876	33540	36140	35204	
028 Purchasing agents and buyers, farm products	20819	22610	24034	25428	26416	26780	29380	30784	31720	31980	34112	35620	
029 Buyers, wholesale and retail trade, except farm products	17541	19049	20250	21424	21996	25480	26052	27040	28028	28184	30212	30160	
033 Purchasing agents and buyers, n.e.c.	20095	21824	23198	24544	24596	26676	26988	28808	30316	30160	30576	31928	
034 Business and promotion agents	20819	22610	24034	25428	26416	26780	29380	30784	31720	31980	34112	35620	
035 Construction inspectors	20819	22610	24034	25428	21840	26780	29380	24804	26000	28184	30524	32760	
036 Inspectors and compliance officers, except construction	18265	19835	21085	22308	24700	24804	26161	26988	28132	27248	31460	34164	
037 Management -related occupations, n.e.c.	20819	22610	24034	25428	24908	26052	29380	30784	30888	27820	34112	33956	
B Professional specialty occupations	20838	23068	24660	26312	27716	29692	31148	32500	33852	35776	37440	38896	
Engineers, architects, and surveyors	24668	27308	29192	31148	32448	34424	35620	37648	37804	40664	42536	44252	
043 Architects	21168	23433	25050	26728	32448	32634	30784	35256	32968	39312	38012	33592	
Engineers	24915	27581	29485	31460	32656	34996	35932	38012	38168	40768	42744	44876	
Aerospace engineers	26151	28949	30947	33020	35828	36348	37544	40352	42640	41860	44460	46696	
045 Metallurgical and materials engineers	24915	27581	29485	31460	32656	34996	35932	38012	38168	40768	42744	44876	
Mining engineers	24915	27581	29485	31460	32656	34996	35932	38012	38168	40768	42744	44876	
Petroleum engineers	24915	27581	29485	31460	32656	34996	35932	38012	38168	40768	42744	44876	
Chemical engineers	26027	28812	30800	32864	32656	38012	35932	41964	40820	42692	47840	47008	
Nuclear engineers	24915	27581	29485	31460	32656	34996	35932	38012	38168	40768	42744	44876	
Civil engineers	23762	26305	28120	30004	30108	33436	32240	34892	37648	38584	41288	42276	
Agricultural engineers	24915	27581	29485	31460	32656	34996	35932	38012	38168	40768	42744	44876	
Electrical and electronic engineers	25492	28220	30167	32188	34216	34944	37180	38948	38948	42016	44512	46124	
Industrial engineers	22609	25028	26755	28548	30316	31616	33644	35776	35152	38064	40508	42120	
Mechanical engineers	24668	27308	29192	31148	33436	35152	36140	37908	37284	40248	42172	43732	
Marine engineers and naval architects	24915	27581	29485	31460	32656	34996	35932	38012	38168	40768	42744	44876	
Engineers, n.e.c.	25039	27718	29631	31616	31772	33800	35412	38168	40092	40248	45136		
Surveyors and mapping scientists	24668	27308	29192	31148	32448	34424	35620	37648	37804	40664	42536	44252	
Mathematical and computer scientists	24504	27126	28997	30940	32240	33384	36192	36764	38116	38376	41756	42796	
Computer systems analysts and scientists	23968	26533	28364	30264	32396	32500	35724	36348	37960	38844	41548	42744	
Operations and systems researchers and analysts	25368	28083	30021	32032	32552	34476	36140	37804	38480	36920	40612	42068	
Actuaries	24504	27126	28997	30940	32240	33384	36192	36764	38116	38376	41756	42796	
Statisticians	24504	27126	28997	30940	32240	33384	36192	36764	38116	38376	41756	42796	
Mathematical scientists, n.e.c.	24504	27126	28997	30940	32240	33384	36192	36764	38116	38376	41756	42796	
Natural scientists	22156	24527	26219	27976	28028	31148	31356	35204	35204	36348	35932	37752	
Physicists and astronomers	22156	24527	26219	27976	28028	31148	31356	35204	35204	36348	35932	37752	
Chemists, except biochemists	22609	25028	26755	28548	28184	31252	32448	35100	35776	36400	37336	39156	
Atmospheric and space scientists	22156	24527	26219	27976	28028	31148	31356	35204	35204	36348	35932	37752	
Geologists and geodesists	22156	24527	26219	27976	28028	31148	31356	35204	35204	36348	35932	37752	
Physical scientists, n.e.c.	22156	24527	26219	27976	28028	31148	31356	35204	35204	36348	35932	37752	
Agricultural and food scientists	22156	24527	26219	27976	28028	31148	31356	35204	35204	36348	35932	37752	
Biological and life	22156	24527	26219	27976	28028	31148	31356	35204	35204	36348	35932	37752	
Forestry and conservation scientists	22156	24527	26219	27976	28028	31148	31356	35204	35204	36348	35932	37752	
Medical scientists	22156	24527	26219	27976	28028	31148	31356	35204	35204	36348	35932	37752	
Health diagnosing occupations	21538	23843	25488	27196	30680	32916	37544	39780	41964	45292	47840	53092	
Physicians	21291	23570	25196	26884	31408	34112	37856	38688	42380	46124	50856	60060	
Dentists	21538	23843	25488	27196	30680	32916	37544	39780	41964	45292	47840	53092	
Veterinarians	21538	23843	25488	27196	30680	32916	37544	39780	41964	45292	47840	53092	
Optometrists	21538	23843	25488	27196	30680	32916	37544	39780	41964	45292	47840	53092	
Podiatrists	21538	23843	25488	27196	30680	32916	37544	39780	41964	45292	47840	53092	
Health diagnosing practitioners, n.e.c.	21538	23843	25488	27196	30680	32916	37544	39780	41964	45292	47840	53092	
Health assessment and treating occupations	17667	19558	20907	22308	25168	26364	25844	28652	30732	32968	34476	36556	
Registered nurses	16391	18144	19396	20696	22984	25584	25480	26832	29172	32708	32032	36556	
Pharmacists	21703	24025	25683	27404	30680	31200	31876	35724	37440	39936	42172	44876	
Dietitians	17667	19558	20907	22308	25168	26364	25844	28652	30732	32968	34476	36556	
Therapists	17667	19558	20907	22308	25168	21944	21580	24648	26884	29380	30524	31720	
Inhalation therapists	17667	19558	20907	22308	25168	21944	21580	24648	26884	29380	30524	31720	
Occupational therapists	17667	19558	20907	22308	25168	21944	21580	24648	26884	29380	30524	31720	
Physical therapists	17667	19558	20907	22308	25168	21944	21580	24648	26884	29380	30524	31720	
Speech therapists	17667	19558	20907	22308	25168	21944	21580	246					

	Teachers, college and university	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
113	Earth, environmental and marine science teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
114	Biological science teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
115	Chemistry teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
116	Physics teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
117	Natural science teachers, n.e.c.	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
118	Psychology teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
119	Economics teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
123	History teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
124	Political science teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
125	Sociology teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
126	Social science teachers, n.e.c.	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
127	Engineering teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
128	Mathematical science teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
129	Computer science teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
133	Medical science teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
134	Health specialties teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
135	Business, commerce, and marketing teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
136	Agriculture and forestry teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
137	Art, drama, and music teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
138	Physical education teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
139	Education teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
143	English teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
144	Foreign language teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
145	Law teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
146	Social work teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
147	Theology teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
148	Trade and industrial teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
149	Home economics teachers	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
153	Teachers, postsecondary, n.e.c.	21250	23524	25147	26832	30472	33176	34112	36192	39104	40820	42016	42848
154	Postsecondary teachers, subject not specified	20797	23023	24611	26260	30524	32136	35412	32344	38428	40300	39884	42432
	Teachers, except college and university	16885	18692	19981	21320	23816	24856	26052	27508	29120	29536	30888	32032
155	Teachers, prekindergarten and kindergarten	16885	18692	19981	21320	23816	24856	26052	27508	29120	29536	30888	32032
156	Teachers, elementary school	16679	18464	19738	21060	23712	24336	25480	26624	27144	28288	29900	31460
157	Teachers, secondary school	16967	18783	20079	21424	23868	25220	26416	28184	30160	30108	31720	32448
158	Teachers, special education	16885	18692	19981	21320	23816	24856	26052	27508	29120	29536	30888	32032
159	Teachers, n.e.c.	17132	18965	20274	21632	24648	23920	24908	26780	27768	27196	29900	31096
163	Counselors, educational and vocational	19603	21700	23198	24752	25948	28548	27820	29848	31148	33800	36140	34632
	Librarians, archivists, and curators	20838	23068	24660	26312	27716	29692	31148	32500	33852	35776	37440	38896
164	Librarians	20838	23068	24660	26312	27716	29692	31148	32500	33852	35776	37440	38896
165	Archivists and curators	20838	23068	24660	26312	27716	29692	31148	32500	33852	35776	37440	38896
	Social scientists and urban planners	22115	24481	26171	27924	29796	30160	35516	31408	35152	36816	35204	36608
166	Economists	28828	31912	34114	36400	32604	37180	41288	38792	37388	42068	39988	49192
167	Psychologists	22115	24481	26171	27924	29796	30160	30212	26446	29120	31356	31460	32968
168	Sociologists	22115	24481	26171	27924	29796	30160	35516	31408	35152	36816	35204	36608
169	Social scientists, n.e.c.	22115	24481	26171	27924	29796	30160	35516	31408	35152	36816	35204	36608
173	Urban planners	22115	24481	26171	27924	29796	30160	35516	31408	35152	36816	35204	36608
	Social, recreation, and religious workers	14290	15819	16911	18044	19344	19396	21840	22620	21528	22568	23192	25480
174	Social workers	16185	17917	19153	20436	20956	21892	23452	24752	22568	25532	25116	26364
175	Recreation workers	14290	15819	16911	18044	19344	19396	21840	22620	21528	22568	23192	25480
176	Clergy	13096	14497	15498	16536	17056	17732	20800	21528	21164	21788	22932	24388
177	Religious workers, n.e.c.	14290	15819	16911	18044	19344	19396	21840	22620	21528	22568	23192	25480
	Lawyers and judges	27469	30408	32506	34684	39416	40664	42224	45448	48360	53092	61568	56628
178	Lawyers	26933	29815	31873	34008	38688	40352	41912	45188	48360	52832	61256	56732
179	Judges	27469	30408	32506	34684	39416	40664	42224	45448	48360	53092	61568	56628
	Writers, artists, entertainers, and athletes	17956	19877	21248	22672	24960	25480	26208	27144	29068	29068	30212	30888
183	Authors	17956	19877	21248	22672	24960	25480	26208	27144	29068	29068	30212	30888
184	Technical writers	17956	19877	21248	22672	24960	25480	26208	27144	29068	29068	30212	30888
185	Designers	20262	22430	23978	25584	26572	27924	29848	30732	31044	30940	32032	31512
186	Musicians and composers	17956	19877	21248	22672	24960	25480	26208	27144	29068	29068	30212	30888
187	Actors and directors	17956	19877	21248	22672	24960	25480	26208	27144	29068	29068	30212	30888
188	Painters, sculptors, craft artists, and artist printmakers	17956	19877	21248	22672	24960	25480	26208	27144	29068	29068	30212	30888
189	Photographers	17956	19877	21248	22672	24960	25480	26208	27144	29068	29068	30212	30888
193	Dancers	17956	19877	21248	22672	24960	25480	26208	27144	29068	29068	30212	30888
194	Artists, performers, and related workers, n.e.c.	17956	19877	21248	22672	24960	25480	26208	27144	29068	29068	30212	30888
195	Editors and reporters	17008	18828	20127	21476	24908	24960	24960	27040	29016	30628	30576	34060
197	Public relations specialists	21580	23889	25537	27248	32240	30420	36296	36400	37076	29068	32396	33280
198	Announcers	17956	19877	21248	22672	24960	25480	26208	27144	29068	29068	30212	30888
199	Athletes	17956	19877	21248	22672	24960	25480	26208	27144	29068	29068	30212	30888
	Technical, sales, and administrative support occupations	15855	17552	18763	20020	20852	21840	22724	23556	24544	24960	25792	26468
C	Technicians and related support occupations	17461	19330	20664	22048	23296	24544	25480	26000	26520	27976	29640	29952
	Health technologists and technicians	14084	15591	16667	17784	20072	19812	21060	20748	21476	24284	24284	25792
203	Clinical laboratory technologists and technicians	15443	17096	18276	19500	20488	20488	22672	20748	25168	24856	25064	25792
204	Dental hygienists	14084	15591	16667	17784	20072	19812	21060	20748	21476	24284	24284	25792
205	Health record technologists and technicians	14084	15591	16667	17784	20072	19812	21060	20748	21476	24284	24284	25792
206	Radiologic technicians	14084	15591	16667	17784	20072	19812	21060	20748	21476	24284	24284	25792
207	Licensed practical nurses	14084	15591	16667	17784	20072	19812	21060	20748	21476	24284	24284	25792
208	Health technologists and technicians, n.e.c.	13178	14589	15595	16640	18824	18200	20488	20020	20696	24128	23348	25636
	Technologists and technicians, except health engineering and related techno	16802	18600	1									

225	Science technicians, n.e.c.	16185	17917	19153	20436	22412	21684	24908	24544	22568	26000	22828	27508
226	Technicians, except health, engineering, and science	20221	22384	23929	25532	26156	26884	28496	29640	31460	32916	34944	34840
227	Airplane pilots and navigators	20221	22384	23929	25532	32136	38636	39520	37232	42796	42068	47320	48516
228	Air traffic controllers	20221	22384	23929	25532	26156	26884	28496	29640	31460	32916	34944	34840
229	Broadcast equipment operators	20221	22384	23929	25532	26156	26884	28496	29640	31460	32916	34944	34840
233	Computer programmers	20427	22612	24172	25792	26520	26988	29068	30420	32396	33852	35932	35724
234	Tool programmers, numerical control	20221	22384	23929	25532	26156	26884	28496	29640	31460	32916	34944	34840
235	Legal assistants	20221	22384	23929	25532	26156	26884	28496	29640	31460	32916	34944	34840
235	Technicians, n.e.c.	19562	21655	23149	24700	24804	25220	27040	26052	27248	29328	29068	
D	Sales occupations	17232	18541	19320	20228	20852	22412	23244	24908	25376	25324	26260	26936
243	Supervisors and proprietors	17542	18875	19668	20592	21320	22776	23920	25168	25428	25740	26468	28548
	Sales representatives, finance and business services	20953	22545	23492	24596	24960	26364	26988	30316	30940	31824	33228	31720
253	Insurance sales	18871	20305	21158	22152	24128	24856	26000	26988	30212	31356	31616	30992
254	Real estate sales	20510	22068	22995	24076	26624	26364	26936	32136	31876	35100	35672	33384
255	Securities and financial services sales	27331	29409	30644	32084	32136	35048	38480	39572	39936	40196	41860	42796
256	Advertising and related sales	17630	18970	19767	20696	20384	26000	26104	25636	26884	24960	27196	31720
257	Sales Occupations, other business services	20598	22164	23095	24180	21684	25428	25324	27196	27144	29588	31096	30524
	Sales representatives, commodities, except retail	19934	21449	22350	23400	24856	25948	26416	28600	30316	30264	32396	33696
258	Sales engineers	19934	21449	22350	23400	24856	25948	26416	28600	30316	30264	32396	33696
259	Sales representatives, mining, manufacturing and wholesale	19934	21449	22350	23400	24856	25948	26416	28600	30316	30264	32396	33696
	Sales workers, retail and personal services	11694	12583	13112	13728	14820	14820	15652	15860	16380	15808	17472	17160
263	Sales workers, motor vehicles and boats	15238	16396	17085	17888	20436	20800	22828	23608	23296	21424	24908	25220
264	Sales workers, apparel	11694	12583	13112	13728	14820	14820	15652	15860	16380	15808	17472	17160
265	Sales workers, shoes	11694	12583	13112	13728	14820	14820	15652	15860	16380	15808	17472	17160
266	Sales workers, furniture and home furnishings	11694	12583	13112	13728	16016	16172	16536	19292	19032	21320	21476	20904
267	Sales workers, radio, television, hi-fi, and appliances	13511	14537	15148	15860	14872	17368	16276	19760	19708	17888	19916	21112
268	Sales workers, hardware and building supplies	11606	12488	13012	13624	14144	13676	15184	14560	16380	16276	19708	17368
269	Sales workers, parts	11562	12440	12963	13572	15080	13572	14872	14976	17160	15236	16796	16640
274	Sales workers, other commodities	10631	11439	11920	12480	13832	14144	14716	14352	14560	14560	16328	17108
275	Sales counter clerks	11694	12583	13112	13728	14820	14820	15652	15860	16380	15808	17472	17160
276	Cashiers	8771	9437	9834	10296	10296	10868	11284	11544	10972	12584	12740	
277	Street and door-to-door sales workers	11694	12583	13112	13728	14820	14820	15652	15860	16380	15808	17472	17160
278	News vendors	11694	12583	13112	13728	14820	14820	15652	15860	16380	15808	17472	17160
	Sales -related occupations	17232	18541	19320	20228	20852	22412	23244	24908	25376	25324	26260	26936
283	Demonstrators, promtors, and models, sales	17232	18541	19320	20228	20852	22412	23244	24908	25376	25324	26260	26936
284	Auctioneers	17232	18541	19320	20228	20852	22412	23244	24908	25376	25324	26260	26936
285	Sales support occupations, n.e.c.	17232	18541	19320	20228	20852	22412	23244	24908	25376	25324	26260	26936
E	Administrative support occupations, including clerical	15212	16566	17742	18824	19656	20332	20956	20904	21736	21892	22880	23868
	Supervisors, administrative support	15982	21325	22839	24232	25168	26728	27092	27924	29328	31148	30940	33800
303	Supervisors, general office	20254	22057	23623	25064	26208	28600	26780	29640	29484	31980	31512	35464
304	Supervisors, computer equipment operators	19582	21325	22839	24232	25168	26728	27092	27924	29328	31148	30940	33800
305	Supervisors, financial records processing	19582	21325	22839	24232	25168	26728	27092	27924	29328	31148	30940	33800
306	Chief communications operators	19582	21325	22839	24232	25168	26728	27092	27924	29328	31148	30940	33800
307	Supervisors, distribution, scheduling, and adjusting clerks	16640	18121	19408	20592	22724	25220	24492	24960	26624	28028	29016	28912
	Computer equipment operators	14539	15833	16958	17992	19448	20540	20592	20332	21580	21684	23192	24076
308	Computer operators	14539	15833	16958	17992	19396	20540	20592	20384	21528	21736	23400	24128
309	Peripheral equipment operators	14539	15833	16958	17992	19448	20540	20592	20332	21580	21684	23192	24076
	Secretaries, stenographers, and typists	13699	14918	15977	16952	18564	17732	16744	18616	16380	21892	20124	19084
313	Secretaries	13699	14918	15977	16952	20644	19188	16744	18616	16380	21892	20124	19084
314	Stenographers	13699	14918	15977	16952	18564	17732	16744	18616	16380	21892	20124	19084
315	Typists	13699	14918	15977	16952	18564	17732	16744	18616	16380	21892	20124	19084
	Information clerks	12732	13866	14850	15756	14976	18304	18044	16224	19552	17680	17680	19656
316	Interviewers	12732	13866	14850	15756	14976	18304	18044	16224	19552	17680	17680	19656
317	Hotel clerks	12732	13866	14850	15756	14976	18304	18044	16224	19552	17680	17680	19656
318	Transportation ticket and reservation agents	12732	13866	14850	15756	14976	18304	18044	16224	19552	17680	17680	19656
319	Receptionists	12732	13866	14850	15756	14976	18304	18044	16224	19552	17680	17680	19656
323	Information clerks, n.e.c.	12732	13866	14850	15756	14976	18304	18044	16224	19552	17680	17680	19656
	Records processing occupations, except financial	13783	15010	16075	17056	15704	16952	17784	18408	19240	18616	18720	20540
325	Classified -ad clerks	13783	15010	16075	17056	15704	16952	17784	18408	19240	18616	18720	20540
326	Correspondence clerks	13783	15010	16075	17056	15704	16952	17784	18408	19240	18616	18720	20540
327	Order clerks	13783	15010	16075	17056	15704	16952	21008	18048	19240	18616	18720	20540
328	Personnel clerks, except payroll and timekeeping	13783	15010	16075	17056	15704	16952	17784	18408	19240	18616	18720	20540
329	Library clerks	13783	15010	16075	17056	15704	16952	17784	18408	19240	18616	18720	20540
335	File clerks	13783	15010	16075	17056	15704	16952	17784	18408	19240	18616	18720	20540
336	Records clerks	13783	15010	16075	17056	15704	16952	17784	18408	19240	18616	18720	20540
	Financial records processing occupations	13447	14644	15683	16640	17940	18772	19032	19500	21216	20384	20800	21372
337	Bookkeepers, accounting, and auditing clerks	13069	14232	15242	16172	17056	17212	17836	17628	20020	19552	20332	20696
338	Payroll and timekeeping clerks	13447	14644	15683	16640	17940	18772	19032	19500	21216	20384	20800	21372
339	Billing clerks	13447	14644	15683	16640	17940	18772	19032	19500	21216	20384	20800	21372
343	Cost and rate clerks	13447	14644	15683	16640	17940	18772	19032	19500	21216	20384	20800	21372
344	Billing, posting, and calculating machine operators	13447	14644	15683	16640	17940	18772	19032	19500	21216	20384	20800	21372
	Duplicating, mail, and other office machine operators	15212	16566	17742	18824	19656	20332	20956	20904	21736	21892	22880	23868
345	Duplicating machine operators	15212	16566	17742	18824	19656	20332	20956	20904	21736	21892	22880	23868
346	Mail preparing and paper handling machine operators	15212	16566	17742	18824	19656	20332	20956	20904	21736	21892	22880	23868
347	Office machine operators, n.e.c.	15212	16566	17742	18824	19656	20332	20956	20904	21736	21892	22880	23868
	Communications equipment operators	15212	16566	17742	18824	19656	20332	20956	20904	21736	21892	22880	23868
348	Telephone operators	15212	16566	17742	18824	19656	20332	20956	20904	21736	21892	22880	23868
349	Telegraphers	15212	16566	17742	18824	19656	20332	20956	20904	21736	21892	22880	23868
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365	Stock and inventory clerks	12943	14094	15095	16016	16432	16848	18044	18044	19292	18616	19396	20436
366	Meter readers	13279	14461	15487	16432	16952	17264	18668	18408	19448	19292	20020	20748
368	Weighers, measurers, and checkers	13279	14461	15487	16432	16952	17264	18668	18408	19448	19292	20020	20748
369	Samplers	13279	14461	15487	16432	16952	17264	18668	18408	19448	19292	20020	20748
373	Expeditors	13279	14461	15487	16432	16952	17264	18668	18408	19448	19292	20020	20748
374	Material recording, scheduling, and distribution clerks, n.e.c.	13279	14461	15487	16432	16952	17264	18668	18408	19448	19292	20020	20748
	Adjusters and investigators	16935	18442	19751	20956	22308	22828	23920	22672	24544	24128	24804	25792
375	Insurance adjusters, examiners, and investigators	17481	19037	20388	21632	23816	23660	25324	22776	27924	25532	26572	30264
376	Investigators and adjusters, except insurance	18826	20501	21957	23296	23192	25012	24180	24700	25532	25324	23816	25948
377	Eligibility clerks, social welfare	16935	18442	19751	20956	22308	22828	23920	22672	24544	24128	24804	25792
378	Bill and account collectors	16935	18442	19751	20956	22308	22828	23920	22672	24544	24128	24804	25792
	Miscellaneous administrative support occupations	12901	14049	15046	15964	17108	18304	19500	20228	19760	19136	20176	20748
379	General office clerks	12396	13500	14458	15340	15808	16744	19396	21152	19448	17420	18460	18824
383	Bank tellers	12901	14049	15046	15964	17108	18304	19500	20228	19760	19136	20176	20748
384	Proofreaders	12901	14049	15046	15964	17108	18304	19500	20228	19760	19136	20176	20748
385	Data -entry keyers	12901	14049	15046	15964	17108	18304	19500	20228	19760	19136	20176	20488
386	Statistical clerks	12901	14049	15046	15964	17108	18304	19500	20228	19760	19136	20176	20748
387	Teachers' aides	12901	14049	15046	15964	17108	18304	19500	20228	19760	19136	20176	20748
389	Administrative support occupations, n.e.c.	15212	16566	17742	18824	20904	20384	20852	20800	21216	20904	21372	24440
G	Service occupations	10788	11684	12677	13260	13780	14144	14768	15392	15548	15912	16640	17160
	Private household occupations	10788	11684	12677	13260	13780	14144	14768	15392	15548	15912	16640	17160
403	Launderers and ironers	10788	11684	12677	13260	13780	14144	14768	15392	15548	15912	16640	17160
404	Cooks, private household	10788	11684	12677	13260	13780	14144	14768	15392	15548	15912	16640	17160
405	Housekeepers and butlers	10788	11684	12677	13260	13780	14144	14768	15392	15548	15912	16640	17160
406	Child care workers, private households	10788	11684	12677	13260	13780	14144	14768	15392	15548	15912	16640	17160
407	Private household cleaners and servants	10788	11684	12677	13260	13780	14144	14768	15392	15548	15912	16640	17160
	Protective service occupations	15019	16266	17648	18460	19604	20332	20904	22204	22048	23920	24804	26104
	Supervisors, protective service occupations	20942	22680	24608	25740	26572	25688	27456	30368	30628	33436	33124	33436
413	Supervisors, firefighting and fire prevention	20942	22680	24608	25740	26572	25688	27456	30368	30628	33436	33124	33436
414	Supervisors, police and detectives	21365	23138	25105	26260	27248	28080	29900	31772	31564	35360	35152	35620
415	Supervisors, guards	20942	22680	24608	25740	26572	25688	27456	30368	30628	33436	33124	33436
	Firefighting and fire prevention occupations	16796	18190	19736	20644	21788	22828	23972	25584	26156	27924	30888	31824
416	Fire inspection and fire prevention occupations	16796	18190	19736	20644	21788	22828	23972	25584	26156	27924	30888	31824
417	Firefighting occupations	16796	18190	19736	20644	21372	22776	24388	25584	26208	27924	30992	32188
	Police and detectives	16331	17686	19189	20072	21320	22464	23036	23576	25168	26104	26624	28600
418	Police and detectives, public service	17219	18648	20233	21164	23192	23660	25012	26884	27196	29120	29588	31304
423	Sheriffs, bailiffs, and other law enforcement officers	14977	16220	17598	18408	19032	21112	21320	23764	20748	21944	23608	26364
424	Correctional institution officers	13708	14845	16107	16848	16484	18928	19240	21322	22828	23296	25532	
	Guards	10027	10859	11782	12324	12740	13364	14144	13832	13988	14924	16068	16068
425	Crossing guards	10027	10859	11782	12324	12740	13364	14144	13832	13988	14924	16068	16068
426	Guards and police, except public service	10154	10996	11931	12480	12844	13364	14300	13988	14144	15080	16120	16172
427	Protective service occupations, n.e.c.	10027	10859	11782	12324	12740	13364	14144	13832	13988	14924	16068	16068
	Service occupations, except protective and private household	9181	9943	10788	11284	11648	11960	12428	13052	13364	13624	14196	14716
	Food preparation and service occupations	7996	8660	9396	9828	10140	10660	10660	11128	11700	12012	12636	12896
433	Supervisors, food preparation and service	12396	13425	14566	15236	14612	14768	15288	16276	16796	15912	17992	18616
434	Bartenders	8969	9714	10539	11024	11856	11804	12740	13520	14976	13832	14352	
435	Waiters and waitresses	9096	9851	10688	11180	11492	12272	10868	13312	11960	12792	13832	14612
436	Cooks, except short order	8038	8706	9446	9880	10400	10764	11024	11388	12480	12220	12896	13364
437	Short-order cooks	7996	8660	9396	9828	10140	10660	10660	11128	11700	12012	12636	12896
438	Food counter, fountain, and related occupations	7996	8660	9396	9828	10140	10660	10660	11128	11700	12012	12636	12896
439	Kitchen workers, food preparation	7996	8660	9396	9828	10140	10660	10660	11128	11700	12012	12636	12896
443	Waiters'/waitresses' assistants	6896	7468	8103	8476	8528	8268	8424	9256	9516	10452	10660	10608
444	Miscellaneous food preparation occupations	6685	7239	7855	8216	8528	8476	8580	8684	9152	10348	10660	10816
	Health service occupations	9900	10722	11633	12168	12584	12584	13104	14508	14404	15288	15600	15912
445	Dental assistants	9900	10722	11633	12168	12584	12584	13104	14508	14404	15288	15600	15912
446	Health aides, except nursing	9900	10722	11633	12168	12584	12584	13104	14508	14404	16484	16016	16328
447	Nursing aides, orderlies, and attendants	9773	10584	11484	12012	12324	12168	13156	14508	13676	15028	14768	15496
	Cleaning and building service occupations, except household	9900	10722	11633	12168	13000	13156	13832	14560	14508	14820	15548	16016
448	Supervisors, cleaning and building service workers	13242	14341	15560	16276	17628	17680	18096	19032	22100	20800	21684	21944
449	Maids and housemen	9054	9805	10639	11128	11492	12220	11908	12480	12168	12480	14508	14248
453	Janitors and cleaners	9773	10584	11484	12012	12844	12844	13572	14300	14144	14612	15288	
454	Elevator operators	9900	10722	11633	12168	13000	13156	13832	14560	14508	14820	15548	16016
455	Pest control occupations	9900	10722	11633	12168	13000	13156	13832	14560	14508	14820	15548	16016
	Personal service occupations	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
456	Supervisors, personal service occupations	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
457	Barbers	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
458	Hairdressers and cosmetologists	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
459	Attendants, amusement and recreation facilities	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
463	Guides	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
464	Ushers	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
465	Public transportation attendants	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
466	Baggage porters and bellhops	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
467	Welfare service aides	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
468	Child care workers, except private household	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
469	Personal service occupations, n.e.c.	9604	10401	11285	11804	11960	12480	13260	13728	13884	15028	15444	15600
I	Precision production, craft, and repair occupations	16763	18204	19406	20124	20488	21216	21736	22412	23192	24388	25376	25688
	Mechanics and repairers	16330	17734	18905	19604	20280	20800	21476	21996	22932	23764	24804	25428
503	Supervisors, mechanics and repairers	21181	23003	24521	25428	25844	27092	27196	30108	30576	29796	30888	30628
	Mechanics and repairers, except supervisors	15983	17358	18503	19188	1991							

