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Causes of Litigation in Workers' Compensation Programs

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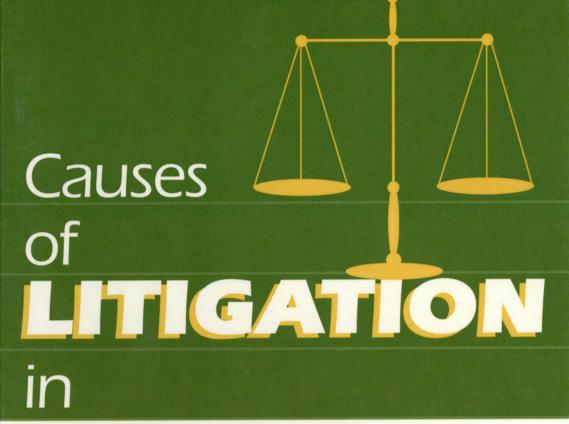Part of the Labor Economics Commons, and the Workers' Compensation Law Commons

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The facts presented in this study and the observations and viewpoints expressed are the sole responsibility of the authors. They do not necessarily represent positions of the W. E. Upjohn Institute for Employment Research.

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CONTENTS

LIST OF TABLES

Executive Summary

Litigation rates in workers' compensation systems in the United States have been rising over time, but relatively little is known about the characteristics of the injured workers and their employers that affect the probability of such litigation. Our research analyzes the factors determining whether or not a case is litigated and, if it is, how deep into the administrative process the case advances. How far the case proceeds is a proxy for societal costs associated with use of the formal dispute resolution system. Litigation involves the filing of a legal claim by at least one party to a dispute and possibly further activity within the formal dispute resolution system. We first construct a theoretical model in which the expected costs and benefits of litigation affect the probability that the concerned parties (the worker or the employer/insurance company) will contest a case and the probability that they will pursue a contested case to verdict. This model guides our empirical work.

Empirical research examining the causes of litigation within states, with sufficiently detailed data to control for a variety of influential factors, is missing from the workers' compensation literature. Our analysis attempts to fill this void. We investigate the compensation experience of employees who sustained lost–time injuries in two states, Delaware and Michigan. Both states earned reputations as being relatively litigious through the early 1980s, although under significantly different administrative structures, with an impairment approach in Delaware and a wage–loss approach in Michigan. We have two data sets from Delaware, for cases with compensated injuries originating in 1982 and in 1985. The Michigan data consist of a sample of cases that closed in 1986. With detailed data on worker characteristics, indemnity benefits received, and the nature of disputed cases, we identify factors influencing the probability of a case becoming contested and factors influencing whether settlement of the case occurs prior to an administrative hearing. For Delaware, we also study the elements affecting the size of indemnity payments to injured workers in contested and uncontested cases and obtain insights into whether litigation substantially increases the amount collected, other things being equal.

Results for Delaware

After a description of the institutional arrangements and data, we present the estimates of the multivariate litigation model for Delaware. We first study

how the employer and the insurance type affect the probability of litigation. Relative to a case in which the employer is commercially insured, a workers' compensation injury is more likely to be contested if the employer is one of the (self-insured) major automakers. In the 1982 and 1985 data, no differences are apparent in the probability of litigation among the major chemical manufacturers, other self-insured employers, and commercially insured employers. For 1982 injuries, cases where the employer is self-insured and in the public sector are also equally likely to be contested as when the employer is commercially insured. For 1985 injuries, such cases are less likely to be contested than those in which the employer is commercially insured.

Industry of employment affects litigation behavior in Delaware. Litigation probabilities are higher in manufacturing and construction than in services. Notably, these three industries account for about 60 percent of the injury claims in Delaware. Our model predicts that the shift of employment in recent years away from manufacturing and construction and towards services will result in lower future litigation probabilities.

The probability of litigation increases with a worker's age up to a maximum and decreases with age thereafter. We predict that the expected increase in the average age of the workforce in the coming decades will result in initial increases in litigation probabilities, but that those probabilities will eventually fall as the workforce continues to age.

A worker's wage has no effect on the litigation probability in 1982 (a recession year) but is negatively associated with the litigation probability in 1985 (a period of economic expansion). We interpret this result in terms of the changing opportunity costs of litigation over different phases of the business cycle.

The part of the body injured and the type of injury are significant determinants of the probability of litigation. In both years, back, shoulder, and knee as well as multiple-part injuries, significantly increase the probability of a case being contested. These are injuries where the existence of pain and the extent of the recovery following some period of recuperation are often difficult to ascertain objectively.

Similarly, the decision to pursue a case to verdict depends on the part of the body injured and on the type of injury. In 1985, a case was more likely to have been pursued to verdict when the employer was a major automaker. As with the decision to contest, pursued cases tend to be those involving injuries that are the most difficult to evaluate.

Indemnity payments to injured workers are related to a number of factors. Wages, type of injury, body part injured, type of employer, industry, and location of employment are associated with indemnity payments.

Insights can be gained about the efficiency of the Delaware workers' compensation system by examining predictions made using the estimated payment

equations. We predict the cumulative payments to the typical nonlitigant if he/ she *would have* litigated the case. We also predict payments had litigants *not litigated* their cases. From these predictions, we conclude that if individuals who did not contest their cases had done so, the litigation outcome would have resulted in smaller gains than those accruing to people who actually litigated their cases. In addition, our model predicts that litigants, even had they not disputed their cases, would have received higher payments than workers observed not to contest their injury. These predictions provide evidence that the dispute resolution system in Delaware sorts cases efficiently.

Results for Michigan

We also estimate the determinants of the probability of litigation and of pursuing a litigated a case to verdict for Michigan. This is particularly relevant for comparison with our Delaware results. Since the Michigan data set includes compensated and uncompensated cases, while the Delaware data only include the former, some of the models for Michigan are estimated with the sample consisting of compensated cases only. This approach allows for easier comparison of the Michigan results with those obtained for Delaware.

Big Three automakers show a greater likelihood of litigation than other types of employers when compensated and uncompensated cases are included in the sample; however, the difference disappears when the sample is limited to compensated cases. This result is consistent with the argument that litigation surrounding Big Three cases is more heavily involved with determining whether or not a case is compensable.

In Michigan, cases in which the employer is commercially insured are more likely to be contested than other cases except those involving the major automakers. In Delaware, cases in which the employer is commercially insured are equally likely to be contested as cases in which the employer is a self-insured private sector firm. The exception is the major automakers. A plausible explanation of this difference arises from the ways commercial workers' compensation insurance prices are regulated in the two states: Delaware imposes a price floor on insurance premiums, while Michigan does not. Insurance premiums in Michigan were regulated prior to the early 1980s. Beginning in 1981, a series of reforms ultimately led to open competition among insurance companies in Michigan, where insurance companies are free to compete with each other on price. In Delaware, insurance companies cannot offer discounts to employers with above-average safety records within a class of employers engaged in the same line of business. In effect, the rate reg-

ulation in Delaware results in very safe workplaces subsidizing less safe workplaces. This incomplete experience rating of workers' compensation insurance policies in Delaware may well explain the apparent difference in behavior of insurers in Michigan, where insurance premiums are more closely related to employer claims.

The next question involves the complexity (i.e., whether the case is pursued to verdict) of litigated cases in Michigan. That is, we are not only interested in the initiation but in the continuation of litigation. We estimate the effect of employer and injured worker characteristics on the probability of whether a case is taken to a decision or to an appeal. Cases in which the employer is a Big Three automaker are more likely to be contested, and when litigation takes place, they are also more likely to go further into the workers' compensation litigation process. For the probability of litigation, we find this outcome only when all cases (including uncompensated ones) are included. The result suggests that, when the employer is a Big Three automaker, the most hotly fought cases are those involving compensability of the injury. The probability that a contested case is pursued to verdict also depends on the worker's age (for compensated cases) and on the location of employment.

Causes of Litigation
in
Workers' Compensation

Introduction

For over a decade, rising litigation rates in workers' compensation systems in the United States have prompted calls for statutory reform. The growth in disputes significantly contributed to the rising total costs of job-related injuries nationally during the 1980s. However, litigation frequency and costs have varied widely across the nation. Some states, such as Wisconsin, have a relatively low proportion of cases involved in formal dispute resolution. At the other extreme is California, where litigation costs totaled $2.2 billion in 1992 and have increased by over 50 percent every two years since 1984 (California Workers' Compensation Institute 1993).

Although litigation has been blamed for rising workers' compensation premiums, there has been little empirical research into the factors that influence the decision by workers or by their employers to litigate. The following chapters offer an econometric analysis of dispute resolution within workers' compensation programs in Delaware and Michigan.

Workers' compensation statutes in Delaware have been the repeated target of criticism from both business and labor leaders during the last decade. The system is allegedly slow in paying benefits to injured workers, quick to involve attorneys, and expensive for employers liable for injury costs. However, as was true in many jurisdictions, the state lacked a suitable data base for determining the validity of these allegations, relative to the average experience in other states. In 1987, a data base was constructed at the University of Delaware as part of a grant from the state to correct this deficiency. The data base provided a profile of the compensation experience of all Delaware workers (and their employers) with lost-time injuries during 1982 (Staten and Link 1988). Five years of experience (through 1987) were incorporated into the data base during our original study in 1988.

A grant from the W.E. Upjohn Institute for Employment Research provided the resources for updating the 1982 file by adding the compensation history for each case through mid-1990. Also, the grant supported the creation of a second Delaware data file based on compensable lost-time injuries that occurred in 1985. Like the 1982 data, the cases in the 1985 file have been followed through mid-1990.

One of the main objectives of our research is to analyze the factors influencing whether a case is litigated and, if litigated, how far into the

1

legal process the case goes. Litigation involves the filing of a legal claim by at least one party to a dispute and possibly further activity within the formal dispute resolution system. The empirical model captures the impact of the economic incentives that affect the decisions of both employees and employers to contest workers' compensation claims. The model incorporates the petitioner's options of either dropping or settling a dispute with the other party or of taking the case to a formal hearing.

These issues are examined with the Delaware data as well as with data provided by the Upjohn Institute, derived from a sample of more than six thousand workers' compensation cases in Michigan that were closed in 1986. The Michigan data provide an opportunity for evaluating the empirical model's applicability to other states.

Both data sets are used to address questions such as the following:

1. What factors determine the probability that a claim will be contested?

2. Why are some contested claims dropped or settled prior to a formal administrative hearing?

3. How are the dollar amounts of compensation influenced by a decision to settle versus a decision to continue to pursue a case through the dispute resolution system?

4. What impact does the type of insurance (commercially purchased versus self-insured) have on the decision to litigate?

Chapter 1 introduces the reader to the litigation problem in workers' compensation programs. The chapter discusses how litigation has escalated within a system that was originally intended to reduce the courts' involvement in the compensation process. Chapter 2 summarizes the components of the Delaware data base and describes the characteristics and compensation experience of workers injured during 1982 and 1985 through a series of bivariate tables. The conceptual model of dispute resolution is described in chapter 3. This model is the basis for the econometric estimates for Delaware injuries presented in chapter 4. Chapter 5 applies the model to analyze the determinants.of litigation in Michigan, based on a sample of cases closed during 1986. Our conclusions are presented in chapter 6.

1

Workers' Compensation
and Market Efficiency

At the beginning of the twentieth century, industrial accidents were frequent.[1] In the days before public assistance programs provided a social safety net, injured workers suffered prolonged and severe income interruptions. Although the tort system was available for recovering damages from employers, workers found that, in many cases, employer negligence, necessary for establishing employer liability for the costs of an injury, was difficult to prove in court. Jury awards in favor of injured plaintiffs were haphazard, varied substantially in size, and almost always involved delays of many months between the time of injury and receipt of payment (Berkowitz and Berkowitz 1985).

In response to these conditions, workers' compensation laws were enacted in the majority of state legislatures between 1911 and 1920. Workers' compensation was conceived as a social insurance program that would preempt reliance on the legal tort system for handling disputes over job-related injuries. Reformers fashioned a "no-fault" system of compensation to injured workers that assigned strict liability to employers for the costs of job-related injuries. Strict liability is where there is no requirement for proof of negligence to establish liability. Through this approach, benefits were provided to all injured workers, without requiring a determination of fault. However, all workers were required to accept workers' compensation benefits as their exclusive remedy. Thus, a *quid pro quo* emerged. Workers received the guarantee of certain and timely compensation (in the form of income replacement plus medical costs) for their injuries on the job, without having to demonstrate employer negligence. In return, the statutes limited an employer's liability for injury costs to maximum amounts of compensation, removing the threat of larger jury awards. In principle, legal disputes over culpability were legislated out of the industrial accident arena.

However, time has proved the reformers too optimistic in the hope that the workers' compensation program would prove to be largely

self-administering. To some degree, litigation has been part of the system since its inception. To qualify for workers' compensation, an injury must be shown to be job related, thereby opening the door to dispute. Moreover, many jurisdictions link the payment of indemnity benefits to an assessment of physical impairment, which may also be disputed. According to estimates from the National Council on Compensation Insurance (NCCI), 23 percent of all 1984 claims for permanent partial disability were represented by an attorney. However, litigation rates varied widely across states. For example, the 1984 NCCI report noted that 47 percent of permanent partial claimants in Illinois hired an attorney but that only 9 percent of such claimants were represented by an attorney in Wisconsin (NCCI 1984).

In some states, the rate and, more importantly, the cost of contested cases grew dramatically between 1970 and 1990. In terms of absolute dollars, California's experience is by far the worst. In 1990, 45 percent of all workers' compensation indemnity cases in California were litigated, and 62 percent of these litigated cases involved disputes over the existence and extent of permanent disability (California Workers' Compensation Institute 1991, p. 2). More importantly, the California Workers' Compensation Institute estimates that the annual cost of workers' compensation *litigation* in that state increased from $240 million in 1981 to $1.5 billion in 1990. In contrast, the number of injuries resulting in lost time of one day or more increased by only 15 percent during the same period.

Standards for Measuring the Impact of Litigation on Program Effectiveness

The reformers who drafted the initial workers' compensation statutes early in the twentieth century were primarily concerned with income maintenance and fairness. The imposition of strict liability reflects the overwhelming judgment that a compensation system relying on the courts for awarding benefits would not accomplish these goals. Thus, it is reasonable to question the extent to which litigation *within* the workers' compensation system has compromised the program's effectiveness.

To clarify analysis of the "litigation problem" it is necessary first to define precisely the criteria used to evaluate the effectiveness of a workers' compensation program. The original concerns of reformers regarding benefit adequacy and equity have persisted over time. Congress formed the National Commission on State Workmen's Compensation Laws (1972) to evaluate the degree of income replacement provided by the network of state workers' compensation laws. In developing a lengthy list of recommendations for state legislatures, the National Commission defined and applied adequacy and equity standards for evaluating a workers' compensation system. Benefits paid and services provided under a workers' compensation program were *adequate* if they were sufficient to meet the objectives of providing substantial protection against interruption of income.[2] An *equitable* system was defined by the National Commission as "delivering benefits and services fairly as judged by the program's consistency in providing equal benefits or services to workers in identical circumstances and its rationality in providing benefits and services in proportion to the impairment or disability for those with different degrees of loss."[3]

Two other evaluative criteria established by the National Commission are directly impacted by litigation. Injuries impose a cost on workers, on firms, and on society as a whole in that there is a reduction in the capacity for producing goods and services. Thus, an important dimension of any method of transferring income to injured workers is the program's impact on *safety*, i.e., its effect on the incentives of both the employer and the employee to reduce the probability of accidents.

Still another area of concern recognized by the National Commission involves the *administrative costs* required to deliver benefits to injured workers. Ideally, benefits of a given quality would be delivered at the lowest possible administrative cost.[4] Of course, a major component of these costs (summed across all parties involved) is the "frictional costs" associated with resolving disputes.

One way of evaluating the burden imposed by litigation is to consider the dollars that injured workers receive (as indemnity benefits, medical treatment, or rehabilitation) as a proportion of the total dollars paid by employers in the form of awards (indemnity, medical, rehabilitation) plus litigation costs. Measured in this way, California's performance over the past two decades highlights the drag imposed by the growth in administration costs. In 1978, employers paid 32 cents in

legal costs for each dollar of benefits delivered to injured workers. By 1992, 78 cents in litigation expenses were paid by employers for each dollar awarded. Clearly, workers received a declining share of the total costs incurred by employers for injuries. A report from the California Workers' Compensation Institute found that "in 1978, employees received 76 cents of each dollar that employers paid for litigation plus awards, while attorneys received 13 cents and forensic physicians received eight cents. By 1992, those proportions shifted dramatically, with the injured worker being the big loser. In 1992, injured workers received only 56 cents of each dollar paid by employers for litigation and awards, while the forensic physicians' share tripled to 24 cents and the attorneys' share increased slightly to 17 cents" (California Workers' Compensation Institute 1993, p. 4).

It is conceptually helpful to combine the separate but related goals of safety and streamlined administrative costs under an umbrella concept termed the *efficiency* of the workers' compensation program. Efficiency is a concept that economists routinely apply in evaluating the performance of markets. Simply put, an efficient mechanism for organizing the production and distribution of goods and services is one that maximizes the value of the things we, as a society, can produce with our scarce resources.

While the efficiency of a workers' compensation system may have been recognized as an important consideration by the early reformers, the importance of efficiency has been substantially elevated over the past two decades. In large part, this is due to a growing body of economic analysis that has empirically quantified the effects of workers' compensation programs on safety incentives, injury rates, worker productivity, total labor costs, and the hiring/location decisions of firms. Discussions of empirical evidence on these issues can be found in Chelius (1977, 1983), Butler and Worrall (1985), and Worrall and Butler (1988).

Economic research has forced workers' compensation policymakers to recognize the trade-offs between competing goals of adequacy, equity, and efficiency. For example, raising weekly compensation payments to enhance benefit adequacy has been shown to lead to more reported injuries and more time off the job. On the other hand, restricted coverage of certain types of injuries or occupational diseases, in the interest of economizing on administrative costs and total com-

pensation payments, can reduce employers' incentives to prevent accidents.

Perhaps the best way to illustrate the concept of efficiency and related trade-offs is in the context of a simple model of the economics of job safety. Workers' compensation plays an important role in determining the amount of job safety that will be produced and consequently, the efficiency of the production of goods and services. Thus, the administrative rules established by a state to determine and deliver workers' compensation also influence the efficiency of production. The following section makes the concept of efficiency, and the trade-offs between safety and streamlined administration, more concrete by inserting workers' compensation into a simple model of the economics of job safety.

Workers' Compensation and the Economics of Job Safety

We must begin with an idea of what constitutes the most desirable or optimal amount of safety.[5] Like any economic good, an increase in workplace safety, measured in terms of a reduction in the probability of injury, involves higher production costs. Of course, the safest (zero-risk) work environment would involve no human contact at all, but reducing labor involvement requires that greater quantities of other resources be substituted in order to manufacture the final product. This defines the terms of the trade-off. We can achieve more safety if we are willing to make do with less of other things. The higher costs of safer working conditions are reflected in a higher product price. The economically efficient amount of safety is the level that maximizes the subjective value that we collectively place on safety plus all the other goods and services we consume for a given expenditure.

Under certain conditions, a free market is capable of providing the optimal amount of safety without government regulation. To see this, begin by imagining a world, long since past, of strict *caveat emptor* in regard to employer-employee obligations in the event of industrial accidents. That is, the firm bears no legal liability for job hazards. In such a world, would a firm have any financial incentive to prevent accidents? The answer is yes, and under certain (restrictive) conditions, a

firm might bear all of the costs of worker injuries. Assume a competitive labor market in which employers vie for qualified workers. Lost-time accidents impose costs on employers in several ways. At the most fundamental level, even minor accidents disrupt a worker's productivity. Injuries that require recovery time away from the job deny the firm the output that the worker would have contributed. Interviewing, hiring, and training replacements impose additional costs. So, even without liability to compensate the injured worker, the firm bears some costs of the accident.

Hazardous worksites impose other, potentially greater costs on a firm. Assume that workers, over time, become fully informed about the working conditions and relative risk of job sites. In a competitive labor market, workers will demand and employers must pay compensating wage differentials for riskier jobs. Risk-neutral workers who are fully informed will demand extra compensation equal to the expected costs associated with the risk of injury in particular jobs (risk-averse workers will demand compensation in excess of expected injury costs). Higher wages for riskier jobs force firms to "internalize" the expected injury costs. That is, firms will consider these costs along with all other production costs when making choices about the amount of output to produce and the mix of inputs to employ.

Employers will typically choose from a variety of options for reducing the expected costs of worker injuries. A firm might automate production in order to use less labor and thus incur less risk of injury. Alternatively, a business might find that installation of safety features or procedures may reduce the risk of injury and lower the compensating wage differential demanded by workers. The point is that a firm in such a market will prevent accidents when prevention is cheaper than paying higher wages to workers to cover the expected costs of injuries. The business bears all of the costs of industrial accidents, and such costs are reflected in the price of the final product. Wealth-maximizing firms in such competitive markets will produce the optimal amount of final product and job safety.

Of course, the real world is not so neatly defined. Optimal production of safety in the "let-the-worker-beware" system described depends critically on workers who are sufficiently informed about job hazards to demand higher wages and are sufficiently mobile to incur no costs of switching jobs. Otherwise, the firm faces less market pressure to pay

compensating differentials and has a reduced incentive to prevent accidents. Consequently, some of the costs of production remain "external" to the firm; workers (and society) incur the costs, but the firm does not. More of the final output is produced and sold at a lower price than would occur if the firm internalized the injury costs. Less safety is produced than would be true if the firm fully compensated injured workers.

Given this less-than-perfect result in a less-than-ideal world, a case can be made for government intervention in the marketplace. The most fundamental form of intervention is the establishment of property rights on behalf of workers that impose liability on employers for injuries resulting from job-site hazards. In principle, the firm's legal liability for injuries at least partially replaced compensating wage differentials as the mechanism forcing it to internalize injury costs. When liable for accident compensation, a wealth-maximizing firm would incorporate into its decisionmaking the expected costs to be paid when an injured worker sues for damages; this would occur just as surely as if the firm were paying higher wages for riskier jobs.

However, prior to the early twentieth century, when the tort system was the legal remedy for injured workers in the United States, the plaintiff (worker) was required to demonstrate some degree of negligence on the part of the employer. As discussed, the difficulty of establishing employer negligence caused awards to vary substantially above and below the actual costs incurred by the injured worker and resulted in considerable uncertainty regarding the probability of recovering any settlement at all. From the standpoint of economic efficiency, the advantage of workers' compensation programs was in the strict liability provisions. The greatly increased probability of having to compensate injured workers required firms to internalize injury costs far more reliably than when payment was subject to the vagaries of the courts.[6]

The extent of the employer's liability for the cost of injuries should be reflected in accident rates. States that require larger compensation payments to injured workers should experience lower injury rates, other things being equal. Interestingly, empirical studies that have related differences in workers' compensation benefit rates across states to differences in injury rates often reveal a positive association. However, this is not because higher benefits have somehow compromised safety, nor is it likely due to greater risk taking by workers. Instead,

most studies that relate accident rates to benefit levels have focused on nonfatal injuries, for which a significant moral hazard effect exists. That is, workers receiving more generous benefits are more likely to report injuries and to claim that injuries occurring off the job were actually job-related (Smith 1990). Also, returning to work after an injury is less attractive when benefits are higher. One recent study estimates that the time off the job increases by 3 percent for each 10 percent increase in workers' compensation benefits (Viscusi 1991, p. 78).

Clearly, incentives matter when considering the impact of workers' compensation programs on both employer and employee behavior. The NCCI has estimated that, from 1978 to 1988, workers' compensation premiums increased by 48.4 percent due to benefit changes, and by an additional 30.1 percent due to changes in worker behavior arising from the altered benefit structure (Viscusi 1991, p. 78).

The question posed earlier remains, however: what impact have benefit levels had on the employer's incentive to prevent accidents? By focusing on work-related *fatalities* in order to eliminate the moral hazard problems, empirical studies have shown that, in the absence of workers' compensation, the risk of job-related fatalities in the United States would be 20-27 percent higher than current levels. This result validates the prediction that (strict) liability for injury costs imposed by workers' compensation does promote investment in safety (Moore and Viscusi 1990) and the efficient production of goods and services.

How does litigation influence efficiency? The impact derives from two separate but related effects. First, the friction imposed by litigation drains scarce resources from other employment as they are used to resolve disputes. Consequently, as litigation costs rise, other things held constant, society has less overall output available for consumption.

This is not to say that all litigation is undesirable, for disputes do arise and resolution is necessary to achieve the desired level of safety. Recall that to be eligible for workers' compensation, an individual must demonstrate an injury to be work-related; this claim is a potential source of dispute. Also, criteria for determining the amount of indemnity compensation may require judgments about physical impairment, the potential loss of use of body parts and systems, or the loss of wage-earning capacity, all of which create an incentive for workers to overstate and for employers to understate the degree of injury. To the extent

that a state's administrative rules create these incentives, efficiency requires some form of litigation to bring actual compensation as close to the true cost of injury as the statutes allow.

Certainly, as discussed in the economic model of job safety, as the costs of dispute resolution rise, other things will not remain constant. Litigation costs resemble a tax on labor, effectively increasing the price of labor relative to other inputs that might be used in the production process. Over time, a wealth-maximizing firm experiencing rising workers' compensation costs will reduce its reliance on labor in favor of other, relatively less costly, inputs. The incentive to avoid the "litigation tax" will be greatest for the types of jobs that most frequently generate disputes over injuries. The substitution incentive is operative at all times but will have different impacts across states, depending upon whether the state's administrative framework promotes or deters disputes.

Consequently, the second effect of rising costs of litigation may be a distortion of safety incentives, leading to the overproduction of safety and underproduction of other goods and services. Injuries will likely be reduced over time for two reasons. Firms will invest in equipment, training, and procedures to lower the probability of injuries that spawn litigated claims. Alternatively, firms may simply cut back employment (to achieve less exposure) in risky jobs. In other words, workers' compensation statutes can cause the market to generate too little employment in some occupations, because the cost of resolving injury disputes inflates the cost of labor and distorts the safety incentives. On the other hand, attempts to rein in litigation costs by limiting coverage of controversial types of injuries run the risk of compromising (sacrificing) the deterrent function that workers' compensation serves when it links the cost of injury to the party generating the risk.

What Causes Disputes?

Disputes arise if there is doubt that the injury is job-related. Disputes also arise when the extent of disability is difficult to measure, since total compensation payments are typically a function of time off

the job or reduced earnings capacity. These two broad categories of issues constitute the large majority of all litigation.[7]

How does the administrative structure of a workers' compensation system influence the number of disputes? Perhaps the best illustration is in the context of the rules for compensating permanent disability. Although only about 20-25 percent of all work-related injuries in the United States involve a permanent disability, payments to these workers accounted for 65 percent of all indemnity benefits in 1982 (Berkowitz and Burton 1987, p. 38). The various state jurisdictions are not uniform in defining precisely the objectives of their provisions for compensating permanent disabilities. Consequently, the costs of permanent partial disability as well as the frequency of disputes vary widely across states.

