Economic Regulation, Work Relations, and Accident Rates in
the United States Motor Carrier Industry

by

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(ABSTRACT)

This study investigated the relationship between firm economic well-being and preventable accident rates in the U.S. motor carrier industry between 1975 and 1986. In 1980 the U.S. motor carrier industry was deregulated which produced highly competitive market conditions. Firms facing such conditions were required to devise coping strategies if they were to survive in this new highly competitive business environment. This research suggests that financially weakened firms trying to survive in a deregulated environment would be forced to rely on cost cutting strategies which are inherently threatening to workplace safety. However, the ability to implement such strategies would be limited at firms where union contracts restricted management from modifying work rules. As such, not all motor carriers were expected to exhibit the same relationship between firm economic well-being and preventable accident rates.

Multiple regression analysis was utilized to assess the relationship between carrier economic well-being and preventable accident rates at two points in time, pre-deregulatory 1975-76 and post-deregulatory 1985-86. Three major hypotheses were tested. First, the economic well-being of the firm was hypothesized to have a greater effect on the firm's preventable accident rate after deregulation than before deregulation. Second, the economic well-being of the firm was hypothesized to have less effect on preventable accident
rates for union firms than for other types of firms. Third, changes in the effects of firm economic well-being on preventable accident rates were hypothesized to differ less across time for union firms than for other types of firms. As expected, union firms and owner-operator firms exhibited a stronger relationship between firm economic well-being and preventable accident rates following deregulation than prior to its passage. However, the regression analysis for nonunion firms produced unexpected results. Nonunion firms exhibited a weaker relationship between firm economic well-being and preventable accident rates in the post-deregulatory model than was the case in the pre-deregulatory model. Possible explanations for this unexpected finding are discussed.

In addition, this study challenges a widely accepted approach to analyzing workplace safety problems. That approach advocates focusing on the inappropriate behavior of specific individuals when firms are confronted with deteriorating workplace safety conditions rather than investigating organizational level variables which are routinely associated with unsafe working environments. This distinction is important because merely removing isolated individuals who are thought to compromise workplace safety will not provide a meaningful remedy if, in fact, such unsafe behavior is a response to managerial pressures. This study suggests that such pressuring would trigger unsafe behavior in almost any individual confronted with similar circumstances.
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Chapter I

Statement of the Problem

While elimination of all industrial accidents is a statistical impossibility, reduction of preventable accidents and examination of factors contributing to them are reasonable endeavors. Preventable accidents by definition are those traced to negligence, or failure to exercise proper care, on the part of a specific individual(s). That is, they are highly predictable occurrences given the history of the circumstances preceding them.

The focus of accident investigations usually involves accountability and blame. This is accentuated in preventable accident investigations where the objectives are to provide an assessment of a chain of events that ended with the accident and to conclusively implicate the inappropriate actions of an individual(s) as contributory to the outcome. Simply put, specific people are deemed to be the cause of the accident, while the social conditions leading up to the accident are seldom considered.

Although the actions of a specific individual(s) may be the proximate cause of an accident, it would be short-sighted to assume such actions to be the only contributory factor.
Identification of background social conditions routinely associated with preventable industrial accidents will provide a broader understanding of the processes contributing to an accident-prone work environment. A thorough analysis of such information can assist in formulating alternative organizational and political policies, thus minimizing risk factors linked to preventable accidents.

For example, in the course of typical workplace operations virtually all decisions regarding the organization and scheduling of work tasks originate from management. Ideally, such decision making would reflect conformity to safety standards and applicable state and federal laws thus safeguarding labor’s health and welfare. However, the activities and interactions in the workplace may reflect a different reality; one where safety is sacrificed in the interests of productivity and profit. This results because the primary objective of a firm is the realization of profit. Therefore, factors which seriously threaten financial stability must be addressed. The source of many threats lie outside the direct control of the firm, such as the intensified market competition created by deregulatory legislation. Firms confronting increasingly competitive environments are forced to develop coping strategies, and such strategies often depend on, as well as involve changing, work relations. In a broad sense, the nature of these changes and their subsequent impact on preventable accidents are the focus of this research.