517	Farm equipment mechanics	14337	15570	16598	17212	17732	18304	19500	19708	20748	21580	22100	22828
518	Industrial machinery repairers	16373	17781	18955	19656	20488	21112	21684	22516	23452	23868	25064	25740
519	Machinery maintenance occupations	15983	17358	18503	19188	19916	20436	21216	21632	22412	23348	24440	25168
523	Electrical and electronic equipment repairers	19318	20980	22365	23192	24908	25948	26728	26884	26624	28132	29952	30836
525	Electronic repairers, communications and industrial equipment	14727	15994	17049	17680	18616	20020	23244	21372	22828	24700	25220	25844
526	Data processing equipment repairers	19448	21121	22515	23348	25116	26416	27612	27924	26988	29588	31356	30888
527	Household appliance and power tool repairers	19318	20980	22365	23192	24908	25948	26728	26884	26624	28132	29952	30836
529	Telephone line installers and repairers	20834	22626	24120	25012	26052	27092	28444	27456	27092	28132	31772	32656
533	Telephone installers and repairers	21138	22956	24471	25376	26936	28028	29692	30264	30264	30680	32708	33696
534	Miscellaneous electrical and electronic equipment repairers	18799	20415	21763	22568	23764	25064	24284	26988	25688	25636	26520	29068
535	Heating, air conditioning, and refrigeration mechanics	14640	15900	16949	17576	19292	19240	20228	20748	21528	22360	23192	24492
536	Miscellaneous mechanics and repairers	15853	17217	18353	19032	19968	20748	21008	21736	22308	22880	24284	25220
538	Camera, watch, and musical instrument repairers	15853	17217	18353	19032	19968	20748	21008	21736	22308	22880	24284	25220
539	Locksmiths and safe repairers	15853	17217	18353	19032	19968	20748	21008	21736	22308	22880	24284	25220
543	Office machine repairers	15377	16699	17801	18460	20644	20200	19552	21892	21996	21944	23296	24128
544	Mechanical controls and valve repairers	15853	17217	18353	19032	19968	20748	21008	21736	22308	22880	24284	25220
545	Elevator installers and repairers	15853	17217	18353	19032	19968	20748	21008	21736	22308	22880	24284	25220
547	Millwrights	18019	19569	20860	21632	24856	26104	26052	26208	26468	28756	28444	29068
549	Not specified mechanics and repairers	14900	16182	17250	17888	18200	19240	20124	20748	21320	22048	22516	23400
	Construction trades	15420	16746	17851	18512	19760	19188	18824	20280	20072	20904	23348	25220
	Supervisors, construction occupations	16243	17640	18804	19500	19968	20488	20852	21632	21996	23452	24960	25168
553	Supervisors, brickmasons, stonemasons, and tile setters	20791	22579	24069	24960	25168	26312	26000	26936	29016	30316	30784	31096
554	Supervisors, carpenters and related workers	20791	22579	24069	24960	25168	26312	26000	26936	29016	30316	30784	31096
555	Supervisors, electricians and power transmission installers	20791	22579	24069	24960	25168	26312	26000	26936	29016	30316	30784	31096
556	Supervisors, painters, paperhangers, and plasterers	20791	22579	24069	24960	25168	26312	26000	26936	29016	30316	30784	31096
557	Supervisors, plumbers, pipefitters, and steamfitters	20791	22579	24069	24960	25168	26312	26000	26936	29016	30316	30784	31096
558	Supervisors, n.e.c.	19968	21685	23117	23972	24596	25792	25324	26624	27040	29900	30628	30368
	Construction trades, except supervisors	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
563	Brickmasons and stonemasons	16936	18393	19607	20332	19448	18200	21372	22932	23296	26416	26312	25480
564	Brickmason and stonemason apprentices	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
565	Tile setters, hard and soft	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
566	Carpet installers	15593	16934	18052	18720	19188	15496	17056	20904	21216	16328	19760	16848
567	Carpenters	13644	14818	15796	16380	16640	17576	18148	19032	19916	20592	21476	22204
569	Carpenter apprentices	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
573	Drywall installers	16546	17969	19155	19864	19656	19916	19500	20436	19916	21060	22880	25064
575	Electricians	18279	19851	21161	21944	22672	23816	24700	24596	24908	25792	27352	28132
576	Electrician apprentices	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
577	Electrical power installers and repairers	18842	20462	21813	22620	25480	26416	26780	28652	28704	28912	30940	31876
579	Painters, construction and maintenance	12215	13265	14141	14664	15912	15912	15652	16796	17264	18564	20072	18772
583	Paperhangers	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
584	Plasterers	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
585	Plumbers, pipefitters, and steamfitters	17326	18816	20058	20800	21008	22412	24440	24284	24024	25792	26416	26468
587	Plumber, pipefitter, and steamfitter apprentices	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
588	Concrete and terrazzo finishers	15593	16934	18052	18720	18616	17368	17732	20956	20332	20748	21528	23296
589	Glaziers	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
593	Insulation workers	15593	16934	18052	18720	19188	19916	18876	20904	21216	20852	22412	24440
594	Paving, surfacing, and tamping equipment operators	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
595	Roofers	12128	13171	14041	14560	14716	14144	15756	17680	16120	18512	17732	19552
596	Sheet metal duct installers	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
597	Structural metalworkers	22091	23990	25574	26520	22568	25740	24284	25688	21216	32552	29588	24440
598	Drillers, earth	15593	16934	18052	18720	19188	19656	20228	20904	21216	22100	23868	24440
599	Construction trades, n.e.c.	13124	14253	15194	15756	16068	15600	17004	16640	18356	20228	18668	20540
	Extractive occupations	20964	22767	24270	25168	25792	25948	26884	25844	26208	29172	30368	31304
613	Supervisors, extractive occupations	20964	22767	24270	25168	31096	35048	26884	25844	26208	29172	30368	31304
614	Drillers, oil well	17672	19192	20459	21216	21008	25948	26884	25844	26208	29172	30368	31304
615	Explosives workers	20964	22767	24270	25168	25792	25948	26884	25844	26208	29172	30368	31304
616	Mining machine operators	20964	22767	24270	25168	25792	25948	26884	25844	26208	29172	30368	31304
617	Mining occupations, n.e.c.	20964	22767	24270	25168	25792	25948	26884	25844	26208	29172	30368	31304
	Precision production occupations	17586	19098	20359	21112	21060	22308	23140	23972	24700	25584	26416	26416
633	Supervisors, production occupations	19708	21403	22816	23660	24128	25480	25740	26468	27352	28808	30472	30784
	Precision metalworking occupations	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
634	Tool and die makers	18842	20462	21813	22620	22672	25792	26416	27196	29952	30940	29276	32292
635	Tool and die maker apprentices	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
636	Precision assemblers, metal	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
637	Machinists	16720	18157	19356	20072	20436	21580	21944	23400	22880	24388	25532	24960
639	Machinist apprentices	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
643	Boilermakers	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
644	Precision grinders, fitters, and tool sharpeners	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
645	Patternmakers and model makers, metal	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
646	Lay-out workers	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
647	Precious stones and metals workers (jewelers)	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
649	Engravers, metal	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
653	Sheet metal workers	17109	18581	19807	20540	20800	21736	21320	23556	23504	24856	25792	25116
654	Sheet metal worker apprentices	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
655	Miscellaneous precision metalworkers	17326	18816	20058	20800	20800	22152	22932	24128	23972	25324	26104	25896
	Precision woodworking occupations	17586	19098	20359	21112	16276	15288	15548	15704	15340	25584	26416	16744
656	Cabinet makers and bench carpenters	17586	19098	20359	21112	16276	15288	15548	15704	15340	25584	26416	16744
657	Furniture and wood finishers	17586	19098	20359									

	Precision workers, assorted materials	12475	13548	14442	14976	16276	17056	17108	18824	18668	20904	19552	20852
675	Hand molders and shapers, except jewelers	12475	13548	14442	14976	16276	17056	17108	18824	18668	20904	19552	20852
676	Patternmakers, lay -out workers, and cutters	12475	13548	14442	14976	16276	17056	17108	18824	18668	20904	19552	20852
677	Optical goods workers	12475	13548	14442	14976	16276	17056	17108	18824	18668	20904	19552	20852
678	Dental laboratory and medical appliance technicians	12475	13548	14442	14976	16276	17056	17108	18824	18668	20904	19552	20852
679	Bookbinders	12475	13548	14442	14976	16276	17056	17108	18824	18668	20904	19552	20852
683	Electrical and electronic equipment assemblers	11219	12183	12987	13468	14248	14612	15860	16744	15600	19708	17784	18564
684	Miscellaneous precision workers, n.e.c.	12475	13548	14442	14976	16276	17056	17108	18824	18668	20904	19552	20852
	Precision food production occupations	14510	15758	16798	17420	16224	16484	16432	15704	16172	18252	19448	18096
686	Butchers and meat cutters	14987	16276	17350	17992	16276	16796	17576	19760	19344	18200	19656	18408
687	Bakers	14510	15758	16798	17420	16224	16484	16432	15704	16172	18252	19448	17368
688	Food batchmakers	14510	15758	16798	17420	16224	16484	17004	18356	18356	18252	19448	18096
	Precision inspectors, testers, and related workers	19189	20839	22214	23036	24960	23296	25012	25584	27144	27196	28964	27872
689	Inspectors, testers, and graders	19318	20980	22365	23192	24856	23296	25116	25896	26988	27508	28548	28496
693	Adjusters and calibrators	19189	20839	22214	23036	24960	23296	25012	25584	27144	27196	28964	27872
	Plant and system operators	18625	20227	21562	22360	23296	25168	25636	26416	26520	27196	28756	28808
694	Water and sewage treatment plant operators	18625	20227	21562	22360	23296	25168	25636	21580	26520	22464	24232	22984
695	Power plant operators	21311	23144	24671	25584	26416	25168	25636	26416	26520	30628	28756	28808
696	Stationary engineers	17672	19192	20459	21216	22256	25636	26936	26052	28600	29484	29484	
699	Miscellaneous plant and system operators	18625	20227	21562	22360	23296	25168	25636	26416	26520	27196	28756	28808
	Operators, fabricators, and laborers	13201	14363	15268	16016	16484	16900	17264	17888	18304	19032	19656	20124
J	Machine operators, assemblers, and inspectors	13936	15190	15950	16588	17108	17732	18408	18356	19032	19708	20332	20592
	Machine operators and tenders, except precision	13587	14810	15550	16172	16432	16952	17732	17784	18460	18928	19812	20332
	Metalworking and plastic working machine operators	14242	15524	16300	16952	17784	18408	19708	20176	20956	20800	22360	22620
703	Lathe and turning machine set-up operators	14242	15524	16300	16952	17784	18408	19708	20176	20956	20800	22360	22620
704	Lathe and turning machine operators	13325	14524	15250	15860	17056	18148	20176	20176	21060	20852	22256	25168
705	Milling and planing machine operators	14242	15524	16300	16952	17784	18408	19708	20176	20956	20800	22360	22620
706	Punching and stamping press machine operators	14854	16190	17000	17680	17680	17680	18304	19552	19916	18824	21216	20904
707	Rolling machine operators	14242	15524	16300	16952	17784	18408	19708	20176	20956	20800	22360	22620
708	Drilling and boring machine operators	14242	15524	16300	16952	17784	18408	19708	20176	20956	20800	22360	22620
709	Grinding, abrading, buffing, and polishing machine operators	13368	14571	15300	15912	16692	17212	19552	19656	19708	20592	22204	22516
713	Forging machine operators	14242	15524	16300	16952	17784	18408	19708	20176	20956	20800	22360	22620
714	Numerical control machine operators	14242	15524	16300	16952	17784	18408	19708	20176	20956	20800	22360	22620
715	Miscellaneous metal, plastic, stone, and glass working machine operators	14242	15524	16300	16952	17784	18408	19708	20176	20956	20800	22360	22620
717	Fabricating machine operators, n.e.c.	13587	14810	15550	16172	16432	16952	17732	17784	18460	18928	19812	20332
	Metal and plastic processing machine operators	13718	14952	15700	16328	16484	17940	18980	17264	18148	19604	19864	20696
719	Molding and casting machine operators	13936	15190	15950	16588	16120	17784	18408	16172	17108	18668	19708	19500
723	Metal plating machine operators	13718	14952	15700	16328	16484	17940	18980	17264	18148	19604	19864	20696
724	Heat treating equipment operators	13718	14952	15700	16328	16484	17940	18980	17264	18148	19604	19864	20696
725	Miscellaneous metal and plastic processing machine operators	13718	14952	15700	16328	16484	17940	18980	17264	18148	19604	19864	20696
	Woodworking machine operators	9655	10524	11050	11492	13520	12844	13676	15184	14196	15392	15444	16172
726	Wood Lathe, routing, and planing machine operators	9655	10524	11050	11492	13520	12844	13676	15184	14196	15392	15444	16172
727	Sawing machine operators	10310	11238	11800	12272	13052	12428	13728	15444	14456	15080	15288	16796
728	Shaping and joining machine operators	9655	10524	11050	11492	13520	12844	13676	15184	14196	15392	15444	16172
729	Nailing and tacking machine operators	9655	10524	11050	11492	13520	12844	13676	15184	14196	15392	15444	16172
733	Miscellaneous woodworking machine operators	9655	10524	11050	11492	13520	12844	13676	15184	14196	15392	15444	16172
	Printing machine operators	15203	16571	17400	18096	18200	19136	20488	20956	20956	21684	22412	23296
734	Printing machine operators	14897	16238	17050	17732	17576	18824	19812	20592	20540	21112	22048	22776
735	Photoengravers and lithographers	15203	16571	17400	18096	18200	19136	20488	20956	20956	21684	22412	23296
736	Type setters and compositors	15203	16571	17400	18096	18200	19136	20488	20956	20956	21684	22412	23296
737	Miscellaneous printing machine operators	15203	16571	17400	18096	18200	19136	20488	20956	20956	21684	22412	23296
	Textile, apparel, and furnishings machine operators	9917	10810	11350	11804	11596	12636	12844	13208	12792	14612	15340	14768
738	Winding and twisting machine operators	9917	10810	11350	11804	11596	12636	12844	13208	12792	14612	15340	14768
739	Knitting, looping, taping, and weaving machine operators	9917	10810	11350	11804	11596	12636	12844	13208	12792	14612	15340	14768
743	Textile cutting machine operators	9917	10810	11350	11804	11596	12636	12844	13208	12792	14612	15340	14768
744	Textile sewing machine operators	9917	10810	11350	11804	11596	12636	12844	13208	12792	14612	15340	14768
745	Shoe machine operators	9917	10810	11350	11804	11596	12636	12844	13208	12792	14612	15340	14768
747	Pressing machine operators	9917	10810	11350	11804	11596	12636	12844	13208	12792	14612	15340	14768
748	Laundering and dry cleaning machine operators	9917	10810	11350	11804	11596	12636	12844	13208	12792	14612	15340	14768
749	Miscellaneous textile machine operators	9917	10810	11350	11804	11596	12636	12844	13208	12792	14612	15340	14768
	Machine operators, assorted materials	13980	15238	16000	16640	16692	17368	17836	17888	18772	19136	19812	20384
753	Cementing and gluing machine operators	13980	15238	16000	16640	16692	17368	17836	17888	18772	19136	19812	20384
754	Packaging and filling machine operators	11970	13048	13700	14248	14560	14716	16848	14300	15132	14924	15392	16588
755	Extruding and forming machine operators	13980	15238	16000	16640	16692	17368	17836	17888	18772	19136	19812	20384
756	Mixing and blending machine operators	13893	15143	15900	16536	15548	17212	17940	18044	18668	20644	19656	20124
757	Separating, filtering, and clarifying machine operators	18917	20619	21650	22516	21892	17368	23192	17888	25584	25896	27300	20384
758	Compressing and compacting machine operators	13980	15238	16000	16640	16692	17368	17836	17888	18772	19136	19812	20384
759	Painting and paint spraying machine operators	13150	14333	15050	15652	16224	16120	17056	18252	16692	17160	20800	20540
763	Roasting and baking machine operators, food	13980	15238	16000	16640	16692	17368	17836	17888	18772	19136	19812	20384
764	Washing, cleaning, and pickling machine operators	13980	15238	16000	16640	16692	17368	17836	17888	18772	19136	19812	20384
765	Folding machine operators	13980	15238	16000	16640	16692	17368	17836	17888	18772	19136	19812	20384
766	Furnace, kiln, and oven operators, except food	16383	17857	18750	19500	19032	21112	22100	21060	23556	22828	24700	23972
768	Crushing and grinding machine operators	13980	15238	16000	16640	16692	17368	17836	17888	18772	19136	19812	20384
769	Slicing and cutting machine operators	12669	13810	14500	15080	15444	15808	14976	15548	16796	18200	18564	18200
773	Motion picture projectionists	13980	15238	16000	16640	16692	17368	17836	17888	18772	19136	19812	20384
774	Photographic process machine operators	13980	15238	16000	16640	16692	17368	17836	17888	18772	19136	19812	20384
777	Miscellaneous machine operators, n.e.c.	14460	15762	16550	17212	17108	17836	18148	18512	19136	19396	19604	21112
779	Machine operators, not specified	14111	15381	16150	16796	17							