Some terminology is helpful for understanding the issues. Berkowitz and Burton (1987, chapter 1) define impairment and disability as the two concepts fundamental to the theory of compensating permanent disabilities. Impairment refers to anatomical, physiological, intellectual, or emotional abnormality or loss resulting from an injury. In contrast, a disability is "the inability or limitations in performing social roles and activities such as in relation to work, family, or to independent community living" (Berkowitz and Burton 1987, pp. 6-9). They distinguish conceptually between two types of disability, work and nonwork. A work disability involves the loss of actual earnings or earnings capability as a consequence of impairment. A nonwork disability involves limitations in performing social roles and activities, as a result of impairment.

Which type of disabilities are workers' compensation laws intended to compensate? The answer is not clear-cut. However, according to Berkowitz and Burton, the National Commission on State Workmen's Compensation Laws (1972) concluded that one of the basic objectives of a modern workers' compensation program is the substantial protection against loss of income. Consequently, workers' compensation benefit payments should be tied to the extent of work disability. Nevertheless, some states accommodate nonwork limitations in their calculations of permanent partial benefits, widening the potential area for dispute.

Even confining the calculations to work disability leaves the issue of determining compensation far from settled. The problem is that work

disability is difficult to measure. "The extent of a worker's disability depends not only on the extent of his or her functional limitations but also on other influences. For example, the loss of actual earnings or decrease in earnings capacity (work disability) depends not just on functional limitations, but on the worker's personal characteristics (age, education, experience, and other factors), the labor market conditions in which he must compete for employment, and the sources of assistance available to him" (Berkowitz and Burton 1987, p. 9).

Almost all states tackle the problem of measuring lost earnings capacity by evaluating impairments, as an observable proxy for the degree of work disability. Some states, such as Delaware, also make payments for the impairment itself, independent of its impact on earnings. However, the decision about the amount of permanent partial benefits to be paid is typically made after the medical condition has stabilized but before most or all of the actual wage loss for which the benefits are intended occurs. In short, "permanent partial benefits are largely based on proxies for the expected wage loss that are assessed on an *ex ante* basis, before the wage loss actually occurs" (Burton 1983, p. 27).

By definition, estimates of lost wages will be subjective and, consequently, disputable. This feature of permanent partial disability compensation is at the root of the litigation problem. States vary substantially with respect to the guidelines adopted for estimating lost wages but generally may be sorted into three categories. In one category are states that base estimates of permanent disability solely on impairment ratings. The second category includes states that attempt to estimate lost earnings capacity. The third, a small group of states, uses the actual wage loss to determine benefits. These approaches, along with the administrative framework set up to oversee the system, heavily influence the frequency of litigation.[8]

We have found the workers' compensation literature to be lacking in empirical work that examines the reasons for litigation within state jurisdictions and that has adequate data to control for various influences. The analysis provided in the following chapters makes such a contribution. We investigate the compensation experience of workers who had lost-time injuries in Delaware and Michigan. Both states were considered to be relatively litigious through the early 1980s, although under markedly different administrative structures, with an impairment

approach in Delaware and a wage-loss approach in Michigan. Using detailed information on worker characteristics, indemnity benefits received, and the nature of disputed cases, we identify factors that affect the probability of a case becoming contested and those factors influencing whether the case is settled prior to an administrative hearing. For Delaware, we also examine the factors that underlie the size of indemnity payments to injured workers in contested and uncontested cases, to determine whether litigation substantially increases the amount collected, other things remaining equal.

NOTES

1. "Industrial accident rates reached their all-time peak in the first decade of this century. In 1907 over 7,000 workers were killed in just two industries, railroading and coal mining" (Berkowitz and Burton 1987, p. 17).

2. It is typical today for state compensation laws to require that medical costs be paid in full and that injured workers be compensated for lost wages at a rate equal to two-thirds of their gross weekly wage, subject to a statewide maximum. Workers' compensation benefits are not taxable. Viscusi and Moore (1987) estimate that, nationwide, the average wage replacement rate for injured workers is 55 percent of income before taxes and represents 83 percent of after-tax income.

3. For further discussion of alternative definitions of equitable benefits, see Burton and Berkowitz (1987), pp. 25-28.

4. Berkowitz and Burton (1987, p. 27) refer to this concept as "panoramic efficiency."

5. For an excellent discussion of social policy toward job safety and the economics of available policy tools, see Smith (1976).

6. Since indemnity payments do not necessarily fully replace lost wages for injured workers, some degree of compensating wage differentials remains in the labor market. The limited liability imposed by workers' compensation statutes has prevented the sort of escalation in punitive damages imposed on firms by the courts in product liability suits.

7. For example, in California during 1992, disputes over permanent disability accounted for 35 percent of all litigation costs for employers and employees. Disputes over causation accounted for another 31 percent of all litigation costs. All other sources of disputes comprised the remaining third (California Workers' Compensation Institute 1993, p. 8).

8. For an interesting contrast of two approaches with strikingly different litigation rates within one state, see Boden (1988).

2
The Delaware Data
and Characteristics of the
Workers' Compensation System

By 1980, several years of spiraling medical fees and larger benefit payouts to injured workers had caused a dramatic increase in workers' compensation costs to Delaware firms. At the same time, the administrative system for resolving disputes over appropriate benefits was experiencing a growing judicial backlog of cases awaiting review. To address these problems, a major legislative "reform" effort was mounted in 1981. However, the ensuing debate suffered noticeably from the lack of a data base to support detailed analysis of the state's prior experience. The reform attempt was unsuccessful.

Motivated in part by the empirical shortcomings of the 1981 reform effort, Staten and Link (1988) constructed a comprehensive data base for the State of Delaware that described the experience of injured workers within its workers' compensation system. The data base utilized information from the Delaware Department of Labor's Division of Industrial Affairs (DIA) to follow compensation claims to their final resolution. The history of compensation payments, including size and timing, as well as the sequence and extent of litigation, was incorporated.

An augmented version of this data base serves as the foundation for the empirical work in the following chapters. To strengthen the analysis and to assess the influence of the business cycle on compensation experience, the same types of data were collected for injuries to workers during 1985. This chapter describes the construction and contents of the data base. Included is a description of the relevant Delaware compensation statutes and administrative practices along with a variety of tables providing a detailed picture of how the Delaware system operated for workers with lost-time injuries during 1982 and 1985.

Construction of the Data Base

A description of the Delaware workers' compensation system involves more than a study of injury patterns across workers and industries. Since the purpose of this study is to investigate the determinants of workers' compensation benefits, and whether they are received with or without formal litigation, it is necessary to observe an injured worker's entire case history.

Given the need to see complete case histories, there are two strategies for assembling data sets that have been employed in studies of compensation programs in other states. One approach is to select cases for workers injured at the same point in time. The injured workers in the sample would have a common injury year, but there would be variation with respect to the time elapsed until final resolution of their cases. The second approach takes a sample of cases with a common *ending* date (closed case files). Cases in this approach begin at different points in time but are closed (i.e., concluded) in the same period.

There are advantages and disadvantages to each approach.[1] Selection of cases with a common beginning guarantees that injured workers all experience the same economic climate and other external factors that could influence experience with the compensation system. Workers injured in the same time period also deal with the same compensation system in the sense that any statutory or administrative changes will alter the rules they all must face.

The disadvantage of selecting a sample based on a common beginning is that to get a complete history on all cases, one must wait until the last case is concluded. This can involve a very long wait, which means using cases that opened several years earlier than the time when the study is conducted. Of course, the more time has elapsed between the date of the injury and the present, the more likely it is that changes have occurred that make conclusions less relevant for the current system.

The approach based on a common closing date suffers from the same drawback, although to a lesser extent. To illustrate, if we look at cases all of which closed in 1986 (which we will do for Michigan in chapter 5), we will find some very recent injuries, as well as injuries that occurred at different points in the past. Of course, the most com-

plicated injuries involving protracted disputes will be older cases, which are likely to be least relevant to the current institutional characteristics of the workers' compensation system.

Another factor dilutes the advantage gained by looking at the entire history of each closed case. Because a survey of closed cases involves cases with different dates of origin, it is harder to distinguish the influence of the compensation system from the influence of distinctive economic conditions and other factors arising from various starting dates. Hunt (1982) notes that in the closed case design, relative to a common beginning date design, cases of extremely long duration tend to be underrepresented.

For the Delaware data base, cases were selected based on a common year of injury. Data track the events following each injury, including how long it takes for benefits to begin, the size and duration of compensation payments, and whether litigation was involved at any stage. Cases were selected for all workers injured during 1982. In the earlier project for the State of Delaware (Staten and Link 1988), the data were collected from computer files maintained by the DIA at the end of February 1987, reflecting four to five years of experience. These files were updated to incorporate activity as of mid-1990.

As of February 1987, 90 percent of the 1982 cases were closed. In other words, 90 percent of injured workers eligible for compensation benefits had received all of their benefits by this time. Although about 10 percent were still classified as open cases, we determined that most of these were undisputed and simply receiving ongoing weekly compensation payments as part of extended or permanent total disability. By mid-1990, based on the sample used for the econometric models in chapter 4, 94 percent of the cases were officially closed. Moreover, of those cases not officially closed, most of them were effectively closed, although the records of the Delaware Industrial Accident Board (IAB) did not yet reflect this fact.[2] For the 1985 data, similar checks indicate that about 94 percent of the cases were officially closed and that some of the cases officially open were effectively closed.[3]

Thus, the patterns discussed in this report are based on observation of the entire case history for all but a small fraction of Delaware cases. The proportions of 1982 and 1985 cases officially listed as closed as of May 1990 are similar, even though three additional years elapsed since the time of the earlier injuries. This similarity reflects the fact that the

IAB probably improved its recordkeeping over time. In particular, for many of the cases officially listed as open, the only missing item was the letter of receipt of the final payment. It appears that, in a number of cases, such a letter was written but not recorded by the IAB. Apparently, recording receipt of the letter took place for a higher number of cases for the more recent injuries.

Of course, eight (five) years had passed between the time a worker was injured in 1982 (1985) and the time the DIA files were tapped to build the data set. How much of that experience with the compensation system is relevant for today's injured worker? Delaware's system changed very little between 1982 and 1990, with no significant legislated modifications to the basic statutes. The number and type of *injuries* may be somewhat different today, due to Delaware's changing employment base, as reflected in the rapid growth of the financial sector and by shrinking employment in the chemical industry. Nevertheless, these workers face exactly the same legal constraints and incentives for obtaining compensation benefits as did their counterparts in 1982.

It should be noted that the 1982 and 1985 data bases provide a comparative description of the experience of carrier-insured and self-insured employers. We are aware of no research, aside from Hunt (1982), that has utilized data to contrast the experience of carrier-insured and self-insured employers. Although several national studies of benefit delivery have been done, they typically utilize data derived from one of the national rating bureaus supported by the compensation insurance industry. Commercial insurance carriers routinely provide claim and loss data to such rating bureaus, in order to support the actuarial rating services upon which most state insurance rates are based. Consequently, the rating bureaus have the same type of data that we have collected for all injuries covered by commercially purchased workers' compensation insurance.[4] However, the rating bureaus typically do not have any information on self-insurers or their loss experience. Self-insurers are usually the largest employers in a state, with a significant proportion of both the workforce and compensation experience. Our data set allows us to examine their experience and to contrast it with that of employers insured by commercial carriers.

A second point about the data should also be emphasized. Because Delaware is a relatively small state, it was possible to examine the

entire universe of cases for both years, rather than selecting a sample. This eliminates problems of potential sampling bias that studies of more populous states must confront. For purposes of estimating regressions in chapter 4, we eliminated observations for which there were missing data on any of the independent variables. Our data file for 1982 consists of 3,951 of the population of 4,025 cases considered compensable lost-time injuries, more than 98 percent of the population. The data file tracking 1985 injuries comprised 4,328 of 4,466 lost-time compensable injuries, 96.9 percent of the population of lost-time compensable injuries.

Information for each injury in the DIA computer files was contained in several different types of files. In constructing the data base for this study, we merged demographic information about injured workers and characteristics of their employers with information on the levels of indemnity (i.e., cash) payments they received for their injuries. Additional information that described any disputes resulting in formal litigation was also matched to each worker's case.

Potential Limitations of the Data Base

It is appropriate here to note several limitations of the data. The two data bases constructed for this research consist of all lost-time injuries that occurred during the years of 1982 and 1985, respectively. Due to data storage constraints, the Delaware DIA does not maintain the computerized record of an injury for more than two years from the date of occurrence, unless it results in lost time or a petition is filed requesting the IAB to resolve a dispute arising from the case. Only lost-time or disputed injuries from 1982 were still available in the data base when the information was originally extracted for this project in 1987. The same is true of the 1985 data base extracted in mid-1990. Of course, these lost-time cases are precisely the ones a workers' compensation system is created to handle. However, it does mean that any statements made about *injury* patterns for 1982 must be limited to those resulting in lost time.

Note also that we have only limited data on lost-time injuries that were judged not to be compensable. Consequently, we cannot address

disputes involving whether an injury was job related. The data probably contain some cases that were disputed on those grounds, but only if they were ultimately compensable. Missing are those lost-time injuries alleged to be job related but that were never compensated.[5]

All employers or their insurers are required by law to report injuries and the amount of indemnity compensation to the Delaware DIA. However, they do not report medical payments or the legal costs incurred by the employer associated with dispute resolution by the IAB. Consequently, we do not have data on either of these costs on a case-by-case basis.

This does not mean that the 1982 data set gives us no insight into the costs of disputes. Although we do not have data on legal costs in dollars, we do have detailed information on the number and type of formal events (e.g., pretrial conference, IAB hearing) associated with each disputed case. We distinguish between cases based on the complexity of the dispute, as measured by the number of formal legal actions taken. If we associate greater complexity of a case with higher legal costs, then we can determine roughly which disputed cases were more expensive for firms to resolve.

An additional potential limitation of the data may particularly affect the reported cumulative indemnity payments to injured workers. In both the 1982 and 1985 data, we know the cumulative payments up to either the time a case was closed or May 1990 (the end of the observation period). Some cases were still open as of May 1990, and we only observe cumulative total payments as of that date. As a result, some workers received payments beyond that date, and we do not know these additional amounts. In statistical terminology, this is called "right censoring" of the payment data. How severe is this right censoring? This is important to ascertain because in chapter 4, we study the determinants of payments to injured workers, and we would like to know whether our results are likely to be affected.

The 1982 data consist of 3,951 cases for which we have complete information on certain characteristics of injured workers and their employers. As of May 1990, 3,705 (93.8 percent) had been closed, and payments had stopped. Open cases included 246 observations, of which 128 were contested and 118 were uncontested. Only 24 contested cases involved a change in expenditures between February 1987 and May 1990, and of these, 18 cases involved minor injuries (e.g., a

scratched finger).[6] Uncontested cases included only one (a minor injury) that involved a change in expenditures in 1987-90. According to the IAB, most of these 246 open cases were effectively closed, although the Delaware IAB records did not yet reflect this fact. It appears that 24 cases were likely to have continued to receive payments after May 1990, and only 5 of these involved significant amounts.[7] In any event, for the 1982 data, significant right censoring is likely to be a problem for less than 1 percent of the cumulative payments that we are able to observe.

In 1985, out of 4,328 cases for which we have complete information on characteristics of workers and their employers, 281 were listed as open as of May 1990.[8] Of the 281 open (or possibly open) cases, 71 were uncontested and involved minor injuries, and an additional 22 were contested but involved minor injuries and had had no activity since 1987. There is a good chance, therefore, that these 93 (=71+22) cases were closed, but this fact had not been recorded as of May 1990. This leaves 188 open cases, 4.57 percent of all 1985 cases, for which right censoring may be important.

In the 1982 Delaware data, the proportion of cases with significant right censoring of cumulative payments to injured workers is very small. In the 1985 data, the proportion of cases with significant right censoring is larger but still modest. It may well be, however, that those cases that are still open eight or five years after the injury are those with the most severe injuries, which may involve disproportionately high payments compared to other cases. In view of the extremely small proportion of 1982 open cases, it is not likely that right censoring is serious for the 1982 data. Thus, right censoring may be more serious for the 1985 payment data but probably is still not a drastic problem.[9] We do caution the reader that the results of our study of payments to injured workers may be more reliable with the 1982 data than with the 1985 data.

The following sections provide an overview of the experience of Delaware workers who were injured in 1982 and 1985. We begin with information describing the institutional characteristics of the Delaware workers' compensation system, including procedures for contesting a claim. Subsequent sections discuss some important demographic characteristics of the injured workforce, the delivery of benefits (how much was received), and the litigation experience of the group.

Workers' Compensation Law In Delaware

Structure of Benefits

Delaware law provides several basic types of indemnity compensa-
tion for nonfatal injuries. Workers receive temporary total disability
compensation while they are off the job recovering from injury. In
addition, the law provides for permanency and/or disfigurement awards
to workers who suffer permanent impairment, loss of body function or
serious disfigurement. Finally, awards are payable to victims of ampu-
tation and/or total loss of designated body parts according to a sched-
ule specified in the Delaware workers' compensation law. Injury
reports and compensation payments are processed by the DIA, within
the Delaware Department of Labor.

Virtually all indemnity compensation in Delaware is tied to a base
rate, payable weekly, which is a function of the injured worker's
weekly wage. The law provides that the compensation rate be equal to
two-thirds of the worker's weekly wage rate, up to a maximum set at
two-thirds of the State Average Weekly Wage (SAWW). The compen-
sation rate can be no less than one-third of the SAWW, provided that
this does not exceed the worker's wage, in which case the worker
receives his or her wage. During a post-injury recovery period, workers
receive temporary total compensation for each week they are off the
job. Thus, workers who earn less than the SAWW have two-thirds of
their weekly wages replaced by workers' compensation. Workers who
earn more than the SAWW have a lower replacement rate. Workers
who earn less than half the SAWW have a higher replacement rate.[10]

Temporary total disability benefits are discontinued when the
employee is able to return to the job. As was noted earlier, if the worker
has a permanent impairment as a result of the injury, he or she is eligi-
ble for reimbursement in the form of permanency awards, defined as a
proportion of the maximum scheduled benefits awarded for entire loss
of the affected part of the body.[11] The important point to note is that
this proportion is likely to be the basis of a case being litigated. Dela-
ware law also provides for up to 150 weeks of compensation payable
as a disfigurement award to any worker who suffers visible scarring

from injuries. The percentage (of 150 weeks) to be awarded for disfigurement is also subject to disagreement.

Resolution of Disputes

All workers' compensation indemnity payments in Delaware are made under an "agreement system." According to Delaware law, if an employer contests an employee's claim for compensation, no indemnity payments need be made to the worker until the dispute is resolved. Of course, once the dispute is settled, payments are calculated retroactive to the date that both parties agree the employee became eligible for compensation.

If the employer and employee do not agree on the amount of compensation due, each party has the right to petition the IAB for a formal review of the case. This petition effectively invokes the formal dispute resolution process, which we shall hereafter refer to as litigation. To be specific, we define a dispute to be any issue that prompted either the employer or the employee to file a petition for a formal hearing before the IAB.

During the period of our analysis, the IAB consisted of five members, each appointed by the governor to serve a six-year term. The decisions made by the board (two board members constitute a quorum) are binding upon the litigating parties, although claimants have the right to appeal board decisions to the Delaware Superior Court. A subsequent appeal to the Delaware Supreme Court is also possible. Both employer and employee have the right to be represented by legal counsel in all phases of the review process.

After a petition is filed, the disputing parties may conduct a series of pretrial conferences and hearings, prior to the formal IAB hearing. The initially scheduled hearing is often postponed, so that the time between petition and hearing ranges from several weeks to several years. Settlement of the dispute may occur at any time prior to the IAB hearing. In such cases, details of the settlement are communicated to the IAB, and, subject to the board's approval, the hearing date is canceled. Alternatively, the party filing the petition may choose to drop the dispute. Sometimes this is formally communicated to the IAB and posted in the case record. In other instances, cases are withdrawn *de facto* through lack of any formal activity subsequent to the petition.

A case is considered closed by the DIA if all agreements to compensate a worker have been fulfilled and the worker has signed a receipt to that effect. Open cases are basically those for which an agreement to compensate was made by the employer, but for which the DIA has not obtained the final signed receipt of payments. This could be either because weekly compensation payments are still ongoing or because all payments have been made and the receipt has not yet been signed by the employee.

According to Delaware law, an employee has five years from the date of last activity on a compensable lost-time injury to petition for a change or addition to compensation. Typically, the five-year period begins on the day the employee signs a receipt for the last agreed-upon compensation payment. Eligibility for further compensation in connection with an injury and the employer's liability expire at the end of the five-year period. Naturally, employers have an incentive to collect a signed receipt as soon as the last agreed-upon payment is made, in order to close the case and to begin the five-year clock that limits their liability.

Type of Dispute

We now address the type of dispute in the Delaware workers' compensation system. Delaware law defines a dispute to be any issue that prompted either the employer or the employee to file a petition for a formal hearing before the IAB. Such a petition invokes the formal dispute resolution mechanism provided under the Delaware workers' compensation statutes. Accordingly, the number of disputes exactly equals the number of formal petitions filed on each case.[12]

At this juncture, it is useful to summarize some key findings by Staten and Link (1988) regarding disputes originating from 1982 injuries. Just over one-third of all disputed cases involved two or more disputed issues (see table 2.1).[13] The private sector, self-insured firms had a significantly higher percentage of cases that generated only one petition, relative to self-insured employers in the public sector and commercially insured employers. This could be indicative of different strategies employed by these employers in arriving at their agreements to compensate. Alternatively, differences across the respective employee groups could account for the contrast in numbers of peti-

tions. Later in the chapter, we will return to the variations across the employer groups with respect to litigation.

Table 2.1 Disputes per Injury by Type of Insurer, Delaware Data, 1982

Number of disputes per injury	Total injuries	Public self-insured	Private self-insured	Commercial carrier	Unknown insurance
1	491	56	91	302	42
	(63.4)	(56.6)	(72.2)	(61.0)	(77.8)
2	159	22	22	105	10
	(20.5)	(22.2)	(17.5)	(21.2)	(18.5)
3	76	15	7	53	1
	(9.0)	(15.2)	(5.6)	(10.7)	(1.9)
4	33	3	5	24	1
	(4.3)	(3.0)	(4.0)	(4.8)	(1.9)
5	7	2	1	4	0
	(0.9)	(2.0)	(0.8)	(0.8)	(0.0)
6 or more	8	1	0	7	0
	(1.0)	(1.0)	(0.0)	(1.4)	(0.0)
Total	774[a]	99	126	495	54
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding.
a. This total reflects the number of 1982 injuries for which formal litigation was initiated.

Table 2.2 groups the frequencies for 1982 disputes according to the classification scheme used by the DIA. A brief explanation of the categories will be helpful for interpreting the data in the tables.

Some petitions are almost always filed by employees. Other requests originate with employers, and still others are filed by either party. Of all petitions originating with employees, table 2.2 shows that petitions to "determine compensation due" are the most frequent. Although not shown in the table, about one-third of the *original* petitions for 1982 injury cases (i.e., those representing the first petition filed in connection with an injury) were filed to "determine compensation due."[14] About 57 percent of petitions filed by employees to determine compensation due were filed within six months of the date of injury. Petitions arising because an employer and employee cannot

Table 2.2 Timing of Litigation by Type of Dispute, Delaware Data, 1982

		Type of petition							
		Employee actions					Employer actions		Either party
Time between injury and petition	Total petitions	Determine compensation due	Fatality benefits	Additional compensation due	Disfigured		Terminate benefits	Second injury	Lump sum	Others
Less than 5 weeks	58	51	0	1	6		0	0	0	0
	(6.1)	(16.9)	(0.0)	(0.4)	(6.5)		(0.0)	(0.0)	(0.0)	(0.0)
5 - 14 weeks	115	77	2	2	10		22	1	0	1
	(12.1)	(25.5)	(18.2)	(0.8)	(10.8)		(11.8)	(4.3)	(0.0)	(1.6)
15 - 25 weeks	93	43	1	14	10		25	0	0	0
	(9.8)	(14.2)	(9.1)	(5.5)	(10.8)		(13.4)	(0.0)	(0.0)	(0.0)
26 - 51 weeks	170	46	3	44	14		51	4	2	6
	(17.8)	(15.2)	(27.3)	(17.4)	(15.1)		(27.3)	(17.4)	(8.7)	(9.8)
1 - 2 years	356	80	4	122	38		61	8	12	31
	(37.4)	(26.5)	(36.4)	(48.2)	(40.9)		(32.6)	(34.8)	(52.2)	(50.8)
Over 2 years	161	5	1	70	15		28	10	9	23
	(16.9)	(1.7)	(9.1)	(27.7)	(16.1)		(15.0)	(43.5)	(39.1)	(37.7)
Total	953	302	11	253	93		187	23	23	61
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)		(100.0)	(100.0)	(100.0)	(100.0)
Percent of total petitions by petition type	100.0	31.7	1.2	26.5	9.8		19.6	2.4	2.4	6.4

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding.

agree upon compensation for permanent disability would fall into this category. Delaware law creates the potential for disputes because it virtually guarantees that a permanency or disfigurement award will be based on an estimate of the worker's loss as of one point in time, rather than on the actual loss experience as it occurs over time. When an employee and employer fail to agree upon the extent of the permanent damage, the employee may file a petition requesting the IAB to determine compensation due. Disputes over "disfigurement compensation" are similar but are classified separately.

The second category in table 2.2 is similar to the first, except that it is filed on behalf of a deceased employee's estate. These cases are infrequent, because they can only result from the small number of work-related fatalities each year.

A third employee-originated action involves requests to "determine additional compensation due." These disputes generally involve injuries with permanent partial impairment and disfigurement. Cases involving petitions for additional compensation tend to be somewhat more complicated than those in other categories; such cases typically result when an injured employee has a recurrence of an injury or believes that a previous permanent partial award was based on an incorrect estimate of impairment. For 1982 injuries, petitions to determine additional compensation due and petitions for disfigurement awards accounted for 26.5 and 9.8 percent, respectively, of all original petitions. Over 70 percent of these petitions were filed more than one year after the date of injury.

Two categories of petitions are listed in table 2.2 as "employer actions." The first involves a petition to "terminate benefits." At the risk of oversimplifying, these cases can be further subdivided into those that involve only administrative housekeeping and those with an ongoing dispute over compensation. An employer will frequently file a petition to terminate a worker's benefits because the last compensation check associated with an agreement has been sent but the employee has failed to sign the receipt that allows the employer to close the case formally. In such situations, there is no current dispute because all compensation to which both the employer and employee agreed has been delivered.[15] However, the collection of the receipt is an important administrative chore for the employer, because the statute of limitations on further liability for the injury does not begin until the case is

closed. Thus, failure to obtain a receipt projects the employer's liability for additional payments on the injury further into the future. Delaware law requires that the employer must either obtain a signed receipt *or* obtain the IAB's approval before it can close the case. Consequently, when the receipt is not forthcoming from the worker, the employer takes the alternate route of litigation.