Specifically, this study will examine the relationship between firm economic well-being and preventable accident rates among for-hire motor carriers in the United States.¹ I argue that following deregulation, as competitive market environments developed, firm survival was threatened. In response to that threat, some motor carriers attempted to alter workplace organization in an effort to increase productivity and to improve their

¹ A for-hire carrier is one engaged in the business of transporting freight belonging to others.
profit margins. I hypothesize such changes in the U.S. motor carrier industry threaten safety because they pressure management to increase control over the labor process. In instances when deteriorating financial conditions prevail, such increased control grants management the flexibility to introduce efficiency measures and cost cutting strategies which augment the potential for unsafe working conditions. In general, this process would be expected to strengthen the relationship between firm economic well-being and preventable accident rates. However, management’s ability to implement such cost cutting strategies is mediated by the firm’s prevailing form of work relations. Formal contracts containing protective work rules preclude ill-advised labor process modifications which could be potentially threatening to safety. This study is designed to illustrate that the organization of work relations mediates the relationship between firm economic well-being and preventable accident rates. As such, the study is expected to emphasize the significant impact variations in work relations can have on workplace safety.
Chapter II

Review of the Literature

2.1 General Market Conditions, Changing Work Relations, and Safety

Kochan, Katz, and McKersie (1986) discussed changing patterns of labor relations in their book *The Transformation of American Industrial Relations*. They argued cooperative labor relations are mandatory if U.S. firms are to survive the increasingly competitive market conditions. They noted a sequence of business decisions set into motion during the 1980s when such economic conditions prevailed:

If the firm decides to remain in the market, the next decision it must make is whether to compete on the basis of low prices (costs) and high volume or to seek out more specialized market niches that will support a price premium.

The central industrial relations effect of this increased sensitivity to prices and costs is that firms shift their priorities away from maintaining labor peace to controlling labor costs, streamlining work rules (so as to increase manufacturing efficiency), and promoting productivity. The pressure to control or lower costs is especially intense if a firm attempts to compete across all segments of its product market on the basis of low prices and high volume (1986:65).
Thus, the basic solution to the competitive challenge, according to Kochan et al., is firm adaptation, flexibility, and cost control (1986:144). However, implementation of these strategies requires managerial flexibility. In firms where union contracts prevail, protective work rules may be considered overly restrictive causing management to seek ways to circumvent or eliminate them. Such thinking is reflected in Kochan, Katz, and McKersie's discussion of successful concession bargaining at Schneider Transport (1986:137). They noted major departures from the terms of the industry-wide Master Freight Agreement. These included

...the negotiation of a separate company agreement; more direct communication with drivers regarding business conditions and alternatives; and the direct participation of operating management in the contract negotiation process, a participation that replaced the previous dominance of the industry association's industrial relations staff. The key changes provided in the new contract at Schneider are a pay and work system that rewards productive behavior and encourages direct involvement of the driver in the operation of the business (1986:143).

Critique of Kochan, Katz, and McKersie

Yet the new Schneider contract resulted in changed work relations which increased the potential for preventable accidents. Schneider management argued the old system of compensation, which relied on payment for miles driven and hours worked loading and unloading, was easily abused because no reasonable method existed by which to verify the actual time spent performing nondriving tasks. Consequently, an alternative method of compensating for these tasks was proposed which was based on a percentage of the revenue generated by the shipment. But this method ignores the actual time commitment required by a driver to perform the various nondriving tasks. Additionally, man-

2 The International Brotherhood of Teamsters developed the National Master Freight Agreement during 1964 in an effort to standardize contract negotiations. It provided national standards for certain noneconomic provisions such as union controls. Major economic issues were included in a series of regional supplements (Levinson, 1980:137).
agement suggested a new mileage payment schedule which, while involving a significant reduction in pay (15%) for each mile driven, offered drivers the opportunity to drive more miles in a year (Kochan et al., 1986:142).