	Production inspectors, testers, samplers, and weighers	16689	18190	19100	19864	20020	20176	21892	22308	22100	23868	23972	23192
796	Production inspectors, checkers, and examiners	16689	18190	19100	19864	20020	20176	21892	22308	22620	24908	25116	24492
797	Production testers	17082	18619	19550	20332	20280	21112	22776	23244	23296	23868	23972	23192
798	Production samplers and weighers	16689	18190	19100	19864	20020	20176	21892	22308	22100	23868	23972	23192
799	Graders and sorters, except agricultural	16689	18190	19100	19864	20020	20176	21892	22308	22100	23868	23972	23192
K	Transportation and material moving occupations	15071	16247	16913	17420	18200	19188	19344	20072	20488	21216	21736	21996
803	Motor vehicle operators	14306	15422	16054	16536	17420	18356	18356	19500	20072	20748	21268	21424
804	Supervisors, motor vehicle operators	14306	15422	16054	16536	17420	18356	18356	19500	20072	21616	28704	26052
805	Truck drivers, heavy	14756	15907	16559	17056	18252	19032	19292	20176	21060	21684	22464	22360
806	Truck drivers, light	11652	12561	13076	13468	13208	14560	14924	15652	15964	16848	16796	16744
808	Driver-sales workers	15926	17168	17872	18408	20436	21164	20800	22620	22516	23608	23192	24076
809	Bus drivers	16421	17701	18427	18980	19708	20956	20228	19968	20644	20540	21060	21372
813	Taxicab drivers and chauffeurs	11292	12173	12672	13052	12896	13832	14248	17576	16484	16640	16328	17680
814	Parking lot attendants	14306	15422	16054	16536	17420	18356	18356	19500	20072	20748	21268	21424
	Motor transportation occupations, n.e.c.	14306	15422	16054	16536	17420	18356	18356	19500	20072	20748	21268	21424
	Transportation occupations, except motor vehicle	22494	24249	25243	26000	26468	29276	30316	31460	32968	35672	37284	
	Rail transportation occupations	22674	24443	25445	26208	26936	31304	30836	32188	32656	34476	37232	40300
823	Railroad conductors and yardmasters	22674	24443	25445	26208	26936	31304	30836	32188	32656	34476	37232	40300
824	Locomotive operating occupations	22539	24297	25293	26052	26468	30524	32760	31928	34112	34476	37232	40300
825	Railroad brake, signal, and switch operators	22674	24443	25445	26208	26936	31304	30836	32188	32656	34476	37232	40300
826	Rail vehicle operators, n.e.c.	22674	24443	25445	26208	26936	31304	30836	32188	32656	34476	37232	40300
	Water transportation occupations	22494	24249	25243	26000	26468	24232	28340	29068	25792	32968	28600	30160
828	Ship captains and mates, except fishing boats	22494	24249	25243	26000	26468	24232	28340	29068	25792	32968	28600	30160
829	Sailors and deckhands	22494	24249	25243	26000	26468	24232	28340	29068	25792	32968	28600	30160
833	Marine engineers	22494	24249	25243	26000	26468	24232	28340	29068	25792	32968	28600	30160
834	Bridge, lock, and lighthouse tenders	22494	24249	25243	26000	26468	24232	28340	29068	25792	32968	28600	30160
	Material moving equipment operators	15206	16392	17064	17576	18148	18928	19604	20072	20176	21112	21684	22048
843	Supervisors, material moving equipment operators	15206	16392	17064	17576	18148	18928	19604	20072	20176	21112	21684	22048
844	Operating engineers	16601	17895	18629	19188	20020	20436	21320	21944	23452	25116	26312	26052
845	Longshore equipment operators	15206	16392	17064	17576	18148	18928	19604	20072	20176	21112	21684	22048
848	Hoist and winch operators	15206	16392	17064	17576	18148	18928	19604	20072	20176	21112	21684	22048
849	Crane and tower operators	18445	19884	20699	21320	21580	22776	23816	24076	22672	24804	24908	26988
853	Excavating and loading machine operators	15296	16489	17165	17680	18304	17576	19032	20540	22256	22568	22412	24284
855	Grader, dozer, and scraper operators	13856	14937	15550	16016	16640	18824	17940	19760	20280	21060	21268	21892
856	Industrial truck and tractor equipment operators	13631	14695	15297	15756	16328	16588	17004	17524	17628	18564	19292	19708
859	Miscellaneous material moving equipment operators	15971	17216	17922	18460	18824	19916	20644	21528	20852	20592	21944	24804
L	Handlers, equipment cleaners, helpers, and laborers	11141	12033	12550	13052	13572	13572	14092	15028	14924	15444	16016	16380
863	Supervisors, handlers, equipment cleaners, and laborers	11141	12033	12550	13052	13572	13572	14092	15028	14924	15444	16016	16380
864	Helpers, mechanics and repairers	11141	12033	12550	13052	13572	13572	14092	15028	14924	15444	16016	16380
	Helpers, construction and extractive occupations	9543	10307	10750	11180	11596	11284	12324	13104	13208	13884	14508	14352
865	Helpers, construction trades	9366	10115	10550	10972	11492	11284	12116	12948	13104	13728	14248	14092
866	Helpers, surveyor	9543	10307	10750	11180	11596	11284	12324	13104	13208	13884	14508	14352
867	Helpers, extractive occupations	9543	10307	10750	11180	11596	11284	12324	13104	13208	13884	14508	14352
869	Construction laborers	12162	13135	13700	14248	14352	14508	14976	16328	16068	17056	18096	18460
873	Production helpers	11141	12033	12550	13052	14560	14820	14092	14300	14924	17472	16276	18044
	Freight, stock, and material handlers	10964	11841	12350	12844	13624	13278	14144	15132	14924	15860	15704	16328
875	Garbage collectors	9543	10307	10750	11180	13624	13000	14820	15132	14924	15860	15704	16328
876	Stevedores	10964	11841	12350	12844	13624	13278	14144	15132	14924	15860	15704	16328
877	Stock handlers and baggers	9366	10115	10550	10972	11388	11908	11336	11700	11180	12948	12584	13260
878	Machine feeders and offbearers	10964	11841	12350	12844	15028	13988	14664	14508	15860	16224	16068	17628
883	Freight, stock, and material handlers, n.e.c.	12162	13135	13700	14248	14976	14820	15288	16848	16640	17316	17524	18928
885	Garage and service station related occupations	7590	8198	8550	8892	8008	10400	10504	10608	11076	11804	12324	11856
887	Vehicle washers and equipment cleaners	9721	10499	10950	11388	11544	10556	1128	11960	11544	12116	13052	12740
888	Hand packers and packagers	10032	10834	11300	11752	12480	12844	13364	13988	14404	15028	13624	15912
889	Laborers, except construction	12251	13231	13800	14352	14820	15132	15132	15704	15600	15808	16640	17004
H	Farming, forestry, and fishing occupations	8572	9327	9914	10400	14404	16068	16900	15340	15236	16744	18720	19656
	Farm operators and managers	8572	9327	9914	10400	14404	16068	16900	15340	15236	16744	18720	19656
473	Farmers, except horticultural	8572	9327	9914	10400	14404	16068	16900	15340	15236	16744	18720	19656
474	Horticulture specialty farmers	8572	9327	9914	10400	14404	16068	16900	15340	15236	16744	18720	19656
475	Managers, farms, except horticultural	8572	9327	9914	10400	14404	16068	16900	15340	15236	16744	18720	19656
476	Managers, horticultural specialty farms	8572	9327	9914	10400	14404	16068	16900	15340	15236	16744	18720	19656
	Other agricultural and related occupations	8315	9047	9617	10088	10452	10920	11180	11128	11856	12688	13312	13676
	Farm occupations, except managerial	8058	8767	9319	9776	9880	10296	10348	10400	10816	11596	12428	12792
477	Supervisors, farm workers	8058	8767	9319	9776	9880	10296	10348	10400	10816	11596	12428	12792
479	Farm workers	7844	8534	9071	9516	9620	10140	10140	10348	10660	11336	12168	12636
483	Marine life cultivation workers	8058	8767	9319	9776	9880	10296	10348	10400	10816	11596	12428	12792
484	Nursery workers	8058	8767	9319	9776	9880	10296	10348	10400	10816	11596	12428	12792
	Related agricultural occupations	8958	9746	10400	10868	11492	12064	12584	12584	12428	13416	13832	14352
485	Supervisors, related agricultural occupations	12044	13104	13929	14612	15340	15704	18720	19812	18876	19864	20488	21736
486	Groundkeepers and gardeners, except farm	8572	9327	9914	10400	10972	11440	11596	11856	12792	13260	13884	14092
487	Animal caretakers, except farm	8958	9746	10360	10868	11492	12064	12584	12428	13416	13832	14352	14716
488	Graders and sorters, agricultural products	8958	9746	10360	10868	11492	12064	12584	12428	13416	13832	14352	14716
489	Inspectors, agricultural products	8958	9746	10360	10868	11492	12064	12584	12428	13416	13832	14352	14716
	Forestry and logging occupations	11144	12125	12888	13520	14508	14352	15080	15236	15496	15912	16276	16224
494	Supervisors, forestry and logging occupations	11144	12125	12888	13520	14508	14352	15080	15236	15496	15912	16276	16224
495	Forestry workers, except logging	11144	12125	12888	13520	14508	14352	15080	15236	15496	15912	16276	16224
496	Timber cutting and logging occupations	10244	11145	11847	12428	13884	14352	15080	15236	15496	15912	16276	16224
	Fishers, hunters, and trappers	8572	9327	9914	10400	10764	11232	11440	11388	12168	13104	13676	13988
497	Captains and other officers, fishing vessels												

Female

12314	13631	14572	15548	15496	16536	17836	18980	19604	20956	20800	22204
14785	16366	17496	18668	18824	20540	22048	23088	23452	25584	26312	27716
14785	16366	17496	18668	18824	20540	22048	23088	23452	25584	26312	27716
14785	16366	17496	18668	18824	20540	22048	23088	23452	25584	26312	27716
16885	18692	19981	21320	21008	23608	24804	26052	25844	28132	29796	31668
14785	16366	17496	18668	18824	20540	22048	23088	23452	25584	26312	27716
12643	13996	14962	15964	17004	17316	18772	20072	21476	23920	24440	24804
14208	15728	16813	17940	17576	18720	20280	20800	22048	21580	23608	25324
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
10809	11630	12118	12688	13572	14352	14664	15392	16744	17108	17004	18772
13688	14728	15347	16068	16380	18564	19396	21424	19188	21268	24804	22724
12625	13584	14155	14820	14508	15704	16380	18460	18252	18928	19552	21112
14175	15252	15893	16640	17108	18928	19864	20748	21372	25584	26052	26832
7442	8008	8344	8736	8996	9360	9516	9984	10348	10816	11388	11700
14175	15252	15893	16640	17108	18928	19864	20748	21372	25584	26052	26832
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
7088	7626	7947	8320	8840	8892	9048	9984	10348	10816	10972	11492
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
7398	7960	8294	8684	8736	8944	9048	9516	9620	10400	10920	11128
9037	9723	10132	10608	11284	11752	12428	12792	13728	15288	14768	15236
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
7442	8008	8344	8736	9100	9308	9360	10140	10608	11180	11700	12636
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
9037	9723	10132	10608	11284	11752	12428	12792	13728	14456	15184	16016
10421	11349	12155	12896	13520	14040	14768	15288	15860	16432	17264	18096
13405	14598	15634	16588	16796	18616	20020	19812	20904	22204	23296	25012
13069	14232	15242	16172	16380	17836	19396	19032	20384	21216	21996	23920
13405	14598	15634	16588	16796	18616	20020	19812	20904	22204	23296	25012
13909	15147	16222	17212	17696	19760	21476	21060	22880	26208	24960	26572
13405	14598	15634	16588	16796	18616	20020	19812	20904	22204	23296	25012
13405	14598	15634	16588	16796	18616	20020	19812	20904	25584	23296	28288
11052	12035	12890	13676	13936	14456	15392	15704	16172	16640	18096	18304
11094	12081	12939	13728	13936	14456	15392	15704	16224	16692	18096	18356
11052	12035	12890	13676	13936	14456	15392	15704	16172	16640	18096	18304
10505	11440	12253	13000	13676	14300	14872	15496	16120	16900	17732	18564
10589	11532	12351	13104	13780	14508	14924	15600	16224	17004	17836	18668
10505	11440	12253	13000	13676	14300	14872	15496	16120	16900	17732	18564
10001	10891	11664	12376	12896	13468	14352	14768	15496	16172	16952	17576
9245	10067	10782	11440	12064	12272	13000	13260	13728	14248	14716	15600
9791	10662	11419	12116	13104	13416	13832	14404	14456	17004	15600	16744
9245	10067	10782	11440	12064	12272	13000	13260	13728	14248	14716	13208
13363	14552	15585	16536	12064	16068	19032	16692	18460	19396	19188	19708
8867	9656	10341	10972	11648	11648	12584	13000	13260	13520	14144	15340
9791	10662	11419	12116	12636	12896	12844	13052	14872	14092	15860	16224
10505	11440	12253	13000	13052	13936	14508	15340	15860	15912	16640	17316
10505	11440	12253	13000	13052	13936	14508	15340	15860	15912	16640	17316
12606	13728	14703	15600	16952	17472	18096	19344	19344	18980	21580	19604
10505	11440	12253	13000	15132	16588	14508	18252	15860	16120	18304	19916
10505	11440	12253	13000	13052	13936	14508	15340	14872	15912	14456	17316
8698	9473	10145	10764	11284	12012	12324	13572	14352	13936	14508	15444
11136	12127	12988	13780	12740	14248	15184	15132	16380	16848	16432	18148
10421	11349	12155	12896	13468	13936	14872	15444	15860	16276	17264	17888
10337	11257	12057	12792	13416	13884	14716	15444	15808	16380	17420	17732
11262	12264	13135	13936	14040	15392	16276	16744	16692	16536	18460	19292
10463	11395	12204	12948	13208	13312	13832	14664	15444	15080	15964	17524
11136	12127	12988	13780	13260	13780	14352	14768	15860	16068	17264	18200
10421	11349	12155	12896	13468	13936	14872	15444	15860	16276	17264	17888
10421	11349	12155	12896	13520	14040	14768	15288	15860	16432	17264	18096
10421	11349	12155	12896	13520	14040	14768	15288	15860	16432	17264	18096
11598	12630	13527	14352	14872	15340	15392	16016	15496	15964	16276	19032
11724	12767	13674	14508	14976	15184	15808	16068	15496	15912	16276	18928
10421	11349	12155	12896	13520	14040	14768	15288	15860	16432	17264	18096
10421	11349	12155	12896	13520	14040	14768	15288	15860	16432	17264	18096
14539	15833	16958	17992	18668	19032	21060	21164	21008	23452	25948	26052
17145	18671	19996	21216	22620	22724	24284	24856	24024	25584	29068	28912
14539	15833	16958	17992	18668	19032	22308	24076	22880	24960	27300	28444
8867	9656	10341	10972	11388	11596	12844	12272	13728	14300	13936	14144
14539	15833	16958	17992	18668	19032	21060	21164	21008	23452	25948	26052
10673	11623	12449	13208	13676	14040	14820	15132	15756	16120	16900	17576
11094	12081	12939	13728	13936	14352	15964	15392	15808	17264	16900	19240
12985	14140	15144	16068	16224	17056	17992	18356	18148	20124	22568	20956
9329	10159	10880	11544	12012	12636	12636	13156	14040	13988	14976	15912

Appendix B. Median Annual Earnings of Wage and Salary Workers Who Usually Work Full Time, by Detailed Occupation and Sex, 1992-95, Continued
 (Current Dollars)

Occupation	Male				Female			
	1992	1993	1994	1995	1992	1993	1994	1995
Total	26260	26728	27144	27976	19812	20540	20748	21112
Managerial and professional specialty occupations	40404	41132	41756	43108	29224	30160	30784	31460
A Executive, administrative, and managerial occupations	40768	41132	41444	43316	26988	27456	28132	29640
003 Legislators	40768	41132	41444	43316	26988	27456	28132	29640
004 Chief executives, and general administrators, public administration	40768	41132	41444	43316	26988	27456	28132	29640
005 Administrators and officials, public administration	41756	41652	42588	43108	31252	31616	32760	33904
006 Administrators, protective services	40768	41132	41444	43316	26988	27456	28132	29640
007 Financial managers	51064	50180	46228	48984	31876	32864	31096	33020
008 Personnel and labor relations managers	40768	41132	41444	43316	30680	26884	29692	33592
009 Purchasing managers	50024	47008	46904	50076	26988	27456	28132	29640
013 Managers, marketing, advertising, and public relations	47580	50908	53404	55276	32604	33124	32812	32812
014 Administrators, education and related fields	45396	48672	48360	49504	35204	33020	32968	35048
015 Managers, medicine and health	43680	45604	44200	43576	34944	32188	30212	30160
016 Postmasters and mail superintendents	40768	46020	41444	43316	26988	27456	28132	29640
017 Managers, food service and lodging establishments	24804	23920	25220	26832	18876	19084	19500	19552
018 Managers, properties and real estate	28496	31928	27768	31928	24804	23348	19968	24128
019 Funeral directors	40768	41132	41444	43316	26988	27456	28132	29640
021 Managers, service organizations, n.e.c.	30784	36504	36660	38376	27248	26572	26260	27196
022 Managers and administrators, n.e.c.	46228	45760	45760	47424	26416	28444	30368	30940
Management-related occupations	36816	37076	37336	38064	26364	26884	27248	28496
023 Accountants and auditors	36712	36920	37648	38844	26936	28288	28340	28496
** Underwriters and other financial officers	41912	37076	37336	38064	26208	26884	27248	28496
024 Underwriters	41912	37076	37336	38064	26624	27976	26416	29172
025 Other financial officers	41756	41600	42484	40716	26728	28600	27612	30472
026 Management analysts	50960	37076	46072	51272	26364	26884	38324	28496
027 Personnel, training, and labor relations specialists	39572	38948	36660	35932	29120	27768	30160	30212
028 Purchasing agents and buyers, farm products	36816	37076	37336	38064	26364	26884	27248	28496
029 Buyers, wholesale and retail trade, except farm products	30784	27456	27768	29432	23608	23140	25272	25012
033 Purchasing agents and buyers, n.e.c.	32396	35152	35100	37544	24596	24700	27144	26884
034 Business and promotion agents	36816	37076	37336	38064	26364	26884	27248	28496
035 Construction inspectors	31408	30784	32032	36296	26364	26884	27248	28496
036 Inspectors and compliance officers, except construction	33800	35516	37076	36764	26364	26884	30056	32760
037 Management-related occupations, n.e.c.	34164	36556	29172	29484	24336	24492	25428	26052