More serious disputes prompting a request to terminate benefits involve cases in which the employer asserts that the employee has recovered sufficiently to return to work but the employee refuses to do so. Another possible source of dispute includes cases of "displaced workers" with skills so specialized that, when injury prevents them from returning to their old jobs, no job with close to the same wage is available. In such a case, the employee may contend that weekly benefits should continue. If employers disagree, they may file a petition in this category. Petitions to terminate benefits accounted for 19.6 percent of all petitions connected with 1982 injuries.

An interesting feature of Delaware law is that, when a petition is filed to terminate a worker's benefits, the IAB assumes the obligation to continue making the weekly compensation payments to the worker until the board resolves the issue at a hearing. Benefits are paid out of the IAB Second Injury and Contingency Fund, which is financed through an annual assessment on all commercial insurance carriers and self-insurers operating in the state. If the board finds in favor of the worker, then the employer, or the employer's insurer, repays the board for all benefits paid out during the interim period. On the other hand, if the board rules in favor of the employer, the worker keeps the benefits received during the time the issue was being decided. The longer it takes to resolve such an issue, the more an employee collects, thus creating an incentive for employees and their attorneys to utilize delaying tactics. This is not a problem when the employee is deserving of benefits, but, in cases where the board rules no compensation is warranted, successful delaying tactics on the part of employees and their lawyers may be profitable to them but costly to the state.

The second type of employer-initiated action is a petition to determine whether an injury may be considered as a "second injury" under state law. An employer is not liable for payment of compensation if a subsequent injury is connected to a previous work-related injury to a worker. Instead, payments to the worker are made out of the IAB Sec-

ond Injury and Contingency Fund. The purpose of this provision of the law is to give employers an incentive to hire workers who have been previously injured.

The last two categories of petitions in table 2.2 may be filed by either injured workers or by their employers. One involves a request to compute and pay the "lump sum" value of what would otherwise be a stream of weekly benefit payments. The final category is a catchall of other types of disputes. Often these involve issues parallel to those raised in connection with a previously filed petition, and so they represent more complicated cases.

Finally, table 2.2 indicates that the bulk of litigation does not surface until long after the injury occurs. For 1982 injuries, about 54 percent of all petitions were filed more than one year after the date of injury. Not surprisingly, petitions to determine additional compensation due take the longest to appear of employee-initiated actions. This finding highlights the need in the "open case" sample design to have enough years after the injury to encompass most or all of the possible events occurring in complex situations.

An Empirical Overview of Litigation in 1982 and 1985

The cases in the 1982 and 1985 data bases were extracted from DIA computer files and updated to reflect litigation information and compensation figures as of mid-1990. Unless otherwise indicated, all statements regarding case status and dollars of compensation paid refer to the cumulative history as of that date. The data bases underlying our analysis include a total of 3,951 and 4,328 lost-time and compensable injuries occurring in 1982 and 1985, respectively.

The job-relatedness requirement for compensation is a frequent cause of disputes. Of those workers injured in 1982, 177 filed petitions to determine compensation due but did not receive any payments for their alleged work-related injury (see note 5). Since no data exist for such cases in the DIA files, we were not able to construct the variables required for our empirical analysis, and the cases were dropped from our study. The remaining discussion in this chapter focuses on the cases judged to involve compensable lost time.

Litigation and Type of Insurer

One hypothesis that can be investigated with the data is that an employer's and, consequently, an employee's experience under Delaware law will be different across the various types of insurers. The Delaware data provide the following general three-category breakdown for type of insurer: private sector self-insured, public sector self-insured, and commercial carrier. A list of the self-insured employers appears in appendix table 2.1. In our empirical analysis in chapter 4, we further subdivide the private self-insured category. Thus, three variables for self-insured include the major automakers (General Motors and Chrysler), the major chemical firms (DuPont and Hercules), and a category designated as "other self-insured," thereby allowing us to test for differences in litigation behavior across these types of employers.

Several reasons underlie this breakdown. One is simply size differences. Typically, only larger firms with significant injury exposure can meet the criteria to qualify for self-insurance. By virtue of size and occupational mix alone, these firms will likely have different safety and/or rehabilitation records relative to those of smaller firms. Quite apart from size differences, self-insured firms will also have internal procedures for resolving disputes that will be different from those imposed on firms contracting with commercial carriers. Furthermore, since their injury costs are a direct function of their own experience, their costs will vary directly with changes in their internal procedures as well as with changes in Delaware law. This situation is in contrast to the circumstances of commercially insured firms paying premiums that may be experience rated to some extent but not perfectly.

We also separated the automakers and chemical firms from other self-insured employers. DuPont is the largest private employer in Delaware and has a long-standing reputation for being safety oriented. Hercules was grouped with DuPont since it is the other major self-insured chemical firm in Delaware. The automakers are not only major employers in the state but are also heavily unionized, which is unusual in Delaware. Hunt (1982) found higher litigation probabilities in workers' compensation cases involving the Big Three automakers than in other employers in Michigan. We wanted to test for the same phenomenon in Delaware, where two of the Big Three are major employers.

Finally, private and public sector employers may behave differently since the latter operate in a not-for-profit environment. As for the distinction between self-insurers in the public and private sectors, we similarly find it plausible to expect a difference in litigation behavior.

Table 2.3 shows the distribution of cases according to the type of insurance covering the employer and provides a further breakdown as to whether the case was litigated. For descriptive purposes, we have grouped employers into five categories. First, we distinguish between employers that purchase compensation insurance from commercial insurance carriers and employers that choose to self-insure. Then, we further divide the self-insured group into private or public sector (government agencies).[16] Private sector self-insured firms are grouped into three categories: automakers, chemicals manufacturers, and other firms (see appendix table 2.1 for a listing of the specific employers).

Table 2.3 yields some insights into the distribution of cases by type of insurer in Delaware as well as potential differences in litigation behavior between the three insurer types. The highest litigation rates occur in cases where the employer is one of the automakers. The data generally show that the propensity for litigation is higher for private sector self-insured firms compared to firms that insure through commercial carriers. The single exception is chemicals manufacturers in 1985. Workers' compensation cases in which the employers were public sector self-insured agencies were more likely to be litigated than cases in which the employers were insured by commercial carriers in 1982.[17] No difference is apparent in 1985 between the litigation rates in cases in which the employers are in the public sector and·self-insured or in the private sector and commercially insured.

Table 2.4 shows the litigated cases that were taken to an IAB hearing and/or resulted in the claimant receiving an award payment as a result of the process. We refer to cases where one or more of these events occurred as being "pursued" as opposed to being settled or dropped. In 1982, between 53 and 60 percent of cases were pursued across the three categories of insurers. However, in 1985, this ratio exceeded 80 percent for cases arising in firms that were privately self-insured. Percentages for the other categories of insurers were between 55 percent and 58 percent. The results in tables 2.3 and 2.4 suggest that private self-insured firms behave differently than other employers in handling litigated cases. It is important to note that this is a bivariate

Table 2.3 Litigation Status of Case by Type of Insurer, Delaware Data, 1982 and 1985

Litigation status	Public self-insured	%[a]	Private self-insured						Commercial carrier	%[a]	Unknown type of insurance	%[a]	Total	%
			Auto-makers	%[a]	Chemical firms	%[a]	Other private self-insured	%[a]						
1982														
Unlitigated	493	14.8	15	0.5	17	0.5	164	4.9	2,523	75.9	113	3.4	3,325	100.0
Litigated	92	14.7	29	4.6	6	1.0	44	7.0	439	70.1	16	2.6	626	100.0
Totals	585	14.8	44	1.1	23	0.6	208	5.3	2,962	75.0	129	3.3	3,951	100.0
Incidence of cases litigated by insurance type (percent)	15.7		65.9		26.1		21.2		14.8		12.4		15.8	
1985														
Unlitigated	650	17.8	22	0.6	20	0.5	182	5.0	2,768	75.9	5	0.1	3,647	100.0
Litigated	109	16.0	37	5.4	2	0.3	35	5.1	498	73.1	0	0.0	681	100.0
Totals	759	17.5	59	1.4	22	0.5	217	5.0	3,266	75.5	5	0.1	4,328	100.0
Incidence of cases litigated by insurance type (percent)	14.4		62.7		9.1		16.1		15.2		0.0		15.7	

NOTE: Percentages may not sum to 100 due to rounding.

a. Percentage of total for row.

comparison. In chapter 4, this hypothesis is investigated in a multivariate framework.

Table 2.4 Cases Pursued to Verdict by Type of Insurer, Delaware Data, 1982 and 1985

Insurer type	Not pursued[a]	Pursued	Total	Incidence of cases pursued (percent)[b]
	1982			
Public self-insured	37	55	92	
	(13.3)	(15.9)	(14.7)	59.8
Private self-insured	37	42	79	
	(13.3)	(12.1)	(12.6)	53.2
Commercial carrier plus unknown type of insurance	205	250	455	
	(73.5)	(72.0)	(72.7)	54.9
Total	279	347	626	
	(100.0)	(100.0)	(100.0)	55.4
	1985			
Public self-insured	49	60	109	
	(18.2)	(14.6)	(16.0)	55.0
Private self-insured	13	61	74	
	(4.8)	(14.8)	(10.9)	82.4
Commercial carrier	207	291	498	
	(77.0)	(70.6)	(73.1)	58.4
Total	269	412	681	
	(100.0)	(100.0)	(100.0)	60.5

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding.
a. Pursued means carrying a litigated case through at least one administrative hearing and/or receiving a payment or award.
b. Percentage of total for row.

Possible events for each of the eight petition types[18] in litigated cases are listed in table 2.5. How complex were disputed cases? The data in table 2.6 provide information about the number of events as of mid-1990 for each of the eight categories of petition, by type of insurer. Our objective in tabulating the number of events by each category of petition is to convey a sense that some cases involved several events and were fairly complex. Presumably, the greater the number of

events, other factors held constant, the more costly the particular case would be.

In 1982, the events most frequent in the litigation process occurred in cases involving employee petitions for "additional compensation due" and "disfigurement." In fact, of the total 4,065 events in 1982, 951 (23 percent) and 1,697 (42 percent) were associated with these two categories of petition, respectively. The figures for 1985 are 1,260 (31 percent) and 1,596 (39 percent) of 4,105 events.

Although the total number of events is distributed reasonably similarly to the distribution of cases by type of insurer shown in table 2.3, there also are some interesting differences in behavior demonstrated. In the injuries originating in both 1982 and 1985, cases involving employees of private sector self-insured firms had a disproportionate share of all events for that type of insurer, about 24 percent, involving employee petitions for "determining compensation due." A similar, but smaller, difference is apparent for events relating to all other types of petitions except "additional compensation due" and for "second injury" in both years as well as for fatality benefits in 1985. This reinforces our feeling that self-insured private sector firms behave differently than other employers in administering claims related to workers' compensation.

Although we cannot, at this point, calculate the expected gain to taking the dispute through each stage of litigation, we can get a rough idea of how total compensation payments are associated with litigation. Table 2.7 describes the sets of 1982 and 1985 injury cases in terms of the average total weekly compensation for temporary total disability, while table 2.8 does the same for total indemnity (weekly compensation plus permanency award plus disfigurement). The tables divide cases according to whether any litigation was involved. The striking feature of the two tables is the trend in the last column. In both 1982 and 1985, the proportion of cases litigated rises dramatically with the amount of compensation paid on the case. Unfortunately, the limitations of bivariate analysis prevent us from discerning the direction of causality. Does litigation lead to higher dollar totals? Alternatively, are the higher dollar payments indicative of more severe, complex cases, which lead to litigation?

Table 2.9 presents an overall summary of the compensation experience of the litigated and unlitigated cases. At the outset, we should note

Table 2.5 Legal Event Classification Used by the Delaware Industrial Accident Board

The Delaware data sets record nine distinct categories of petitions. These are:
- determine compensation due
- determine compensation due for deceased employee's estate
- review petition (obsolete category)
- determine additional compensation due (used in permanency cases)
- determine compensation for disfigurement
- review case for purposes of terminating benefits
- review to determine whether injury qualifies as a "second injury"
- commutation of weekly payments (that is, request a lump-sum payment)
- other (frequently the classification of a second and all subsequent petitions on an injury)

A case is classified as contested if it contains at least one petition. For each type of petition, it is possible to have one or more of each of the following legal events:
- petition filed
- pretrial conference
- withdraw petition
- IAB hearing
- IAB award
- appeal to Superior Court
- decision rendered by Superior Court
- appeal to Delaware Supreme Court
- decision rendered by Delaware Supreme Court
- award mailed (an administrative action)
- settlement
- conference call
- remanded to lower court (rarely occurs, and only if the higher court discovers an error in the IAB or lower court deliberation)
- hold pending outcome of other legal activity elsewhere (used when either attorney is interested in precedent that may be set in another case)

SOURCE: Delaware Industrial Accident Board.

Table 2.6 Number of Events by Type of Insurer and Type of Petition, Delaware Data, 1982 and 1985

| Type of insurer | Total | Type of petition | | | | | | | | |
| | | Employee actions | | | | Employer actions | | Either party | |
		Determine compensation due	Fatality benefits	Determine additional compensation due	Disfigured	Terminate benefits	Second injury	Lump sum	Others
		1982							
Public self-insured	660	38	0	144	324	48	14	40	52
	(16.2)	(7.9)	(0.0)	(15.1)	(19.1)	(16.3)	(6.6)	(43.0)	(16.0)
Private self-insured	502	122	5	42	224	56	11	10	32
	(12.3)	(25.5)	(33.3)	(4.4)	(13.2)	(19.0)	(5.2)	(10.8)	(9.8)
Commercial carrier	2,903	318	10	765	1,149	190	186	43	242
	(71.4)	(66.5)	(66.7)	(80.4)	(67.7)	(64.6)	(88.2)	(46.2)	(74.2)
Total	4,065	478	15	951	1,697	294	211	93	326
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
		1985							
Public self-insured	550	20	6	183	243	56	3	7	32
	(13.4)	(4.1)	(75.0)	(14.5)	(15.2)	(19.1)	(2.2)	(14.6)	(11.4)
Private self-insured	494	123	0	64	210	37	11	8	41
	(12.0)	(25.4)	(0.0)	(5.1)	(13.2)	(12.6)	(8.1)	(16.7)	(14.6)
Commercial carrier	3,061	341	2	1,013	1,143	200	122	33	207
	(74.6)	(70.5)	(25.0)	(80.4)	(71.6)	(68.3)	(89.7)	(68.8)	(73.9)
Total	4,105	484	8	1,260	1,596	293	136	48	280
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding.

Table 2.7 Average Total Weekly Compensation Paid for Temporary Total Disability by Litigation Status of Case, Delaware Data, 1982 and 1985

Average total weekly compensation	Unlitigated	Litigated	Total	Incidence of litigated cases (percent)[a]
1982				
$1.00 - 199.99	1,167	28	1,195	
	(36.7)	(5.6)	(32.5)	2.3
$200.00 - 499.99	957	62	1,019	
	(30.1)	(12.4)	(27.7)	6.1
$500.00 - 999.99	444	51	495	
	(14.0)	(10.2)	(13.5)	10.3
$1,000.00 - 1,999.99	361	67	428	
	(11.4)	(13.4)	(11.6)	15.7
$2,000.00 - 4,999.99	186	123	309	
	(5.9)	(24.6)	(8.4)	39.8
$5,000.00 - 9,999.99	44	55	99	
	(1.4)	(11.0)	(2.7)	55.6
$10,000.00 - 19,999.99	13	62	75	
	(0.4)	(12.4)	(2.0)	82.7
Over $20,000	4	52	56	
	(0.1)	(10.4)	(1.5)	92.9
Total	3,176	500	3,676	
	(100.0)	(100.0)	(100.0)	13.6
1985				
$1.00 - 199.99	1,302	54	1,356	
	(37.5)	(10.0)	(33.8)	4.0
$200.00 - 499.99	985	61	1,046	
	(28.4)	(11.3)	(26.1)	5.8
$500.00 - 999.99	548	70	618	
	(15.8)	(13.0)	(15.4)	11.3
$1,000.00 - 1,999.99	367	88	455	
	(10.6)	(16.4)	(11.4)	19.3
$2,000.00 - 4,999.99	181	128	309	
	(5.2)	(23.8)	(7.7)	41.4
$5,000.00 - 9,999.99	50	62	112	
	(1.4)	(11.5)	(2.8)	55.4
$10,000.00 - 19,999.99	25	44	69	
	(0.7)	(8.2)	(1.7)	63.8
Over $20,000	9	31	40	
	(0.3)	(5.8)	(1.0)	77.5
Total	3,467	538	4,005	
	(100.0)	(100.0)	(100.0)	13.4

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding. All dollar figures are expressed in 1982 dollars.
a. Percentage of total for row.

Table 2.8 Average Total Indemnity Paid by Litigation Status of Case, Delaware Data, 1982 and 1985

Average total indemnity	Unlitigated	Litigated	Total	Incidence of litigated cases (percent)[a]
1982				
$1.00 - 199.99	1,165	24	1,189	
	(35.0)	(3.8)	(30.1)	2.0
$200.00 - 499.99	950	48	998	
	(28.6)	(7.7)	(25.3)	4.8
$500.00 - 999.99	445	38	483	
	(13.4)	(6.1)	(12.2)	7.9
$1,000.00 - 1,999.99	420	74	494	
	(12.6)	(11.8)	(12.5)	15.0
$2,000.00 - 4,999.99	150	90	240	
	(4.5)	(14.4)	(6.1)	37.5
$5,000.00 - 9,999.99	115	108	223	
	(3.5)	(17.3)	(5.6)	48.4
$10,000.00 - 19,999.99	63	111	174	
	(1.9)	(17.7)	(4.4)	63.8
Over $20,000	17	133	150	
	(0.5)	(21.2)	(3.8)	88.7
Total	3,325	626	3,951	
	(100.0)	(100.0)	(100.0)	15.8
1985				
$1.00 - 199.99	1,299	50	1,349	
	(35.6)	(7.3)	(31.2)	3.7
$200.00 - 499.99	975	47	1,022	
	(26.7)	(6.9)	(23.6)	4.6
$500.00 - 999.99	546	51	597	
	(15.0)	(7.5)	(13.8)	8.5
$1,000.00 - 1,999.99	431	106	537	
	(11.8)	(15.6)	(12.4)	19.7
$2,000.00 - 4,999.99	162	104	266	
	(4.4)	(15.3)	(6.1)	39.1
$5,000.00 - 9,999.99	132	107	239	
	(3.6)	(15.7)	(5.5)	44.8
$10,000.00 - 19,999.99	68	122	190	
	(1.9)	(17.9)	(4.4)	64.2
Over $20,000	34	94	128	
	(0.9)	(13.8)	(3.0)	73.4
Total	3,647	681	4,328	
	(100.0)	(100.0)	(100.0)	15.7

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding. All dollar figures are expressed in 1982 dollars.
a. Percentage of total for row.

that the litigation rate in Delaware of 1982 lost-time injuries was 16 percent. Of course, this means that the large majority of all workers suffering lost-time injuries (84 percent) were compensated without having to resort to the state's dispute resolution mechanism.

The compensation figures in tables 2.7 through 2.9 have been adjusted to account for changes in the Consumer Price Index and are expressed in 1982 dollars. The differences between the litigated and unlitigated groups as a whole are sizable and appear in each of the three employer categories. Division of the data set according to the presence of litigation reveals two distinctly different types of cases, with respect to their compensation levels.

Tables 2.10 and 2.11 summarize the extent to which particular types of injuries are litigated. Table 2.10 examines the incidence of litigation according to the part of the body injured. Of those cases for which we have a definite injury classification, cases that involve body system injuries rank first in frequency of litigation, with a 31.6 percent litigation rate for 1982. For 1985, other head injuries rank first with a 23.1 percent litigation rate. Multiple part injuries in 1982 and back injuries in both years also rank high in terms of litigation rates. Table 2.11 displays similar information, but with respect to the nature of the injury, where "sprains and strains" are shown to be the dominant type of identified injury among litigated cases.

Table 2.12 gives a perspective on whether the litigation rate varies with the location in Delaware where the injury occurred. Interestingly, in 1982, the litigation rate was highest for injuries occurring in New Castle County, the most urban of the three counties in Delaware, with the frequency declining as the injury location moves south, downstate. By 1985, the differential in dispute rates between the counties had disappeared.

An issue addressed in table 2.13 is the question of whether the industry of the injured worker is associated with the propensity to litigate a workers' compensation case. Although no clear pattern arises with regard to the incidence of litigation, construction and manufacturing comprise about 49 percent of the litigated cases in 1982 and about 40 percent in 1985. When the service and wholesale and retail industries are included, the percentage rises to more than 78 percent.

Table 2.9 Summary of Compensation Experience for Compensated Cases, Permanent Partial Disability, Delaware Data, 1982 and 1985

	Insurer type					
	Public self-insured		Private self-insured		Commercial carrier	
	Unlitigated	Litigated	Unlitigated	Litigated	Unlitigated	Litigated
1982						
Average weekly wage of injured worker[a]	$257	$284	$316	$290	$287	$308
Average total weekly compensation	$721	$5,501	$784	$7,796	$761	$7,572
Average total indemnity	$1,187	$10,212	$1,786	$12,585	$1,219	$13,922
Number of cases	493	92	196	79	2,523	439
Percent of lost-time cases	84.3	15.7	71.3	28.7	85.2	14.8
1985						
Average weekly wage of injured worker[a]	$291	$295	$346	$321	$302	$315
Average total weekly compensation	$735	$4,116	$801	$3,344	$822	$5,766
Average total indemnity	$955	$9,722	$2,579	$7,811	$1,380	$10,679
Number of cases	650	109	224	74	2,768	498
Percent of lost-time cases	85.6	14.4	75.2	24.8	84.8	15.2

NOTE: All dollar figures are expressed in 1982 dollars. When the type of carrier is unknown, these cases are included in the "Commercial Carrier" category in this table.

a. Cases that received no compensation are excluded from all averages in this table.

Table 2.10 Part of Body Injured by Litigation Status of Case, Delaware Data, 1982 and 1985

Selected parts of body	Unlitigated	Litigated	Total	Incidence of litigated cases (percent)[a]
	1982			
Head	41	9	50	
	(1.2)	(1.4)	(1.3)	18.0
Face	22	5	27	
	(0.7)	(0.8)	(0.7)	18.5
Other head parts	12	3	15	
	(0.4)	(0.5)	(0.4)	20.0
Neck	42	6	48	
	(1.3)	(1.0)	(1.2)	12.5
Arms	182	34	216	
	(5.5)	(5.4)	(5.5)	15.7
Hand	202	28	230	
	(6.1)	(4.5)	(5.8)	12.2
Back	769	216	985	
	(23.1)	(34.5)	(24.9)	21.9
Shoulder	109	14	123	
	(3.3)	(2.2)	(3.1)	11.4
Legs	106	16	122	
	(3.2)	(2.6)	(3.1)	13.1
Knee	196	33	229	
	(5.9)	(5.3)	(5.8)	14.4
Multiple parts	328	123	451	
	(9.9)	(19.6)	(11.4)	27.3
Body system	13	6	19	
	(0.4)	(1.0)	(0.5)	31.6
Other parts	1,303	133	1,436	
	(39.2)	(21.2)	(36.3)	·9.3
Total	3,325	626	3,951	
	(100.0)	(100.0)	(100.0)	15.8

Table 2.10 Part of Body Injured by Litigation Status of Case, Delaware Data, 1982 and 1985 (continued)

Selected parts of body	Unlitigated	Litigated	Total	Incidence of litigated cases (percent)[a]
		1985		
Head	51	7	58	
	(1.4)	(1.0)	(1.3)	12.1
Face	23	4	27	
	(0.6)	(0.6)	(0.6)	14.8
Other head parts	10	3	13	
	(0.3)	(0.4)	(0.3)	23.1
Neck	63	12	75	
	(1.7)	(1.8)	(1.7)	16.0
Arms	174	31	205	
	(4.8)	(4.6)	(4.7)	15.1
Hand	195	20	215	
	(5.3)	(2.9)	(5.0)	9.3
Back	829	223	1,052	
	(22.7)	(32.7)	(24.3)	21.2
Shoulder	129	26	155	
	(3.5)	(3.8)	(3.6)	16.8
Legs	101	10	111	
	(2.8)	(1.5)	(2.6)	9.0
Knee	231	46	277	
	(6.3)	(6.8)	(6.4)	16.6
Multiple parts	402	117	519	
	(11.0)	(17.2)	(12.0)	22.5
Body system	28	5	33	
	(0.8)	(0.7)	(0.8)	15.2
Other parts	1,411	177	1,588	
	(38.7)	(26.0)	(36.7)	11.1
Total	3,647	681	4,328	
	(100.0)	(100.0)	(100.0)	15.7

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding.
a. Percentage of total for row.

Table 2.11 Nature of Injury by Litigation Status of Case, Delaware Data, 1982 and 1985

Selected injury category	Unlitigated	Litigated	Total	Incidence of litigated cases (percent)[a]
1982				
Amputation	13	6	19	
	(0.4)	(1.0)	(0.5)	31.6
Burns	118	15	133	
	(3.5)	(2.4)	(3.4)	11.3
Sprains and strains	1,322	260	1,582	
	(39.8)	(41.5)	(40.0)	16.4
Multiple injuries	181	57	238	
	(5.4)	(9.1)	(6.0)	23.9
Other	1,691	288	1,979	
	(50.9)	(46.0)	(50.1)	14.6
Total	3,325	626	3,951	
	(100.0)	(100.0)	(100.0)	15.8
1985				
Amputation	13	7	20	
	(0.4)	(1.0)	(0.5)	35.0
Burns	110	21	131	
	(3.0)	(3.1)	(3.0)	16.0
Sprains and strains	1,571	330	1,901	
	(43.1)	(48.5)	(43.9)	17.4
Multiple injuries	200	58	258	
	(5.5)	(8.5)	(6.0)	22.5
Other	1,753	265	2,018	
	(48.1)	(38.9)	(46.6)	13.1
Total	3,647	681	4,328	
	(100.0)	(100.0)	(100.0)	15.7

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding.

a. Percentage of total for row.

Table 2.12 County of Injury by Litigation Status of Case, Delaware Data, 1982 and 1985

County	Unlitigated	Litigated	Total	Incidence of litigated cases (percent)[a]
1982				
New Castle	2,187	450	2,637	
	(65.8)	(71.9)	(66.9)	17.1
Kent	526	97	623	
	(15.8)	(15.5)	(15.8)	15.6
Sussex	612	79	691	
	(18.4)	(12.6)	(17.5)	11.4
Total	3,325	626	3,951	
	(100.0)	(100.0)	(100.0)	15.8
1985				
New Castle	2,401	443	2,844	
	(65.9)	(65.1)	(75.7)	15.5
Kent	539	106	645	
	(14.8)	(15.6)	(14.9)	16.4
Sussex	707	132	839	
	(19.4)	(19.4)	(19.4)	15.7
Total	3,647	681	4,328	
	(100.0)	(100.0)	(100.0)	15.7

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding.
a. Percentage of total for row.