On strictly economic grounds, the new scheme invites abuse of the hours of service regulations mandated by the Federal Highway Administration (FHWA). These rules require drivers to maintain an accurate daily record of work related activities, including both driving and nondriving duties. When driving tasks become the primary source of compensation, logging hours with nondriving activities becomes financially counterproductive. It consumes available hours with noncompensated activities, thus legally reducing hours available for remunerated duties. Consequently, there is pressure on drivers to understate time spent performing such tasks despite the fact those hours contribute to driver fatigue, a well documented cause of motor carrier accidents.

Additionally, Schneider’s proposed contract represented a shift away from compensation arrangements typically associated with union firms, replacing them with pay schemes traditionally found at nonunion firms or in subcontracting agreements. Prior to deregulation, drivers covered under union contracts routinely received generous hourly compensation for duties such as loading, unloading, break-downs, and the like. Conversely, nonunion drivers generally received no additional pay or a token flat rate compensation for such tasks. Under the nonunion arrangement, the carrier suffers minimal financial loss when the loading process consumes excessive time because drivers’ wages have essentially been eliminated. The driver, on the other hand, may spend many uncompen-

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3 The Federal Highway Administration legally restricts all on duty hours, including both driving and non-driving activities, to 70 hours in 8 days. For complete details of these regulations see Part 395.1 through Part 395.13, U.S. Department of Transportation, FHWA, Federal Motor Carrier Safety Regulations.

4 For a discussion of fatigue and its impact on motor carrier safety see the publication, “Gearing up for Safety”, available from the Congressional Office of Technology Assessment (September, 1988).
rated hours at a shipper's facility trying to get a trailer loaded while also being expected to maintain the integrity of the carrier's delivery schedule which often does not take such delays into consideration. This further contributes to accidents because drivers attempt to make up time while en route to a destination.

Another primary departure from pre-deregulatory union agreements proposed in the new Schneider contract included compensation based on a percentage of load revenue rather than on fixed rates. This system of compensation, which is commonly seen in subcontracting agreements, contains a threat to safety similar to the one involving loading and unloading time discussed previously. When drivers are paid a percentage of load revenue, all time spent driving unladen equipment is uncompensated. As a consequence, it is financially advantageous for drivers to minimize the amount of time engaged in such travel and to understate unladen driving time in log books. Attempts to accomplish these ends contribute to excessive speeding and fatigue, a lethal combination.

Moreover, limiting this analysis to an economic framework leaves other, more fundamental, issues untouched. Kochan, Katz, and McKersie argued employers require increased trust, commitment, and cooperation at the workplace rather than further institutionalization of adversarial relationships (1986:231). This recommendation appears to have developed out of the assumption that the maintenance of labor's interests depends entirely upon corporate survival. Hence, preserving the firm must take precedence over any other considerations. In highly competitive environments, this assumption could have adverse effects on labor because the implementation of many cost cutting measures, viewed by management as necessary for firm survival, threaten safety. For example, in the motor carrier industry, attention to equipment maintenance or re-
placement may be reduced, or suspended, because financial resources are insufficient. Clearly, this is not in the best interest of a driver whose physical well-being depends upon sound equipment. Yet, without benefit of an effective collective bargaining agreement, drivers who are instructed to operate unfit equipment, and subsequently refuse to do so, jeopardize their employment relationship. This occurs as a consequence of existing employment law which does little to protect workers' interests.