	Health assessment and treating occupations	38324	39832	39416	41444	34216	35360	34840	35776
095	Registered nurses	32916	35256	36868	37180	34476	35776	35360	36036
096	Pharmacists	46644	47892	50076	54964	42016	45968	34840	35776
097	Dietitians	38324	39832	39416	41444	23764	25584	28548	25272
	Therapists	34684	33800	33904	35620	33228	32708	32760	34580
098	Respiratory therapists	34684	33800	33904	35620	33228	32708	32760	34580
099	Occupational therapists	34684	33800	33904	35620	33228	32708	32760	34580
103	Physical therapists	34684	33800	33904	35620	36140	36192	32760	40820
104	Speech therapists	34684	33800	33904	35620	33228	32708	35724	37752
105	Therapists, n.e.c.	34684	33800	33904	35620	33228	32708	32760	34580
106	Physicians' assistants	38324	39832	39416	41444	34216	35360	34840	35776
	Teachers, college and university	46592	46488	46280	48932	34996	35828	40092	38220
113	Earth, environmental and marine science teachers	46592	46488	46280	48932	34996	35828	40092	38220
114	Biological science teachers	46592	46488	46280	48932	34996	35828	40092	38220
115	Chemistry teachers	46592	46488	46280	48932	34996	35828	40092	38220
116	Physics teachers	46592	46488	46280	48932	34996	35828	40092	38220
117	Natural science teachers, n.e.c.	46592	46488	46280	48932	34996	35828	40092	38220
118	Psychology teachers	46592	46488	46280	48932	34996	35828	40092	38220
119	Economics teachers	46592	46488	46280	48932	34996	35828	40092	38220
123	History teachers	46592	46488	46280	48932	34996	35828	40092	38220
124	Political science teachers	46592	46488	46280	48932	34996	35828	40092	38220
125	Sociology teachers	46592	46488	46280	48932	34996	35828	40092	38220
126	Social science teachers, n.e.c.	46592	46488	46280	48932	34996	35828	40092	38220
127	Engineering teachers	46592	46488	46280	48932	34996	35828	40092	38220
128	Mathematical science teachers	46592	46488	46280	48932	34996	35828	40092	38220
129	Computer science teachers	46592	46488	46280	48932	34996	35828	40092	38220
133	Medical science teachers	46592	46488	46280	48932	34996	35828	40092	38220
134	Health specialties teachers	46592	46488	46280	48932	34996	35828	40092	38220
135	Business, commerce, and marketing teachers	46592	46488	46280	48932	34996	35828	40092	38220
136	Agriculture and forestry teachers	46592	46488	46280	48932	34996	35828	40092	38220
137	Art, drama, and music teachers	46592	46488	46280	48932	34996	35828	40092	38220
138	Physical education teachers	46592	46488	46280	48932	34996	35828	40092	38220
139	Education teachers	46592	46488	46280	48932	34996	35828	40092	38220
143	English teachers	46592	46488	46280	48932	34996	35828	40092	38220
144	Foreign language teachers	46592	46488	46280	48932	34996	35828	40092	38220
145	Law teachers	46592	46488	46280	48932	34996	35828	40092	38220
146	Social work teachers	46592	46488	46280	48932	34996	35828	40092	38220
147	Theology teachers	46592	46488	46280	48932	34996	35828	40092	38220
148	Trade and industrial teachers	46592	46488	46280	48932	34996	35828	40092	38220
149	Home economics teachers	46592	46488	46280	48932	34996	35828	40092	38220
153	Teachers, postsecondary, n.e.c.	46592	46488	46280	48932	34996	35828	40092	38220
154	Postsecondary teachers, subject not specified	42016	44304	39676	45448	27612	35256	40040	38220

	Teachers, except postsecondary	32604	33488	36036	36192	27560	29120	31356	31252
155	Teachers, prekindergarten and kindergarten	32604	33488	36036	36192	18564	18044	19500	19292
156	Teachers, elementary school	34216	34632	33800	37076	28548	30472	32292	32604
157	Teachers, secondary school	33644	34580	37856	37596	30368	31200	34528	33124
158	Teachers, special education	32604	33488	36036	36192	28808	30524	32188	31876
159	Teachers, n.e.c.	30004	29900	31356	31460	25428	25428	24700	23504
163	Counselors, educational and vocational	31824	37804	39728	38272	28600	31148	32136	33488
	Librarians, archivists, and curators	40040	41132	42068	43004	30836	29380	30108	31044
164	Librarians	40040	41132	42068	43004	30888	29432	30524	30940
165	Archivists and curators	40040	41132	42068	43004	30836	29380	30108	31044
	Social scientists and urban planners	45344	39572	43784	40352	30420	32032	32032	31824
166	Economists	45344	51688	43784	48256	30420	32032	32032	34632
167	Psychologists	45344	39572	38480	34216	30680	32240	29484	30472
168	Sociologists	45344	39572	43784	40352	30420	32032	32032	31824
169	Social scientists, n.e.c.	45344	39572	43784	40352	30420	32032	32032	31824
173	Urban planners	45344	39572	43784	40352	30420	32032	32032	31824
	Social, recreation, and religious workers	26156	27040	28132	26832	23348	24440	24752	24908
174	Social workers	27612	29796	29328	29380	24388	25792	25844	25844
175	Recreation workers	26156	27040	28132	26832	23348	24440	14820	15756
176	Clergy	25948	26312	28600	25844	23348	24440	24752	24908
177	Religious workers, n.e.c.	26156	27040	28132	26832	23348	24440	24752	24908
	Lawyers and judges	60164	63388	64116	63908	45968	52676	47424	49088
178	Lawyers	61100	63024	64324	60892	47684	52780	47684	49816
179	Judges	60164	63388	64116	63908	45968	52676	47424	49088
	Writers, artists, entertainers, and athletes	32240	33332	32760	33644	25688	26364	26416	27144
183	Authors	32240	33332	32760	33644	25688	26364	26416	27144
184	Technical writers	32240	33332	32760	33644	25688	26364	26416	27144
185	Designers	36452	35100	34216	34684	24336	25220	23608	25480
186	Musicians and composers	32240	33332	32760	33644	25688	26364	26416	27144
187	Actors and directors	32240	33332	32760	33644	25688	26364	26416	27144
188	Painters, sculptors, craft artists, and artist printmakers	32240	33332	32760	26936	25688	26364	26416	27144
189	Photographers	32240	33332	32760	33644	25688	26364	26416	27144
193	Dancers	32240	33332	32760	33644	25688	26364	26416	27144
194	Artists, performers, and related workers, n.e.c.	32240	33332	32760	33644	25688	26364	26416	27144
195	Editors and reporters	33124	35464	34892	34112	27040	26208	30316	29172
197	Public relations specialists	36348	39208	34892	39208	29848	30056	27560	31460
198	Announcers	32240	33332	32760	33644	25688	26364	26416	27144
199	Athletes	32240	33332	32760	33644	25688	26364	26416	27144

	Technical, sales, and administrative support occupations	26988	27768	28496	28912	18980	19552	19552	19916
C	Technicians and related support occupations	30732	31980	32344	33332	22672	24336	24232	24960
	Health technologists and technicians	26052	27144	28912	28860	21580	22620	22880	23452
203	Clinical laboratory technologists and technicians	30004	31876	31044	29172	25636	26572	25792	26416
204	Dental hygienists	26052	27144	28912	28860	21580	22620	22880	23452
205	Health record technologists and technicians	26052	27144	28912	28860	21580	16692	22880	23452
206	Radiologic technicians	26052	27144	28912	28860	27456	28808	27196	29380
207	Licensed practical nurses	26052	27144	28912	28860	21372	22412	23244	23036
208	Health technologists and technicians, n.e.c.	24960	25740	28912	26936	19032	20072	19968	21008
	Technologists and technicians, except health	30732	31980	32344	31876	22672	24336	24232	24960
	Engineering and related technologists and technicians	29952	29900	32344	31876	24180	24596	23764	26988
213	Electrical and electronic technicians	31564	31720	26156	32344	24180	24596	23764	26988
214	Industrial engineering technicians	29952	29900	30732	31876	24180	24596	23764	26988
215	Mechanical engineering technicians	29952	29900	32500	31876	24180	24596	23764	26988
216	Engineering technicians, n.e.c.	30264	29744	30160	30732	23296	24596	21268	25168
217	Drafting occupations	28132	28392	29224	32916	24180	24596	23764	26988
218	Surveying and mapping technicians	23868	24804	26780	31876	24180	24596	23764	26988
	Science technicians	27144	27144	29952	31460	19500	23192	23504	22828
223	Biological technicians	27144	27144	29952	31460	19500	23192	23504	22828
224	Chemical technicians	31148	30680	33176	35932	19500	23192	23504	22828
225	Science technicians, n.e.c.	27144	26884	30888	30680	19500	23192	23504	22828
	Technicians, except health, engineering, and science	33644	38220	39000	38896	25376	29068	28548	30732
226	Airplane pilots and navigators	45760	58448	52832	49920	25376	29068	28548	30732
227	Air traffic controllers	33644	38220	39000	38896	25376	29068	28548	30732
228	Broadcast equipment operators	33644	38220	39000	38896	25376	29068	28548	30732
229	Computer programmers	37596	40196	39468	39624	31616	36088	36036	35412
233	Tool programmers, numerical control	33644	38220	39000	38896	25376	29068	28548	30732
234	Legal assistants	33644	38220	39000	30264	24596	27352	25064	26052
235	Technicians, n.e.c.	30212	31512	29484	38896	21892	22048	28548	30732
D	Sales occupations	27196	28288	29900	30108	16276	17108	16848	17160
243	Supervisors and proprietors	28652	30056	30368	30732	19240	20072	21008	20228
	Sales representatives, finance and business services	36296	36244	38428	37492	25272	26624	25220	25948
253	Insurance sales occupations	35308	32656	37960	40404	23504	26000	24128	23556
254	Real estate sales occupations	34736	37648	37960	33800	24908	30056	24908	26832
255	Securities and financial services sales occupations	51272	47268	48932	48672	27560	30992	26936	26312
256	Advertising and related sales occupations	29744	37232	33020	31304	24960	26364	25116	28912
257	Sales occupations, other business services	33332	32916	36712	34320	26104	24908	26364	26364
	Sales representatives, commodities, except retail	34268	35100	29900	36556	24596	26884	26780	29536
258	Sales engineers	34268	35100	29900	18980	24596	26884	26780	29536
259	Sales representatives, mining, manufacturing and wholesale	34268	35100	34424	18980	24596	26884	26780	29536

	Sales workers, retail and personal services	17264	19032	19032	30108	12116	12532	12584	13156
263	Sales workers, motor vehicles and boats	25116	26000	28548	29952	12116	12532	12584	13156
264	Sales workers, apparel	17264	19032	19032	30108	12376	12844	13416	13364
265	Sales workers, shoes	17264	19032	19032	30108	12116	12532	12584	13156
266	Sales workers, furniture and home furnishings	20020	23244	24440	22048	12116	12532	12584	13156
267	Sales workers, radio, tv, hi-fi, and appliances	23036	24024	21528	23920	12116	12532	12584	13156
268	Sales workers, hardware and building supplies	17316	19240	18356	18928	12116	12532	12584	13156
269	Sales workers, parts	16744	18616	19968	20176	12116	12532	12584	13156
274	Sales workers, other commodities	16796	16744	18408	16484	13104	13000	13832	14040
275	Sales counter clerks	17264	19032	19032	30108	11908	12532	11544	13364
276	Cashiers	11908	13104	13728	13312	11284	11492	11440	12116
277	Street and door-to-door sales workers	17264	19032	19032	30108	16900	19188	12584	19500
278	News vendors	17264	19032	19032	30108	12116	12532	12584	13156
	Sales-related occupations	27196	28288	29900	30108	16276	17108	16848	17160
283	Demonstrators, promoters and models, sales	27196	28288	29900	30108	16276	17108	16848	17160
284	Auctioneers	27196	28288	29900	30108	16276	17108	16848	17160
285	Sales support occupations, n.e.c.	27196	28288	29900	30108	16276	17108	16848	17160
E	Administrative support occupations, including clerical	25064	25584	25064	25428	18928	19500	19448	19968
	Supervisors, administrative support occupations	33904	35984	33956	33748	25740	26728	25324	25376
303	Supervisors, general office	36972	37960	34268	35204	25116	26208	24076	24492
304	Supervisors, computer equipment operators	33904	35984	33956	33748	25740	26728	25324	25376
305	Supervisors, financial records processing	33904	35984	33956	33748	28652	28496	28652	30004
306	Chief communications operators	33904	35984	33956	33748	25740	26728	25324	25376
307	Supervisors, distribution, scheduling, and adjusting clerks	28028	31824	30056	31044	26052	26728	25324	25948
	Computer equipment operators	25844	26364	25948	27248	19656	21112	18980	20436
308	Computer operators	25844	26520	26000	27404	19656	21216	19084	20384
309	Peripheral equipment operators	25844	26364	25948	27248	19656	21112	18980	20436
	Secretaries, stenographers, and typists	21008	20748	20644	22932	19240	20020	19812	20540
313	Secretaries	21008	20748	20644	22932	19396	20072	19916	20540
314	Stenographers	21008	20748	20644	22932	19396	23088	20644	20540
315	Typists	21008	20748	20644	22932	17888	19084	19136	20488
	Information clerks	20072	19968	19344	20956	16380	16900	16536	17472
316	Interviewers	20072	19968	19344	20956	17784	18356	18512	17628
317	Hotel clerks	20072	19968	19344	20956	12740	13624	14144	17472
318	Transportation ticket and reservation agents	20072	19968	23972	25896	20176	20800	20280	20332
319	Receptionists	20072	19968	19344	20956	16068	16380	16016	17004
323	Information clerks, n.e.c.	20072	19968	19344	20956	16016	17420	17628	17836

	Records processing occupations, except financial	20124	23088	22464	22048	18200	18928	20228	19760
325	Classified-ad clerks	20124	23088	22464	22048	18200	18928	20228	19760
326	Correspondence clerks	20124	23088	22464	22048	18200	18928	20228	19760
327	Order clerks	24856	23088	22464	29432	21528	23660	23608	23504
328	Personnel clerks, except payroll and timekeeping	20124	23088	22464	22048	18200	18928	24856	19760
329	Library clerks	20124	23088	22464	22048	18200	18928	20228	21112
335	File clerks	20124	23088	22464	22048	15288	16016	15912	17264
336	Records clerks	20124	23088	22464	22048	17992	19344	19916	19448
	Financial records processing occupations	22828	23660	21060	23140	18876	19500	19396	19864
337	Bookkeepers, accounting, and auditing clerks	22464	20592	21320	23140	18824	19448	19292	19864
338	Payroll and timekeeping clerks	22828	23660	21060	23140	20280	20696	21372	21320
339	Billing clerks	22828	23660	21060	23140	18252	18200	18876	19396
343	Cost and rate clerks	22828	23660	21060	23140	21632	19500	19396	19864
344	Billing, posting, and calculating machine operators	22828	23660	21060	23140	18460	19500	17732	18356
	Duplicating, mail, and other office machine operators	25064	25584	25064	25428	18928	19500	19448	19968
345	Duplicating machine operators	25064	25584	25064	25428	18928	19500	19448	19968
346	Mail preparing and paper handling machine operators	25064	25584	25064	25428	18928	19500	19448	19968
347	Office machine operators, n.e.c.	25064	25584	25064	25428	18928	19500	19448	19968
	Communications equipment operators	25064	25584	25064	25428	19864	19396	19344	19760
348	Telephone operators	25064	25584	25064	25428	19604	19552	19760	19760
353	Communications equipment operators, n.e.c.	25064	25584	25064	25428	19864	19396	19344	19760
	Mail and message distributing occupations	30420	31512	31824	32188	26468	27872	26884	25532
354	Postal clerks, except mail carriers	31980	32708	33748	33332	30264	30836	30576	32084
355	Mail carriers, postal service	31460	33280	34060	34580	30524	31304	32500	31304
356	Mail clerks, except postal service	16068	16536	16588	18772	14976	15652	17004	16172
357	Messengers	18044	19396	19396	19812	26468	27872	26884	25532
	Material recording, scheduling, and distributing clerks	21528	21632	22048	22672	18200	18772	19188	19656
359	Dispatchers	25532	25532	24388	24856	20176	20592	18824	19552
363	Production coordinators	31564	31928	31772	36296	22776	23712	22932	24752
364	Traffic, shipping, and receiving clerks	18980	19708	20696	20280	16692	16640	17576	17576
365	Stock and inventory clerks	20384	22048	21372	22984	17680	18304	19500	20904
366	Meter readers	21528	24856	22048	22672	18200	18772	19188	19656
368	Weighers, measurers, checkers, and samplers	21528	21632	22048	22672	18200	18772	19188	19656
373	Expeditors	22620	18252	22048	21632	16744	18460	18876	17524
374	Material recording, scheduling, and distributing clerks, n.e.c..	21528	21632	22048	22672	18200	18772	19188	19656
	Adjusters and investigators	25792	27820	26104	26156	19916	20332	20956	21372
375	Insurance adjusters, examiners, and investigators	30784	34944	31252	32188	21268	21528	22100	22256
376	Investigators and adjusters, except insurance	25792	25844	26364	24336	19240	19864	20488	20852
377	Eligibility clerks, social welfare	25792	27820	26104	26156	19760	20800	23348	22776
378	Bill and account collectors	25792	21112	26104	26156	19240	19344	19032	20592

	Miscellaneous administrative support occupations	24804	23400	24024	22516	17992	18044	18356	18252
379	General office clerks	21840	18668	20956	20228	18148	18096	19084	18720
383	Bank tellers	24804	23400	24024	22516	14820	15080	15340	15496
384	Proofreaders	24804	23400	24024	22516	17992	18044	18356	18252
385	Data-entry keyers	18824	18512	21632	20384	17888	17784	18460	18356
386	Statistical clerks	24804	23400	24024	22516	17992	18044	20592	19188
387	Teachers' aides	24804	23400	24024	22516	13676	13884	13156	13884
389	Administrative support occupations, n.e.c.	28236	28548	27976	26780	20904	21268	21112	22568
G	Service occupations	17160	18200	18200	18564	12896	13468	13364	13728
	Private household occupations	17160	18200	18200	18564	9204	9516	9204	10036
403	Laundermen and ironers	17160	18200	18200	18564	9204	9516	9204	10036
404	Cooks, private household	17160	18200	18200	18564	9204	9516	9204	10036
405	Housekeepers and butlers	17160	18200	18200	18564	9204	9516	9204	10036
406	Child care workers, private households	17160	18200	18200	18564	7956	7852	8164	9464
407	Private household cleaners and servants	17160	18200	18200	18564	9828	10348	10036	10348
	Protective service occupations	26052	27248	27976	28704	20748	21684	22360	22776
	Supervisors, protective service occupations	33436	37076	37908	36764	20748	21684	22360	22776
413	Supervisors, firefighting and fire prevention	26052	27248	27976	28704	20748	21684	22360	22776
414	Supervisors, police and detectives	37908	39468	43160	40820	20748	21684	22360	22776
415	Supervisors, guards	26052	27248	27976	28704	20748	21684	22360	22776
	Firefighting and fire prevention occupations	32604	32032	33280	32708	20748	21684	22360	22776
416	Fire inspection and fire prevention occupations	32604	32032	33280	32708	20748	21684	22360	22776
417	Firefighting occupations	33228	32240	33072	32604	20748	21684	22360	22776
	Police and detectives	28704	30836	30940	31824	23140	25584	25116	26572
418	Police and detectives, public service	32760	33540	34632	34840	23140	29952	30264	29692
419	Sheriffs, bailiffs, and other law enforcement officers	26000	30160	27352	29276	23140	25584	25116	26572
424	Correctional institution officers	25532	26364	25688	26624	21424	22724	20748	23244
	Guards	16848	17680	17368	17576	14872	16952	17316	15912
425	Crossing guards	16848	17680	17368	17576	14872	16952	17316	15912
426	Guards and police, except public service	16900	17680	17420	17836	15912	18876	18460	16484
427	Protective service occupations, n.e.c.	16848	17680	17368	17576	14872	16952	17316	15912
	Service occupations, except protective and private household	14716	15080	15236	15600	12896	13468	13312	13728
	Food preparation and service occupations	13156	13416	14092	14196	11492	11960	12428	12792
433	Supervisors, food preparation and service occupations	19864	20852	19344	20020	14768	13988	15288	14872
434	Bartenders	14300	15912	16432	16380	12064	13780	14716	13624
435	Waiters and waitresses	13260	14144	15496	16328	11128	11440	12220	13416
436	Cooks	13676	13728	13988	13988	11388	12116	12220	12376
438	Food counter, fountain, and related occupations	13156	13416	14092	14196	11492	11960	12428	10140
439	Kitchen workers, food preparation	13156	13416	14092	14196	11856	12168	11388	11700
443	Waiters' Waitresses' assistants	11128	10816	11596	13988	10816	11960	12272	11440
444	Miscellaneous food preparation occupations	11076	11024	11648	11856	11700	12116	11700	13676

	Health service occupations	15184	15756	16120	17420	14352	14924	14352	14664
445	Dental assistants	15184	15756	16120	17420	17316	16848	17056	17576
446	Health aides, except nursing	15184	15756	18252	17940	15756	15808	14716	14820
447	Nursing aides, orderlies, and attendants	14352	15548	15652	17212	13780	14508	14092	14300
	Cleaning and building service occupations, except household	15964	16640	16328	16380	12740	13000	12948	13260
448	Supervisors, cleaning and building service workers	21112	21684	21580	23504	15912	15912	15964	15756
449	Maids and housemen	14404	14248	14664	14924	11648	12428	12272	12376
453	Janitors and cleaners	15704	16536	15964	15964	13416	13260	13260	13468
454	Elevator operators	15964	16640	16328	16380	12740	13000	12948	13260
455	Pest control occupations	15964	16640	16328	16380	12740	13000	12948	13260
	Personal service occupations	16588	15912	16484	18668	13000	14092	13416	13988
456	Supervisors, personal service occupations	16588	15912	16484	18668	13000	14092	13416	13988
457	Barbers	16588	15912	16484	18668	13000	14092	13416	13988
458	Hairdressers and cosmetologists	16588	15912	16484	18668	13208	14092	14300	14612
459	Attendants, amusement and recreation facilities	16588	15184	17628	19240	13000	14092	13416	13988
461	Guides	16588	15912	16484	18668	13000	14092	13416	13988
462	Ushers	16588	15912	16484	18668	13000	14092	13416	13988
463	Public transportation attendants	16588	15912	16484	18668	13000	14092	24128	13988
464	Baggage porters and bellhops	16588	15912	16484	18668	13000	14092	13416	13988
465	Welfare service aides	16588	15912	16484	18668	13000	14092	13416	13988
466	Family child care providers	16588	15912	16484	18668	13000	14092	13416	13988
467	Early childhood teacher's assistants	16588	15912	16484	18668	11336	12428	11180	11856
468	Child care workers, n.e.c.	16588	15912	16484	18668	13312	14040	11544	14560
469	Personal service occupations, n.e.c.	16588	15912	16484	18668	13000	16328	15236	14404
I	Precision production, craft, and repair occupations	26156	26572	26780	27768	17472	17888	19240	19292
	Mechanics and repairers	25792	26468	26988	27976	27196	28236	27040	28600
503	Supervisors, mechanics and repairers	31928	34840	35152	37232	27196	28236	27040	28600
	Mechanics and repairers, except supervisors	25428	26156	26624	27352	27092	27352	26572	27872
	Vehicle and mobile equipment	23348	24648	25324	26000	27196	28236	27040	28600
	Mechanics and repairers	23348	24648	25324	26000	27196	28236	27040	28600
505	Automobile mechanics	21268	21944	22932	24336	27196	28236	27040	28600
506	Automobile mechanic apprentices	21268	21944	22932	24336	27196	28236	27040	28600
507	Bus, truck, and stationary engine mechanics	23608	24908	25532	27664	27196	28236	27040	28600
508	Aircraft engine mechanics	31772	32500	36816	31720	27196	28236	27040	28600
509	Small engine repairers	23348	24648	25324	26000	27196	28236	27040	28600
514	Automobile body and related repairers	20800	21164	23660	20592	27196	28236	27040	28600
515	Aircraft mechanics, except engine	23348	24648	25324	26000	27196	28236	27040	28600
516	Heavy equipment mechanics	26832	28028	28756	29952	27196	28236	27040	28600
517	Farm equipment mechanics	23348	24648	25324	26000	27196	28236	27040	28600
518	Industrial machinery repairers	25948	26572	27768	28288	27196	28236	27040	28600
519	Machinery maintenance occupations	25428	26156	26624	27352	27092	27352	26572	27872