**Table 2.13 Industry by Litigation Status of Case, Delaware Data, 1982
and 1985**

Industry	Unlitigated	Litigated	Total	Incidence of litigated cases (percent)[a]
	1982			
Construction	551	119	670	
	(16.6)	(19.0)	(17.0)	17.8
Manufacturing	800	185	985	
	(24.1)	(29.6)	(24.9)	18.8
Transportation	245	35	280	
	(7.4)	(5.6)	(7.1)	12.5
Wholesale and retail trade	693	109	802	
	(20.8)	(17.4)	(20.3)	13.6
Finance, insurance and real estate	49	13	62	
	(1.5)	(2.1)	(1.6)	21.0
Services	725	119	844	
	(21.8)	(19.0)	(21.4)	14.1
Public administration	189	38	227	
	(5.7)	(6.1)	(5.7)	16.7
Not classified	73	8	81	
	(2.2)	(1.3)	(2.1)	9.9
Total	3,325	626	3,951	
	(100.0)	(100.0)	(100.0)	15.8
	1985			
Construction	611	106	717	
	(16.8)	(15.6)	(16.6)	14.8
Manufacturing	775	164	939	
	(21.3)	(24.1)	(21.7)	17.5
Transportation	263	57	320	
	(7.2)	(8.4)	(7.4)	17.8
Wholesale and retail trade	794	136	930	
	(21.8)	(20.0)	(21.5)	14.6
Finance, insurance and real estate	29	11	40	
	(0.8)	(1.6)	(0.9)	27.5
Services	841	130	971	
	(23.1)	(19.1)	(22.4)	13.4
Public administration	243	57	300	
	(6.7)	(8.4)	(6.9)	19.0
Not classified	91	20	111	
	(2.5)	(2.9)	(2.6)	18.0
Total	3,647	681	4,328	
	(100.0)	(100.0)	(100.0)	15.7

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding.
a. Percentage of total for row.

Table 2.14   Litigation Status of Case, by Age of Claimant, Delaware Data, 1982 and 1985

Age	Unlitigated	Litigated	Total	Incidence of litigated cases (percent)[a]
1982				
Under 25	973	162	1,135	
	(29.3)	(25.9)	(28.7)	14.3
25 - 34	972	177	1,149	
	(29.2)	(28.3)	(29.1)	15.4
35 - 44	642	152	794	
	(19.3)	(24.3)	(20.1)	19.1
45 - 54	458	83	541	
	(13.8)	(13.3)	(13.7)	15.3
55 - 64	253	44	297	
	(7.6)	(7.0)	(7.5)	14.8
65 and over	27	8	35	
	(0.8)	(1.3)	(0.9)	22.9
Total	3,325	626	3,951	
	(100.0)	(100.0)	(100.0)	15.8
1985				
Under 25	1,196	206	1,402	
	(32.8)	(30.2)	(32.4)	14.7
25 - 34	1,078	208	1,286	
	(29.6)	(30.5)	(29.7)	16.2
35 - 44	663	144	807	
	(18.2)	(21.1)	(18.6)	17.8
45 - 54	428	79	507	
	(11.7)	(11.6)	(11.7)	15.6
55 - 64	244	41	285	
	(6.7)	(6.0)	(6.6)	14.4
65 and over	38	3	41	
	(1.0)	(0.4)	(0.9)	7.3
Total	3,647	681	4,328	
	(100.0)	(100.0)	(100.0)	15.7

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding.

a. Percentage of total for row.

Table 2.15 Gender of Claimant by Litigation Status of Case, Delaware Data, 1982 and 1985

Gender	Unlitigated	Litigated	Total	Incidence of litigated cases (percent)[a]
		1982		
Female	889	186	1,075	
	(26.7)	(29.7)	(27.2)	17.3
Male	2,436	440	2,876	
	(73.3)	(70.3)	(72.8)	15.3
Total	3,325	626	3,951	
	(100.0)	(100.0)	(100.0)	15.8
		1985		
Female	1,031	220	1,251	
	(28.3)	(32.3)	(28.9)	17.6
Male	2,616	461	3,077	
	(71.7)	(67.7)	(71.1)	15.0
Total	3,647	681	4,328	
	(100.0)	(100.0)	(100.0)	15.7

NOTE: Numbers in parentheses represent percentages of column totals. Percentages may not sum to 100 due to rounding.
a. Percentage of total for row.

Tables 2.14 and 2.15 show the propensity to litigate by age and gender, respectively, of the injured worker. No clear pattern emerges from these bivariate tables. In chapter 4, we will examine the effects of these variables within the context of multivariate models explaining whether or not a case is litigated and the levels of workers' compensation benefits.

Summary

This chapter has discussed the construction and contents of the data base on lost-time injuries in Delaware during 1982 and 1985. The data

base includes a nearly complete case history on about 98 percent of 1982 and 1985 lost-time injuries.

Nearly 16 percent of all lost-time injuries in both 1982 and 1985 were litigated. Approximately one-third of all disputed cases involved more than one issue. Each case may involve one or more events (e.g., IAB hearing, pretrial hearing, superior court hearing). The econometric models estimated in chapter 4 assume a case is contested if at least one event occurs in the administrative and/or judicial process.

Disputes over disfigurement compensation accounted for nearly 10 percent of all disputes during 1982. Another 26.5 percent of all disputes involved requests for additional compensation, which are typically associated with a permanent partial disability. Employers filed 22 percent of petitions, most of which requested permission to terminate compensation benefits.

The formal dispute resolution mechanism is typically initiated well after an injury occurs. Only about 28 percent of all petitions involving 1982 injuries were filed within six months of the injury. Petitions requesting permanent partial awards (additional compensation) take the longest to surface, with over 70 percent filed a year or more after the date of injury.

The proportion of cases litigated was higher for private sector, self-insured firms (28.7 percent in 1982 and 24.8 percent in 1985), compared to either self-insured public sector or commercially insured employers. Private sector, self-insured firms had a higher percentage of cases that involved only a single dispute. Also, the 1985 data reveal that private sector, self-insured disputes were significantly more likely to proceed to an IAB hearing, as opposed to settling earlier. Taken together, the evidence suggests that private sector, self-insured firms employ a different strategy for arriving at their agreements to compensate.

Not surprisingly, disputes arose frequently for cases involving body system, multiple injuries, other head, back injuries, and sprains and strains, which involve relatively more subjective evaluation of the extent of injury and subsequent impairment. Finally, across all three types of insurers, litigated cases involve substantially higher dollar amounts of total compensation than unlitigated cases. The multivariate analysis in chapter 4 will investigate these relationships in greater detail.

Appendix Table 2.1 Self-Insured Employers in Delaware

Public sector self-insured agencies
City of Wilmington
New Castle County
State of Delaware

Private sector self-insured firms

Allegheny Corp./Jones Manufacturing
American Telephone & Telegraph
American District Telegraph
AMOCO
AT&T Communications of Delaware
AT&T Communications, Inc.
AT&T Technologies, Inc.
Baltimore Aircoil Co., Inc.
Beatrice/Hunt-Wesson, Inc.
Borden, Inc.
C.B.I. Services, Inc.
Cargill, Inc.
Chicago Bridge & Iron
Chrysler Corp.
Conoco, Inc.
Conagra Poultry Co.
Container Corp. of America
Delaware Humane Assoc.
Delmarva Power & Light Co.
Diamond State Telephone
E.I. DuPont de Nemours & Co.
Esmark, Inc.
Esso Standard Oil Co.
Fairmont Supply Co.
First Maryland Bancorp
FMC Corp.
General Metalcraft, Inc.
General Motors Corp.
Georgia-Pacific Corp.
Getty Refining/Marketing
Graybar Electric Co.
Great Atlantic & Pacific Tea Co.
Greyhound Food Management, Inc.
Haveg, Inc.
Herconfin, Inc.

Hercules, Inc.
International Harvester Co.
Intn. Terminal Operating Co./Ameriport
John Sexton & Co.
K-Mart Apparel Fashion Corp.
K-Mart, Inc.
Koppers Company, Inc.
Lavino Shipping Co.
Manufacturing Life Insurance Co.
Mason Dixon Lines, Inc.
Montgomery Ward & Co., Inc.
Montgomery Ward Credit Corp.
N.L. Industries, Inc.
Nabisco Brands, Inc.
P I E Nation Wide Inc.-Ryder
Peoples Life Insurance Co.
Perdue Farms, Inc.
PPG Industries, Inc.
Preston Trucking Co., Inc.
Ralston Purina Co.
RLC Corp.
Scott Paper Co.
Sears Roebuck Acceptance Corp.
Sears Roebuck & Co.
Service American Corp. (Macke)
SES, Inc.
Shell Oil Co.
St. Francis Hospital, Inc.
Stop & Shop Companies, Inc.
Strawbridge & Clothier
Supermarkets General Corp.
The Budd Co.
United States Steel Corp.
Vlasic Foods, Inc.
W.L. Gore & Associates
Walden Book Co.
Warner Co.
Western Electric Co., Inc.
Western Union Telegraph
Western/Southern Life Ins.
Westvaco
Weyerhaeuser Co.
Witco Chemical Corp.

SOURCE: Delaware Industrial Accident Board. This information was obtained in May 1990.
These are large employers whose type of workers' compensation insurance has changed little
over the time period covered by this study.

NOTES

1. The following discussion of the two approaches draws heavily on Hunt (1982).

2. For the majority of open cases no activity had occurred for at least two years, with the only missing item being the letter of receipt of final payment.

3. This issue is discussed further in the next section.

4. The Delaware-Pennsylvania Compensation Rating Bureau has much more detailed data than we possess on projected future losses relating to a given claim. Our indemnity figures reflect only what had been explicitly awarded or already paid as of mid-1990. Their data include the insurance carrier's estimate of future liability on each claim.

5. This is a major difference between the Delaware data discussed in chapters 2 through 4 and the Michigan data discussed in chapter 5. As will be noted below, we do have 177 observations on injuries that were litigated but remained uncompensated. Presumably, the disputed issue revolved around compensability. Although these cases appear in tables 2.1 and 2.2, no data were available on the variables used in the multivariate equation estimates of chapter 4. Consequently, these 177 cases were dropped from the chapter 4 analysis as well as from tables 2.3, 2.4, and 2.6 through 2.15.

6. The February 1987 date is the base because the 1982 data were originally received from the Delaware IAB in February 1987 and were updated in May 1990.

7. Also, some of the 27 cases that were contested with major injuries may be given payments in the future; however, some of the payments received between 1987 and 1990 may have been final settlements, which had not yet been recorded as such by May 1990.

8. No information was available as to whether five of these cases were open or closed.

9. It would be quite a different matter if, for example, a fifth of all cases were still open by the end of the observation period.

10. If the state average weekly wage is $300, the maximum any worker can receive as compensation will be $200 per week of lost time. Workers earning more than $300 will collect something less than a two-thirds replacement of their lost wages since their payments are capped at $200 per week. Injured workers earning less than $300 per week are not constrained by this cap and will receive two-thirds of their wages as compensation.

11. For example, assume that the law provides for 220 weeks of compensation to be paid to a worker with an amputated hand. If an injured worker instead loses part of the function of a hand (no amputation), compensation is due for the extent of the impairment. It would be computed as a fraction of 220 weeks, with the fraction to be determined by the percentage loss of use of the hand suffered by the worker. This percentage is subject to substantial disagreement, which can result in formal litigation.

12. The empirical analysis in chapter 4 will focus on the probability that an injury will spawn *any* dispute, that is, the *probability of a disputed injury.*

13. This table is based on the total number of controverted cases (775) that existed in the DIA files as of February 1987.

14. We distinguish original from subsequent petitions because compensability issues associated with some injuries become so complex that multiple petitions are filed before a case is finally closed. Moreover, a peculiar feature of Delaware law is that attorney fees are determined *per issue contested.* Obviously, such a fee structure encourages the fragmentation of an injury dispute into multiple issues, and the multiple filing of petitions per injury.

15. Of course, an employee may be reluctant to sign because he/she may feel additional compensation might be warranted in the future. However, Delaware law provides for this contingency with the five-year window of opportunity for petitioning to reopen a case. Thus, the IAB, upon

petition from the employer, can administratively close a case for which all agreed-upon payments have been made, without a worker forfeiting the right to request additional compensation.

16. Appendix table 2.1 lists all employers approved to self-insure their workers' compensation coverage in Delaware as of April 1987. Note that there are only three employers in the group of public self-insured agencies: the City of Wilmington, New Castle County, and the State of Delaware.

17. Another difference is in the proportion of injuries involving litigation over whether or not the injury is compensable at all. In 1982, the DIA recorded 4,025 compensable lost-time injuries in Delaware (593 from public self-insured agencies, 276 from private self-insured firms, 3,023 from commercially insured employers, and 133 with unknown type of insurance). Also arising from injuries in 1982 were an additional 177 disputed cases that were never compensated (16 from public self-insured agencies, 53 from private self-insured firms, 69 from commercially insured firms, and 39 with unknown type of insurance). Calculations reveal that over 16 percent of compensated or litigated cases associated with private sector, self-insured firms [53/(276 + 53)] involved disputes over compensability that were not resolved in favor of the worker. This figure is substantially above the 2 to 3 percent rates for the other two groups of employers.

18. A ninth petition type ("review petition") listed in table 2.5 is obsolete.

3

An Economic Model of Workers' Compensation Litigation and an Empirical Methodology

This chapter presents the economic model that serves as the conceptual foundation for the empirical work in chapters 4 and 5. The dispute resolution framework of Cooter and Rubinfeld (1989) is helpful as a general background to the model. According to this approach, disputes can be divided into four phases. We will describe each phase, along with its counterpart in the Delaware workers' compensation system.

First, we should clarify the terms "dispute" and "litigation." When acceptable compensation is forthcoming from the employer, the "dispute" ends before it really gets under way, i.e., in phase 2. In this framework, "litigation" is different from "dispute." A dispute always exists as a result of an accident or injury involving two parties. But litigation, which we discuss in detail in subsequent pages, only occurs when phase 2 leads to phase 3.

Moreover, the discussion of phases 2 and 3 shows that the employee goes through some evaluation of whether the offered compensation is sufficient; this is an important part of the dispute resolution process. The two parties interact, and information is exchanged; compensation is not automatic. Exclusion of nonlitigated cases from the scope of the model eliminates a good chunk of what the conceptual model is intended to explain. The general model developed by Cooter and Rubinfeld, because it is trying to explain whether or not a case is litigated, requires inclusion of the population in question; in our application, this consists of lost-time workers' compensation cases, not just the litigated ones.

Phase 1. There is an underlying event, such as an accident, in which one party allegedly harms another.
In the context of workers' compensation, phase 1 corresponds to the occurrence of a lost-time injury.

Phase 2. The injured party decides whether or not to assert a legal claim.

The period after the injury corresponds to phase 2, during which the employee must decide whether to press a legal claim (file a petition); this decision will hinge on what the employer offers as compensation. If the employer makes an offer of compensation, the employee may choose to accept, and the dispute is ended. Indeed, chapter 2 revealed this to be the outcome in Delaware for 84 percent of lost-time injuries during 1982. Alternatively, the employee may not accept the offer because it is viewed as inadequate; in this case, the employee must decide whether to press forward by filing a petition for a formal hearing before the Industrial Accident Board (IAB).

Phase 3. This is the period after the assertion of a legal claim but before a trial: "A bargaining game whose cooperative solution corresponds to a settlement out of court and whose non-cooperative solution corresponds to an adversarial trial" (Cooter and Rubinfeld 1989, p. 1069).

In the context of the workers' compensation system in Delaware, some bargaining takes place prior to the assertion of a legal claim (the filing of a petition) and some afterward. This occurs because not every injured party has to file suit to be compensated. Consequently, the distinction between phase 2 and phase 3 (bargaining over compensation) is somewhat blurred. However, it may be helpful to think of phase 3 as consisting of two distinct stages: one prior to a petition and one after the petition but before a trial. The critical feature of both periods is some degree of "pretrial discovery," which provides the basis for bargaining. In particular, physician opinions are solicited regarding the extent of injury and impairment. The central feature of the economic model of dispute resolution that will generate a settlement outcome (either before or after a petition is filed) is that both parties continue to revise their estimates of the expected outcome of a formal hearing throughout the bargaining/learning periods leading up to a trial (IAB hearing).

Litigation costs may accelerate with the filing of the petition, so there is a distinction between phase 2 and phase 3. Still, it is the learning process that causes some cases to drop out over time and that is characteristic of the entire period between the time of injury and the IAB hearing.

Phase 4.   Some cases result in a court-imposed solution to the dispute.

Phase 4 corresponds to the IAB hearing or appeal to the superior or supreme courts of Delaware.

An Economic Model

Assume that both employee and employer are risk neutral, wealth maximizers as they consider the appropriate compensation following an injury. Assume also that the "American Rule" for determining payment of legal fees applies: each party to a dispute pays his/her own legal costs. Either party can initiate litigation by filing a petition for a hearing before the IAB. As described in the previous chapter, petitions filed by workers generally involve requests for compensation. Conversely, petitions filed by employers generally involve termination of compensation benefits.

In the case of a petition filed by a worker who believes compensation is due, we assume that the worker (possibly with a lawyer's assistance) formulates an expectation of appropriate compensation, based on what similar injuries have been awarded through settlements or formal hearings in the past. The worker will then subtract the expected litigation costs associated with formally contesting a case to arrive at an "asking price," or minimum settlement amount. The employer (possibly with the advice of an insurance carrier, assumed to have knowledge of previous awards for purposes of formulating an expectation of the hearing outcome) goes through a similar calculation. The employer's "maximum offer price" will equal the expected award to the worker should the case go to a formal hearing plus the associated litigation costs. Assuming all decision makers are wealth maximizers, the case would be settled without a formal hearing if the employer's maximum offer price exceeds the employee's asking price.

Assume further that there are no asymmetric gains. That is, there is no possibility that an IAB decision will set a precedent for similar injury cases, in which an employer or insurance company could stand to lose more than a single worker stands to gain. The rationale for this assumption is that the employer is already strictly liable for injury; therefore, fault is not an issue, either in this case or in any other comparable case.

Winning or losing a particular case will not likely adversely affect the employer's public image or methods and costs of operations. The particulars of each injury case that truly influence the amount of compensation (typically, estimates of impairment) are so case-specific as to have no applicability to later cases. The same can be argued for questions of job-relatedness. This assumption eliminates the troublesome theoretical prospect of nuisance suits filed to extort settlements from a defendant, which are common in the product liability arena.[1] We also assume that there is no strategic behavior. Neither party behaves as though his/her actions will affect the actions of the other, now or in the future.[2]

Finally, we assume that the costs of negotiating a settlement are zero but that the costs of formal litigation are positive.[3] Under these conditions, the following expression clarifies that a hearing occurs if and only if the disagreement on the expected award exceeds the sum of the two parties' legal costs. These assumptions are primarily made for the sake of theoretical tractability: we are interested in deriving a basic model that will be useful as a guide to empirical work. An empirical application of this model is discussed in the next section. Our theoretical model is not realistic in every respect, but we want to show in a simple framework that expected costs and benefits play important roles in workers' compensation litigation.

Assume the following:

1. The plaintiff files a petition for an IAB hearing. The defendant is the other party to the dispute.

2. We define:

Z = amount in dispute (expected IAB award),

P_p = plaintiff's estimate of the probability of winning at trial (at the IAB),

P_d = defendant's estimate of the probability of *plaintiff* winning at trial,

X = plaintiff's legal costs, and

Y = defendant's legal costs.

3. Z is viewed as identical for both parties.

After filing a petition, a *hearing* occurs if

     defendant offer price – plaintiff asking price < 0.

Formally, this is

$$((P_d \bullet Z) + Y) - ((P_p \bullet Z) - X) < 0,$$

which we can rewrite as

$$((P_d \bullet Z) - (P_p \bullet Z)) + X + Y < 0.$$

Rearranging terms, we obtain

$$(P_d - P_p) \bullet Z < -(X + Y).$$

If we assume that $P_D < P_p$, i.e., that the plaintiff is more optimistic than the defendant, it follows that

$$|(P_d - P_p) \bullet Z| > X + Y.$$

In other words, a hearing occurs if the divergence on the expected award $|(P_d - P_p) . Z|$ *exceeds* the sum of the legal costs.

Factors likely to affect the decision to litigate generally include those influencing (1) the degree of uncertainty with respect to the outcome of a formal hearing, (2) the dollar amount of the potential award, and (3) litigation costs.

Of course, some cases are settled after a petition is filed but prior to final verdict. In these situations, either the plaintiff's minimum asking price and/or the defendant's maximum offer price change sufficiently in the intervening period to create a spread that allows a mutually agreeable settlement to be negotiated.

Why would these reservation prices change? We shall assume that new information is revealed in the process of filing a formal petition and in proceeding with a series of prehearing discussions/conferences. The information may pertain directly to the plaintiff's condition or

simply affect the plaintiff's (and defendant's) expectations regarding the likely outcome of a hearing. In any event, we assume that both parties have an opportunity to learn more about the merits of the case as the formal litigation process develops. This new information prompts a revision of the "ask" and "offer" prices.

For example, suppose an injured worker feels that he/she is eligible for compensation but that the employer disagrees. At this initial stage there may be an information asymmetry. The employee has better information about his/her true condition than does the employer. Estimates by the parties of P_d and P_p, and possibly Z, may differ. After the petition (to determine compensation due) is filed, our assumption is that the newly available information causes the difference between estimates of P_d and P_p to narrow. As the difference in estimates about the expected dollar value of a hearing outcome shrinks, the gains diminish from utilizing the formal dispute resolution process, with associated legal costs. Some cases will settle. The model reveals that the factors affecting the decision to pursue a case to verdict or to settle are similar to the factors affecting the decision to file a petition and invoke the dispute resolution process.

The logic of the model dictates that those cases not settling are somewhat unusual. Priest and Klein (1984) point out that disputes reaching a formal trial constitute neither a random nor representative sample of the set of all disputes. This occurs because, when disputing parties behave as described in the preceding general model, the only cases that do not settle in advance are those with characteristics that lead to persistent divergence in expected outcomes. This bit of insight enables us to generate predictions regarding characteristics of litigated cases, which will be discussed in more detail in chapters 4 and 5.

Specification of an Estimable Statistical Model

In data sets such as those available to us, there is information on characteristics of injured workers and their employers. These characteristics are likely to affect both the expected benefits and costs of initiating and pursuing litigation. For example, the wage of the injured worker affects both the dollar amount of the potential award as well as the cost of litigation since being involved in litigation and remaining

away from one's job impose an opportunity cost. The age of the injured worker affects both the expected gains from litigation and the opportunity cost of being away from work. In particular, during the early phases of a person's career, an individual accumulates on-the-job training that increases future wages. Over later phases of careers, less (or no) on-the-job training occurs, and the rate of wage growth is smaller. Therefore, a young worker may face higher opportunity costs of litigating and remaining off the job (by giving up wages that are increasing quickly) than an older worker. Older workers tend to have higher earnings (and therefore higher potential workers' compensation payments), which rise more slowly than earnings of younger workers, so there is less of an impact on the rate of wage growth for an older worker than for a younger worker who remains off the job.

The type of injury will affect whether there is a disagreement over its nature and extent. For example, soft-tissue, back, and joint injuries are generally harder to evaluate objectively and are more subject to disagreements.[4] The job a worker performs is likely to influence the severity of injury, which may lead to disagreements over the readiness of the employee to resume work. The kind of insurance coverage may affect the probability that an employer engages in litigation (as observed in chapter 2). Injury severity may also be related to the type of output an employer produces.

Clearly, many of the preceding variables affect the expected gains and costs of litigation to some party in a dispute. Since it is not obvious how to disentangle the determinants of offer and asking prices, we adopt a reduced form approach in which characteristics of workers and firms regarded as given (exogenous) affect the *probability of litigation* (defined as one or more disputes giving rise to petitions for IAB review), the probability that a case is *pursued to verdict* (IAB hearing or award on one or more petitions), and the amount of *indemnity payments* to injured workers.[5]

In developing a set of reduced form equations for estimation purposes, the following summary of the theoretical discussion is relevant: a potential dispute over compensation in a work injury case involves two parties, the worker and the employer (if self-insured) or the insurance company (if the employer is commercially insured). Given the existence of a dispute, a case is contested (litigated) if for either party the expected utility from contesting is greater than the expected utility

from not contesting. Both parties may choose to contest simultaneously the same or different aspects of a case. Also, either or both parties may choose to contest several aspects of the same case. A contestant may choose to pursue a dispute to verdict, to withdraw, or to settle the dispute. After a verdict is rendered at one level, the parties to the dispute may appeal the verdict to a higher judicial level. At each level, they have the option of pursuing or of not pursuing the dispute to verdict. The highest appeal, although not used often, would occur in the Delaware Supreme Court.

For each case, we also observe the total monetary payment (indemnity payment) to the worker. Most work injury cases are not contested (3,325 out of a total of 3,951 cases in 1982, or 84.2 percent, and 3,647 out of a total of 4,328 cases in 1985, or 84.3 percent, as reported in table 2.3), and most of those that are contested involve a single dispute. A small number of cases, however, involve multiple events (e.g., pretrial hearing) and disputes by both parties, with some aspects of the disputes pursued to verdict. Also, some verdicts are appealed while others are not, occasionally all in connection with the same case. Modeling this process in detail is very complicated and will most likely lead to empirical models that are impractical to estimate, since only a very small number of cases involve certain complicated sequences of judicial events.

Our objectives are more modest. In order to be able to specify empirical models whose estimation is practical, we adopt a simplified approach summarized by five equations:

(3.1) $C_i = B x_i + e_{1i}$

(3.2) $P_i = D x_i + e_{2i}$

(3.3) $A_{1i} = E x_i + e_{3i}$

(3.4) $A_{2i} = F x_i + e_{4i}$

(3.5) $A_{3i} = G x_i + e_{5i}$.

C and P are theoretical constructs that may be called, respectively, individuals' "propensity to contest a case" and "propensity to pursue a case to verdict." C and P are not observed. Instead, in the data and for

each individual, we observe c and p with each taking the value of 1 if the case was contested (pursued) and 0 otherwise (binary variables). A_1, A_2 and A_3 are the natural logarithms of cumulative indemnity payments (awards) to injured workers in 1982 dollars for (1) uncontested cases, (2) contested cases not pursued to verdict, and (3) contested cases pursued to verdict, respectively. The vector of variables x includes measures of workers' traits along with characteristics of their injuries and employers. The observation index is i. B, D, E, F and G are coefficient vectors, and e_1 through e_5 are random error terms. Equation (3.1) relates the probability that a case is litigated (at least one petition pertaining to an injury filed for IAB review) to exogenous right-hand-side variables (i.e., the x_is)[6] and a random error term (e_{1i}).