To fully appreciate labor's legal vulnerability, one must understand contractualism, the theory underpinning work relationships in the United States. Klare reviewed the origins of contractualism in employment relations law and noted the ongoing criticism of this legal framework,

...In the nineteenth century, freedom of contract doctrine reshaped and revised that [employment relations] law so as to provide a framework for protecting expectations and facilitating transactions deemed essential or desirable from the standpoint of the emerging capitalist order. In the spirit of laissez faire, the doctrine extolled the social virtue of uncompelled private-ordering of most transactions: the right of private citizens to establish the legal incidents and standards governing most of their relationships.

Since its appearance a century or more ago, the moral and social policy of freedom of contract has been assailed by critics who regard as its chief vice the fact that the substantive content of private-ordering reflects the gross disparities of economic power characteristic of capitalist society. In this view, freedom of contract is, in practice, an institutional framework for the legitimate exercise of coercive power (1978:295).

The legal concept employment-at-will and its companion doctrine, terminability-at-will, contribute to this coercive power. These rules legally permit employers to replace workers on purely discretionary grounds. Given the economic dependence of labor on employment relations, coupled with the existence of a surplus labor pool, such rules endow employers with undue advantages. The creation of the employment-at-will rule has been attributed to the development of contract law referenced by Klare, which places a premium on managerial flexibility, ostensibly necessary for coping with economic fluctuations (Jacoby, 1982:85). This reasoning also provides the legal basis for the terminability-at-will rule. That doctrine holds that unless the duration of employment
is fixed by an employment contract, private employers can dismiss a nonunionized employee without notice or cause (Jacoby, 1982:85).

Contractualism, and the body of employment law spawned from it, have guaranteed employers significant legal dominance and authority in the workplace. This legal edge, coupled with the economic inequities of the labor-capital relationship, put labor at considerable disadvantage if management's demands become unreasonable or illegal. Refusal to follow instructions is generally considered insubordination, sufficient cause for discharge. Even when instructions are unreasonable or illegal, challenging a dismissal is a slow and arduous process because no legal opinions define the boundary between reasonable and abusive exercise of management discretion. Therefore, the reasonableness of management's order is evaluated on a case by case basis through an examination of the circumstances in which it was given (Holloway and Leech, 1985:127). Workers opting to voluntarily quit rather than follow unreasonable or unsafe managerial directives find themselves similarly disadvantaged. They are generally blocked from collecting unemployment compensation until the unreasonableness or illegality of the employer's order has been established, often a lengthy and expensive judicial process. Furthermore, once unemployed, whether voluntarily or involuntarily, the worker must attempt to re-enter the labor force without favorable letters of recommendation from their immediate past employer, a sizeable barrier to gainful employment.

As a result of employment law bias, any workplace changes affecting labor's autonomy, such as the loss of a collective bargaining contract, increase job insecurity which can be beneficial to capital. Weisskopf, Bowles, and Gordon offer support for this position. They noted that

capital wields power over workers in the workplace and at the bargaining table primarily through the threat of unemployment. Capital benefits from an abundance of ready workers, a scarcity of jobs,
and a lack of alternative sources of workers' income. When such conditions obtain, we say that the cost of job loss is high (1985:275).

However, when conditions are the reverse, with a plenitude of available jobs and a shortage of ready workers, Weisskopf et al. have argued, work intensity and productivity growth tend to go down because the major source of capitalist power, labor's fear of unemployment, has been sufficiently weakened. These conditions lead to increased political and economic power for labor. Hence, wages tend to rise more rapidly, inflationary pressures increase, and profit margins and rates are reduced (1985:276).