	Electrical and electronic equipment repairers	31200	31304	31876	32500	27092	32084	30368	32032
523	Electronic repairers, communications and industrial equipment	24856	26884	27924	30472	27092	32084	30368	32032
525	Data processing equipment repairers	31460	30628	31200	31252	27092	32084	30368	32032
526	Household appliance and power tool repairers	31200	31304	31876	32500	27092	32084	30368	32032
527	Telephone line installers and repairers	33280	31304	31876	35204	27092	32084	30368	32032
529	Telephone installers and repairers	34112	34060	36192	36504	27092	32084	30368	32032
533	Miscellaneous electrical and electronic equipment repairers	32500	32240	30004	31408	27092	32084	30368	32032
534	Heating, air conditioning, and refrigeration mechanics	24648	25584	25636	26156	27092	32084	30368	32032
	Miscellaneous mechanics and repairers	25376	25948	26416	27092	27092	32084	30368	32032
535	Camera, watch, and musical instrument repairers	25376	25948	26416	27092	27092	32084	30368	32032
536	Locksmiths and safe repairers	25376	25948	26416	27092	27092	32084	30368	32032
538	Office machine repairers	24700	24492	24024	29380	27092	32084	30368	32032
539	Mechanical controls and valve repairers	25376	25948	26416	27092	27092	32084	30368	32032
543	Elevator installers and repairers	25376	25948	26416	27092	27092	32084	30368	32032
544	Millwrights	31200	32708	36920	31408	27092	32084	30368	32032
547	Specified mechanics and repairers, n.e.c.	23192	25064	25532	26260	27092	32084	30368	32032
549	Not specified mechanics and repairers	24908	23920	24284	25740	27092	32084	30368	32032
	Construction trades	25740	25740	25584	26364	17472	17888	21216	20800
	Supervisors, construction occupations	32396	32968	32396	31564	17472	17888	21216	20800
553	Supervisors, brickmasons, stonemasons, and tile setters	32396	32968	32396	31564	17472	17888	21216	20800
554	Supervisors, carpenters and related workers	32396	32968	32396	31564	17472	17888	21216	20800
555	Supervisors, electricians and power transmission installers	32396	32968	32396	31564	17472	17888	21216	20800
556	Supervisors, painters, paperhangers, and plasterers	32396	32968	32396	31564	17472	17888	21216	20800
557	Supervisors, plumbers, pipefitters, and steamfitters	32396	32968	32396	31564	17472	17888	21216	20800
558	Supervisors, n.e.c.	31876	32448	31772	31252	17472	17888	21216	20800
	Construction trades, except supervisors	25012	24856	24752	25740	17472	17888	21216	19916
563	Brickmasons and stonemasons	25064	25012	25272	25168	17472	17888	21216	20800
564	Brickmason and stonemason apprentices	25012	24856	24752	25740	17472	17888	21216	20800
565	Tile setters, hard and soft	25012	24856	24752	25740	17472	17888	21216	20800
566	Carpet installers	19604	24856	21424	17888	17472	17888	21216	20800
567	Carpenters	22256	22828	22100	24336	17472	17888	21216	20800
569	Carpenters apprentices	22256	22828	22100	24336	17472	17888	21216	20800
573	Drywall installers	21996	20800	22100	23608	17472	17888	21216	20800
575	Electricians	28652	28548	29900	31044	17472	17888	21216	20800
576	Electrician apprentices	25012	24856	24752	25740	17472	17888	21216	20800
577	Electrical power installers and repairers	33540	36244	38064	38012	17472	17888	21216	20800
579	Painters, construction and maintenance	20072	20852	19968	20696	17472	17888	21216	20800
583	Paperhangers	25012	24856	24752	25740	17472	17888	21216	20800
584	Plasterers	25012	24856	24752	25740	17472	17888	21216	20800
585	Plumbers, pipefitters, and steamfitters	26936	27092	27612	28964	17472	17888	21216	20800
587	Plumber, pipefitter, and steamfitter apprentices	26936	27092	27612	28964	17472	17888	21216	20800
588	Concrete and terrazzo finishers	25012	21788	21216	22048	17472	17888	21216	20800
589	Glaziers	25012	24856	24752	25740	17472	17888	21216	20800
593	Insulation workers	23348	24856	24596	22360	17472	17888	21216	20800
594	Paving, surfacing, and tamping equipment operators	25012	24856	24752	25740	17472	17888	21216	20800
595	Roofers	21632	17420	19292	20176	17472	17888	21216	20800
596	Sheet metal duct installers	25012	24856	24752	25740	17472	17888	21216	20800

597	Structural metalworkers	25012	24856	24752	35516	17472	17888	21216	20800
598	Drillers, earth	25012	24856	24752	25740	17472	17888	21216	20800
599	Construction trades, n.e.c.	21320	20852	21684	22932	17472	17888	21216	20800
	Extractive occupations	33072	33384	34008	35360	17472	17888	19240	19292
613	Supervisors, extractive occupations	33072	33384	34008	35360	17472	17888	19240	19292
614	Drillers, oil well	33072	33384	34008	35360	17472	17888	19240	19292
615	Explosives workers	33072	33384	34008	35360	17472	17888	19240	19292
616	Mining machine operators	33072	33384	34008	35360	17472	17888	19240	19292
617	Mining occupations, n.e.c.	33072	33384	34008	35360	17472	17888	19240	19292
	Precision production occupations	27040	27612	28496	29484	16432	16588	17784	17888
628	Supervisors, production occupations	31512	31200	31772	32500	20800	20592	21632	22256
	Precision metalworking occupations	27040	28236	29120	30056	16432	17576	17784	17368
634	Tool and die makers	33436	32760	34632	36400	16432	17576	17784	17368
635	Tool and die maker apprentices	33436	32760	34632	36400	16432	17576	17784	17368
636	Precision assemblers, metal	27040	28236	29120	30056	16432	17576	17784	17368
637	Machinists	26052	26936	27248	28184	16432	17576	17784	17368
639	Machinist apprentices	26052	26936	27248	28184	16432	17576	17784	17368
643	Boilermakers	26052	26936	27248	28184	16432	17576	17784	17368
644	Precision grinders, filers, and tool sharpeners	26052	26936	27248	28184	16432	17576	17784	17368
645	Patternmakers and model makers, metal	26052	26936	27248	28184	16432	17576	17784	17368
646	Lay-out workers	26052	26936	27248	28184	16432	17576	17784	17368
647	Precious stones and metals workers (jewelers)	26052	26936	27248	28184	16432	17576	17784	17368
649	Engravers metal	26052	26936	27248	28184	16432	17576	17784	17368
653	Sheet metal workers	25428	28392	29588	27248	16432	17576	17784	17368
654	Sheet metal worker apprentices	26052	26936	27248	28184	16432	17576	17784	17368
655	Miscellaneous precision metalworkers	26052	26936	27248	28184	16432	17576	17784	17368
	Precision woodworking occupations	20176	18720	20592	21008	16432	16588	17784	17888
656	Patternmakers and model makers, wood	20176	18720	20592	21008	16432	16588	17784	17888
657	Cabinet makers and bench carpenters	20176	18720	20592	21008	16432	16588	17784	17888
658	Furniture and wood finishers	20176	18720	20592	21008	16432	16588	17784	17888
659	Miscellaneous precision woodworkers	20176	18720	20592	21008	16432	16588	17784	17888

	Precision textile, apparel, and furnishings machine workers	17576	16796	19240	18876	12740	14144	17784	15132
666	Dressmakers	17576	16796	19240	18876	12740	14144	17784	15132
667	Tailors	17576	16796	19240	18876	12740	14144	17784	15132
668	Upholsterers	17576	16796	19240	18876	12740	14144	17784	15132
669	Shoe repairers	17576	16796	19240	18876	12740	14144	17784	15132
674	Miscellaneous precision apparel and fabric workers	17576	16796	19240	18876	12740	14144	17784	15132
	Precision workers, assorted materials	21372	21892	20280	22204	15808	16328	16744	16796
675	Hand molders and shapers, except jewelers	21372	21892	20280	22204	15808	16328	16744	16796
676	Patternmakers, lay-out workers, and cutters	21372	21892	20280	22204	15808	16328	16744	16796
677	Optical goods workers	21372	21892	20280	22204	15808	16328	16744	16796
678	Dental laboratory and medical appliance technicians	21372	21892	20280	22204	15808	16328	16744	16796
679	Bookbinders	21372	21892	20280	22204	15808	16328	16744	16796
683	Electrical and electronic equipment assemblers	19552	19864	18252	20540	15548	16380	16900	16588
684	Miscellaneous precision workers, n.e.c.	21372	21892	20280	22204	15808	16328	16744	16796
	Precision food production occupations	17940	20436	19604	19604	12948	13884	13624	15236
686	Butchers and meat cutters	18148	20228	19708	19396	12584	13520	13416	15236
687	Bakers	16484	20436	18356	18564	12948	13884	13624	15236
688	Food batchmakers	17940	20436	19604	19604	12948	13884	13624	15236
	Precision inspectors, testers, and related workers	28028	30472	30992	31096	12948	13884	13624	15236
689	Inspectors, testers, and graders	27820	30004	31252	30836	12948	13884	13624	15236
693	Adjusters and calibrators	28028	30472	30992	31096	12948	13884	13624	15236
	Plant and system operators	31980	31668	31720	32604	16432	16588	17784	17888
694	Water and sewage treatment plant operators	26468	26104	27196	25896	16432	16588	17784	17888
695	Power plant operators	31980	31668	31720	32604	16432	16588	17784	17888
696	Stationary engineers	32032	30472	30784	31564	16432	16588	17784	17888
699	Miscellaneous plant and system operators	31980	31668	31720	32604	16432	16588	17784	17888
	Operators, fabricators, and laborers	20436	20748	21112	21476	14508	14976	15236	15444
J	Machine operators, assemblers and inspectors	21112	21164	21580	21892	14300	14768	15184	15392
	Machine operators and tenders, except precision	20696	20644	21320	21736	13468	13884	14820	14976
	Metalworking and plastic working machine operators	22412	22100	23504	23868	16432	17628	16796	14976
703	Lathe and turning machine set-up operators	22412	22100	23504	23868	16432	17628	16796	14976
704	Lathe and turning machine operators	22412	22100	23504	23868	16432	17628	16796	14976
705	Milling and planing machine operators	22412	22100	23504	23868	16432	17628	16796	14976
706	Punching and stamping press machine operators	20280	21320	21736	21320	16432	17628	16796	14976
707	Rolling machine operators	22412	22100	23504	23868	16432	17628	16796	14976
708	Drilling and boring machine operators	22412	22100	23504	23868	16432	17628	16796	14976
709	Grinding, abrading, buffing, and polishing machine operators	22204	20124	22308	20852	16432	17628	16796	14976
713	Forging machine operators	22412	22100	23504	23868	16432	17628	16796	14976
714	Numerical control machine operators	22412	22100	23504	23868	16432	17628	16796	14976
715	Miscellaneous metal, plastic, stone, and glass working machine operators	22412	22100	23504	23868	16432	17628	16796	14976
717	Fabricating machine operators, n.e.c.	20696	20644	21320	21736	16432	17628	16796	14976

	Metal and plastic processing machine operators	20124	20956	21060	21320	13468	13884	14820	14976
719	Molding and casting machine operators	19760	21060	20332	22152	13468	13884	14820	14976
723	Metal plating machine operators	20124	20956	21060	21320	13468	13884	14820	14976
724	Heat treating equipment operators	20124	20956	21060	21320	13468	13884	14820	14976
725	Miscellaneous metal and plastic processing machine operators	20124	20956	21060	21320	13468	13884	14820	14976
	Woodworking machine operators	15964	17472	16588	16848	13468	13884	14820	14976
726	Wood lathe, routing, and planing machine operators	15964	17472	16588	16848	13468	13884	14820	14976
727	Sawing machine operators	15184	17420	16692	16276	13468	13884	14820	14976
728	Shaping and joining machine operators	15964	17472	16588	16848	13468	13884	14820	14976
729	Nailing and tacking machine operators	15964	17472	16588	16848	13468	13884	14820	14976
733	Miscellaneous woodworking machine operators	15964	17472	16588	16848	13468	13884	14820	14976
	Printing machine operators	24128	24388	24440	25584	16016	16276	18304	18720
734	Printing press operators	23660	23816	24388	25792	16016	16276	18304	18720
735	Photoengravers and lithographers	24128	24388	24440	25584	16016	16276	18304	18720
736	Typesetters and compositors	24128	24388	24440	25584	16016	16276	18304	18720
737	Miscellaneous printing machine operators	24128	24388	24440	25584	16016	16276	18304	18720
	Textile, apparel, and furnishings machine operators	14716	15184	15496	16016	11596	12168	12792	13156
738	Winding and twisting machine operators	14716	15184	15496	16016	11596	12168	12792	13156
739	Knitting, looping, taping, and weaving machine operators	14716	15184	15496	16016	11596	12168	12792	13156
743	Textile cutting machine operators	14716	15184	15496	16016	11596	12168	12792	13156
744	Textile sewing machine operators	12220	13104	13780	15028	11232	11544	12064	12792
745	Shoe machine operators	14716	15184	15496	16016	11596	12168	12792	13156
747	Pressing machine operators	14716	15340	15496	16016	11440	11388	13312	11700
748	Laundering and dry cleaning machine operators	14716	14612	14040	16016	11388	12376	12844	12740
749	Miscellaneous textile machine operators	14716	15184	15496	16016	11596	12168	12792	13156
	Machine operators, assorted materials	21164	20956	21788	22256	15132	15340	16068	16068
753	Cementing and gluing machine operators	21164	20956	21788	22256	15132	15340	16068	16068
754	Packaging and filling machine operators	16172	16120	17264	16640	14560	14404	14560	14976
755	Extruding and forming machine operators	21164	20956	21788	22256	15132	15340	16068	16068
756	Mixing and blending machine operators	22204	21684	22048	22880	11596	12168	12792	13156
757	Separating, filtering, and clarifying machine operators	28912	20956	33384	22256	11596	12168	12792	13156
758	Compressing and compacting machine operators	21164	20956	21788	22256	15132	15340	16068	16068
759	Painting and paint spraying machine operators	20228	20332	20904	23244	11596	12168	12792	13156
763	Roasting and baking machine operators, food	21164	20956	21788	22256	15132	15340	16068	16068
764	Washing, cleaning, and pickling machine operators	21164	20956	21788	22256	15132	15340	16068	16068
765	Folding machine operators	21164	20956	21788	22256	15132	15340	16068	16068
766	Furnace, kiln, and oven operators, except food	25012	26156	26104	25792	11596	12168	12792	13156
768	Crushing and grinding machine operators	21164	20956	21788	22256	15132	15340	16068	16068
769	Slicing and cutting machine operators	19344	18616	19396	20332	13104	12168	12792	14404
773	Motion picture projectionists	21164	20956	21788	22256	15132	15340	16068	16068
774	Photographic process machine operators	21164	20956	21788	22256	15132	15340	16068	16068
777	Miscellaneous machine operators, n.e.c.	21736	21528	22932	23036	16068	16120	17576	16796
779	Machine operators, not specified	21268	21268	21372	22048	15028	15808	16744	17004

	Fabricators, assemblers, and hand working occupations	21268	21632	21476	21684	15652	15912	15600	16068
783	Welders and cutters	23088	23764	24180	24388	15652	15912	15600	16068
784	Solderers and brazers	21268	21632	21476	21684	15652	15912	15600	16068
785	Assemblers	19604	20228	19812	20592	15756	15964	15652	15912
786	Hand cutting and trimming occupations	21268	21632	21476	21684	15652	15912	15600	16068
787	Hand molding, casting, and forming occupations	21268	21632	21476	21684	15652	15912	15600	16068
789	Hand painting, coating, and decorating occupations	21268	21632	21476	21684	15652	15912	15600	16068
793	Hand engraving and printing occupations	21268	21632	21476	21684	15652	15912	15600	16068
795	Miscellaneous hand working occupations	21268	21632	21476	21684	15652	15912	15600	16068
	Production inspectors, testers, samplers, and weighers	24752	23920	24388	25012	15704	16276	16328	16224
796	Production inspectors, checkers, and examiners	25376	25740	25220	26416	16068	16796	16848	16640
797	Production testers	24752	23920	24388	25012	15704	16276	16328	16224
798	Production samplers and weighers	24752	23920	24388	25012	15704	16276	16328	16224
799	Graders and sorters, except agricultural	24752	14924	16276	14768	11648	14456	13520	14144
K	Transportation and material moving occupations	22672	23712	24388	25064	17108	18616	18772	18408
	Motor vehicle operators	21996	23192	24076	25064	16536	18616	17368	17420
803	Supervisors motor vehicle operators	26312	31148	27196	30264	16536	18616	17368	17420
804	Truck drivers	21892	23348	24492	25168	15548	17212	17160	17940
806	Driver-sales workers	25844	25220	24544	27092	16536	18616	17368	17420
808	Bus drivers	24336	22932	21788	25844	17108	19136	17472	17212
809	Taxicab drivers and chauffeurs	16640	16588	20228	18824	16536	18616	17368	17420
813	Parking lot attendants	21996	23192	24076	25064	16536	18616	17368	17420
814	Motor transportation occupations, n.e.c.	21996	23192	24076	25064	16536	18616	17368	17420
	Transportation occupations, except motor vehicle	36452	37492	32812	36972	17108	18616	18772	18408
	Rail transportation occupations	37440	38168	36712	38272	17108	18616	18772	18408
823	Railroad conductors and yardmasters	37440	38168	36712	38272	17108	18616	18772	18408
824	Locomotive operating occupations	37440	38168	36712	38272	17108	18616	18772	18408
825	Railroad brake, signal, and switch operators	37440	38168	36712	38272	17108	18616	18772	18408
826	Rail vehicle operators, n.e.c.	37440	38168	36712	38272	17108	18616	18772	18408
	Water transportation occupations	36452	35256	30108	32500	17108	18616	18772	18408
828	Ship captains and mates, except fishing boats	36452	35256	30108	32500	17108	18616	18772	18408
829	Sailors and deckhands	36452	35256	30108	32500	17108	18616	18772	18408
833	Marine engineers	36452	35256	30108	32500	17108	18616	18772	18408
834	Bridge, lock, and lighthouse tenders	36452	35256	30108	32500	17108	18616	18772	18408
	Material moving equipment operators	22568	23296	23816	23816	17108	18616	18772	23608
843	Supervisors, material moving equipment operators	22568	23296	23816	23816	17108	18616	18772	23608
844	Operating engineers	26728	26260	27456	26520	17108	18616	18772	23608
845	Longshore equipment operators	22568	23296	23816	23816	17108	18616	18772	23608
848	Hoist and winch operators	22568	23296	23816	23816	17108	18616	18772	23608
849	Crane and tower operators	29432	28600	27872	29068	17108	18616	18772	23608
853	Excavating and loading machine operators	22672	22672	23452	26364	17108	18616	18772	23608
855	Grader, dozer, and scraper operators	22984	21840	25116	26000	17108	18616	18772	23608
856	Industrial truck and tractor equipment operators	19448	20488	21944	20228	17108	18616	18772	23608
859	Miscellaneous material moving equipment operators	22568	23296	25064	24804	17108	18616	18772	23608

L	Handlers, equipment cleaners, helpers, and laborers	16328	16588	16588	17056	14508	14872	14508	14768
864	Supervisors, handlers, equipment cleaners, and laborers, n.e.c.	16328	16588	16588	17056	14508	14872	14508	14768
865	Helpers, mechanics and repairers	16328	16588	16588	17056	14508	14872	14508	14768
**	Helpers, construction and extractive occupations	14716	15184	16588	15340	14508	14872	14508	14768
866	Helpers, construction trades	14456	15028	14508	15184	14508	14872	14508	14768
867	Helpers, surveyor	14456	15028	14456	15184	14508	14872	14508	14768
868	Helpers, extractive occupations	14456	15028	14508	15184	14508	14872	14508	14768
869	Construction laborers	18044	19656	17576	18564	14508	14872	14508	14768
874	Production helpers	16328	16588	19552	17056	14508	14872	14508	14768
	Freight, stock, and material handlers	16328	16432	16744	16900	14456	14456	13780	14612
875	Garbage collectors	16328	16432	16744	16900	14456	14456	13780	14612
876	Stevedores	16328	16432	16744	16900	14456	14456	13780	14612
877	Stock handlers and baggers	13780	14404	14092	14508	13416	13312	12584	12896
878	Machine feeders and offbearers	16432	16432	17628	16900	14456	14456	13780	14612
883	Freight, stock, and material handlers, n.e.c.	18460	17836	19448	18824	14456	16692	16484	18408
885	Garage and service station related occupations	13000	12792	13468	14404	14508	14872	14508	14768
887	Vehicle washers and equipment cleaners	13832	13728	14560	14144	14508	14872	14508	14768
888	Hand packers and packagers	14456	14508	15132	15496	13676	14404	14456	14716
889	Laborers, except construction	17108	17212	17316	18044	15184	15392	15132	14820
H	Farming, forestry, and fishing occupations	13988	14248	15080	15288	11596	12584	12168	12948
	Farm operators and managers	13988	14248	15080	21632	11596	12584	12168	12948
473	Farmers, except horticultural	13988	14248	15080	21632	11596	12584	12168	12948
474	Horticulture specialty farmers	13988	14248	15080	21632	11596	12584	12168	12948
	Farm managers	13988	14248	15080	21632	11596	12584	12168	12948
475	Managers, farm, except horticultural	13988	14248	15080	21632	11596	12584	12168	12948
476	Managers, horticultural specialty farms	13988	14248	15080	21632	11596	12584	12168	12948
	Other agricultural and related occupations	13676	13884	14820	14820	11492	12480	12168	12792
	Farm occupations, except managerial	12636	13052	13780	14040	10764	12116	12116	11752
477	Supervisors, farm workers	12636	13052	13780	14040	10764	12116	12116	11752
479	Farm workers	12376	12896	13416	13832	10660	12064	11908	11284
483	Marine life cultivation workers	12636	13052	13780	14040	10764	12116	12116	11752
484	Nursery workers	12636	13052	13780	14040	10764	12116	12116	11752
	Related agricultural occupations	14768	14716	15704	15548	12844	12844	12272	14300
485	Supervisors, related agricultural occupations	21580	20852	21580	22048	12844	12844	12272	14300
486	Groundskeepers and gardeners, except farm	14352	14196	15080	14872	12844	12844	12272	14300
487	Animal caretakers, except farm	14768	14716	15704	15548	12844	12844	12272	14300
488	Graders and sorters, agricultural products	14768	14716	15704	15548	12844	12844	12272	14300
489	Inspectors, agricultural products	14768	14716	15704	15548	12844	12844	12272	14300
	Forestry and logging occupations	15600	18876	19032	20592	11596	12584	12168	12948
494	Supervisors, forestry and logging occupations	15600	18876	19032	20592	11596	12584	12168	12948
495	Forestry workers, except logging	15600	18876	19032	20592	11596	12584	12168	12948
496	Timber cutting and logging occupations	15600	18668	19032	20904	11596	12584	12168	12948

	Fishers, hunters, and trappers	13988	14248	15080	15288	11596	12584	12168	12948
497	Captains and other officers, fishing vessels	13988	14248	15080	15288	11596	12584	12168	12948
498	Fishers	13988	14248	15080	15288	11596	12584	12168	12948
499	Hunters and trappers	13988	14248	15080	15288	11596	12584	12168	12948
999	Occupation not reported	26260	26728	27144	27976	19812	20540	20748	21112

NOTE: Medians were not available where the base was under 50,000. Medians for such cases used the next highest aggregated level as a proxy.