Earlier, we designated a case as being pursued to verdict when there is at least one sequence of judicial events, beginning with a petition and ending in an award or mailing of a payment, for closed cases and at least one sequence of events, ending in a hearing, for open cases. Equation (3.2) relates the probability that a contested case is pursued to verdict to exogenous regressors and an error term (e_{2i}). Equation (3.3) relates the natural logarithm of the cumulative payments (or awards) in 1982 dollars to injured workers in uncontested cases to exogenous regressors and an error term (e_{3i}). Equations (3.4) and (3.5) apply to payments to injured workers in contested cases that were not pursued to verdict and contested cases that were pursued to verdict, respectively. In equations (3.3) through (3.5) the left-hand-side variables are the natural logarithms of payments, while the right-hand-side variables are in arithmetic form. This semilogarithmic functional form is appropriate because the observed frequency distribution of awards has a pronounced thin right tail.[7] In other words, the frequency of relatively large awards is low.

Equations (3.1) and (3.2) are reduced forms relating the respective binary left-hand-side variable to characteristics of the injured worker and the employer (such as type of insurance and industrial sector of employment or firm) without making a distinction as to who initiates a dispute and what sequence of judicial events is followed. For policy purposes, it is important to be able to predict how particular changes in the state's industrial structure or in insurance arrangements are likely to affect the incidence of litigation as well as the average value of awards to injured workers. Equations such as (3.1) through (3.5) can

answer such questions. They cannot, however, answer questions regarding the effect of changes in exogenous variables on the frequency of certain events (e.g., the type of appeal) in the dispute resolution system since we do not distinguish between specific types of events empirically. Equation (3.2) is intended to indicate those litigated cases likely to have used the largest amounts of resources of the dispute resolution system.

For three reasons, we do not make a distinction between contested cases initiated by workers or contested cases initiated by employers. First, some cases are initiated by both parties simultaneously beginning litigation on different aspects of a case. Second, every contested case requires that both parties behave in a manner such that the case is not settled informally. Who initiates litigation by first filing a petition is not of central concern to our study; we are mainly interested in finding out the relationship between exogenous characteristics of workers or firms and the probability that a case goes through the formal dispute resolution mechanism. Third, the interests of both parties are similar regardless of who initiates litigation: one party wishes to receive greater compensation, and one party wishes to provide smaller compensation than would otherwise result. The observed outcome is an equilibrium whose determinants we wish to study.

We do not distinguish contested cases by who "won" or "lost" the litigation because, in many situations, it is possible for the parties to achieve some but not all of their desired aims; thus the definition of "win" or "lose" becomes an arbitrary determination by the researchers.[8] We study payments to workers that are continuous measures of the outcome of each case (i.e., dollars of compensation) because these do not require us to make judgments as to who won a case.

The right-hand-side variables in equations (3.1) through (3.5) that we treat as exogenous include the type of insurance and sector of employment or the type of self-insured employer. Dummy variables are used for public sector self-insured agencies, for self-insured major automakers, for self-insured major chemicals manufacturers, and for other self-insured firms. The omitted category is commercially insured employers. Employee variables include the worker's gender, age, age squared, the natural logarithm of the worker's wage at the time of the injury (measured in 1982 dollars), and the industry of employment. Also included is the county of location when the injury took place

(New Castle or Kent; the omitted category is Sussex, the only other county in Delaware), the part of the body injured, and the type of injury.

As indicated in chapter 2, it is possible that type of insurance and firm may affect the probability of litigation and how far litigation is pursued. The theoretical model presented in the previous section assumes that there are no asymmetric gains from litigation (no precedent to be set). In reality, asymmetric gains are possible. It may well be that self-insured firms are more concerned than commercial insurers about precedent-setting cases because self-insured firms are less able to spread risk than commercial insurers. If this is the case, self-insured firms may contest cases for which the up-front gains do not exceed the up-front litigation costs. Why? Because they expect significant cost savings in the future.

The binary variables for body part injured and type of injury are proxies for the degree of uncertainty regarding the outcome of litigation, due to the difficulty of measuring the extent of certain types of injuries. These variables take the value one if the specified body part was injured or the specified type of injury occurred and zero otherwise. We also include variables showing gender, age, and wage at time of injury, all of which are related to the opportunity cost of litigation. In addition, we have a set of binary variables for industry of employment, to indicate aspects of the severity of injury that are otherwise not captured by the other "part of body" and "type of injury" measures. These variables take the value one if an injured worker worked in the specified industry and zero otherwise.

Since the left-hand-side variables of equations (3.1) and (3.2) are binary, an appropriate estimation technique is probit. The left-hand-side variables of equations (3.3) through (3.5) are continuous, so, under certain circumstances, we can estimate these equations by ordinary least squares (OLS). OLS is suitable if the error terms of equations (3.1) through (3.5) are uncorrelated. If the error terms are correlated, other estimation techniques are appropriate. Whether the error terms of the equations are or are not correlated is an empirical matter. In the appendix to this chapter, we discuss certain plausible correlations of the error terms in general and outline an empirical strategy to find out whether this is an important problem in practice.

It is possible that equations (3.3) through (3.5) could be collapsed into fewer equations (either two or one) if the coefficient estimates of some payment equations do not differ significantly from those of other payment equations. This empirical issue is explored in the next chapter.

Chapter 4 reports estimates of the reduced form equations (3.1) through (3.5) for injuries that took place in Delaware in 1982 and in 1985. Chapter 5, which analyzes Michigan data, only provides estimates of equations (3.1) and (3.2); equations (3.3) through (3.5) cannot be estimated for Michigan due to data limitations.

APPENDIX
A Model With Correlated Error Terms

Bivariate probit is an appropriate estimator if the error terms of equations (3.1) and (3.2) are correlated. Such correlation may arise because of the presence of omitted variables affecting both the probability that a case is contested and that it is pursued to verdict. These omitted variables describe characteristics of the workers or of their injuries that are known to the parties to a dispute but are unobserved by the researchers.

For example, certain back injuries (more so than other types of back injuries) may make it more likely that there will be a disagreement among the parties, leading to a case being contested. These same types of back injuries may make it more likely that a case will be pursued to verdict because less information, which may make the parties narrow their differences, becomes available during the pretrial period.

As an illustration, our data only tell us that there was a back injury but not what type of back injury it was. If the back injury was of the kind just described, this fact will be captured by the error term of the contest equation (3.1) and by the error term of the pursue equation (3.2), and so the error terms will be correlated. If we ignore this correlation, the resulting probit estimates will be biased. Bivariate probit takes account of this possibility and permits us to test for significant correlation between the error terms of the two equations.

Another type of plausible correlation of the error terms of the contest and the pursue equations is with the error terms of the payment equations. For example, unobserved characteristics that increase the probability of cases being contested (or pursued) may also increase payments. If such correlation is present and we ignore it, biased estimates of the payment equations are likely. This bias is known as selectivity bias.

We implement a two-step estimator formulated by Tunali (1986), which permits us to test for and control for double selection in the payment equations. A simpler selectivity model, the switching regression setup formulated by Lee (1978), was also estimated; in this approach, equations (3.4) and (3.5) are collapsed into one equation relevant to payments in contested cases (without any distinction as to whether a case was pursued to verdict or not), and equation (3.2) is omitted. In this simpler model, we test whether the error term of the contest equation is correlated with the error terms of the payment equations. If we find no evidence of selectivity bias in the payment equations, then OLS is appropriate. In chapter 4, we explore the possible presence of correlation in the error terms of the contest and pursue equations and selectivity bias in the payment equations.

NOTES

1. See Cooter and Rubinfeld (1989), pp. 1083-84.

2. We recognize that firms may have an incentive to cultivate an image as a tough bargainer in order to induce workers to accept the initial settlement offer. A referee noted that some firms (carriers) have a reputation for always contesting a questionable case. Other firms never contest. However, we lack sufficient firm-specific data for all firms that would allow us to categorize each firm according to likely strategies. Given the lack of theoretical consensus in economic models of strategic settlement behavior, we have opted for a simpler, nonstrategic theoretical model. As a practical matter, however, it is likely that our variables for type of insurance, industrial sector, and firm in our empirical work control for strategic behavior that, in fact, takes place. For more discussion on strategic behavior, see Cooter and Rubinfeld (1989), pp. 1078-1080.

3. This assumption is not entirely realistic or necessary. What is needed is for settlement (negotiating) costs to be less than trial costs. In other words, the difference between trial costs and settlement costs represents the extra transaction costs incurred by holding out for a formal trial. As long as these extra costs are greater than zero, the logic of the model follows. Consequently, many authors adopt the simplifying assumption of letting settlement costs be equal to zero, and litigation (trial) costs be greater than zero.

4. See Boden, Kern, and Gardner (1991) for a discussion of procedures for evaluating these hard-to-measure aspects relating to back injuries.

5. In order to be able to estimate separate equations of the determinants of offer and asking prices of the parties to a dispute, we would need to know which variables affect some prices but not other prices. Theory offers no guidance on this issue, and we do not wish to proceed by making arbitrary assumptions.

6. A right-hand-side variable is exogenous if it is unaffected by the left-hand-side variable. For example, in equation (3.1) a worker's age may affect the probability of a case being litigated; the reverse is not possible.

7. We assume that payments are lognormally distributed (a lognormal distribution has a long right tail, and the natural logarithm of a lognormal random variable is normally distributed); hence their natural logarithms are normal, satisfying the assumptions of the general linear regression model.

8. From a practical standpoint, this would involve the logistically formidable task of sifting through transcripts of over 15,000 legal hearings in order to try to determine the "winner" or "loser" of each judicial event. More important, though, is the fact that many cases do not have a clear winner. For example, suppose a worker claims that he/she should receive $15,000 but that the dispute resolution system awards him $12,000. Has the worker won or lost?

4

The Determinants of Litigation
and Payments for
Workers' Compensation
in Delaware

In this chapter, we report estimates of the reduced form statistical model described in chapter 3. First, we briefly review some of the key characteristics of the 1982 and 1985 data, along with the important institutional factors associated with the workers' compensation system in Delaware. Variables used in the empirical model are then defined. Finally, we report the model's estimates of the determinants of (1) whether or not a case is litigated, (2) whether it is pursued to verdict, given that it is litigated, rather than settled or withdrawn, and (3) the level of indemnity payments (in 1982 dollars) to injured workers, based on the 1982 and 1985 Delaware workers' compensation data. Note that we use the terms litigated and contested interchangeably.

Brief Description of Institutions and Data

The characteristics of cases included in the Delaware data sets, along with our definitions of contested cases and of contested cases pursued to verdict, are discussed in this section. The reader should refer back to chapter 2 for a more complete description of the data.

Both Delaware data sets (1982 and 1985 injuries) exclude all cases in which a worker reports an injury but does not have lost time from his or her job. Information on these types of claims is not available to us because such cases are deleted from files after two years by the state agency administering the workers' compensation program. These tend to be cases in which a worker reports a minor injury that might result in disability but, in fact, does not.

Compensability of an injury is a common source of disputes. Cases where the injury was ruled as not compensable (e.g., because the injury did not occur at work) are excluded from the data files by the Industrial Accident Board (IAB). Data for cases found to be "not compensable" only contain information as to when the case closed and whether the case was contested, with no further information on any of the other variables used in our analysis.[1]

In our statistical analysis, the unit of account is a workers' compensation *case*. A case may involve no litigation (when no petitions are filed), or it may involve litigation, with a single petition or multiple petitions. There are nine distinct categories of petitions in Delaware (see table 2.5). A case is classified as contested if it contains at least one of the nine possible types of petitions associated with workers' compensation in Delaware. For each type of petition, it is possible for many different legal events to occur. Four events are of importance in our estimated models: petition withdrawn without a hearing, IAB hearing, IAB award, and mailing of an award (an administrative action).

Closed contested cases designated as pursued to verdict are those containing at least one sequence of legal events ending in an IAB hearing, an award, or the mailing of an award. Open contested cases that include at least one sequence of legal events ending in a hearing are also categorized as pursued to verdict. All other cases are classified as not pursued to verdict.

Means and standard deviations for the variables used in our analysis are shown in table 4.1. In 1982, for example, in 14.8 percent of the cases the employer was self-insured and in the public sector. Also in 1982, 24.9 percent of workers' compensation cases involved a back injury. Definitions of selected variables are shown in table 4.2.

Table 4.1 Means and Standard Deviations of the Variables, Delaware Data, 1982 and 1985

Variable	Delaware data 1982		Delaware data 1985	
	Mean	Standard deviation	Mean	Standard deviation
Type of employer/insurer				
Public self-insured	0.148	0.355	0.175	0.380
Other self-insured private sector	0.070	0.255	0.069	0.253
Chemicals, self-insured	0.006	0.076	0.006	0.071
Automakers, self-insured	0.011	0.105	0.014	0.116
Age	34.139	12.436	33.110	12.317
Age squared	1320.10	965.26	1247.9	959.28
Male	0.728	0.445	0.710	0.453
Location				
New Castle County	0.667	0.471	0.657	0.475
Kent County	0.158	0.364	0.149	0.356
Industry				
Construction	0.170	0.375	0.166	0.372
Manufacturing	0.250	0.433	0.217	0.412
Transportation	0.071	0.257	0.074	0.262
Wholesale trade	0.203	0.402	0.215	0.411
Finance, insurance, real estate	0.016	0.124	0.009	0.096
Public administration	0.058	0.232	0.070	0.254
Natural logarithm of worker's wage	5.540	0.496	5.485	0.506
Part of body injured				
Head	0.013	0.112	0.013	0.115
Face	0.007	0.082	0.006	0.079
Jaw	0.005	0.070	0.005	0.070
Neck	0.012	0.110	0.017	0.130
Arms	0.055	0.227	0.047	0.212
Hand	0.058	0.234	0.050	0.217
Back	0.249	0.433	0.243	0.429
Shoulder	0.031	0.174	0.036	0.186

Table 4.1 Means and Standard Deviations of the Variables, Delaware Data, 1982 and 1985 (continued)

Variable	Delaware data 1982		Delaware data 1985	
	Mean	Standard deviation	Mean	Standard deviation
Legs	0.031	0.173	0.026	0.158
Knee	0.058	0.234	0.064	0.245
Multiple parts	0.114	0.318	0.120	0.325
Body system	0.005	0.069	0.008	0.087
Other part	0.030	0.170	0.015	0.120
Nature of injury				
Amputation	0.005	0.070	0.005	0.068
Burns	0.034	0.180	0.030	0.171
Sprains	0.400	0.490	0.439	0.497
Sample size	3,951		4,328	
Contested cases	626		681	
Cases pursued to verdict	347		412	

SOURCE: Analysis based on data from Delaware Industrial Accident Board.

Table 4.2 Selected Variable Definitions for Injuries, Delaware Data

Head	Head, brain, multiple head injuries, head injury n.e.c.[a]
Face	Face unspecified, multiple face injuries, face injury n.e.c.
Jaw	Jaw, mouth, nose, scalp, skull
Neck	Neck, upper extremities unspecified, upper extremities n.e.c.
Arms	Arms unspecified, upper arm, elbow, forearm, arm multiple, arm n.e.c.
Hand	Hand
Back	Back
Shoulder	Shoulder
Legs	Legs unspecified, lower leg, leg multiple, leg n.e.c.
Knee	Knee
Multiple parts	Multiple parts
Body system	Body system unspecified, circulatory system, digestive system, excretory system, musculoskeletal system, nervous system, respiratory system, other body systems
Other parts	Body parts n.e.c., nonclassifiable
Amputation	Amputation or enucleation
Burns	Burn (heat), burn (chemical)
Sprains	Sprains, strains

SOURCE: Delaware Industrial Accident Board.
a. Not elsewhere classified.

Results for Delaware

Determinants of Litigation

Estimates of the determinants of whether or not a case is litigated (contested), as expressed in equation (3.1), are obtained using information on 1982 injuries and appear in the first data column of table 4.3. The corresponding estimates based 1985 injuries appear in the first column of data in table 4.4. The second columns of tables 4.3 and 4.4

Table 4.3 Maximum Likelihood Probit Estimates of the Contest and Pursue Equations, Delaware Data, 1982

Variable[a]	Contest	Pursue
Constant	-2.123**	-0.510
	(-6.232)	(-0.752)
Type of employer/insurer		
Public self-insured	-0.013	0.086
	(-0.146)	(0.577)
Other private sector self-insured	0.144	-0.011
	(1.307)	(-0.055)
Chemicals, self-insured	0.173	-0.348
	(0.574)	(-0.643)
Automakers, self-insured	1.348**	0.004
	(6.440)	(0.013)
Age	0.028**	0.047*
	(2.085)	(1.722)
Age squared	-0.0003**	-0.0005
	(-2.055)	(-1.598)
Male	-0.178**	b
	(-2.698)	
Location		
New Castle County	0.188**	0.095
	(2.502)	(0.774)
Kent County	0.158*	b
	(1.706)	
Industry		
Construction	0.338**	b
	(3.607)	
Manufacturing	0.305**	b
	(3.486)	
Transportation	0.056	b
	(0.457)	
Wholesale trade	0.093	b
	(1.062)	
Finance, insurance, real estate	0.366*	b
	(1.846)	
Public administration	0.227*	b
	(1.808)	
Natural logarithm of worker's wage	-0.011	-0.140
	(-0.173)	(-1.263)
Part of body injured		
Head	0.546**	0.840*
	(2.506)	(1.839)

(continued)

Table 4.3 Maximum Likelihood Probit Estimates of the Contest and Pursue Equations, Delaware Data, 1982 (continued)

Variable[a]	Contest	Pursue
Face	0.528*	-0.454
	(1.807)	(-0.697)
Jaw	0.601*	0.286
	(1.753)	(0.448)
Neck	0.382	0.640
	(1.575)	(1.137)
Arms	0.439**	0.542**
	(3.672)	(2.084)
Hand	0.257**	0.452
	(2.067)	(1.622)
Back	0.820**	0.468**
	(9.835)	(2.564)
Shoulder	0.387**	0.457
	(2.389)	(1.247)
Legs	0.411**	0.316
	(2.631)	(0.909)
Knee	0.426**	0.615**
	(3.609)	(2.323)
Multiple parts	0.926**	0.510**
	(10.798)	(2.814)
Body system	0.947**	0.406
	(2.959)	(0.743)
Other part	1.045**	0.434*
	(7.752)	(1.753)
Nature of injury		
Amputation	0.986**	-0.087
	(3.213)	(-0.159)
Burns	-0.323**	-0.369
	(-2.086)	(-1.090)
Sprains	-0.159**	0.170
	(-2.357)	(1.264)
Log-likelihood	-1576.2	-415.07
χ^2 (contest 32) [pursue 24]	301.44**	30.27**
Observations	3,951	626

NOTE: The t statistics are in parentheses.
*Denotes significance at the 10 percent level.
**Denotes significance at the 5 percent level.
a. Categories in the omitted groups for categorical variables include: commercially insured employers, female employees, location in Sussex County, service industry, any other part of body injured or nature of injury from those listed.
b. Variable not included in the pursue equation.

**Table 4.4 Maximum Likelihood Probit Estimates of the Contest and
Pursue Equations, Delaware Data, 1985**

Variable	Contest	Pursue
Constant	-1.215**	-1.241**
	(-3.890)	(-1.992)
Type of employer/insurer		
Public self-insured	-0.149*	-0.172
	(-1.773)	(-1.238)
Other private sector self-insured	0.033	0.241
	(0.304)	(1.000)
Chemicals, self-insured	-0.330	4.810
	(-0.793)	(0.014)
Automakers, self-insured	1.418**	1.465**
	(7.835)	(3.947)
Age	0.036**	0.048*
	(2.872)	(1.675)
Age squared	-0.0004**	-0.0005
	(-2.742)	(-1.318)
Male	-0.149**	a
	(-2.506)	
Location		
New Castle County	-0.024	-0.188*
	(-0.382)	(-1.712)
Kent County	0.017	a
	(0.209)	
Industry		
Construction	0.157*	a
	(1.810)	
Manufacturing	0.126	a
	(1.514)	
Transportation	0.0283**	a
	(2.628)	
Wholesale trade	0.049	a
	(0.618)	
Finance, insurance, real estate	0.418*	a
	(1.835)	
Public administration	0.365**	a
	(3.355)	
Natural logarithm of worker's wage	-0.131**	0.084
	(-2.353)	(0.887)
Part of body injured		
Head	0.109	-0.681
	(0.495)	(-1.285)

Table 4.4 Maximum Likelihood Probit Estimates of the Contest and Pursue Equations, Delaware Data, 1985 (continued)

Variable	Contest	Pursue
Face	0.234	-0.852
	(0.773)	(-1.207)
Jaw	0.440	0.591
	(1.362)	(0.871)
Neck	0.255	0.268
	(1.332)	(0.638)
Arms	0.215*	0.298
	(1.819)	(1.121)
Hand	-0.140	0.021
	(-1.049)	(0.063)
Back	0.532**	0.408**
	(7.025)	(2.558)
Shoulder	0.345**	0.662**
	(2.599)	(2.221)
Legs	-0.076	0.566
	(-0.427)	(1.259)
Knee	0.358**	(0.320
	(3.526)	(1.462)
Multiple parts	0.511**	0.362**
	(6.565)	(2.215)
Body system	0.335	-0.449
	(1.155)	(-0.758)
Other part	0.912**	-0.374
	(5.365)	(-1.235)
Nature of injury		
Amputation	0.866**	0.939
	(2.899)	(1.496)
Burns	0.140	-0.811**
	(0.987)	(-2.642)
Sprains	-0.040	-0.152
	(-0.635)	(-1.135)
Log-likelihood	-1773.4	-420.44
χ^2 (contest 32) [pursue 24]	220.59**	72.94**
Observations	4,328	681

NOTE: The t statistics are in parentheses.
*Denotes significance at the 10 percent level.
**Denotes significance at the 5 percent level.
a. Variable not included in the pursue equation.

report estimates of the determinants of whether a litigated case is pursued to verdict for 1982 and 1985 injuries, respectively, as expressed in equation (3.2).

The equations for the probability that a case is litigated and that a litigated case is pursued to verdict are specified as probit. We will refer to these equations as the contest and pursue equations. Recall that we use the terms "litigate" and "contest" interchangeably. A positive coefficient estimate in tables 4.3 or 4.4 means that the presence of this characteristic or an increase in this characteristic raises the probability that a case is litigated (or pursued to verdict, depending upon which equation we are considering). A negative coefficient estimate in tables 4.3 or 4.4 means that the presence of or increase in this characteristic lowers the probability that a case is litigated (or pursued to verdict, as appropriate). In tables 4.3 and 4.4, we indicate with two asterisks the coefficient estimates that are significant at the 5 percent level and with one asterisk the coefficients that are significant at the 10 percent level. Significance at the 5 percent level means that we are 95 percent certain that the coefficient differs from zero. Significance at the 10 percent level means that we are 90 percent certain that the coefficient differs from zero.[2]

We tested whether the error terms of the contest and pursue equations for a given year were significantly correlated, and we found no significant correlation for either 1982 or 1985.[3] In this way, we checked for a plausible failure in the conditions that must be satisfied for the probit models reported in tables 4.3 and 4.4 to be correct. Stated differently, we tested for the existence of significant common omitted determinants of both the probability of a case being contested and of being pursued to verdict.[4] Since this problem is not serious, our probit estimates are reliable.[5]

In terms of major results, the first variables of interest involve the types of insurance and their impact on litigation. The baseline category is private sector, commercially insured employers. Coefficients for the variables representing insurance type are to be interpreted with respect to the baseline (omitted) group, commercially insured employers. Relative to a case in which the employer is commercially insured, a workers' compensation injury is more likely to be contested (positive coefficient estimate) if the employer is one of the (self-insured) major automakers. Hunt (1982, p. 89) found the same result in his study of

workers' compensation in Michigan. Cases in which the employer is one of the major self-insured chemicals manufacturers or other self-insured private sector employers are no more likely to be contested than cases in which the employer is commercially insured. Simply stated, the coefficients of the variables representing chemicals and other self-insured employers do not significantly differ from zero. These results are found for both 1982 and 1985.

As mentioned earlier, the greater probability that a case becomes contested when the employer is one of the major automakers has been found for Michigan as well as for Delaware. It is likely that we are capturing some aspect of the industrial relations process in the automobile industry. It may also be that either the automakers or the United Auto Workers union (or both) are behaving strategically and wish to cultivate the image of a tough bargainer for workers' compensation or other industrial relations issues.

Cases in which the employer is self-insured and in the public sector are equally likely to be contested as when the employer is commercially insured for 1982 injuries but less likely to be contested for 1985 injuries.[6] Over the course of the 1980s in Delaware, public sector employees' wages gradually declined relative to wages in the private sector.[7] It is possible that declining relative wages for public sector employees resulted in declining quality of the public sector work force, which led to less efficiency in spotting and contesting questionable claims.

It is easier to see the impact of type of insurance on the probability of litigation by studying some predictions based on the estimates in tables 4.3 and 4.4. All variables except type of insurance are set to their sample means for 1982 and 1985, respectively. The predictions should be interpreted as the effect of a particular variable on litigation, holding other factors the same. Table 4.5 shows predicted probabilities of litigation for various types of insurance. The first column of data contains predictions for 1982, and the second column has predictions for 1985. In the 1982 data, the predicted probabilities of litigation do not differ much between private sector commercially insured firms and public sector self-insured ones (each is about 13 percent). The probability of litigation for the self-insured automakers is almost 60 percent, more than four times higher. For the self-insured chemicals manufacturers as well as other private sector self-insured firms, the predicted probabili-

ties are moderately higher than for commercially insured private sector firms (by 30 and 25 percent). However, these differences are not statis-tically significant.

Table 4.5 Predicted Litigation Probabilities by Type of Insurance, Delaware Data, 1982 and 1985

Type of insurance	Percent, 1982	Percent, 1985
Commercially insured	13.4	14.7
Public sector self-insured	13.1	11.5
Automaker, self-insured	59.5	64.4
Chemicals manufacturer, self-insured	17.5	8.4
Other self-insured private sector	16.7	15.5

SOURCE: Predictions based on models in tables 4.3 and 4.4.
NOTE: These predicted probabilities (we report them after multiplying them by 100) are obtained using the probit coefficients in the first data colums of table 4.3 and 4.4 and the sample means of all variables other than type of insurance for 1982 and 1985, respectively.

For 1985, some of the predicted probabilities for specified types of insurance increase and other probabilities decrease relative to 1982 results. All of the predicted probabilities change because of changes in the mean characteristics of firms and workers, as shown in table 4.1. The predicted probabilities of litigation for specific insurance types also change over time because of changes in the coefficients of the liti-gation equation, as can be seen by comparing the coefficients in the first columns of tables 4.3 and 4.4.[8] For example, there is evidence of a reduced tendency to contest a case over time when the employer is in the public sector.