Clearly, this is an undesirable situation for capital because it threatens their primary objective, accumulation. Similarly, the state regards these circumstances as adverse because of the effects of inflation on the macro-economy. Under these conditions, deregulatory legislation becomes increasingly attractive. It stimulates competition while legitimizing changes in work relations. This in turn weakens labor's economic and political positions by increasing the threat of unemployment on two fronts. First, some firms actually do fail, while others merge, both causing job loss. Second, the increased flexibility management gains through modification or elimination of collective bargaining agreements provides a powerful tool for terminating unproductive, uncooperative employees. The financial insecurity created by this chain of events places labor in a defensive position where the goal becomes job preservation, possibly to the extent of giving back wages, benefits, and safety controls. Thus, management's demands for flexibility and cost control might appear reasonable because the alternative -- unemployment in a competitive labor market -- seems less reasonable.
Mediating Factors

Relations between labor and capital, then, are affected by historical conditions and events which firms are not able to predict or control. One such historic event was the passage of several deregulatory legislative acts in the late 1970s and early 1980 which introduced highly competitive market conditions in several industries, including airlines, natural gas, telecommunications and motor carriers. A firm's ability to cope with the new market environment was mediated by at least three major factors: (1) the firm's size; (2) the firm's economic well-being prior to deregulation; and (3) the existing form of work relations when deregulatory changes took effect.

Size

Edwards (1979) argued that knowledge of the first factor, firm size, is a strong indicator of the second factor, work relations. In general, Edwards identified a relationship between large firms and bureaucratic management styles in which...

...control is embedded in the social and organizational structure of the firm and is built into job categories, work rules, promotion procedures, discipline, wage scales, definitions of responsibilities, and the like. Bureaucratic control establishes the impersonal force of "company rules" or "company policy" as the basis for control (1979:131).

Conversely, smaller firms rely on personal touch managerial styles. Edwards noted the origins of control associated with this managerial approach:

...The personal leadership and appeal--the charisma, to use Max Weber's word--of the capitalist himself served to motivate workers. After all, the capitalist-entrepreneur was responsible for more than technical coordination. His success depended on his ability to get work out of his workers, whether by harsh discipline or by inspiration; undoubtedly, most attempted to use both. Successful entrepreneurs understood the possibilities (and limits) of such personal motivation and to some extent realized its benefits. Workers undoubtedly were oppressed and exploited by such employers, but they also became enmeshed in a whole network of personal relations. They had someone with whom to identify (1979:26).
Additionally, Edwards (1979:27) attributed successful union organizing to the break-
down of the personal touch management style, which occurs when a firm’s workforce
becomes large and the owner cannot sustain personal ties with workers. Hence, larger
firms tend toward unionized work forces while smaller firms do not.

Smaller, personal touch firms experiencing the effects of deregulation might be prone to
increase demands on workers, as well as decrease certain types of maintenance and in-
novation costs. The lack of union representation in such situations might well translate
into increased worker fatigue and thus, on-the-job accidents. Operational procedures
at larger, unionized firms, by contrast, are defined in legal contracts. Hence, major
policy changes require the agreement of both management and labor. Such formalized
procedures hamper implementation of potentially dangerous labor process modifications,
thus buffering labor from the effects of increased market competition provoked by
deregulatory changes.

Burawoy’s (1983) discussion of work organization adds to the insights gleaned from
Edward’s argument. Burawoy associated variations in work relations with firms’ market
dominance, contrasting the organization of work under monopoly market conditions
with the organization of work under competitive market conditions.5 Firms operating
under conditions of competitive capitalism are characterized by the “despotic organiza-
tion of work, in which coercion clearly prevails over consent.” This coercion is necessary
because “the expenditure of labor on the shop floor critically determines the survival,
not only of the laborer, but of the firm itself” (1979:194). Alternatively, firms operating
under conditions of monopoly capitalism reflect the “hegemonic organization of

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5 The terms monopoly capitalism and competitive capitalism are frequently associated with dual economy
literature. For the purposes of this research, however, they are used to identify specific historical moments
and to describe the various types of work organization found in firms experiencing monopoly or com-
petitive market conditions.
work,...based on consent predominating over coercion." Coercion is not necessary at these firms because "the wage and therefore the survival of the laborer are only weakly linked to the expenditure of labor, and the firm is able to insulate itself from, or directly control the market" (1979:194).