Detail may not add to totals because of rounding.

N.e.c. = not elsewhere classified.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Current population Survey, 1992 annual averages.

Appendix C. Employee Benefits as Percent of Payroll, by Standard Classification System (SIC) Industry Group

Industry title	SIC	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Total industry	9900-9999	23.7	23.9	24.8	24.9	25.5	24.8	25.7	25.3	24.1	24.5	25.5	26.6	27.2	28.6	28.8	29.6	27.4
All manufacturing		25.1	25.0	26.9	26.7	27.5	26.8	28.5	28.0	24.5	24.1	27.2	26.0	27.9	27.9	29.3	29.7	29.3
Total nonmanufacturing		22.1	22.8	23.1	26.4	30.7	27.3	24.3	25.2	23.3	26.3	28.6	31.9	32.5	24.5	26.3	24.9	25.2
Food, beverages, tobacco	2000-2141	24.1	24.4	26.5	21.5	21.8	21.7	20.1	18.9	21.2	20.7	20.5	25.6	22.3	24.0	21.1	20.7	19.7
Textile and wearing apparel	2200-2399	20.2	20.1	21.4	24.3	26.2	23.8	25.7	22.4	23.4	23.0	26.6	24.8	25.2	25.0	25.1	23.9	
Pulp, paper, lumber and furniture	2400-2679	23.5	23.9	25.4	25.0	24.5	21.9	19.0	21.2	20.3	20.7	22.5	22.7	26.7	24.7	25.6	24.5	27.8
Printing and publishing	2700-2796	22.5	23.7	24.6	27.3	26.1	27.5	22.1	21.4	22.4	25.5	23.0	22.0	28.1	31.7	29.0	26.0	26.8
Chemicals and allied products	2800-2899	27.5	27.8	29.0	28.4	32.8	26.4	20.9	28.5	30.7	25.4	23.7	23.7	25.0	29.7	29.1	25.4	24.4
Petroleum	2900-2999	31.3	29.6	31.7	25.8	28.2	26.8	43.0	33.5	28.7	29.9	32.8	36.6	37.2	28.0	27.3	23.9	25.2
Rubber, leather, and plastic	3000-3199	23.2	23.8	27.5	25.1	28.7	22.9	22.5	21.1	23.5	23.3	27.6	27.8	26.8	26.1	30.2	23.8	23.5
Stone, clay, and glass	3200-3299	23.6	25.0	28.0	34.0	34.8	36.4	40.5	43.6	34.4	30.4	29.9	30.0	32.0	28.4	24.0	25.5	28.6
Primary metals	3300-3399	31.7	29.6	34.3	28.1	28.8	29.3	24.4	30.9	26.5	37.1	30.1	29.7	29.9	28.3	28.3	25.3	24.9
Fabricated metals	3400-3499	26.6	25.0	29.4	28.7	26.9	27.4	22.1	22.4	22.6	25.8	28.6	27.0	26.2	27.6	33.3	32.7	30.4
Machinery, exclude electric equipment	3500-3599	25.3	25.5	27.8	24.1	25.6	25.2	21.4	22.7	24.3	22.2	28.1	22.1	30.1	28.2	31.1	35.3	21.9
Electric machinery	3600-3699	23.1	23.7	24.0	27.5	26.8	27.3	35.0	38.4	26.2	24.0	26.1	27.0	29.4	29.5	40.3	36.1	33.2
Transportation equipment	3700-3799	24.8	24.6	27.4	24.9	25.8	23.1	22.9	23.3	21.8	23.6	21.8	24.3	21.3	24.1	24.4	27.6	27.2
Instruments and misc manufacturing	3800-3999	23.5	22.8	22.4	23.2	23.8	23.4	23.3	23.3	23.8	24.8	24.6	26.9	26.9	28.9	28.6	29.4	27.0
Public utilities	4900-4971	25.3	25.9	26.4	26.6	27.2	25.8	26.0	27.0	27.2	27.3	28.0	31.3	29.0	32.6	33.6	35.1	32.9
Department stores	5310-5311	20.9	21.1	21.3	21.0	19.4	20.2	19.9	19.5	21.0	19.6	19.7	23.4	24.5	23.3	27.4	24.9	24.7
Trade (wholesale and retail)	5000-5271; 5300-5999	20.2	21.1	20.7	20.6	24.7	23.2	23.7	23.2	28.3	25.7	24.5	25.4	26.2	27.9	25.2	24.1	22.3
Banks, finance	6000-6289	26.1	25.3	25.5	24.2	23.7	24.3	21.9	20.2	20.3	21.6	19.0	20.3	20.5	22.1	22.0	23.4	22.4
Insurance	6300-6399	23.8	24.9	25.9	24.0	25.1	24.3	22.2	22.4	22.3	24.9	24.6	24.9	26.1	28.0	26.7	27.9	25.5
Hospitals	8060-8069	16.7	17.5	18.5	19.2	19.9	20.2	19.3	19.2	20.2	20.2	21.0	21.8	20.2	23.1	22.3	20.9	22.3
Misc. non-manufacturing	0100-1799; 4000-4899	20.8	21.3	21.6	22.4	22.7	22.5	23.1	22.6	23.3	23.6	23.4	25.8	27.6	28.3	28.0	29.5	28.5
	6400-8059; 8070-9721																	

Note: If no data were available, the average of the surrounding years were used as a proxy

Source: U.S. Chamber of Commerce. *Employee Benefits*, years 1980-1996

Appendix D. Life-Cycle Wage Growth Rate by Age, Sex, and Race

Age	Male				Female			
	Other	White	Black	Hispanic	Other	White	Black	Hispanic
16	1.178421	1.180746	1.149965	1.106431	1.110945	1.110392	1.113542	1.079347
17	1.178421	1.180746	1.149965	1.106431	1.110945	1.110392	1.113542	1.079347
18	1.178421	1.180746	1.149965	1.106431	1.110945	1.110392	1.113542	1.079347
19	1.178421	1.180746	1.149965	1.106431	1.110945	1.110392	1.113542	1.079347
20	1.178421	1.180746	1.149965	1.106431	1.110945	1.110392	1.113542	1.079347
21	1.178421	1.180746	1.149965	1.106431	1.110945	1.110392	1.113542	1.079347
22	1.178421	1.180746	1.149965	1.106431	1.110945	1.110392	1.113542	1.079347
23	1.178421	1.180746	1.149965	1.106431	1.110945	1.110392	1.113542	1.079347
24	1.178421	1.180746	1.149965	1.106431	1.110945	1.110392	1.113542	1.079347
25	1.038625	1.039084	1.025737	1.023383	1.014546	1.013302	1.011039	1.012115
26	1.038625	1.039084	1.025737	1.023383	1.014546	1.013302	1.011039	1.012115
27	1.038625	1.039084	1.025737	1.023383	1.014546	1.013302	1.011039	1.012115
28	1.038625	1.039084	1.025737	1.023383	1.014546	1.013302	1.011039	1.012115
29	1.038625	1.039084	1.025737	1.023383	1.014546	1.013302	1.011039	1.012115
30	1.038625	1.039084	1.025737	1.023383	1.014546	1.013302	1.011039	1.012115
31	1.038625	1.039084	1.025737	1.023383	1.014546	1.013302	1.011039	1.012115
32	1.038625	1.039084	1.025737	1.023383	1.014546	1.013302	1.011039	1.012115
33	1.038625	1.039084	1.025737	1.023383	1.014546	1.013302	1.011039	1.012115
34	1.038625	1.039084	1.025737	1.023383	1.014546	1.013302	1.011039	1.012115
35	1.008849	1.008627	1.004751	1.005298	1.000431	1.000456	1.009062	0.994432
36	1.008849	1.008627	1.004751	1.005298	1.000431	1.000456	1.009062	0.994432
37	1.008849	1.008627	1.004751	1.005298	1.000431	1.000456	1.009062	0.994432
38	1.008849	1.008627	1.004751	1.005298	1.000431	1.000456	1.009062	0.994432
39	1.008849	1.008627	1.004751	1.005298	1.000431	1.000456	1.009062	0.994432
40	1.008849	1.008627	1.004751	1.005298	1.000431	1.000456	1.009062	0.994432
41	1.008849	1.008627	1.004751	1.005298	1.000431	1.000456	1.009062	0.994432
42	1.008849	1.008627	1.004751	1.005298	1.000431	1.000456	1.009062	0.994432
43	1.008849	1.008627	1.004751	1.005298	1.000431	1.000456	1.009062	0.994432
44	1.008849	1.008627	1.004751	1.005298	1.000431	1.000456	1.009062	0.994432
45	0.986407	0.986751	0.978142	0.986647	0.981522	0.982711	0.972257	0.978843
46	0.986407	0.986751	0.978142	0.986647	0.981522	0.982711	0.972257	0.978843
47	0.986407	0.986751	0.978142	0.986647	0.981522	0.982711	0.972257	0.978843
48	0.986407	0.986751	0.978142	0.986647	0.981522	0.982711	0.972257	0.978843
49	0.986407	0.986751	0.978142	0.986647	0.981522	0.982711	0.972257	0.978843
50	0.986407	0.986751	0.978142	0.986647	0.981522	0.982711	0.972257	0.978843
51	0.986407	0.986751	0.978142	0.986647	0.981522	0.982711	0.972257	0.978843
52	0.986407	0.986751	0.978142	0.986647	0.981522	0.982711	0.972257	0.978843
53	0.986407	0.986751	0.978142	0.986647	0.981522	0.982711	0.972257	0.978843
54	0.986407	0.986751	0.978142	0.986647	0.981522	0.982711	0.972257	0.978843
55	0.96781	0.967439	0.97349	0.963994	0.98476	0.985622	0.97273	0.979321
56	0.96781	0.967439	0.97349	0.963994	0.98476	0.985622	0.97273	0.979321
57	0.96781	0.967439	0.97349	0.963994	0.98476	0.985622	0.97273	0.979321
58	0.96781	0.967439	0.97349	0.963994	0.98476	0.985622	0.97273	0.979321
59	0.96781	0.967439	0.97349	0.963994	0.98476	0.985622	0.97273	0.979321
60	0.96781	0.967439	0.97349	0.963994	0.98476	0.985622	0.97273	0.979321
61	0.96781	0.967439	0.97349	0.963994	0.98476	0.985622	0.97273	0.979321
62	0.96781	0.967439	0.97349	0.963994	0.98476	0.985622	0.97273	0.979321
63	0.96781	0.967439	0.97349	0.963994	0.98476	0.985622	0.97273	0.979321
64	0.96781	0.967439	0.97349	0.963994	0.98476	0.985622	0.97273	0.979321
65	0.977462	0.977422	0.97361	0.977061	0.992866	0.993195	0.983066	0.983614
66	0.977462	0.977422	0.97361	0.977061	0.992866	0.993195	0.983066	0.983614
67	0.977462	0.977422	0.97361	0.977061	0.992866	0.993195	0.983066	0.983614

Appendix E. Annual Household Production Values by Age and Sex

Age	Male	Female
16	5299.8	5799.85
17	5299.8	5799.85
18	6088.2	11081.4
19	6088.2	11081.4
20	6088.2	11081.4
21	6088.2	11081.4
22	6088.2	11081.4
23	6088.2	11081.4
24	6088.2	11081.4
25	8792.85	13873.65
26	8792.85	13873.65
27	8792.85	13873.65
28	8792.85	13873.65
29	8792.85	13873.65
30	8792.85	13873.65
31	8792.85	13873.65
32	8792.85	13873.65
33	8792.85	13873.65
34	8792.85	13873.65
35	10278.4	15665.8
36	10278.4	15665.8
37	10278.4	15665.8
38	10278.4	15665.8
39	10278.4	15665.8
40	10278.4	15665.8
41	10278.4	15665.8
42	10278.4	15665.8
43	10278.4	15665.8
44	10278.4	15665.8
45	10716.4	15366.5
46	10716.4	15366.5
47	10716.4	15366.5
48	10716.4	15366.5
49	10716.4	15366.5
50	10716.4	15366.5
51	10716.4	15366.5
52	10716.4	15366.5
53	10716.4	15366.5
54	10716.4	15366.5
55	12647.25	16939.65
56	12647.25	16939.65
57	12647.25	16939.65
58	12647.25	16939.65
59	12647.25	16939.65
60	12647.25	16939.65
61	12647.25	16939.65
62	12647.25	16939.65
63	12647.25	16939.65
64	12647.25	16939.65
65	13870	16571
66	13870	16571
67	13870	16571

Appendix F. All-Urban Consumer Price Index Adjustment Factors

Base Year	Original CPI Number	Target Year								
		1992	1993	1994	1995	1996	1997	1998	1999	
1980	82.4	0.5873129	0.5702422	0.5560054	0.5406824	0.5251753	0.5133956	0.5055215	0.4945978	
1981	90.9	0.6478974	0.6290657	0.6133603	0.5964567	0.5793499	0.5663551	0.5576687	0.5456182	
1982	96.5	0.6878118	0.6678201	0.6511471	0.6332021	0.6150414	0.6012461	0.5920245	0.5792317	
1983	99.6	0.7099073	0.6892734	0.6720648	0.6535433	0.6347992	0.6205607	0.6110429	0.5978391	
1984	103.9	0.740556	0.7190311	0.7010796	0.6817585	0.6622052	0.647352	0.6374233	0.6236495	
1985	107.6	0.766928	0.7446367	0.7260459	0.7060367	0.6857871	0.670405	0.6601227	0.6458583	
1986	109.6	0.7811832	0.7584775	0.7395412	0.7191601	0.6985341	0.682866	0.6723926	0.6578631	
1987	113.6	0.8096935	0.7861592	0.7665317	0.7454068	0.724028	0.7077882	0.6969325	0.6818727	
1988	118.3	0.8431932	0.8186851	0.7982456	0.7762467	0.7539834	0.7370717	0.7257669	0.710084	
1989	124.0	0.8838204	0.8581315	0.8367072	0.8136483	0.7903123	0.7725857	0.7607362	0.7442977	
1990	130.7	0.9315752	0.9044983	0.8819163	0.8576115	0.8330147	0.8143302	0.8018405	0.7845138	
1991	136.2	0.9707769	0.9425606	0.9190283	0.8937008	0.8680688	0.8485981	0.8355828	0.817527	
1992	140.3	1	0.9709343	0.9466937	0.9206037	0.8942001	0.8741433	0.8607362	0.8421369	
1993	144.5	1.0299359	1	0.9750337	0.9481627	0.9209688	0.9003115	0.8865031	0.8673469	
1994	148.2	1.0563079	1.0256055	1	0.9724409	0.9445507	0.9233645	0.9092025	0.8895558	
1995	152.4	1.0862438	1.0546713	1.0283401	1	0.9713193	0.9495327	0.9349693	0.9147659	
1996	156.9	1.1183179	1.0858131	1.0587045	1.0295276	1	0.9775701	0.9625767	0.9417767	
1997	160.5	1.1439772	1.1107266	1.082996	1.0531496	1.0229446	1	0.9846626	0.9633854	
1998	163.0	1.1617962	1.1280277	1.099865	1.0695538	1.0388783	1.0155763	1	0.9783914	
1999	166.6	1.1874555	1.1529412	1.1241565	1.0931759	1.0618228	1.0380062	1.0220859	1	

Source: U.S. Department of Labor Statistics/Bureau of Labor Statistics, Consumer Price Index

Appendix G. Medical Care Consumer Price Index Adjustment Factors

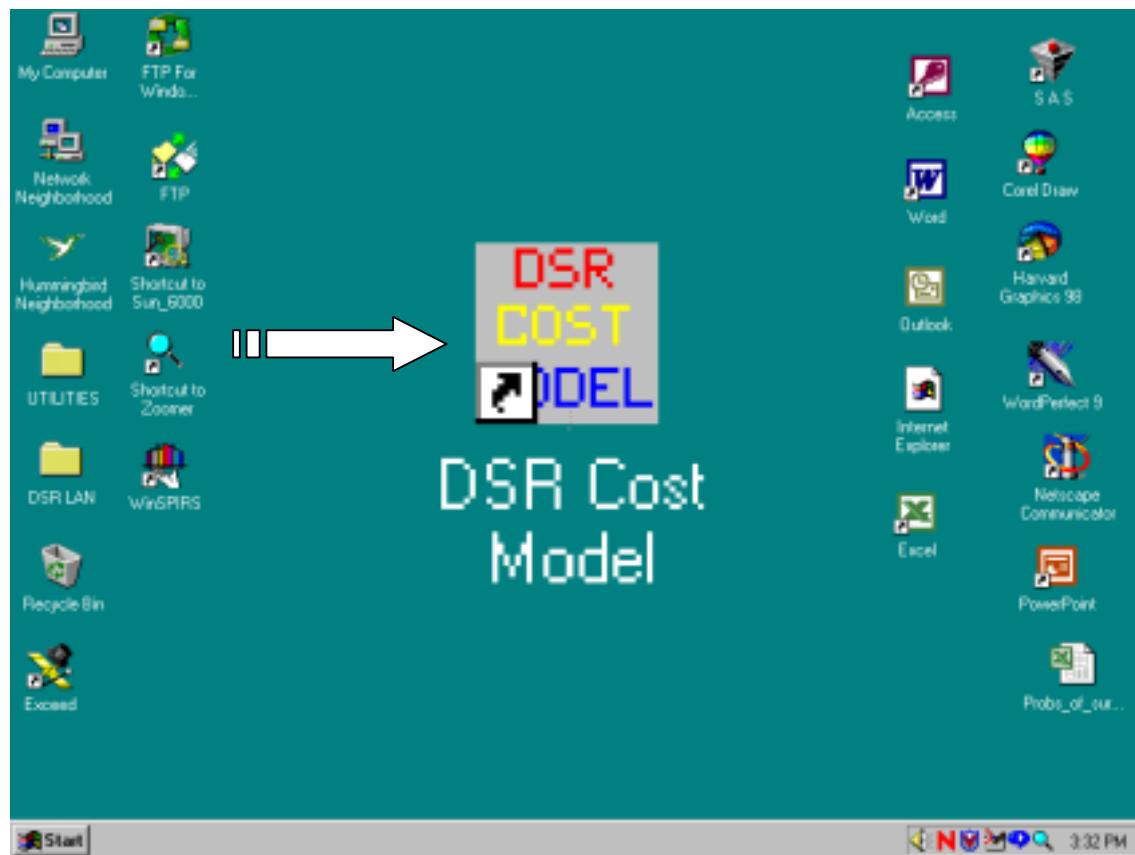
Base Year	Original CPI ↑	Target Year							
		1992	1993	1994	1995	1996	1997	1998	1999
1980	74.9	0.3940032	0.3718967	0.3549763	0.3396825	0.3282209	0.3192668	0.3093763	0.2988827
1981	82.9	0.4360863	0.4116187	0.392891	0.3759637	0.3632778	0.3533674	0.3424205	0.3308061
1982	92.5	0.486586	0.459285	0.4383886	0.4195011	0.4053462	0.3942882	0.3820735	0.3691141
1983	100.6	0.5291952	0.4995035	0.4767773	0.4562358	0.4408414	0.428815	0.4155308	0.4014366
1984	106.8	0.5618096	0.530288	0.5061611	0.4843537	0.4680105	0.455243	0.44114	0.4261772
1985	113.5	0.5970542	0.5635551	0.5379147	0.5147392	0.4973707	0.4838022	0.4688145	0.452913
1986	122.0	0.6417675	0.6057597	0.5781991	0.553288	0.5346188	0.5200341	0.503924	0.4868316
1987	130.1	0.6843766	0.6459782	0.6165877	0.5900227	0.5701139	0.554561	0.5373812	0.519154
1988	138.6	0.72909	0.6881827	0.656872	0.6285714	0.607362	0.5907928	0.5724907	0.5530726
1989	149.3	0.7853761	0.7413108	0.7075829	0.6770975	0.6542507	0.6364024	0.6166873	0.5957702
1990	162.8	0.8563914	0.8083416	0.771564	0.738322	0.7134093	0.6939471	0.6724494	0.6496409
1991	177.0	0.9310889	0.8788481	0.8388626	0.8027211	0.7756354	0.7544757	0.7311029	0.7063049
1992	190.1	1	0.9438928	0.9009479	0.8621315	0.8330412	0.8103154	0.7852127	0.7585794
1993	201.4	1.0594424	1	0.9545024	0.9133787	0.8825592	0.8584825	0.8318876	0.8036712
1994	211.0	1.1099421	1.0476663	1	0.9569161	0.9246275	0.8994032	0.8715407	0.8419792
1995	220.5	1.1599158	1.0948361	1.0450237	1	0.9662577	0.9398977	0.9107807	0.8798883
1996	228.2	1.2004208	1.1330685	1.0815166	1.0349206	1	0.9727195	0.9425857	0.9106145
1997	234.6	1.2340873	1.1648461	1.1118483	1.0639456	1.0280456	1	0.9690211	0.9361532
1998	242.1	1.2735402	1.2020854	1.1473934	1.0979592	1.0609115	1.0319693	1	0.9660814
1999	250.6	1.3182536	1.24429	1.1876777	1.1365079	1.0981595	1.0682012	1.0351095	1