In general, the predicted probabilities across insurance types in 1985 display a similar pattern as in 1982. A notable difference compared to 1982 is that the litigation probability declines for the public sector employers by about 12 percent. Also of interest is that the litigation probability increases for the automakers by 8 percent, but declines for other self-insured private sector firms (by 7.2 percent). For commer-cially insured employers the litigation probability increases by 9.7 per-cent. The large drop in the litigation probability for chemicals manufacturers is not statistically significant across the two years.

Returning to the coefficient estimates in the first columns of tables 4.3 and 4.4, we document that in both years the probability of a case

becoming contested increases with a worker's age but at a diminishing rate. The positive coefficient estimate for age and negative coefficient estimate for the square of age imply such a result. With all else held constant at each year's sample means, the probability of a case being contested reaches a maximum at age 40 in the 1982 data and at age 41 in the 1985 data. Table 4.6 reports predicted litigation probabilities for each data set and for various ages.[9] In both years, we predict an inverted U-shaped age-litigation probability profile with a maximum probability in the early forties. The entire age-litigation probability profile shifts up slightly from 1982 to 1985.

Table 4.6 Predicted Litigation Probabilities by Age of Worker, Delaware Data, 1982 and 1985

Age	Percent, 1982	Percent, 1985
25	13.6	14.1
30	14.5	15.4
35	15.2	16.4
40	15.4	16.8
45	15.1	16.6
50	14.5	15.9
55	13.6	14.7
60	12.3	13.1

SOURCE: Predictions based on models in tables 4.3 and 4.4.
NOTE: Predicted probabilities obtained using the probit coefficients and the sample means of all variables other than age for the 1982 and 1985 data sets, respectively.

The shape of the probability profile likely reflects systematic changes in the types of jobs workers have at different stages of their working life and the associated changes in the severity of injuries they suffer. For example, employees in their twenties are more likely to be helpers or trainees; individuals in their thirties and early forties are more likely to be fully trained skilled or semiskilled workers who may suffer more severe injuries than would their more junior colleagues. These more serious injuries may result in a greater probability of litigation. In contrast, older workers (beyond their early forties) are more likely to have supervisory jobs, where the probability of severe injury may be lower and, hence, the probability of litigation is lower. In our

data, we have no information on workers' occupations; we have measures of the part of body injured and the type of injury but no measure of the severity of injury. It is possible that age reflects workers' occupations, which are associated with injuries of various degrees of severity: increasing up to the early forties, reaching a maximum, and decreasing thereafter.

In discussing more results from tables 4.3 and 4.4, it is helpful to relate these to the predictions reported in table 4.7. A case is less likely to be contested when the worker is a man than when the worker is a woman. For both years, the probability of litigation is 3.5 to 4.1 percentage points lower for men.

Table 4.7 Predicted Litigation Probabilities by Gender, Industry, and Part of Body Injured, Delaware Data, 1982 and 1985

Characteristic	Percent, 1982	Percent, 1985
Gender		
Male	12.8	13.6
Female	16.9	17.1
Industry		
Services	10.3	13.4
Construction	17.7	16.3
Manufacturing	16.9	17.0
Part of body injured		
Back	23.6	22.7
Shoulder	12.4	17.4
Knee	13.3	17.8
Multiple parts	26.9	22.0

SOURCE: Predictions based on models in table 4.3 and 4.4.
NOTE: All predictions made at the means of all variables for each sample except the variables in the first column.

Employment in construction, manufacturing, public administration, and finance/insurance/real estate in 1982 (table 4.3) and in transportation, public administration, finance/insurance/real estate, and construction in 1985 (table 4.4) is associated with an increased probability of a case being contested.[10] Employment in the service industry serves as the comparison level or baseline.

The Delaware data do not include any measure of the type of work performed by an injured worker other than the industry of employment. Therefore, these industry variables, as well as age, are used to reflect, in part, the type of work, which, in turn, may be related to the nature of injuries or their severity. Industry variables also reflect how hazardous a particular job is.

The probability of the average worker injured in 1982 and 1985 disputing a case is higher in construction and manufacturing than in services (center panel of table 4.7). The litigation probability is around 16 to 18 percent in construction and manufacturing in both years, but it jumps from 10.3 to 13.4 percent from 1982 to 1985 in services. There was a very rapid expansion of employment in service industries in Delaware during this period. The growth seems to have been associated with a greater incidence of litigation in connection with work-related injuries. Manufacturing, construction, and services accounted for more than one-half of the injury claims in 1982 and 1985.

The part of the body injured and the type of injury are significant determinants of the probability of litigation. Table 4.2 contains definitions for the variables representing selected parts of the body and nature of the injury. In both years, back, shoulder, other part, and knee injuries as well as multiple parts injuries significantly increase the probability of a case being contested. These are injuries where pain and the extent of the recovery following some period of recuperation are often difficult to ascertain objectively and are likely to give rise to disputes.

The bottom panel of table 4.7 reports predicted probabilities of litigation for various injuries and shows that, over time, some probabilities increase while others decrease. On average, however, the litigation probabilities rise somewhat for these types of injuries. There was considerable slack in the labor market in 1982, a recession year, while 1985 was a year of economic expansion, with a much tighter labor market in Delaware. A tight labor market is associated with more overtime work and a more intense work pace, which may result in more severe injuries of a given type, on average, and hence a higher average litigation probability.

With the 1982 data, residence in New Castle County, a predominantly urban area, significantly increased the probability of a case being contested, as compared to residence in Kent and Sussex Coun-

ties, which are more rural. By 1985, county of residence had no significant effect on the probability of a case being contested. A positive effect would be consistent with residents of urban areas being more litigious than residents of rural areas and possibly facing lower costs in searching for a lawyer and pursuing legal actions. This effect is borne out for injuries occurring during the recession period of 1982 but not during the expansion in 1985. The dissipation of the "New Castle County effect" is consistent with a diffusion of information (or litigiousness) from urban areas to rural areas over time so that eventually it makes no difference where a worker lives. The finding for 1985 is at least partially a reflection of the rapid economic development taking place in the southern part of Delaware, especially in Sussex County near the resort areas.

With the 1985 data, we also find a negative and significant effect of the natural logarithm of the worker's real wage (in 1982 dollars) at the time of the injury on the probability of a case being contested. No significant wage effect is found with the 1982 data. This pattern of results coincides with the increasing opportunity cost to workers of contesting an injury as wages rise during an economic expansion: workers try to return to work quickly under these circumstances. The opportunity costs fall during a recession, when the probability of a layoff is higher: workers would be much more likely to contest a case, given that returning to work quickly is a less certain prospect. In addition, during the course of the 1980s, the U.S. economy experienced widening skill differentials in wages (Murphy and Welch 1993). This growing divergence represents a structural change in the earnings distribution independent of the business cycle and suggests that higher wage (and skilled) workers would face increasing opportunity costs associated with staying away from the job.[11]

Another possible explanation of the insignificant effect of wages in 1982 but negative effect of wages in 1985 may be that during recessionary times (1982), displaced employees are likely to consider workers' compensation as a possible source of income and may be more likely to contest a case in order to continue receiving payments. In contrast during a period of economic expansion (1985), workers' compensation is relatively less attractive, given that prospects for earning wages are improving.

Determinants of Pursuing a Litigated Case

Estimates of probit models of whether or not a litigated case is pursued to verdict, as represented by equation (3.2), are reported in the second data column of table 4.3 (1982) and in the second data column of table 4.4 (1985). Cases pursued to verdict are likely to use more resources of the formal dispute resolution system than other cases. Even though our data do not contain direct monetary measures of legal costs, the study of the factors affecting the probability that a litigated case is pursued to verdict provides some insight into the use of resources of the legal system.

In the Delaware data sets, the probability that a case is pursued to verdict depends significantly on the part of the body injured and on the type of injury. In 1982, the significant factors included injury to the head, arms, back, or knee, multiple parts injuries, and other (unclassified) injuries. In 1985, back, shoulder, and multiple parts injuries significantly increased the probability that a litigated case was pursued to verdict. Consistent with our earlier results, injuries (e.g., back, multiple injuries) from which recovery is hard to evaluate are associated with a higher probability of a case being contested and of being pursued to verdict, thus using more resources of the legal system.

Cases in which the injured worker suffered burns are significantly less likely to have been pursued in the 1985 data. It may well be that, in 1985, many of these types of cases were settled before a final verdict was rendered; this may have resulted as new information became available to the disputing parties in the discovery phase of the dispute resolution proceedings.

To give a more concrete indication of the magnitudes involved, we calculated predicted probabilities of a contested case being pursued to verdict for various injuries as of 1982 (table 4.8). Litigated cases in which the worker suffered a head injury have the highest probability of being pursued to verdict (73 percent), while the presence of injury to the arms, back, knee, or to multiple parts is associated with probabilities that are 7.9 to 13.5 percentage points lower.

For both the 1982 and the 1985 data, we find that the probability of a litigated case being pursued to verdict increases with the worker's age. Evidence of an inverted U-shaped probability profile is weaker than was the case with the litigation model. Age is probably associated with

the type of work an injured worker performed and, therefore, with the severity of injury. Increasing age might also be associated with general health or with the labor market conditions faced by a worker, which would tend to affect the probability that a litigated case is pursued to verdict.

Table 4.8 Predicted Probabilities of Pursuing a Litigated Case by Part of Body Injured, Delaware Data, 1982

Part of body	Percent
Head	73.2
Arms	62.6
Back	59.7
Knee	65.3
Multiple parts	61.3

SOURCE: Predictions based on models in tables 4.3 and 4.4.
NOTE: All predictions are made using the probit coefficient estimates in the second data column of table 4.3 and the means of all variables except part of body injured.

In 1985, a case was significantly more likely to have been pursued to verdict when the employer was a major automaker. For 1982, the type of employer or insurance had no effect on the probability of a case being pursued. Our finding for the major automakers in 1985 is consistent with these large, self-insured firms becoming increasingly aggressive over time in pursuing contested workers' compensation cases to final verdict. Perhaps this is evidence that, over the period studied, the automakers became more concerned about precedent-setting workers' compensation cases and, therefore, became less willing to settle contested cases before a final verdict was rendered. Recall that, in both years, cases in which the employer was an automaker were more likely to be litigated than other cases.

The fit (or explanatory power) of the pursue equations is lower than the fit of the contest equations, as indicated by the values of the chi-square statistics in table 4.3 and 4.4. However we are charting unexplored ground. We are unaware of any previous empirical studies of how far into the formal dispute resolution system a contested workers' compensation case is likely to go.

Determinants of Real Compensation Payments

Up to now we have examined the determinants of whether a workers' compensation case is litigated and of how far into the formal dispute resolution mechanism a litigated case is pursued. We turn our attention to the determinants of an outcome of litigation: compensation paid to workers in contested cases.[12] Since most workers' compensation cases are not contested, it is important for purposes of explanation and prediction to compare the determinants of payments in contested cases to those in uncontested cases. First, we will explain our regression results in a way that closely parallels the preceding discussion of the estimates of the contest and pursue equations. Then, we will illustrate how our equations can provide predictions that enable us to evaluate the efficiency of the dispute resolution system in Delaware for workers' compensation.

We estimated workers' compensation payment (henceforth "payment") equations for uncontested and contested cases using ordinary least squares (OLS) regression techniques. The left-hand-side variable in these regression equations is the natural logarithm of the real value (in 1982 dollars) of the cumulative indemnity payments to injured workers until a case closes, or up to May 1990 for open cases. In order to verify the reliability of our empirical work, we tested the payment equations for some possible failures of the conditions under which the OLS regression estimates we report would be correct. We tested for selectivity bias using two different statistical setups.[13] We also tested whether the payment equations could be collapsed into fewer categories. Our statistical tests show no evidence of selectivity (for more documentation, see the appendix to this chapter). It is, therefore, appropriate to estimate the payment equations by the OLS method.

Characteristics of injured workers and of their employers may have different effects on benefit payments in contested and uncontested cases. For instance, the part of body (e.g., back injury) may have a distinct impact on real benefits in contested as compared to uncontested cases. Contested cases include instances where the parties disagree as to the size and/or extent of the injury. If the effects are different in these situations, and if benefit equations are estimated with the sample in which contested and uncontested cases are pooled, resulting coefficients would be misleading. Under these circumstances, the researcher

would obtain biased estimates of, for example, the influence of back injuries on the level of benefits received by workers who contest their cases. Statistical tests were conducted to determine the appropriateness of pooling contested and noncontested cases as well as whether or not contested cases may be pooled whether they were pursued to verdict or not.

We found no significant difference between the payment regressions for contested cases pursued to verdict and for contested cases not pursued to verdict. However, the payment regressions for contested and for uncontested cases are significantly different.[14] Consequently, we report estimates of payment equations for uncontested and for contested cases separately. Results for contested cases are pooled into one equation.

As we pointed out in chapter 2, right censoring of the cumulative payments is unlikely to be serious for 1982 but might be more serious (but probably not drastically so) for the 1985 data. Consequently our estimates of the payment equations may have greater reliability for 1982 than for 1985. However, to the extent that we obtain broadly similar patterns of findings for both years, the more recent information can serve the useful function of confirming the results obtained with the earlier data.

Estimates of the payment equations are reported in tables 4.9 and 4.10 for 1982 and 1985, respectively. The payment equation estimates for the sample of uncontested cases are reported in the first data column, while estimates for contested cases are reported in the second data column of each table.

Uncontested Cases

In 1982, cumulative payments in uncontested cases significantly increased, relative to commercially insured employers, when the employer was a self-insured chemicals manufacturer. We obtain the same result with a very similar coefficient estimate for 1985. This probably reflects the severity of workers' injuries in these cases. In the 1982 data, cumulative payments for other employer insurance types are not significantly different relative to commercially insured employers. However, in the 1985 data, real cumulative payments (in 1982 dollars) are significantly higher for automakers and significantly lower for public sector employers. The change in the effects of automakers and

Table 4.9 Ordinary Least Squares Estimates of the Payment Equations, Delaware Data, 1982

Dependent Variable: Natural Logarithm of Real Cumulative Payment		
Variable	Uncontested cases	Contested cases
Constant	1.298**	2.980**
	(3.901)	(3.348)
Type of employer/insurer		
Public self-insured	-0.007	-0.213
	(-0.086)	(-0.929)
Other private sector self-insured	-0.040	0.437*
	(-0.336)	(1.663)
Chemicals, self-insured	2.073**	0.466
	(5.407)	(0.715)
Automakers, self-insured	0.329	-0.548*
	(0.858)	(-1.676)
Age	0.007	0.116**
	(0.566)	(3.479)
Age squared	0.0001	-0.001**
	(0.314)	(-2.951)
Male	-0.033	0.103
	(-0.492)	(0.624)
Location		
New Castle County	0.180**	-0.094
	(2.580)	(-0.473)
Kent County	0.173**	0.388
	(1.960)	(1.592)
Industry		
Construction	0.077	-0.001
	(0.824)	(-0.005)
Manufacturing	0.094	-0.064
	(1.101)	(-0.288)
Transportation	0.088	-0.536*
	(0.755)	(-1.690)
Wholesale trade	0.142*	-0.307
	(1.678)	(-1.367)
Finance, insurance, real estate	-0.045	0.315
	(-0.206)	(0.685)
Public administration	-0.018	-0.304
	(-0.144)	(-0.939)
Natural logarithm of worker's wage	0.729**	0.467**
	(11.412)	(3.014)

(continued)

Table 4.9 Ordinary Least Squares Estimates of the Payment Equations, Delaware Data, 1982 (continued)

Variable	Uncontested cases	Contested cases
Dependent Variable: Natural Logarithm of Real Cumulative Payment		
Part of body injured		
Head	-0.477**	-0.109
	(-2.043)	(-0.201)
Face	-0.544*	-0.932
	(-1.724)	(-1.313)
Jaw	0.072	0.986
	(0.189)	(1.254)
Neck	0.114	1.206*
	(0.492)	(1.828)
Arms	0.059	0.569*
	(0.503)	(1.813)
Hand	-0.227**	0.930**
	(-2.031)	(2.741)
Back	-0.085	1.054**
	(-1.068)	(4.776)
Shoulder	0.131	0.693
	(0.880)	(1.540)
Legs	0.209	1.366**
	(1.411)	(3.230)
Knee	0.274**	1.293**
	(2.414)	(4.095)
Multiple parts	0.238**	1.118**
	(2.550)	(5.130)
Body system	0.252	0.299
	(0.582)	(0.455)
Other part	0.375**	0.191
	(2.208)	(0.637)
Nature of injury		
Amputation	1.510**	0.299
	(3.692)	(0.462)
Burns	-0.477**	-1.233**
	(-3.366)	(-2.983)
Sprains	-0.120*	-0.297*
	(-1.826)	(-1.848)
R^2	0.116	0.187
F	13.459**	4.260**
Sample size	3,325	626

NOTE: The t statistics are in parentheses.
*Denotes significance at the 10 percent level.
**Denotes significance at the 5 percent level.

Table 4.10 Ordinary Least Squares Estimates of the Payment Equations, Delaware Data, 1985

Dependent Variable: Natural Logarithm of Real Cumulative Payment		
Variable	Uncontested cases	Contested cases
Constant	0.840**	2.466**
	(2.540)	(3.140)
Type of employer/insurer		
Public self-insured	-0.199**	-1.173
	(-2.328)	(-0.744)
Other private sector self-insured	-0.099	0.111
	(-0.851)	(0.384)
Chemicals, self-insured	1.902**	0.758
	(4.899)	(0.663)
Automakers, self-insured	0.751**	-0.457
	(2.301)	(-1.484)
Age	-0.004	0.044
	(-0.350)	(1.266)
Age squared	0.0002	-0.0002
	(1.138)	(-0.389)
Male	0.005	-0.172
	(0.086)	(-1.156)
Location		
New Castle County	0.109	-0.035
	(1.617)	(-0.213)
Kent County	0.185**	0.049
	(2.093)	(0.231)
Industry		
Construction	0.101	-0.050
	(1.124)	(-0.222)
Manufacturing	0.071	-0.213
	(0.821)	(-0.976)
Transportation	0.041	-0.096
	(0.352)	(-0.351)
Wholesale trade	-0.001	-0.635**
	(-0.014)	(-3.064)
Finance, insurance, real estate	0.213	-0.258
	(0.745)	(-0.507)
Public administration	0.105	-0.534*
	(0.885)	(-1.881)
Natural logarithm of worker's wage	0.859**	0.811**
	(13.915)	(6.323)

Table 4.10 Ordinary Least Squares Estimates of the Payment Equations, Delaware Data, 1985 (continued)

Dependent Variable: Natural Logarithm of Real Cumulative Payment		
Variable	Uncontested cases	Contested cases
Part of body injured		
Head	-0.525**	0.791
	(-2.440)	(1.279)
Face	-0.144	-0.108
	(-0.454)	(-0.134)
Jaw	-0.799**	0.701
	(-2.173)	(0.867)
Neck	0.536**	1.050**
	(2.739)	(2.126)
Arms	0.258**	-0.189
	(2.131)	(-0.598)
Hand	0.141	-0.062
	(1.202)	(-0.161)
Back	0.126	0.773**
	(1.582)	(3.958)
Shoulder	0.146	0.787**
	(1.025)	(2.284)
Legs	0.514**	0.428
	(3.310)	(0.815)
Knee	0.311**	0.576**
	(2.876)	(2.118)
Multiple parts	0.324**	0.806**
	(3.736)	(4.030)
Body system	1.005**	0.449
	(3.099)	(0.619)
Other part	0.548**	0.572
	(2.318)	(1.549)
Nature of injury		
Amputation	1.386**	1.246**
	(3.309)	(2.016)
Burns	-0.420**	-0.725**
	(-2.786)	(-1.970)
Sprains	-0.133**	-0.170
	(-2.046)	(-1.057)
R^2	0.135	0.217
F	17.596**	5.610**
Sample size	3,647	681

NOTE: The t statistics are in parentheses.
*Denotes significance at the 10 percent level.
**Denotes significance at the 5 percent level.

the public sector may reflect differences in injury severity over time. Recall that 1982 was a recession year while 1985 was not. During periods of economic expansion, automakers tend to operate their plants closer to capacity, using overtime employment and perhaps a more rapid work pace than during recessions. These conditions may be associated with more severe injuries, when injuries occur, and higher cumulative payments. Among public sector employees, it may well be that injuries have become less severe over time. Alternatively, right censoring may distort the relative ranking of cumulative payments across different types of insurance/employers and be the source of the changes in results for the automakers and the public sector between the two years.

Cumulative payments in 1982 for uncontested cases are higher in New Castle County (an urban area) and Kent County (partly urban) relative to Sussex County (a predominantly rural area). This probably is a reflection of the type of work and severity of injuries in these cases. By 1985, real cumulative payments were significantly higher only in Kent County (with a similar coefficient as in 1982) relative to Sussex County. During the 1980s, southern Delaware (Sussex County) experienced very rapid economic development, particularly in the resort areas and in the service sector. New Castle County also saw very fast growth of employment in service industries. Economic convergence of these two areas has undoubtedly manifested itself in similar cumulative payments to injured workers in uncontested cases, which represent the bulk of workers' compensation cases.[15]

The 1982 cumulative payments in uncontested cases increase when employment is in wholesale trade. This probably reflects the severity of injuries. Payments are also affected by body part injured and by type of injury. In particular, payments significantly increase for injuries to the knee, multiple parts, and other (unclassified) parts as well as for amputations. Payments significantly decrease for head, face, and hand injuries as well as for burns and sprains. Payments in 1985 significantly increase for neck, arm, leg, knee, multiple parts, other part, and body system injuries, and for amputations. The 1985 payments significantly decrease for sprains, head, and jaw injuries as well as for burns. Our estimates of the effects of head and knee injuries as well as of the effects of burns are similar in 1982 and 1985. We also obtain results that are in the same direction but differ somewhat more in magnitude

across the two years for amputations, multiple parts, and other part injuries.

The natural logarithm of the worker's (real) wage has a positive and significant effect on payments in uncontested cases in both 1982 and 1985. The 1985 coefficient is about 18 percent larger than the 1982 coefficient. The positive effect the injured worker's wage has on cumulative payments is not surprising since periodic benefits are a function of wages (with a maximum and minimum value). However, total cumulative payments and a worker's weekly wage are not definitionally related.

Contested Cases

We will now discuss the estimates of the payment equations for contested cases, shown in the second data columns of tables 4.9 and 4.10. In 1982 contested cases, cumulative payments are higher when the employer is in the category "other private sector self-insured" and lower when the employer is an automaker. No significant insurance/ employer type effects are found for 1985. The 1982 results could well be measures of the severity of the particular injuries in contested cases that year. For 1982 contested cases, we find an inverted U-shaped relationship between age and payments. Employment in transportation (1982) and in wholesale trade (1985) or public administration (1985) significantly reduce cumulative payments.

In 1982, injuries to the neck, arms, hand, back, legs, knee, and multiple parts are associated with increased cumulative payments, while burns and sprains are associated with decreased payments. For 1985, neck, back, shoulder, knee, and multiple parts injuries as well as amputations are associated with higher payments, and burns are associated with lower payments. In general, the coefficients for body part and injury type for contested cases vary across the two years. These may reflect changes in injury severity across the two years; they may also reflect the effects of right censoring in 1985.

Although the magnitudes differ across years, several results on the effects of type of injury and of body part injured do go in the same direction in both 1982 or 1985 (i.e., are associated with increased or with decreased payments). Wages have a positive effect on payments in contested cases, as was true with uncontested cases, in both years. The estimated coefficient in 1985 is 74 percent higher than it is in 1982.

The overall fit of the payment equations (for a given litigation status) improves somewhat over time. This is probably due to increases in sample size. It is also notable that the fit of the contested payment equations (both years) is better than the fit of the uncontested payment equations. We suspect that the variance of unmeasured characteristics of workers and their employers is smaller in the payment equations of contested than of uncontested cases which leads to the better fit of the former.

Efficiency of the Delaware System

Insights can be gained about the efficiency of the Delaware workers' compensation system by examining predictions associated with the payment equations.[16] These are presented in table 4.11. Panel A of table 4.11 reports predictions of natural logarithms, panel B reports predictions in 1982 dollars. The first potentially relevant prediction is of the cumulative payments going to injured workers who did not contest their cases. This is obtained for 1982 by plugging in the mean characteristics of nonlitigants into the payment equation, based on the sample of nonlitigants shown in the first column of data in table 4.9. The predicted real cumulative payment is $922 (panel B) for a typical workers' compensation recipient (i.e., has average characteristics of nonlitigants) in 1982 who had no litigation associated with his or her injury. The corresponding prediction for 1985, also shown in table 4.11, panel B, is $976.

Another prediction for 1982 involves inserting mean characteristics of the sample of workers who litigated their cases into the payment equation for this group (see the second column of table 4.9). The predicted cumulative payment in 1982 for contestants is $12,338, while the value for 1985 is $8,984.

There are also other predictions of interest to policy makers. Suppose we wanted to know how the typical nonlitigant would have fared in receiving cumulative workers' compensation payments if he/she *had* litigated the case. This information obviously is not observed. However, it can be obtained by plugging the characteristics of nonlitigants into the equation estimated for litigants. That is, we use the coefficients from the total payment equation for litigants and the characteristics (means) of nonlitigants. In 1982, the coefficients are from the second

column of table 4.9, and the means are those associated with nonlitigants. The predicted total payments are $9,460, based on the premise that the typical *nonlitigant* in 1982 had litigated his or her case. Using the same procedure yields a prediction of $7,959 for 1985.

Table 4.11 Payment Predictions, Delaware Data, 1982 and 1985

I. 1982

A. Predicted natural logarithms

(standard errors in parentheses)

		Coefficients	
		Uncontested	Contested
Means	Contested	5.94[a]	8.51
			(1.52)
	Uncontested	5.82	8.24[b]
		(1.46)	

B. Predicted payments in 1982 dollars

		Coefficients		
		Uncontested	Contested	Actual means
Means	Contested	$1,041.61[a]	$12,337.70	$12,904.00
	Uncontested	922.47	9,459.50[b]	1,229.40

II. 1985

A. Predicted natural logarithms

(standard errors in parentheses)

		Coefficients	
		Uncontested	Contested
Means	Contested	5.89[a]	8.15
			(1.58)
	Uncontested	5.82	8.03[b]
		(1.50)	

B. Predicted payments in 1982 dollars

		Coefficients		
		Uncontested	Contested	Actual means
Means	Contested	$1,045.60[a]	$8,984.01	$10,214.00
	Uncontested	976.20	7,959.31[b]	1,376.80

SOURCE: Predictions based on models in tables 4.9 and 4.10.
a. Calculated as if litigants had not contested their cases.
b. Calculated as if nonlitigants had contested their cases.