**Economic Well-Being**

Firm survival in competitive markets depends on adaptation to the new market conditions. However, not all firms are able to respond to the intensified competitive market environment in the same way. Managers, in other words, have limited strategies available to handle such conditions. Burawoy has identified four such strategies: (1) introduction of new technology designed to increase productivity; (2) cost cutting through reductions in wages and capital replacement; (3) speed-up of the production process, thus intensifying labor's work pace; (4) specialization or expansion which introduces economies of scale (1979:183). Burawoy has further argued that a firm's response to a competitive challenge is limited by its overall economic well-being. Any financially troubled firm lacking capital reserves is generally unable to develop or purchase new technology. Nor can it create economies of scale through expansion or specialization. As a result, such firms respond to increased competition through cost cutting and speed-up of the production process (1979:184), both strategies having a potentially profound impact on safety.
Work Relations

Management at larger firms, with unionized labor forces, encounter considerable employee resistance when attempting to implement cost cutting measures. Kochan, Katz, and McKersie's discussion of concession bargaining at Schneider Transport illustrates this point. When drivers initially rejected the proposed contract changes, Schneider management threatened to close down a substantial part of the operation (Kochan et al., 1986:143). Additionally, Schneider Transport expanded their subcontractor operations, calculating such operations represented a 30 percent reduction in labor costs over traditional union agreement labor costs (Kochan et al., 1986:139). Subcontractors, then, provided the threat of an alternative labor pool, without whose presence Schneider management might not have successfully achieved their concessionary bargaining goals. Burawoy (1983) would characterize the success of this concessionary campaign as the hegemonic despotism of Schneider management. In describing this form of work organization he noted

...workers face the threat of losing their jobs not as individuals but as a result of threats to the viability of the firm. This enables management to turn the hegemonic regime against workers, relying on its mechanisms of coordinating interests to command consent to sacrifices. Concession bargaining and quality of worklife programs are two faces of this hegemonic despotism (1983:590).

I maintain subcontracting, at least in contemporary terms, facilitates the application of hegemonic despotic management tactics because it provides management with a viable and legal means to displace a firm's unionized or uncooperative labor force.

Subcontractors can offer corporations additional advantages over traditional wage labor. For example, in the motor carrier industry, subcontractors legally surrender care, custody, and control of expensive equipment to the leasing firm while retaining complete

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Subcontractors are generally referred to as owner-operators. They are individuals who purchase equipment and lease it to regulated carriers either for a percentage of the load revenue or for a flat rate per mile.
financial responsibility for equipment and operating costs. They are neither guaranteed a minimum return on their investment, nor are they free to haul loads for other carriers when the leasing firm is experiencing business downturns. The magnitude of subcontractors' financial investments can become a powerful incentive, motivating them to work beyond reasonable and safe limits. This, in turn, is beneficial for the leasing firm because it maintains high levels of productivity.

This depiction of motor carrier subcontracting is a radical departure from earlier forms of inside contracting common in the United States during the late 1800s and early 1900s. Clawson (1980) described these earlier forms. "Inside contractors had complete charge of production,...hiring their own employees and supervising the work process" (1980:71). Furthermore, he noted that contractors' incomes and degree of autonomy suggested an equality with management (1980:112), which does not appear to be the case for subcontractors in the motor carrier or any other industry today. The inside contractors referenced by Clawson set their own rates of compensation, while contemporary subcontractors typically accept the terms of a prewritten agreement expressly designed to protect the economic interests of the subcontracting firm. To effectively protect such interests, subcontracting agreements contain mechanisms which permit compensation to be automatically adjusted when firm economic conditions deteriorate. For example, in the motor carrier industry, subcontractor compensation is typically based on a percentage of load revenue. Hence, if the leasing firm cuts rates, subcontractor compensation reflects a similar reduction. Such compensation schemes effectively erode subcontractor autonomy, rendering owner-operators dependent on the financial well-being of the leasing firm.
In general, following deregulation, a firm’s economic well-being and existing form of work relations defined the range of managerial strategies available for coping with the new competitive conditions. Financially weakened firms likely moved away from technological modifications, such as purchasing newer fuel efficient equipment. Specialization or expansion schemes, requiring upgrading of existing facilities or construction of new ones, were also probably considered cost prohibitive. Instead, management attention most likely focused on reorganizing work relations in ways which intensified the linkage between individual productivity and employment security. Industry-wide union organization might have given way to decentralized bargaining units, decertification elections, or replacement by subcontracted laborers. In firms where corporate survival was seriously threatened, implementation of cost cutting strategies was likely to increase. If labors’ collective legal autonomy simultaneously eroded, the potential for serious safety problems developed. This might well have been exacerbated by the general economic recession occurring after deregulation which made the cost of job loss high. Under such conditions, labor’s tendency to become committed to management’s production goals can be reinforced despite increased risk. Nichols and Armstrong point out,