U.S. Department of Labor Statistics/Bureau of Labor Statistics, Consumer Price Index (Medical Care Major Group)

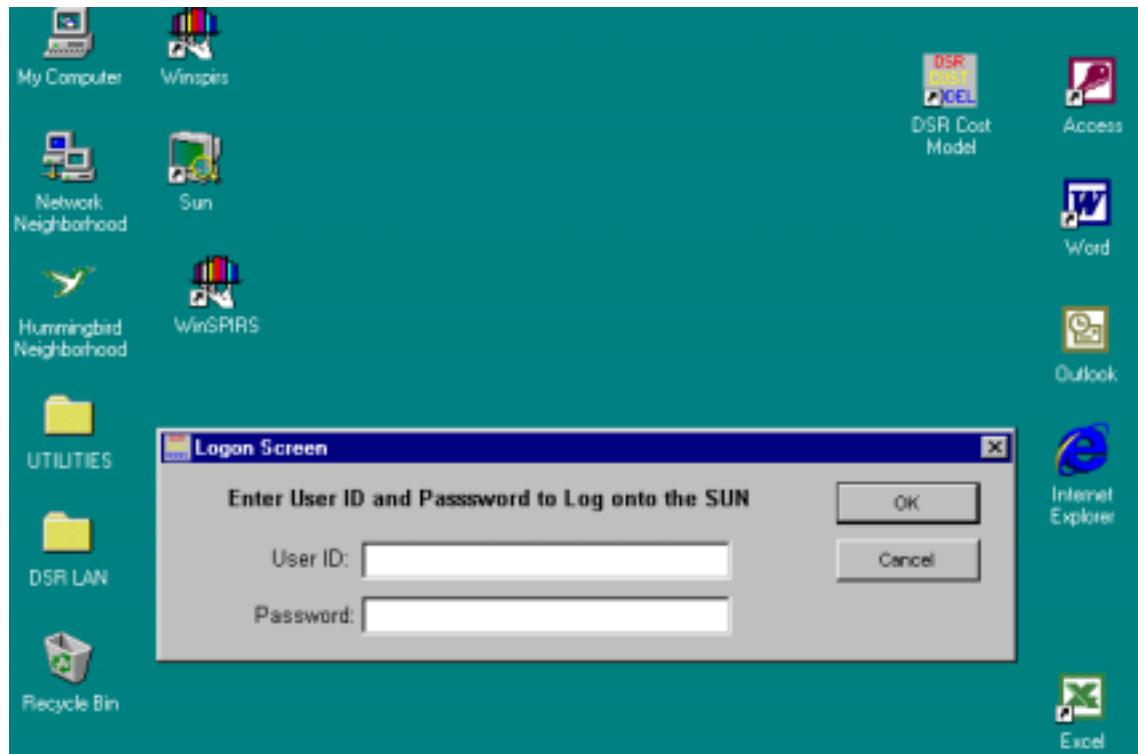
Appendix H. User Guide

How to Use the DSR Cost Model

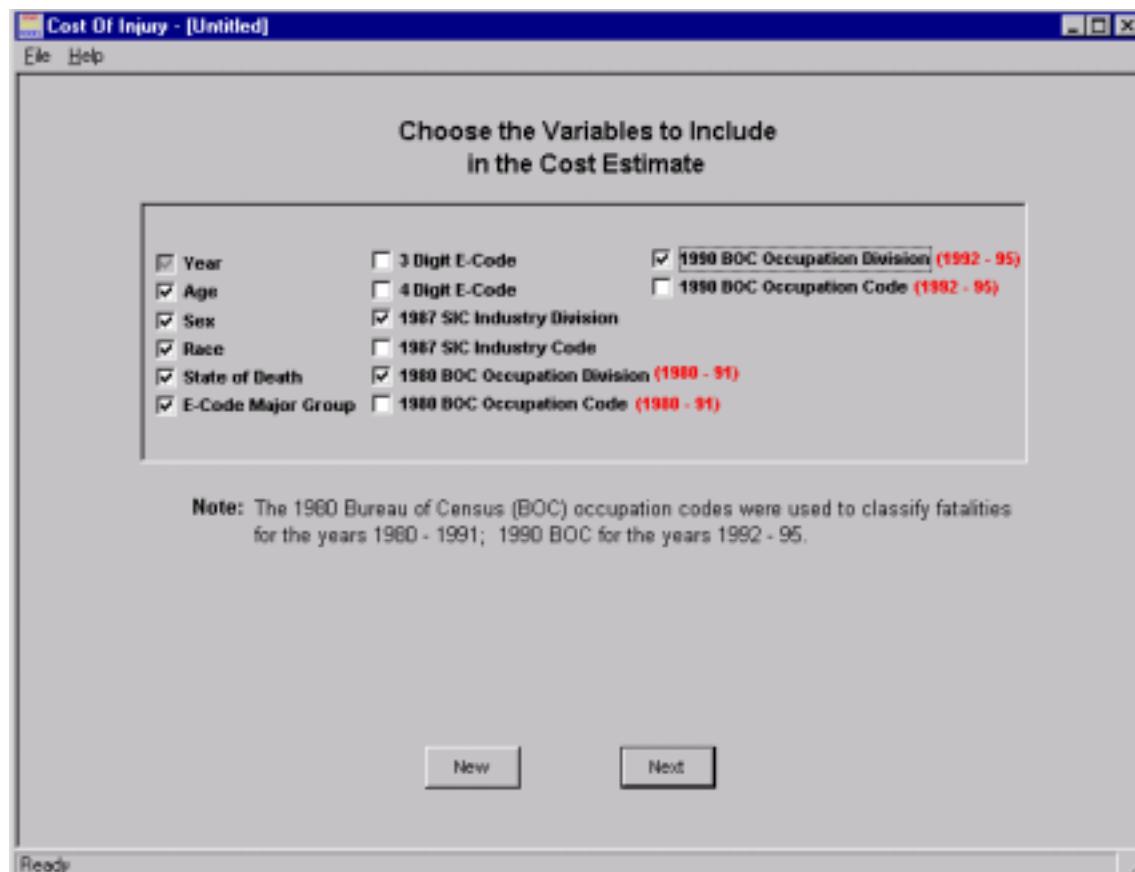
Double click the “DSR Cost Model” desktop icon. (As indicated by the arrow)



2. This activates the User ID and Password screen. Enter your normal User ID. Tab to the password line and enter your SUN password. Click the “OK” button or press the return key.



3. The next screen presents a menu of variables or characteristics of the fatalities that can be included in the cost calculation. Select the variables for inclusion by clicking the checkbox beside the variable name. After you have made your selection(s), click the “Next” button to proceed to the following screen. (Note: The “New” button clears all checked boxes).



4. The next series of selection screens depend on the variables chosen previously. On the next several pages are examples illustrating the layout of selection screens.

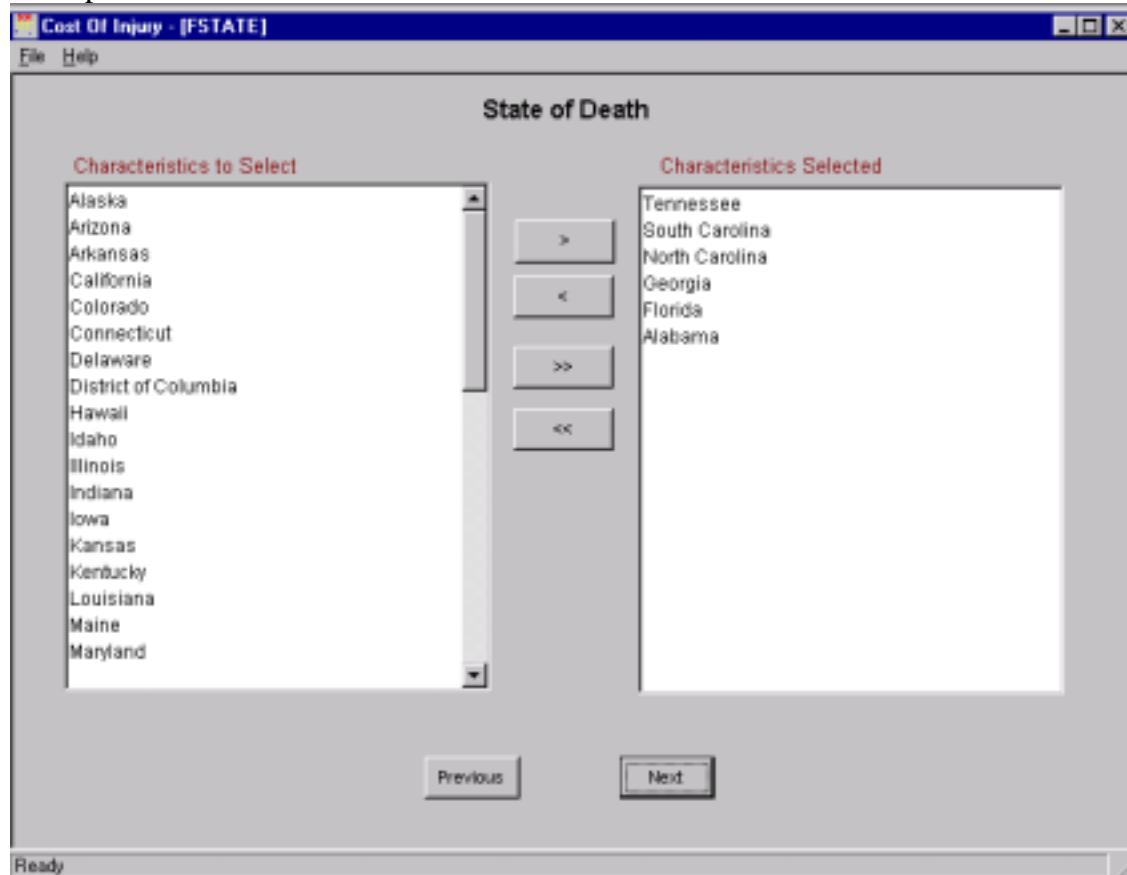
Select individual characteristics by double clicking on their names. Note that the selected items are highlighted and now appear in the “Characteristics selected” column.

Another option is to use the single arrow buttons to move highlighted individual characteristics from side to side.

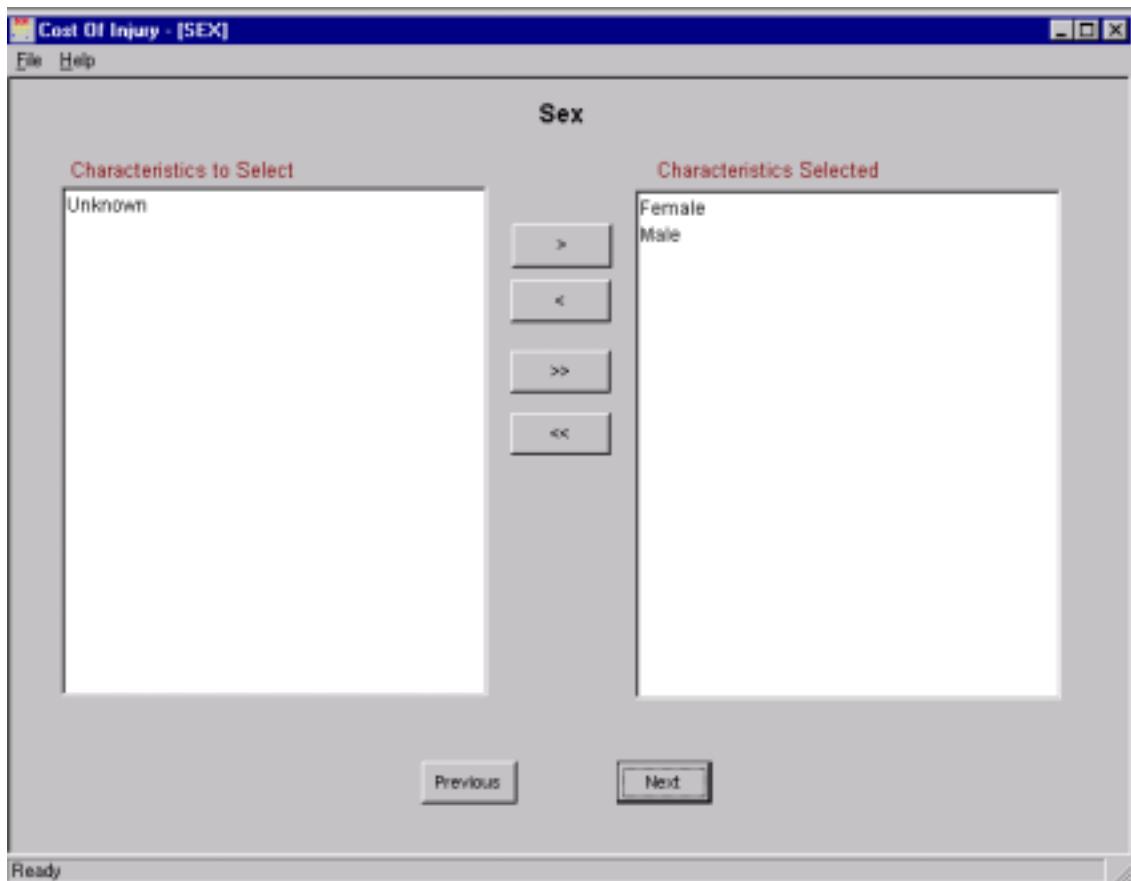
A final option is to use the right double arrow button to select every item with one click. The left double arrow button is provided in case you wish to clear all previous entries.

After you have made your selection(s) click the “Next” button to proceed to the following menu.

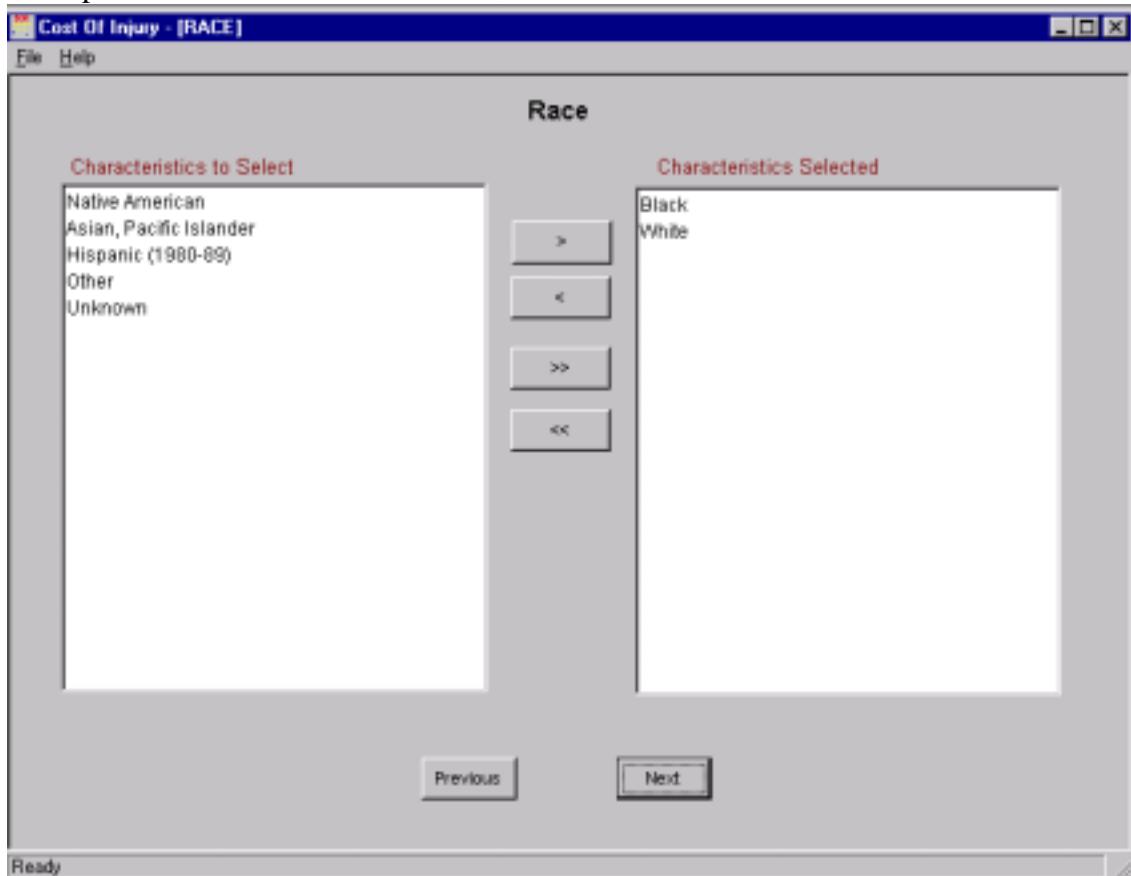
Example of State of Death screen with six states selected



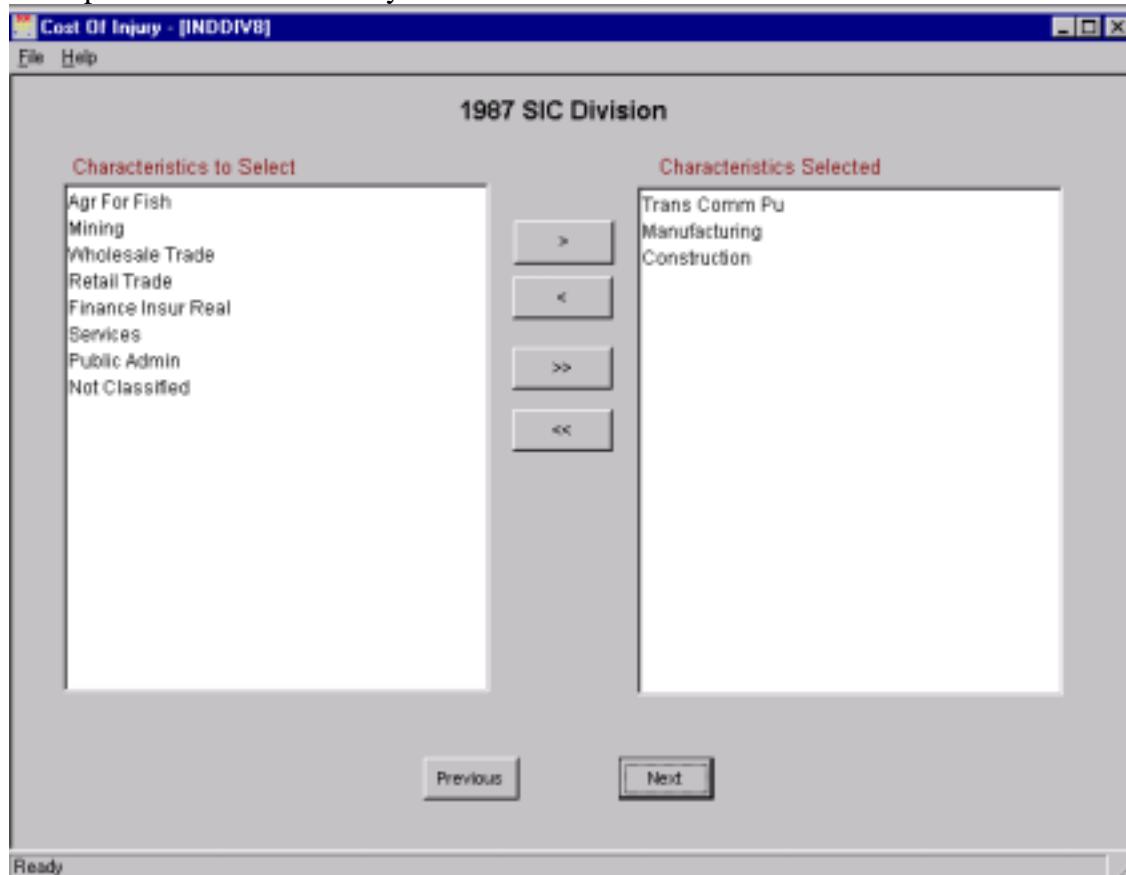
Example of Sex of decedents screen with male and female selected



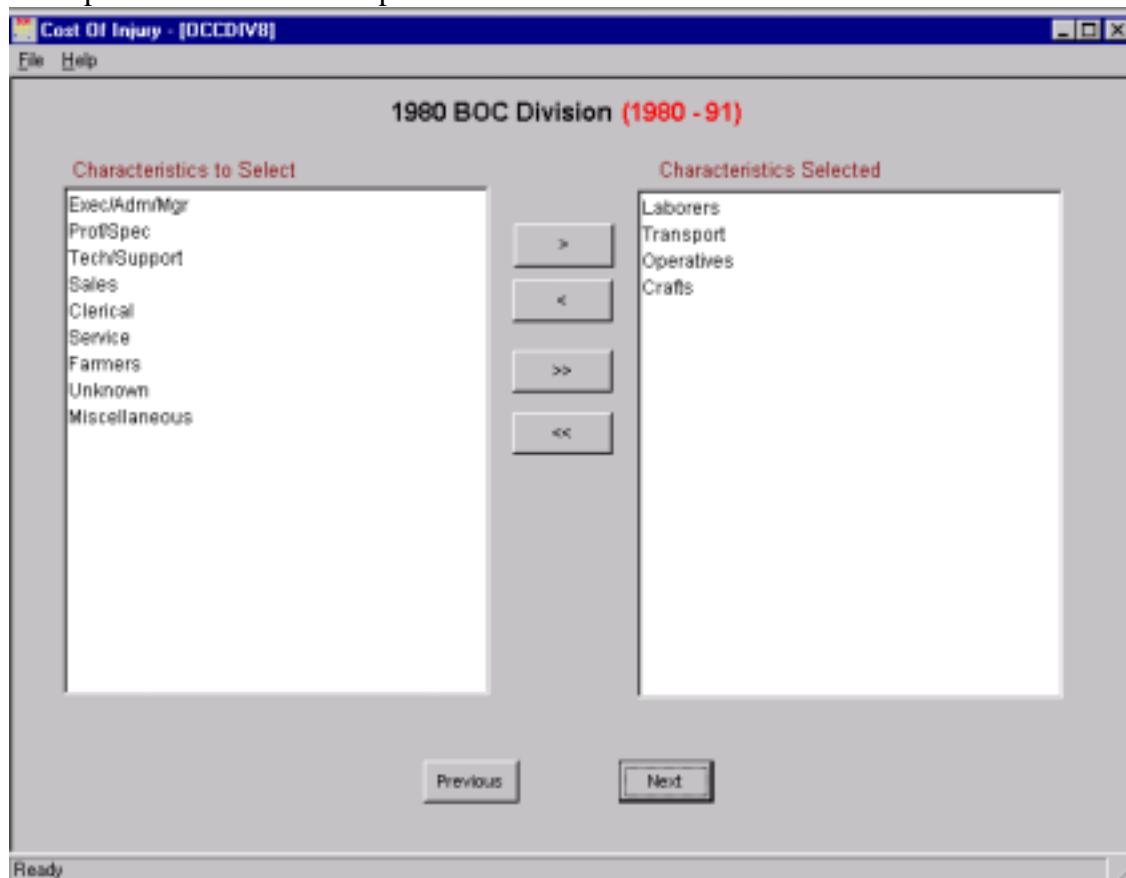
Example of Race screen with black and white selected