On the other hand, suppose that we want to know the predicted value of workers' compensation benefits had *litigants* not litigated their cases. Again, this is a case not actually observed in our data. We can obtain the prediction by plugging the characteristics of litigants into the equation in which the coefficients are associated with nonlitigants (in 1982, the first column of table 4.9). The 1982 predicted value of payments is $1,042, assuming that those who actually litigated had not done so; for 1985, it is $1,046 (table 4.11).

Some conclusions can be drawn from these predictions.[17] First, if individuals who did not contest their cases had done so, the litigation outcome would have been ˙smaller than what accrued to workers who actually litigated their cases. Our model also predicts that the actual litigants, even had they not disputed their cases, would have received higher payments than workers observed not to contest their injury. This prediction is not only plausible but provides evidence that the dispute resolution system in Delaware sorts cases efficiently. The implication is that the cases that proceed through the litigation process, on average, are those that display elements associated with higher predicted compensation. Suppose our model had predicted that injured workers who did not contest their cases would have received significantly larger payments if their cases had been contested than the sums received by workers who actually contested cases. Such a finding would raise the possibility of important inefficiencies in the dispute resolution mechanism or of misspecification of the estimated model. Our results do not suggest either of these problems.[18]

Cumulative payments for contested cases declined between 1982 and 1985. Part of this decrease may be due to right censoring that is greater in the 1985 than in the 1982 data. Possibly more important, however, may be the willingness of injured workers to return to work following a shorter recuperation during an economic expansion (1985) than during a recession period (1982). During an economic expansion, wages are likely to rise faster than during a recession, and it is more attractive to resume work quickly in order to continue investments in human capital (on-the-job training), which will lead to higher future wages.

Predictions about the Effect of Changes in Industry of Employment

Estimates of the statistical models can be used to predict what would happen if some exogenous characteristic changed. For example, if all workers had characteristics equal to the 1982 sample means of the regressors, we predict that (based on 1982 coefficient estimates) 13.8 percent of workers' compensation cases in Delaware would be contested.[19] If the proportion of injured employees working in manufacturing declined by one-half, from 25 to 12.5 percent, and the extra workers were employed in services, the predicted proportion of contested cases would fall to 13.0 percent (about a 6 percent decrease).[20] The direction of the hypothetical employment changes corresponds closely to what is actually happening in Delaware. Major manufacturers, including chemical and automotive firms, have undergone significant downsizing. At the same time, there has been rapid growth in the financial and service sectors.

If the proportion of injured workers employed in construction declined by one-half and the extra workers were employed in services, the predicted proportion of contested cases would decline to 13.2 percent.

Summary

In Delaware, for injuries that occurred in 1982 and 1985, a case was more likely to be contested if the employer was a self-insured major automaker; for 1985, it was less likely to be contested if the employer was in the public sector. An increase in the worker's wage decreased the probability that a case would be contested (for the 1985 data only). This, very likely, reflects an opportunity cost effect, which depends on the phase of the business cycle, and may also reflect longer-term structural changes in the economic environment.

The probability of litigation was found to rise with the worker's age up to a maximum (at 40 to 41 years of age) and thereafter to decline. This pattern may reflect injury severity, which depends on what kind of work an individual performs, which, in turn, depends on age. Type and

severity of injury also affect the probability of litigation as well as the probability that the litigation is pursued to verdict.

We predict that if injured workers who did not contest their cases had done so, the litigation would have resulted in smaller indemnity payments than those accrued by individuals who actually contested their cases. This is evidence that cases are sorted efficiently by Delaware's system for dispute resolution.

APPENDIX
Tests for Selectivity Bias

To test for the possible existence of sample selectivity in the payment equations, we estimated a double selectivity model along the lines suggested by Tunali (1986). We first estimated a bivariate probit model for the probabilities that a case is contested and that it is pursued to verdict. The contest equation includes industry dummies (and a few other variables such as gender and some location variables), while the pursue equation does not. Thus, the contest and pursue equations are identified. We also tried alternative exclusion restrictions to identify the pursue and contest equations, and the results are generally the same in all of these cases. We then formed appropriate sample selectivity correction variables and estimated payment equations with these variables among the regressors (as well as the regressors included in the models reported in tables 4.5 and 4.6). There were three payment equations: uncontested cases (this equation includes one selectivity correction variable), contested cases that were not pursued to verdict, and contested cases that were pursued to verdict. Both of the last two equations include two selectivity correction variables.

The equations were estimated with the 1982 and with the 1985 Delaware data. In both cases, the estimates of the correlation coefficients of the error terms of the contest and pursue equations were not significantly different from zero, and the selectivity correction coefficients were also not significantly different from zero. The estimates of the selectivity correction coefficients are reported in appendix table 4.1. The estimates in the table indicate that the error terms of the contest, pursue, and payment equations may be modeled as independent.

We also estimated a simpler selectivity model along the lines of Lee (1978), which involves estimating only a contest equation by probit and only making a distinction between payment equations for contested and uncontested cases (i.e., collapsing the payment equations for contested cases into one equation, whether or not a case was pursued to verdict). Once again, the estimates do not indicate the presence of selectivity bias.

All of the payment equations in the models with selectivity (double or single) rely on functional form for identification. In order to assess the sensitivity of our results to this identifying assumption, we also estimated alternative models in which the industry dummy variables appear in the contest equation but not in the payment equations. For example, one might claim that the type of industry affects the precise nature of an injury, which affects whether a case is contested, but that payment depends on other administrative rules, which do not depend on the industry of employment. We do not necessarily subscribe to this view, but we mention it as a possible justification of some exclusionary

identifying restrictions. Estimating a (single) selectivity model excluding industry from the pursue equation results in estimates of the payment equation that are virtually indistinguishable from compared to the ones relying only on functional form for identification. The upshot of these tests is that the OLS regression and univariate probit models underlying our study are, in fact, appropriate for the analysis of the determinants of litigation in the Delaware workers' compensation system.

Appendix Table 4.1 Estimates of the Selectivity Correction Coefficients of the Payment Equations, Delaware Data, 1982 and 1985

	Uncontested	Contested but not pursued	Contested and pursued
1982			
Selectivity A	2054.26	-1.081	-4.688
	(0.706)	(-0.414)	(-0.820)
Selectivity B		-0.038	1.375
		(-0.025)	(0.424)
1985			
Selectivity A	-0.144	-0.706	-1.008
	(-0.114)	(-0.037)	(-0.487)
Selectivity B		-0.685	0.143
		(-0.329)	(0.072)

NOTE: t statistics are in parentheses.

NOTES

1. In both 1982 and 1985, fewer than 200 cases of this type were in the data.

2. These significance levels are arbitrary but are conventionally used in applied statistical work.

3. We estimated bivariate probit models. Identification of the bivariate probit model is attained by assuming that some regressors do not affect whether a case is pursued. The estimated correction coefficients of the error terms (t statistics in parentheses) are -0.385 (-0.883) for 1982, -0.512 (-1.196) for 1985. In both cases, we cannot reject the hypothesis that the correlation coefficient is zero. This is evidence that the simple (or univariate) probit estimates reported in tables 4.3 and 4.4 are appropriate.

4. More detail appears in the appendix to chapter 3.

5. The estimates are reliable at least with respect to this particular failure of the assumptions underlying the probit models.

6. The coefficient is significant at the 7.6 percent level. In other words, there is a 92.4 percent chance that the public sector effect for 1985 is not zero.

7. In recognition of this problem, the State of Delaware increased the wages of several categories of state employees in the late 1980s in order to compete more effectively with the private sector and to reduce state employee turnover.

8. Note, however, that some of the coefficient changes over time (e.g., for chemicals manufacturers) are not significant.

9. These predictions are useful in showing how the litigation probability changes as an individual ages and has average characteristics with respect to the variables in the models.

10. Coefficients of industry variables are significant at the 7 percent level or higher in both years.

11. The outcome is the same as with the effect of the business cycle, but here we are referring to a longer-term transformation of the U.S. economy (see Murphy and Welch 1993).

12. Payments in most workers' compensation cases are received over a period of time. It is important, therefore, to adjust for inflation when comparing awards. We converted the awards into real (1982) dollars as follows: using the worker's wage, we calculated the weekly benefit. The number of weeks of total disability was found by dividing the total disability payments as of 1990 by the weekly benefit entitlement. We assumed that total disability payments started at the beginning of the disability period and were received in consecutive weeks until benefits were exhausted. We then applied the appropriate Consumer Price Index (CPI) for all urban consumers for each year to deflate the benefits received. If payments for disfigurement, temporary partial, or permanent injuries were involved, the total workers' compensation payment was greater than the sum of the total disability payments that accrued by mid-1990. We treated other types of payments (partial disability, permanent, or disfigurement) as lump sums and assumed that they were paid two years after the date of disability. In reality, some of these were received before or after two years. Our source at the Delaware IAB, however, said that our assumption was reasonable in most cases.

Our method of allocating total disability payments over time ignores periods during which an injured worker recovers, returns to work (and benefits cease) but is reinjured or has a relapse of the injury, and once more receives benefits. We have no information on the duration and timing of such interruptions, so our method is likely to result in some underadjustment for inflation. Fortunately, the period from 1982 to 1990, during which most of the cases were closed, was a time of low inflation (average annual CPI increase of about 3.7 percent), so the possible underadjustment is unlikely to be drastic.

13. Selection bias may arise from unobserved characteristics affecting the probability that a case is contested or pursued, which may be correlated with the error term of the payment equations. First, we estimated a switching regression model with double selection, consisting of an equation on whether or not a case was contested and an equation on whether or not the case was pursued to verdict (conditional on the case being contested). We specified these equations to have error terms that are jointly normally distributed and estimated this bivariate probit model for each Delaware data set. After forming the appropriate sample selectivity correction terms, we estimated three payment equations: uncontested cases, contested cases not pursued to verdict, and contested cases pursued to verdict. Each of the two payment equations for contested cases includes two selectivity correction variables, while the equation for uncontested cases includes one selectivity correction variable in addition to all the regressors included in the contest equation.

14. The F statistics test the hypothesis that the payment equations are identical for contested and uncontested cases; they are $F(33, 3885) = 48.18$ for 1982 and $F(33, 4262) = 39.99$ for 1985. In both data sets, we reject the hypothesis of equality of the payment regressions at the 1 percent significance level.

15. The 1985 results may be affected by right censoring of the cumulative payments data.

16. In table 4.11, panel A, we report payment predictions in natural logarithms and their standard errors (the standard errors indicate that the payments are significantly different across categories). These are translated into dollars, reported in panel B, by a Taylor series expansion (extension of the method in Goldberger 1964, pp. 217-18). We include third and fourth moments in order to increase the accuracy of the retransformation.

17. The low standard errors of the predictions in table 4.11, panel A, suggest a high degree of confidence that our predictions are different across categories.

18. We remind the reader that we have no information about the details of cases judged to be not compensable. Therefore, we make no claims about the efficiency or lack thereof of the dispute resolution system in Delaware as it relates to noncompensable cases.

19. The actual proportion is 16 percent. The discrepancy arises from making the prediction at the (1982) means of all regressors rather than averaging the predictions at the values of each observation. This is inessential for our purposes; we only wish to obtain a baseline prediction and study changes in it in response to assumed changes in the values of regressors.

20. We assume that the employers were not the major automakers or chemicals firms.

5
Determinants of Litigation
Michigan Closed Case Study

The empirical model of workers' compensation litigation estimated for Delaware will be of greater policy relevance if it is applicable to other states. Fortunately, we were able to obtain data from the W. E. Upjohn Institute for Employment Research that relate to the litigation process for the Michigan workers' compensation system in 1986. This is particularly relevant for comparison purposes since the period is very close to the 1982 and 1985 time frame of our Delaware data.

Our discussion will first focus on the Michigan data, including the purpose for the development of this information. Next, we will highlight the key features of the litigation process and litigants in Michigan. Third, econometric models specifying the determinants of litigation and the determinants of the complexity of the litigated cases are estimated and results presented. Finally, there will be a discussion of conclusions along with their implications for policy.

The Michigan Data

Our discussions in this chapter relating to the litigation process in Michigan draw heavily on the unpublished report, "Intrastate Differences in Workers' Compensation Costs, October 1986 Closed Case Study" by Allan Hunt and Leslie Lance (1989). Our empirical estimates of the determinants of litigation are based on data collected for Hunt and Lance by the Michigan Bureau of Workers' Disability Compensation.[1]

As in Delaware, policymakers in Michigan have often been faced with the task of evaluating and reforming workers' compensation in the absence of empirical information that would allow an objective evaluation of the system. The major goal of Hunt and Lance was to provide information about the operation of the Michigan workers' compensation system as it existed in 1986 so as to give legislators facts

on which to base future policy recommendations. More specifically, they wanted to shed light on how the system in Michigan operated in 1986 as compared to 1978, the last time there had been a systematic study (Hunt 1982). Information on the operation of the system in 1986 and its outcomes, along with comparisons with the 1978 system, provided legislators with the requisite information to evaluate the effectiveness of the reforms in Michigan workers' compensation instituted in the early 1980s.

The information used by Hunt and Lance was extracted from a data base of more than 655,000 cases developed and maintained by the Bureau of Workers' Disability Compensation of the Michigan Department of Labor. The sample included 6,265 workers' compensation cases closed in October of 1986. Closed cases are defined as those that have no administrative action pending and no payments currently taking place. In particular, a case is closed when the individual claimant has recuperated and returned to work; has recuperated but not returned to work; has accepted a lump-sum payment along with an agreement not to seek further compensation; has withdrawn the claim or had benefits denied in an administrative procedure, and thus is no longer eligible for benefits; or has died (Hunt and Lance 1989, p. 3).

The closed case sample design of Hunt and Lance is different from the approach we chose for Delaware. In the latter, we selected all cases opened in 1982 and 1985 and then followed each case for eight and five years, respectively. As Hunt and Lance point out, a major advantage of the closed case data design is that the researcher knows what has happened in each case, since it has gone through a complete cycle, a beginning and an ending.[2] A disadvantage of this approach occurs in cases that are heavily litigated and date back several years. Serious long-term claims are systematically underrepresented in closed case data sets. Their frequency is reduced by virtue of the fact that employment and workers' compensation claims have been growing over time. In addition, since the entitlement to benefits in such cases occurred under a much earlier policy regime, there may be little or no relevance to the current workers' compensation system. Finally, an advantage of the closed case sample for 1986 arises because Hunt's previous study of the 1978 system (prior to reforms of the early 1980s) was based on a closed case sample design, making it appropriate for comparisons of the pre- and postreform period in Michigan (Hunt 1982).

Key Variables

The 1986 file of closed cases for Michigan workers' compensation is a rich source of information. Using this resource, we now highlight important characteristics of the litigated cases. The first point to emphasize is that most workers' compensation cases in Michigan, as in Delaware, are uneventful. Namely, the worker is injured, with prompt acknowledgment from the employer, and then payment of benefits is made by the insurer (i.e., the party responsible for liability). Of 6,265 cases, 5,488, or 87.6 percent, were unlitigated. As in Delaware, litigation occurs when an employer, employee, or the insurance carrier disagree on some aspect of the claim. Litigation occurred in 777 or 12.4 percent of the 6,265 cases (Hunt and Lance, 1989, p. 9). This is slightly below the 16 percent figure we report for Delaware in 1982 and 1985 in table 2.3.

We treat the individual case as the unit of observation. In order to make meaningful comparisons with the Delaware results for factors affecting litigation, we constructed two dependent variables: one reflecting whether or not a case is litigated at all and another to pick up what we referred to in the Delaware data as "pursued" cases. Litigated cases may involve one or more petitions and events. Whether the case has one or thirty events in the dispute resolution process, it is considered litigated. In our work on Delaware, we defined a case as "pursued" if it included *at least one* sequence of legal events that ended in an award of benefits, mailing of a payment, or an administrative hearing. The last category could include, but is not limited to, such activities as a hearing before the workers' compensation board, a superior court hearing, or a supreme court hearing. More complex cases might include multiples of these and other legal events (see the chapter 2 discussion).

A variable (case type) Hunt and Lance refer to as "case complexity" provided the information for constructing the variables "litigate/not litigate" and "pursue." Although the complexity variable is not defined in exactly the same manner as the variable we constructed for Delaware, it should provide information similar to the Delaware "pursue" variable.[3] The intent of the pursue variable is to measure how deep into the legal system a case progresses. Pursued cases use more resources of

the workers' compensation and legal systems. Thus, understanding the determinants of whether or not a case is pursued provides information leading to resource-saving system changes.

The least complex category of the litigated cases in Michigan consists of situations where only an employee petition for a hearing was included. Hunt and Lance denote this classification as "contested"; it included only 10 observations. Another type of case used in Michigan is called a "redemption." These are closed cases and involve a lump-sum payment to the claimant in exchange for freeing the employer from future liability in the case. The "redemption" category included a total of 348 cases. The third type of case included those having a "decision" form filed, with or without the forms associated with the previously mentioned case types. These decisions are rendered by workers' compensation magistrates who write orders enforceable under the law. This "decision category" included 343 cases. The final classification involves cases where the forms for an appeal are part of the record, whether or not forms are included relating to any of the other types of cases. "Appealed" cases comprised 76 of the litigated cases. In the following statistical analysis, we define cases that involve decisions or appeals as being pursued to a verdict.

We now discuss the variables that will appear as determinants of the litigation of a case or of its being pursued to a verdict. Insurer types are segmented into two major categories: commercial insurers and self-insured. Hunt and Lance further divided self-insured firms by singling out the Big Three automakers "because of their economic importance in the Michigan economy and because of the widespread impression that they handle workers' compensation cases differently than other employers in the state" (Hunt and Lance 1989, p. 29). In our statistical analysis, we used the Hunt and Lance breakdown as the starting point for classifying employer/insurer types associated with each claim. These categories include the Big Three automakers, other self-insured, commercial carriers, and multiple types of insurance. Within other self-insured are small organizations in a common industry that contribute to a group self-insurance fund. For instance, a group of hardware stores across the state may contribute to a group fund. These group arrangements are probably more similar to those associated with a commercial insurance carrier than with a self-insured employer; as a result, we separated out "group" from the self-insured category. Group

insured included 556 claims, 9 percent of the sample of 6,265. We also created a category for public sector self-insured (e.g., City of Detroit) because of the belief that cost minimization (or profit maximization) incentives will be weaker for public sector entities as compared to private sector firms. In summary, categorical dummy variables were constructed to represent the Big Three automakers; other self-insured private employers, excluding group insured; group insured; self-insured public employers; commercial carriers; and multiple types.

The potential importance of the type of insurer as a determinant of whether a case is litigated is also shown by a cross tabulation of litigation status by insurer type. As table 5.1 indicates, claims involving Big Three firms are three times more likely to have a case litigated than are the typical claims associated with "other self-insured" employers and have more than twice the likelihood of claims associated with firms insured by a commercial carrier. Cases in which employers are insured by commercial carriers are more likely to be litigated than cases in which employers are self-insured (see Hunt and Lance 1989, p.61; reproduced here as table 5.1); this result is confirmed in our multivariate analysis of the Michigan data discussed later in the chapter. In chapter 4, for the Delaware data, we found no difference in the litigation probability between cases in which the employer was commercially insured or was self-insured and in the private sector (other than the major automakers). Economic theory does provide a plausible explanation of why the results in Delaware are different from those in Michigan.

Where a claim originates within Michigan is potentially important as a determinant of litigation, since workers' compensation magistrates who hear cases in different regions have discretion that can lead to different administrative practices across the state. Moreover, practices of the local bar association are likely to vary by location within Michigan (Hunt and Lance 1989, p. 23). We categorized the Standard Metropolitan Statistical Areas (SMSAs) of the state into Detroit Metropolitan, Ann Arbor-Jackson, Flint-Saginaw, Grand Rapids-Muskegon, Kalamazoo-Battle Creek, Lansing-East Lansing, and finally, other areas. The data show that location of claim may play an important role in the litigation process. For example, the Detroit metropolitan area accounts for about 50 percent of workers' compensation claims, but it is responsible

for over 67 percent of the litigated cases in the sample of 6,265 (Hunt and Lance 1989, p. 52).

Table 5.1 Insurer Type by Litigation Status, Michigan, 1986

Insurer type	Unlitigated	Litigated	Total
Big Three automaker	414	142	556
(Percent of row)	(74.5)	(25.5)	(100.0)
(Percent of column)	(7.5)	(18.3)	(8.9)
Other self-insured employer	1,986	177	2,163
(Percent of row)	(91.8)	(8.2)	(100.0)
(Percent of column)	(36.2)	(22.8)	(34.5)
Commercial carrier	3,088	419	3,507
(Percent of row)	(88.1)	(11.9)	(100.0)
(Percent of column)	(56.3)	(53.9)	(56.0)
Multiple types of insurance	0	39	39
(Percent of row)	(0.0)	(100.0)	(100.0)
(Percent of column)	(0.0)	(5.0)	(0.6)
Total	5,488	777	6,265
(Percent of row)	(87.6)	(12.4)	(100.0)
(Percent of column)	(100.0)	(100.0)	(100.0)

SOURCE: Hunt and Lance (1989, p. 61).

It should be noted that location and type of insurer may be interacting to yield the results for Detroit. Insurers categorized as Big Three automakers are concentrated in the Detroit, Flint-Saginaw, and Lansing-East Lansing areas of Michigan. Thus, the greater incidence of litigation in these places may be due to location and/or type of insurance carrier. Other self-insured carriers are more evenly distributed throughout Michigan (Hunt and Lance 1989, p. 53).

Another interesting result relates to the differential outcomes of litigation by region of the state. "Washouts," cases not compensated, comprise only 4.5 percent of the total Michigan sample of 6,265 but 6.6 percent of the total for Detroit. Almost three-fourths of all washouts in the sample occurred in Detroit, leading Hunt and Lance to suggest that this could reflect less credible claims occurring there (Hunt and Lance 1989, pp. 55-56). It should be emphasized that the Delaware data

underlying chapter 4 do not include washouts. The workers' compensation system in Delaware only collects information on compensable cases. In order to check for the effects of noncompensable cases on our results, we estimated models that include and that exclude washouts.

Determinants of Litigation: A Multivariate Model

Researchers have more confidence in results obtained from statistical models when conclusions from alternative data sets are similar. When data sets produce dissimilar conclusions, the observed differences must be explained. To find out if this is the case for our Delaware results relating to the determinants of litigation, we reestimated equations (3.1) and (3.2), the contest and pursue equations from chapter 3, with the 1986 Michigan closed case data.

There are major differences between the Michigan and Delaware data. The Michigan data set is based on a closed case design, using cases closed in 1986. The Delaware data consist of two files, one including all cases where the date of injury was 1982, and the other comprising cases originating with a 1985 injury. For all intents and purposes, the Delaware laws governing workers' compensation did not change following 1982 through the end of the period we analyzed, May 1990. The Michigan closed case file includes cases originating *prior* to the reforms of the early 1980s. Inclusion of such cases may lead to misleading observations regarding the outcome of reforms.

Several variables found to be important determinants of contesting a case in Delaware were not available at all, or when available, contained large amounts of missing data for persons litigating their cases. The Michigan data do not include any information about the nature of the injury or part of the body affected, variables found to be major factors in the Delaware litigation. The industry in which the injury occurred is not available in the Michigan data except for claims involving the Big Three automakers. Also, there are substantial numbers of missing observations for the gender and earnings variables in more than half of the litigated cases in the Michigan data. To avoid possible selectivity bias, which may result if we use only Michigan observations in which the workers' gender and wage are reported, we do not use these vari-

ables. We caution the reader, therefore, that the regression results obtained for Michigan may be affected by the absence of information on several worker and employer characteristics found to be important in our analysis of the Delaware data. In spite of these limitations, the Michigan data are useful in estimating some of the models developed earlier for Delaware and make it possible to compare results for the two states.

The Delaware Industrial Accident Board retains complete data only on cases that are compensable. Data collected by the Michigan Bureau of Workers' Disability Compensation include both compensable and noncompensable cases. Also, as noted, the 1986 closed case Michigan data include injury cases that began prior to the reforms in the early 1980s. In order to make the samples of the two states as comparable as possible, we estimate the contest (i.e., litigate or not litigate) equation under several assumptions about the samples. Table 5.2 shows the means and standard deviations for the samples of all cases (compensated and noncompensated) and "compensated cases" only that opened after 1969. Similar statistics are shown in table 5.3 for cases occurring after 1981. The key point is that the means of the variables are similar in both tables irrespective of the time period or whether or not the case was compensable.

The post-1969 total and compensated-only sample sizes are 6,198 and 5,926, respectively. For cases after 1981, the total and compensated-only samples include 5,951 and 5,724 observations, respectively. The sample including all cases originating after 1969 yields a litigation rate of 12.3 percent, while the compensated-only sample had 8.9 percent of cases litigated. The litigation rates for cases after 1981 for the total and compensated-only samples were 9.7 percent and 6.8 percent, respectively. The lower litigation rates on the more recently originated cases are not surprising since cases that settle in a shorter time frame are less likely to be of the complex variety. Note that litigation rates fall when noncompensated cases are dropped from both the post-1969 and post-1981 samples.

It is helpful to compare the characteristics of workers' compensation claimants from the Michigan sample with those of claimants from Delaware. Means and standard deviations for the variables employed in the analyses are shown in tables 5.2 and 5.3 for the Michigan data and in table 4.1 for the Delaware data. The average age of Delaware claim-

ants is slightly lower, between 33 and 34, compared to 36 for Michigan.

Table 5.2 Means and Standard Deviations of the Variables (Based on Cases Occurring after 1969), Michigan Data, 1986, Full Sample

Variable	All cases		Compensated cases	
	Mean	Standard deviation	Mean	Standard deviation
Age	36.424	12.134	36.302	12.055
Age squared	1474.0	983.2	1463.1	975.0
Type of employer/insurer				
Big Three automaker	0.088	0.283	0.079	0.271
Group insurance	0.089	0.284	0.090	0.286
Other self-insured private sector	0.196	0.397	0.199	0.399
Self-insured public sector	0.063	0.243	0.062	0.241
Multiple types of insurance	0.006	0.077	0.005	0.067
Location				
Ann Arbor-Jackson	0.041	0.199	0.040	0.196
Kalamazoo-Battle Creek	0.047	0.211	0.049	0.215
Detroit	0.495	0.500	0.484	0.500
Flint-Saginaw	0.062	0.241	0.062	0.241
Grand Rapids-Muskegon	0.105	0.306	0.108	0.310
Lansing-East Lansing	0.049	0.216	0.050	0.219
Female	0.290	0.454	0.291	0.454
Sample size	6,198		5,926	
Number contested	760		528	
Number pursued	406		174	

Table 5.3 Means and Standard Deviations of the Variables (Based on Cases Occurring after 1981), Michigan Data, 1986

Variable	All cases		Compensated cases	
	Mean	Standard deviation	Mean	Standard deviation
Age	36.231	12.076	36.114	12.011
Age squared	1458.5	977.2	1448.4	969.4
Type of employer/insurer				
Big Three automaker	0.078	0.268	0.074	0.260
Group insurance	0.091	0.290	0.092	0.290
Other self-insured private sector	0.198	0.398	0.200	0.400
Self-insured public sector	0.063	0.243	0.062	0.241
Multiple types of insurance	0.004	0.064	0.003	0.057
Location				
Ann Arbor-Jackson	0.041	0.199	0.039	0.195
Kalamazoo-Battle Creek	0.047	0.212	0.049	0.215
Detroit	0.493	0.499	0.483	0.499
Flint-Saginaw	0.060	0.237	0.060	0.238
Grand Rapids-Muskegon	0.106	0.308	0.109	0.311
Lansing-East Lansing	0.049	0.216	0.050	0.218
Sample size	5,591		5,724	
Number contested	577		390	
Number pursued	294		107	

Michigan has a much larger representation of self-insured employers (including those from both the public and private sectors), equal to more than 40 percent of the sample, compared to between 20 and 25 percent for Delaware (see table 4.1). If employers covered under group insurance are excluded from the self-insured category because they are more likely to act like commercial carriers, the percentage of self-insured in Michigan is still greater than 30 percent. Moreover, fully 36 percent of the cases in Michigan involved private self-insured carriers,

while the figure is only 7 percent in Delaware. The 36 percent figure declines to 27 percent if "group" is excluded from the private self-insured classification.

Due to limitations in the Michigan data, we were unable to estimate all of the equations as we did for the Delaware data.[4] We were able, however, to estimate the determinants of whether a case was litigated and the determinants of case complexity. Because the results are very similar for two time periods, 1970-1986 and 1982-1986, results in this chapter are based on the samples including injuries after 1969. The determinants of whether or not a case is litigated are shown in table 5.4, the predicted litigation probabilities by type of insurance are in table 5.5, and the determinants of whether a case is pursued are presented in table 5.6. Equations based on the samples comprised of injuries after 1981 can be found in appendix tables 5.1 and 5.2. The equations are specified as probit equations, where the first column of equation estimates always refers to the sample including compensated *and* not compensated cases, while the second column is based on the sample of compensated cases. First, we will examine the determinants of litigation, the contest equations.

Type of Insurer and Litigation Rates

Insurance type produces very different results in Michigan vis-a-vis Delaware. The models estimated for Delaware indicated that claims occurring in private sector self-insured firms other than the major automakers were no more likely to be litigated than similar cases in which the firm had insurance from a traditional commercial carrier (tables 4.3 and 4.4). As just noted, the one exception was that cases involving the major automakers were more likely to be litigated.

Results for the determinants of litigation for all cases originating after 1969 are shown in table 5.4. Commercially insured employers comprise the omitted group and are used as the basis for comparison. The coefficient for the Big Three automakers was positive and significant when both (compensated and uncompensated) cases were included in the sample (first column of data). Although still positive, the coefficient was not statistically significant when the sample was limited to compensated cases (second column). This result is consistent with the argument that litigation surrounding Big Three cases is more

**Table 5.4 Maximum Likelihood Estimates of the Contest Equation
(Based on Cases Occurring after 1969), Michigan Data, 1986**

Variable	All cases	Compensated cases
Constant	-1.699**	-2.079**
	(-8.138)	(-8.818)
Age	-0.001	0.014
	(-0.092)	(1.155)
Age squared	0.0002	0.00003
	(1.457)	(0.223)
Type of employer/insurer		
Big Three automaker	0.384**	0.103
	(5.412)	(1.210)
Group insurance	-0.382**	-0.459**
	(-4.194)	(-4.339)
Other self-insured private sector	-0.226**	-0.249**
	(-3.808)	(-3.783)
Self-insured public sector	-0.350**	-0.313**
	(-3.604)	(-2.950)
Multiple types of insurance	6.990	7.112
	(0.021)	(0.018)
Location		
Ann Arbor-Jackson	0.433**	0.398**
	(3.780)	(3.180)
Kalamazoo-Battle Creek	-0.087	-0.079
	(-0.648)	(-0.555)
Detroit	0.498**	0.384**
	(7.778)	(5.584)
Flint-Saginaw	0.053	-0.003
	(0.481)	(-0.022)
Grand Rapids-Muskegon	0.158*	0.144
	(1.73)	(1.480)
Lansing-East Lansing	-0.182	-0.161
	(-1.341)	(-1.087)
Log-likelihood	-2082.7	-1627.8
χ^2 (13)	447.34**	305.33**
Sample size	6,198	5,926

NOTE: The *t* statistics are in parentheses.
*Denotes significance at the 10 percent level.
**Denotes significance at the 5 percent level.

heavily involved with finding out whether or not a case is compensable. Among those claims ultimately found to be compensable, Big Three cases were not significantly more likely to be litigated than cases associated with commercial insurers.

Workers' compensation cases involving other categories of self-insured firms in 1986 were *less* likely to be litigated than cases involving firms covered through commercial insurance carriers. This is demonstrated by negative and statistically significant coefficients on the variables indicating claims associated with other self-insured private sector firms, group-insured private sector firms, and public sector self-insured employers.

To see more clearly the effect of type of insurance on the probability of litigation, we calculated predicted litigation probabilities (with all variables except insurance type at the sample mean values) for various categories of insurance (table 5.5). The predicted litigation probability for the Big Three automakers (all cases) is 78 percent higher than that for commercially insured firms, but it is about 2.5 to 3.5 times higher than those for the other types of insurance. The predicted litigation probability for cases with a commercially insured employer is 1.5 times the probability for cases with a self-insured private employer other than one of the Big Three automakers, but it is about twice the litigation probability for private group-insured or public self-insured employers. Finally, the predicted litigation probability for cases involving Big Three automakers is very different in the samples including and excluding washouts: 21.6 percent and 11.1 percent, respectively.

Cases in Michigan in which the employer is commercially insured and in the private sector are more likely to be contested than other cases, except for the major automakers (table 5.4). However, in Delaware, cases in which the employer is commercially insured are no more likely to be contested as cases in which the employer is a self-insured firm in the private sector, except for the major automakers (tables 4.3 and 4.4). A plausible explanation of this difference arises from the way prices for commercial workers' compensation insurance are regulated in the two states: Delaware imposes a price floor on insurance premiums, while Michigan does not.

Insurance premiums in Michigan were regulated prior to the early 1980s, but beginning in 1981, a series of reforms ultimately led to open competition among insurance companies in the pricing of workers'

compensation. Hunt, Krueger, and Burton (1988) document a significant reduction in insurance premiums during the 1982 to 1985 period as a result of the removal of the price floor that had been in effect prior to 1982. Insurance companies in Michigan are free to compete with each other on price, while insurance companies in Delaware cannot offer discounts to employers with above-average safety records within a class of employers engaged in the same line of business.[5]

Table 5.5 Predicted Litigation Probabilities by Type of Insurance, Michigan Data, 1986

Employer/insurer	Percent
Big Three automaker, all cases	21.6
Big Three automaker, compensated cases	11.1
Commercial insurance, all cases	12.1
Other private sector, self-insured, all cases	8.1
Group insurance, all cases	6.0
Public sector, self-insured, all cases	6.4

SOURCE: Predictions obtained using the model in table 5.4.
NOTE: In making these predictions, all variables other than insurance type are set to their sample mean values.

In effect, the rate regulation in Delaware results in very safe workplaces subsidizing less safe workplaces. This incomplete experience rating of workers' compensation insurance policies may well explain the apparent difference in behavior of insurers in Delaware relative to those in Michigan. Insurers in Michigan appear to charge premiums that are closely related to employers' claims experience.

In order to shed light on reasons for the discrepancies between the 1986 Michigan findings and those for Delaware obtained in chapter 4, it is informative to mention some results obtained by Allan Hunt in his study of the Michigan workers' compensation system as it existed in 1978 (Hunt 1982, p. 89). Hunt employed a closed case sample that included compensated and uncompensated cases. Using a linear probability model, where the dependent variable is equal to one if a case is litigated and is equal to zero otherwise, Hunt found a statistically significant and positive coefficient on the variable indicating that a worker was the employee of one of the Big Three automakers. Thus, our

results with regard to the Big Three are identical to those found by Hunt. The coefficient of the variable designating "all other self-insured" firms revealed a negative and statistically significant relationship with the probability of litigation, again similar to our findings for 1986.

In summary, and relating to 1978, Hunt found a significantly higher probability of litigation for a workers' compensation case involving a Big Three automaker than for a comparable case in which the firm was covered by a traditional commercial carrier. Conversely, a case in which an injured worker was employed by any other firm categorized as self-insured was less likely to have involved litigation. Thus, Hunt's earlier results on other self-insured firms differ from the corresponding results we have obtained for Delaware. We are not sure why the effect of (other) self-insurance was different in Michigan in 1978 than in Delaware in 1982 or 1985. One may speculate that, even though Michigan insurers operated with a premium price floor in 1978, premiums in Michigan might have been more completely experience rated in 1978 than were premiums in Delaware in 1982 or 1985.

Competition also forces insurers to pursue, on the margin, questionable claims more vigorously than in Delaware. In Delaware, regulation results in incomplete experience rating, which lessens the competitive pressure on insurers to pursue some questionable cases. Of course, all insurers would, other things being equal, challenge questionable claims, but doing so is a costly activity. Given a sufficient implicit subsidy of less safe workplaces by safer workplaces, which is induced by rate regulation, it may well be that insurers will not contest some cases that would be contested in a more competitive rate environment.

A useful analogy can be made with the operation of the unemployment insurance system. In most states, unemployment compensation is financed by taxes on employers, and these taxes are incompletely experience rated. Typically, employers face declining marginal tax rates on layoffs beyond certain levels. Usually, for layoffs up to a threshold, each dollar in unemployment compensation paid to workers results in a dollar in taxes collected from the employer. For layoffs beyond the threshold, however, an extra dollar in benefits paid to workers results in an additional tax of less than a dollar on the employer. In effect, large employers, once they have laid off a certain number of workers, receive a subsidy for additional layoffs, financed by taxes on smaller employ-

ers or by general tax revenue. It is well documented (e.g., Feldstein, 1976 and Topel 1983) that when a large firm experiences a temporary reduction in demand for its product, it is more likely to lay off workers than to retain them producing less than their contribution to the value of the firm's output; this occurs because the system of financing unemployment compensation essentially subsidizes layoffs by large employers. Incomplete experience rating makes laying off a worker advantageous to the firm, on the margin, relative to keeping the worker on the job but temporarily "underemployed."

In an analogous manner, workers' compensation insurers will, in general, contest questionable claims. However, the incomplete experience rating of insurance premiums will raise the threshold of expected benefits required for litigation to occur, lowering the probability that an insurer will contest a case. Hunt, Krueger, and Burton (1988) suggested that when Michigan lifted price floors from workers' compensation policy premiums in the early 1980s, this would very likely lead to increased competition, forcing insurers to contest questionable cases more vigorously than before in an attempt to reduce their costs.

Another analogy may be made with the escalation of costs in the U.S. health care system in recent years. One explanation of this acceleration is that the full tax deductibility of health insurance premiums for firms takes away some of the incentive of employers and individuals to demand that insurance companies and health care providers control costs. Absent such pressure, insurance companies pass on increases in providers' fees to employers, who then deduct the insurance premiums from their gross income as a business expense. Without tax deductibility, one could argue that employers and individuals would insist that insurance companies require providers to moderate price increases.

Our estimates for Michigan are very similar to those obtained by Hunt (1982), who argues persuasively that his model is correctly specified. There may also be other institutional differences between the Delaware and Michigan situations, which we are unable to control for and which may account for the discrepancies in our estimates across the two states. Keeping this caveat in mind, however, we propose the preceding arguments as an economic explanation of the differences between Delaware and Michigan in the behavior of commercial insurers.

In conclusion, open competition in pricing has resulted in insurance companies pursuing questionable cases more vigorously than was true when there was a floor on workers' compensation insurance premiums. Thus, the negative coefficient estimate on the private self-insured variable (table 5.4) is not surprising.

Other Variables Affecting Litigation Rates

The probability of a case being litigated in Michigan is not significantly affected by a worker's age. For Delaware, we found increasing probabilities of litigation up to age 40 (1982 data) or 41 (1985 data) and decreasing probabilities thereafter. Differences in results could partly be caused by the sample designs (common opening date versus closed case) and partly by the omission of relevant variables such as type of injury, body part injured, industry, gender, and wage from the contest equation for Michigan in 1986.

The region variables have the expected effect, with workers' compensation cases in the Detroit metropolitan area much more likely to be litigated compared to most other areas in the state (table 5.4). However, cases were also more likely to be litigated in the Ann Arbor-Jackson metropolitan area. The probability of litigation in a typical case in Ann Arbor and in Detroit, evaluated at the means of all other variables, is 16.7 and 15.1 percent, respectively, while the probability of litigation for nonmetropolitan areas is 7.1 percent.

Determinants of Case Complexity

The next question involves the complexity of litigated cases in Michigan. As a case type goes from contest and/or redemption to decision and/or appeal, the case absorbs ever more state resources. In our probit regression models, we estimated the effect of employer and injured worker characteristics on the probability of whether or not a case has been taken to a decision or an appeal. The independent variables are the same as in the models of the determinants of litigation. Parameter estimates are reported in table 5.6 for cases that originated after 1969. Results based on cases starting in 1982 through 1986 are found in appendix table 5.2.

Table 5.6 Maximum Likelihood Estimates of the Pursue Equation (Based on Cases Occurring after 1969), Michigan Data, 1986

Variable	All cases	Compensated cases
Constant	-0.322	-1.946**
	(-0.646)	(-2.898)
Age	0.001	0.065*
	(0.046)	(1.941)
Age squared	-0.0002	-0.0009**
	(-0.566)	(-2.254)
Type of employer/insurer		
Big Three automaker	0.782**	0.555**
	(5.390)	(2.962)
Group insurance	0.214	-0.078
	(0.923)	(-0.243)
Other self-insured private sector	0.121	0.068
	(0.879)	(0.399)
Self-insured public sector	0.202	0.242
	(0.873)	(0.878)
Multiple types of insurance	0.956**	1.110**
	(3.925)	(4.072)
Location		
Ann Arbor-Jackson	-0.093	-0.121
	(-0.359)	(-0.361)
Kalamazoo-Battle Creek	0.150	0.209
	(0.424)	(0.514)
Detroit	0.564**	0.416**
	(3.548)	(2.112)
Flint-Saginaw	0.731**	0.674**
	(2.654)	(2.018)
Grand Rapids-Muskegon	0.241	0.235
	(1.065)	(0.871)
Lansing-East Lansing	0.786**	0.924**
	(2.209)	(2.329)
Log-likelihood	-484.07	-309.57
χ^2 (13)	81.878**	50.215**
Sample size	760	528

NOTE: The t statistics are in parentheses.
*Denotes significance at the 10 percent level.
**Denotes significance at the 5 percent level.

Many of the estimated coefficients are very similar for the "all cases" and the "compensated cases" samples. Age of the injured worker is not an important factor influencing whether or not a contested case is pursued through the litigation process when washouts are included in the sample. However, for the sample including only cases deemed compensable, the incidence of pursuing a case rises with age, reaches a peak at age 36, and declines thereafter. A similar pattern for the probability of pursuing a case is evident with the Delaware data, but with a higher age at which the probability reaches a maximum. For Delaware, the greatest probability is reached at age 47 (1982) and age 48 (1985). The differences between Delaware and Michigan in the age at which the highest probability of pursuing a case occurs likely reflect variations in the occupational distribution of the workforces in the two states.

The coefficient of the Big Three automaker variable is positive and statistically significant, which indicates that these cases are more likely, if contested, to be pursued through the workers' compensation litigation process. For the sample of all cases, the model predicts that the probability of pursuing a contested case associated with a Big Three related injury is 72.3 percent, while that for a commercial carrier is 42.5 percent. The bottom line is that cases in which the employer is one of the major automakers are both more likely to be contested and, given that litigation has taken place, more likely to go further into the workers' compensation litigation process. We found a similar result for Delaware for 1985. Even though claims involving other self-insured employers, both private and public, are less likely to be litigated, when they are, the probability that the case will be pursued to a decision or appealed is the same as that of a commercial carrier. This is indicated by the insignificant coefficient of the variables reflecting other self-insured employers. Cases in which the employer is covered by commercial carriers are more likely to be litigated but equally likely to be pursued, perhaps because commercial insurance carriers have more resources than other firms and can bring about a mutually agreeable settlement of the issue(s) in the dispute.

The location in the state where the injury occurred is also an important factor: Detroit, Flint-Saginaw, and Lansing-East Lansing were most likely to have litigated claims pressed beyond the initial stages of the litigation process. Predicted probabilities of pursuing a case (for the

sample of all cases) are reported in table 5.7 for various areas of Michigan. Such probabilities are 1.5 to 2.0 times higher in metropolitan than in nonmetropolitan areas.

Table 5.7 Predicted Probabilities of Pursuing a Litigated Case by Location, Michigan Data, 1986

Location	Percent
Detroit	55.8
Flint-Saginaw	62.2
Lansing-East Lansing	64.3
Nonmetropolitan areas	33.8

SOURCE: Predictions obtained using the model in table 5.6.

Summary

In Michigan, cases in which the employer is a Big Three automaker or is commercially insured and in the private sector are more likely to be contested than other cases (table 5.5). For Delaware, we found, instead, that cases in which the employer is self-insured and in the private sector are equally likely to be contested as other cases. This difference arises from the ways commercial workers' compensation insurance prices are regulated in the two states: Delaware imposes a price floor on insurance premiums while Michigan does not. As a result, there is less competitive pressure in Delaware than in Michigan to challenge questionable claims.

For Michigan, we documented increasing probabilities that a case is pursued to verdict when the employer is one of the Big Three automakers or has multiple types of insurance. For compensated cases, the probability that a case is pursued increases with a worker's age up to a maximum, and decreases thereafter. This is a qualitatively similar age-related pattern to that in Delaware. Injury claims in which the employer operates in the Detroit, Flint-Saginaw, and the Lansing-East Lansing metropolitan areas, other factors held equal, are more likely to be pursued to verdict than in nonmetropolitan areas.

Appendix Table 5.1 Maximum Likelihood Estimates of the Contest Equation (Based on Cases Occurring after 1981), Michigan Data, 1986

Variable	All cases	Compensated cases
Constant	-1.748**	-2.079**
	(-7.821)	(-8.187)
Age	-0.003	0.009
	(-0.277)	(0.702)
Age squared	-0.0002	0.00007
	(-1.449)	(0.481)
Type of employer/insurer		
Big Three automaker	0.221**	-0.071
	(2.702)	(-0.698)
Group insurance	-0.312**	-0.374**
	(-3.336)	(-3.453)
Other self-insured private sector	-0.291**	-0.340**
	(-4.434)	(-4.555)
Self-insured public sector	-0.435**	-0.415**
	(-3.985)	(-3.378)
Multiple types of insurance	6.999	6.884
	(0.017)	(0.023)
Location		
Ann Arbor-Jackson	0.481**	0.430**
	(3.924)	(3.162)
Kalamazoo-Battle Creek	-0.046	-0.047
	(-0.319)	(-0.305)
Detroit	0.520**	0.407**
	(7.479)	(5.398)
Flint-Saginaw	0.032	-0.123
	(0.255)	(-0.807)
Grand Rapids-Muskegon	0.138	0.132
	(1.373)	(1.235)
Lansing-East Lansing	-0.266	-0.362*
	(-1.644)	(-1.849)
Log-likelihood	-1726.1	-1303.6
χ^2 (13)	336.70**	240.97**
Sample size	5,951	5,724

NOTE: The t statistics are in parentheses.
*Denotes significance at the 10 percent level.
**Denotes significance at the 5 percent level.

Appendix Table 5.2 Maximum Likelihood Estimates of the Pursue Equation (Based on Cases Occurring after 1981), Michigan Data, 1986

Variable	All cases	Compensated cases
Constant	-0.590	-2.299**
	(-1.056)	(-2.894)
Age	0.014	0.079**
	(0.505)	(2.001)
Age squared	-0.0003	-0.001**
	(-0.893)	(-2.145)
Type of employer/insurer		
Big Three automaker	0.658**	0.249
	(3.656)	(0.960)
Group insurance	0.127	-0.159
	(0.529)	(-0.464)
Other self-insured private sector	0.084	0.160
	(0.519)	(0.725)
Self-insured public sector	0.037	-0.108
	(0.137)	(-0.302)
Multiple types of insurance	1.004**	1.202**
	(3.379)	(3.585)
Location		
Ann Arbor-Jackson	0.006	-0.493
	(0.021)	(-1.131)
Kalamazoo-Battle Creek	0.309	0.383
	(0.800)	(0.850)
Detroit	0.538**	0.380
	(2.991)	(1.643)
Flint-Saginaw	0.684**	0.270
	(2.072)	(1.579)
Grand Rapids-Muskegon	0.133	0.160
	(0.507)	(0.493)
Lansing-East Lansing	0.815*	0.721
	(1.660)	(1.149)
Log-likelihood	-375.85	-213.05
χ^2 (13)	47.980**	32.195**
Sample size	577	390

NOTE: The t statistics are in parentheses.
*Denotes significance at the 10 percent level.
**Denotes significance at the 5 percent level.

NOTES

1. See Hunt (1982) as well as Hunt and Lance (1989) for details surrounding issues that we discussed for Delaware in chapter 2.

2. Our time frame was sufficient for Delaware, such that very few cases were still open by mid-1990, the ending point for the Delaware data.

3. Details on the construction of the Hunt and Lance variables appear in the following paragraphs.

4. With the Michigan data, it is not possible to determine in which year a worker received a payment; therefore, it is difficult to convert cumulative payments into real values for estimation of payment equations. The longer time period covered by these data and the fact that many cases were open in the late 1970s or early 1980s, when inflation was high by historical standards, make application of the deflation method we used for Delaware problematic.

5. Delaware authorizes an independent rating bureau to compile and publish insurance rates, to which commercial carriers must adhere in pricing their product. The various components of an employer's insurance premium are calculated according to these rates. All insurance companies are constrained by a statutory minimum rate, below which they cannot sell insurance.

6
Conclusions and Implications

We have studied the determinants of the probability of litigation and of the probability that a contested workers' compensation case is pursued to verdict. Very little is known about this area, and our empirical work presents new evidence with data from Delaware and Michigan. With the Delaware data, we have also studied the determinants of indemnity payments to injured workers in contested (litigated) and in uncontested workers' compensation cases.

We found that regulation of commercial insurance pricing for workers' compensation has an important impact on the probability of litigation: a price floor on insurance premiums (as in Delaware) tends to reduce the litigation probability. Conversely, competitive pricing of commercial insurance (as in Michigan) tends to increase the litigation probability, as insurers have a greater incentive to contest questionable cases. We found some evidence in Delaware that cases involving a self-insured employer in the public sector have tended to be contested less frequently over time. In both states, cases in which the employer is one of the major automakers are more likely to be contested than cases involving other types of employers and (over time) have tended to be more likely to be pursued to verdict rather than being settled. The major automakers may have pursued questionable cases with increasing aggressiveness in order to control future liability arising from precedent-setting situations.

The part of the body injured and the type of injury affect both the litigation probability and the probability that a contested case is pursued to verdict, as evidenced by the Delaware data. Injuries that are difficult to evaluate objectively, such as back injuries or multiple injuries, increase the probability that a contested case is pursued to verdict.

The industry of employment (Delaware) and the age of the injured worker (in Delaware) affect the probability of litigation. Both industry and age most likely reflect the severity of injury suffered by workers. Employment in manufacturing or construction tends to increase the litigation probability, while employment in services tends to decrease this probability. Therefore, redistribution of employment away from

manufacturing or construction and towards services should result in lower litigation rates. A shift of employment in this direction has been occurring in Delaware and in the U.S. labor market as a whole over the past decade. Our model for Delaware predicts that the movement of jobs from manufacturing and construction to services, within the range of the experience of the past few years, will reduce litigation rates.

Both the probability of litigation and the probability that a contested case is pursued to verdict increase with a worker's age up to a maximum value and decrease thereafter. A similar pattern is observed in Delaware and Michigan. The implication of our finding is that a rise in the average age of the workforce, which will take place over the coming decades, will tend initially to increase litigation rates and the rates at which litigated cases are pursued to verdict. However, continued increases in the average age will eventually tend to lower both rates.

Cumulative real indemnity payments to injured workers depend on a worker's wage, age, type of injury, part of body injured, and location. The payment equations we estimated for Delaware permit us to predict the amounts injured workers in uncontested cases would have received if the cases had been contested. We also predict the payments for contested cases as if these cases had not been contested. We conclude that, for cases judged to be compensable, the dispute resolution system for workers' compensation in Delaware sorts cases efficiently.

The two states whose workers' compensation systems we have studied have fundamentally different underlying principles: payment in Delaware depends on the degree of impairment while, in Michigan, it depends on wage loss. What is the effect of this difference on litigation? In general, an approach to workers' compensation that requires subjective (nonmarket) evaluation of impairment (Delaware's approach) will be more litigious than one that is based on actual wage loss (that is, where payment is a fraction of the difference between the old wage and the best new wage obtained after the injury). Delaware bases compensation on proxies for the expected wage loss assessed *ex ante*, before the wage loss actually occurs. Michigan pays on the basis of lost wages.

Litigation should be predictable in an impairment state: the greater the difficulty or uncertainty in estimating impairment, the more likely the litigation. We would not expect the same sort of pattern in a wage-loss state, particularly if one omits the lump-sum settlement cases. In

fact, the empirical results for Delaware show the anticipated predict-ability of litigation frequency with respect to type of injury or body part injured as a result of the system's reliance on the impairment approach.

Consequently, we should see generally higher litigation probabili-ties in Delaware relative to Michigan. It follows that overall efficiency is compromised in Delaware, because the system introduces friction that would not be necessary if a pure wage-loss approach were used in the compensation process. That is, why estimate the *expected* wage loss, subject to error, when the *actual* wage loss can be observed? Of course, the wage-loss approach is likely to have its own problems, and moral hazard is one of them.

However, as discussed in chapter 5, the methods of setting insurance premium rates in the two states differ dramatically and with precisely the opposite impacts on litigation. Delaware's rate-regulated environ-ment discourages litigation. Michigan's open competition encourages insurance carriers to challenge claims aggressively so that cost savings can be passed along in the form of lower premiums. As a result, no clear net empirical prediction is possible for the combined influences of the fundamental compensation principle and the insurance premium pricing mechanism. The effects of differing compensation approaches are exactly the reverse of the effects of the rate-setting environment.

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Index

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The Institute is funded largely by income from the W.E. Upjohn Unemployment Trust, supplemented by outside grants, contracts, and sales of publications. Activities of the Institute are comprised of the following elements: (1) a research program conducted by a resident staff of professional social scientists; (2) a competitive grant program, which expands and complements the internal research program by providing financial support to researchers outside the Institute; (3) a publications program, which provides the major vehicle for the dissemination of research by staff and grantees, as well as other selected work in the field; and (4) an Employment Management Services division, which manages most of the publicly funded employment and training programs in the local area.

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