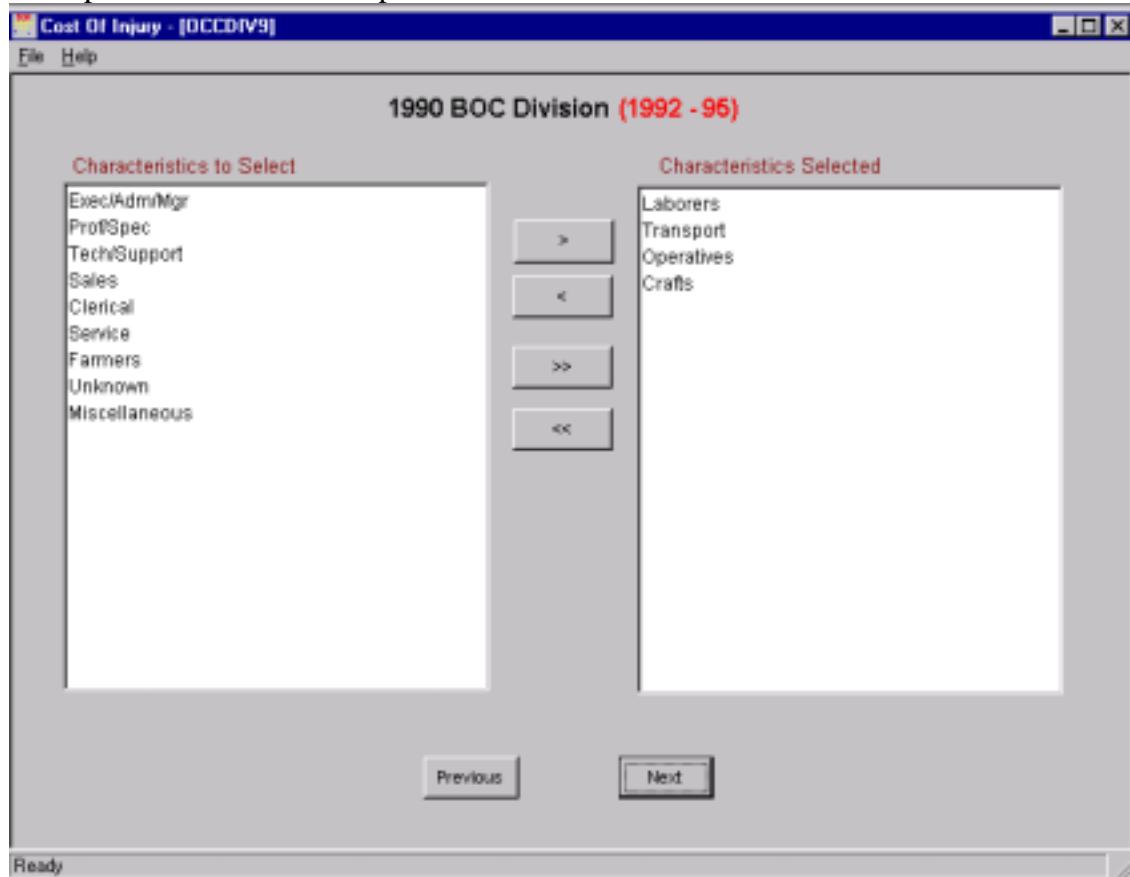
Example of 1987 SIC Industry Division screen with three items selected



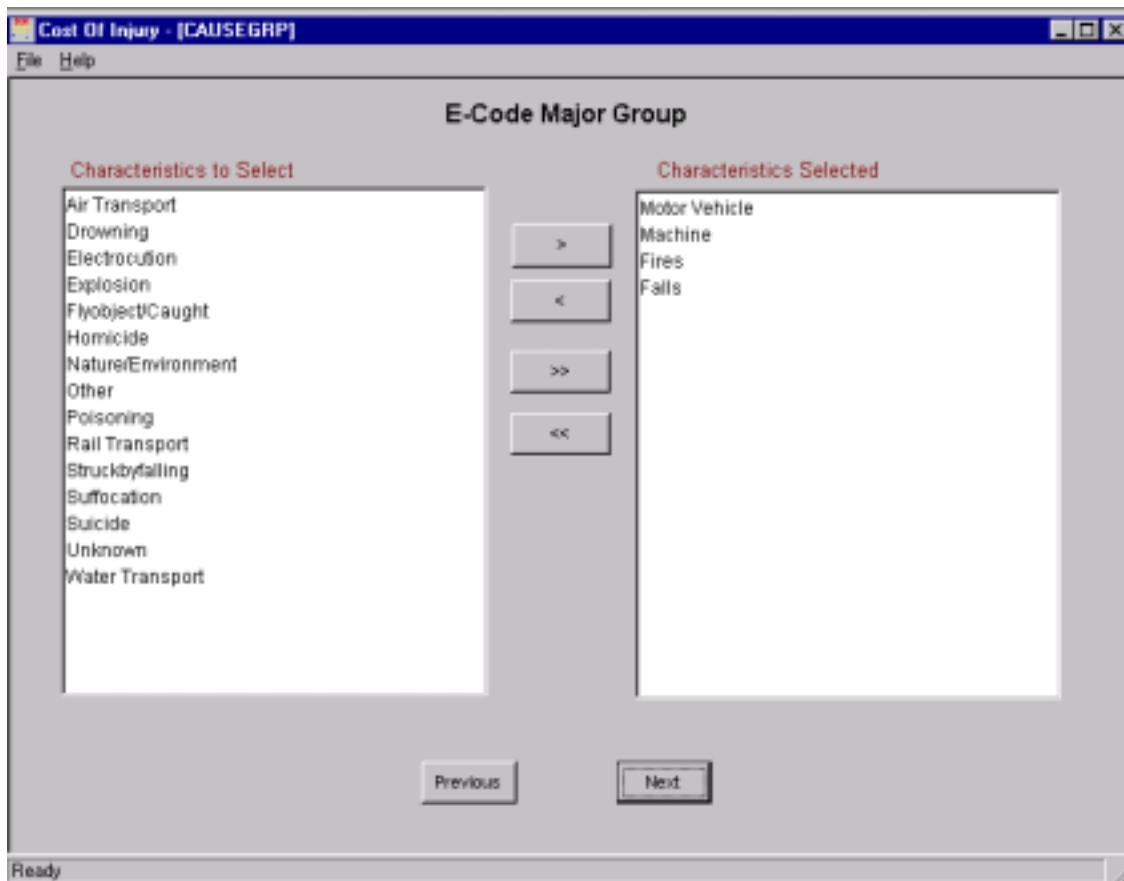
Example of 1980 BOC Occupation Division screen with four divisions selected



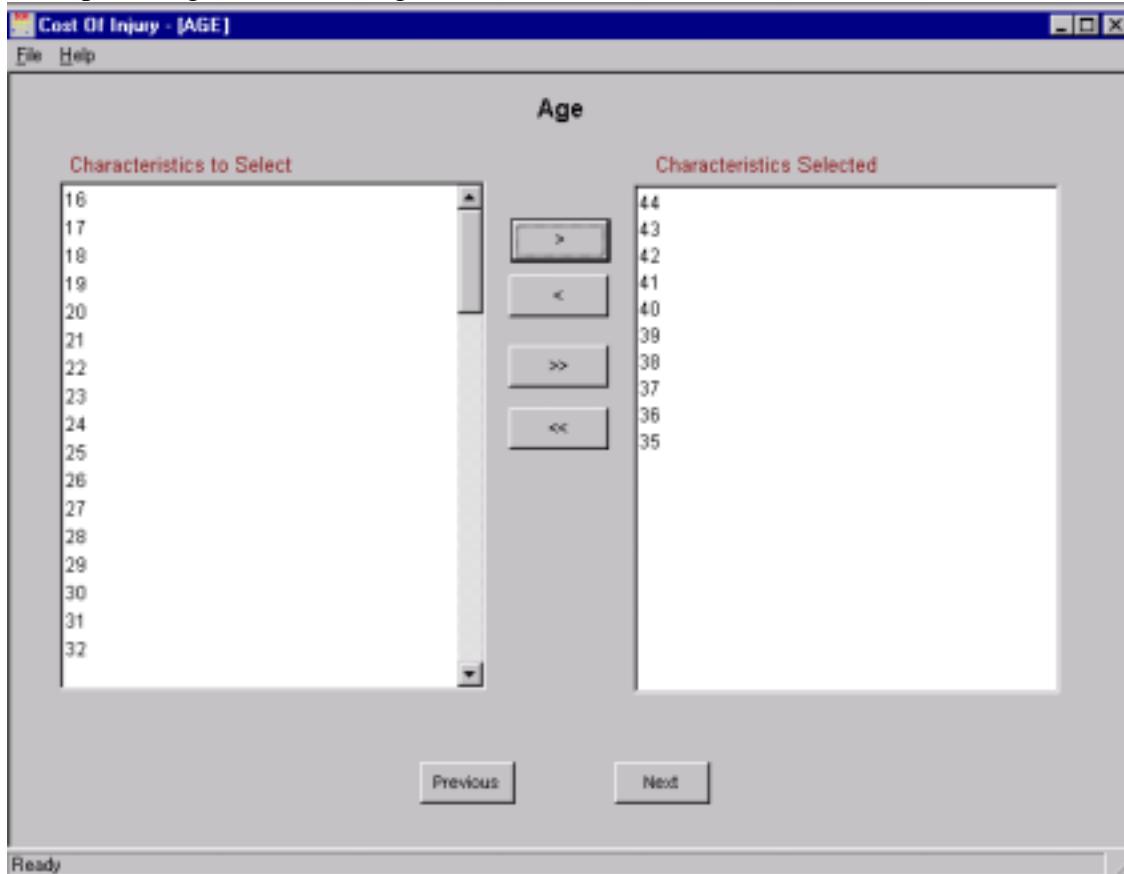
Example of 1990 BOC Occupation Division screen with four items selected



Example of External Cause of Death Code (E-Code) Major Group screen with four categories selected

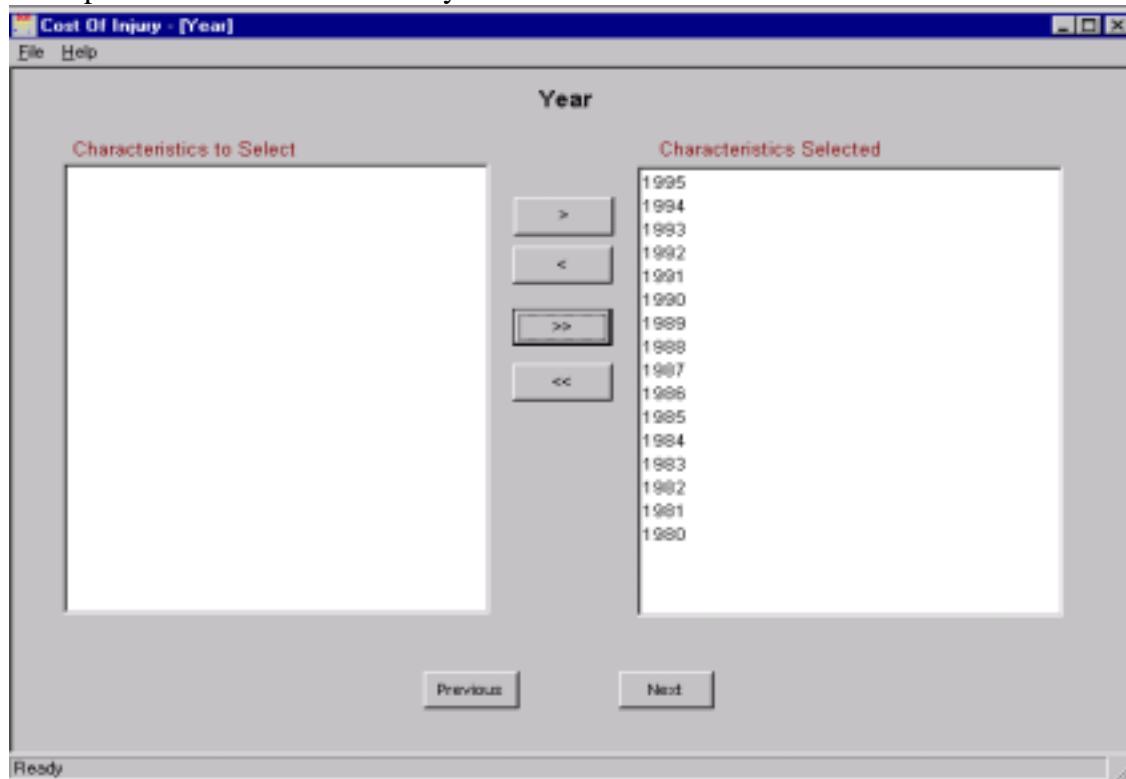


Example of Age screen with ages 35-44 selected

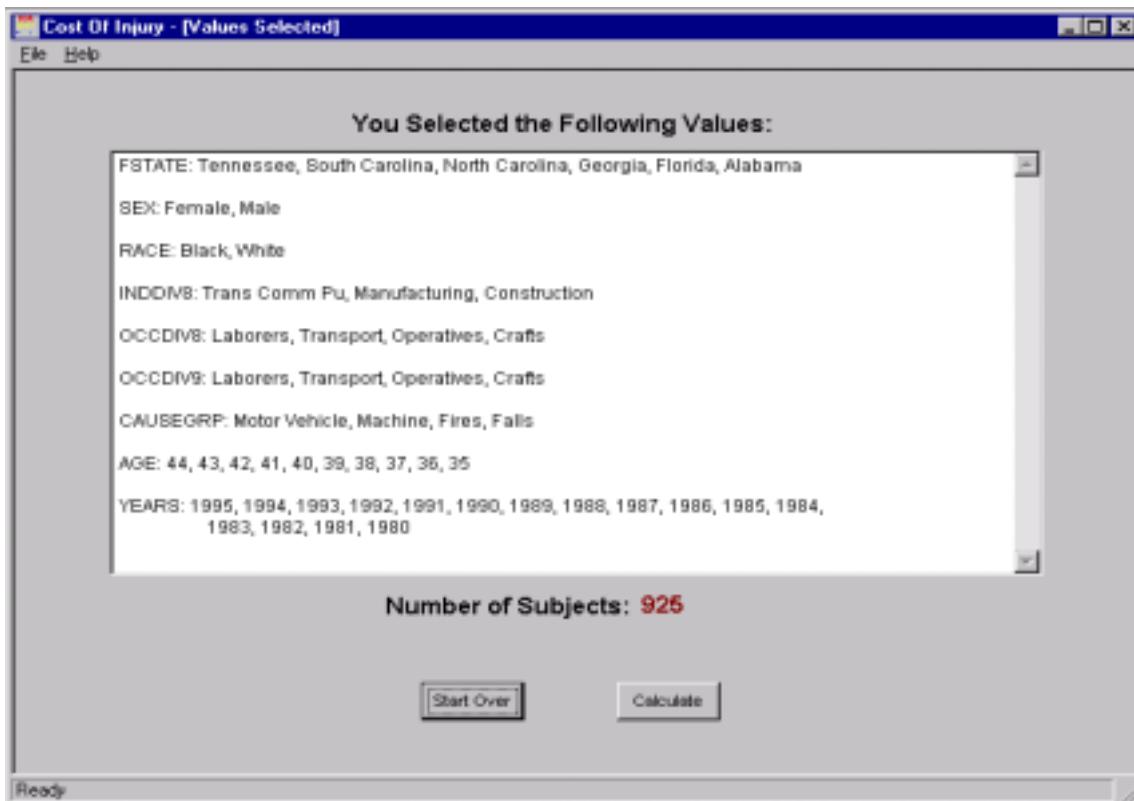


5. Year is a required field and is the last menu for every run. After selecting the year(s) click on the “Next” button.

Example of Years screen with all years selected



6. This screen lists the characteristics you selected and the total number of decedents with matching characteristics. At this point you can choose “Start Over” to revise your query or you can choose “Calculate” to determine the total cost and the average cost per subject.



7. If you choose calculate, the next screen presented is the “Cost of Fatal Injury” screen. This screen displays the characteristics selected, total cost, number of subjects, and mean and median cost per subject.



8. If you choose to print these results, press the “Print” button.
9. If you do not wish to perform additional calculations, press the “Exit” button to leave the program.
10. If you wish to perform additional calculations press the “New Calculation” button. If you choose to create a new calculation you will return to the first menu page, which will display your previous choices. You can select additional variables and/or deselect previously chosen variables by clicking the checkbox beside each variable. Clicking the “New” button will clear all of the previous choices. Click on the “Next” button when you want to proceed to the chosen variables. Proceed with the calculation as described in steps 3-9 above.

**Curriculum Vitae for
Elyce Anne Biddle**

Professional Experience

- 1996-pres. Senior Economist, Division of Safety Research, National Institute for Occupational Safety and Health, Center for Disease Control, U.S. Dept. of Health and Human Services, Morgantown, WV.
- 1995-96 Senior Labor Economist, Division of Occupational Pay and Employee Benefit Levels, Office of Compensation Levels and Trends, U.S. Department of Labor, Bureau of Labor Statistics, Washington, DC.
- 1985-95: Senior Economist, Division of Safety, Health, Program Analysis and Control, Office of Safety, Health and Working Conditions, U.S. Department of Labor, Bureau of Labor Statistics, Washington, DC.

Education

- M.S. 2001 West Virginia University, Morgantown, WV: Agricultural and Resource Economics (Expected)
- M.B.A. 1985 University of New Mexico, Albuquerque, NM: Business (35 hours completed in 3/2 program)
- B.A. 1985 University of New Mexico, Albuquerque, NM: Economics (Summa Cum Laude)

Summary of Honors and Professional Service

- National Institute for Occupational Safety and Health, NORA, Social and Economic Consequences of Workplace Injury and Illnesses; Chairperson 1997-pres
- Center to Protect Workers' Rights Economic Research Network, National Institute for Occupational Safety and Health Representative 1996-pres
- American National Standards Institute (ANSI) Z-16 Committee Member 1996-pres
- Centers for Disease Control and Prevention and Agency for Toxic Substances and Disease Registry Quality of Worklife Committee, Chairperson 1997-pres

Recent Publications

"The Role of NIOSH in Productivity Evaluation: Health and Safety in the Workplace" in Health and Work Productivity: Emerging Issues in Research and Policy. R. Kessler and P. Stang, eds. University of Chicago Publishing Co. (Forthcoming)

"Fire- and Flame-Related Occupational Fatalities in the United States, 1980-1994", Journal of Occupational and Environmental Medicine, Vol. 42, No. 4, April 2000

"Impact of a Changing U.S. Workforce on the Occupational Injury and Illness Experience", American Journal of Industrial Medicine, Supplement 1, September, 1999

"Denominator Effects on Traumatic Occupational Fatality Incidence Rates", Statistical Bulletin, Jan-Mar 1998

"Development and Application of an Occupational Injury and Illness Classification System", ILO Encyclopaedia of Occupational Health and Safety, Fourth Edition, Geneva:ILO, 1997

Recent Presentations:

"Measuring the Economic Burden of Occupational Injuries in the United States, 1990-1995" Presentation at the National Occupational Injury Research Symposium, October 2000.

"Impact of a Changing U.S. Workforce on the Occupational Injury Experience, 1980-1994" presented at the National Occupational Injury Research Symposium, October 2000.

"Reaching Consensus on Quality of Life and Economic Outcomes of Injury" For The 3rd International Conference Measuring the Burden of Injury, May 2000.

"Modeling the Economic Burden of Occupational Fatal Injuries in the United States, 1990-1995", for the Eastern Economic Association, March 2000.

"Classifying Occupational Injuries and Illnesses: Evolution of the Current System", for 13th Annual California Conference on Childhood Injury Prevention, October 1999.

"Classifying Occupational Injuries and Illnesses", for National Conference on Health Statistics, August 1999.

"Project Evaluation within NIOSH", presentation for WVU Department of Agricultural and Resource Economics, December 1998

"Methods in Social and Economic Analysis", presentation Allergic and Irritant Dermatitis National Occupational Research Agenda Implementation Team, December 1998

"Impact of a Changing U.S. Workforce on the Occupational Injury and Illness Experience", for 7th Joint Science Symposium on Occupational Safety and Health, October 1998

"Safety of Women in the Workplace", for Eastern Economic Association, February 1998

"Introduction to OIICS Coding Structure", for Insurance Data Management Association and American National Standards Institute Seminar on Injury Coding, January 1998

"Selecting an Appropriate Quality of Life Adjustment Index", for International Society for Quality of Life Studies, November 1997

Peer review panel for Consumer Product Safety Commission cost of injury model, June 1997

Discussant for Economics of Ergonomics for Managing Ergonomics in the 1990's : A discussion of the science and policy, Cincinnati, June 1997

Publications in process:

"Fire and Flame Related Events With Multiple Occupational Injury Fatalities in the United States, 1980-1995", manuscript submitted to peer-reviewed journal

"Will Risk to Older Workers Change in the 21st Century?", submitted to peer-reviewed journal

"The Role of NIOSH in Productivity Evaluation: Health and Safety in the Workplace" in Health and Work Productivity: Emerging Issues in Research and Policy. University of Chicago Press (in publication)