...where there is pressure for production, workers will be encouraged, either directly or indirectly, to engage in unsafe practices to ensure that the work is done, the result being that accidents occur (1973).

In the motor carrier industry, such pressure falls into the category of speeding up the production process. Its implementation occurs in various ways. For example, schedules can become so inflexible that maintaining their integrity does not permit a driver adequate rest periods or meal breaks. A more subtle approach involves the comparison of one driver’s work performance to another, a managerial practice which implicitly sets work standards at the level of the most productive worker, regardless of whether that worker’s performance reflects adherence to safe and legal practices. Clearly, then, the
most unsafe driver might also be the most productive. Edwards and Scullion have offered support for this claim:

...given that the prime goal of the firm is production, workers who are most strongly wedded to this goal are likely to strive the hardest to increase output, thus ignoring safety precautions and rendering themselves likely to suffer an accident (1982:3).

Summarizing then, increasingly competitive market conditions provoke organizational changes, some of which are potentially threatening to workplace safety. Two factors, firm economic well-being and prevailing form of work relations, are expected to define managerial strategies for coping with intensified market competition. Typically, coping strategies adopted by financially troubled firms tend to modify work relations and the labor process in ways inherently threatening to safety. Hence, one would expect firms experiencing worsening financial conditions to reflect rising preventable accident rates. However, the relationship between firm economic well-being and preventable accident rates is mediated by the prevailing form of work relations. Consequently, when deteriorating financial conditions develop at firms where protective work rules limit managerial flexibility the likelihood that worsening economic conditions will have an adverse effect on safety is sharply reduced.

2.2 The U.S. Motor Carrier Industry

Deregulatory legislation, a notion popularized during the mid-1970s, was designed to increase efficiency through intensified competition. Supporters of such legislation argued for the removal of protective market entry restrictions which would allow free enterprise principles to operate. Such action would ostensibly provide benefits to both consumers and to the overall economy through the reduction of waste. This position
was developed out of a revitalization of market theory originating from the Chicago school of economics during the 1960s and 1970s which held that market forces sufficiently protected consumer and corporate interests. As Childs (1985:176) noted:

Using their interpretation of Adam Smith's descriptions of capitalism, the neoclassical economists argued that the removal of government controls would elevate the consumer to a position of influence, which in turn would stimulate more careful attention to efficiency and reduce the bureaucratic costs that regulation imposed on carriers and shippers and consumers. Many members of the Chicago school, however, seem to have skipped lightly over two hundred years of history, for their insistence that elimination of controls would stimulate lower prices and better service ignores that those regulations, for the most part, were enacted precisely to bring about better prices and services. Consumers had not been able to choose. Either monopoly practices raised prices or unfettered competition reduced efficiency and created chaotic marketing practices.

A cursory examination of changes in the composition of two deregulated industries, airlines and motor carriers, illustrates Child's position. During the first six years of airline deregulation the number of U.S. airlines rose from 36 to 123. As of 1989, however, that number had shrunk to 73. Of those 73, only 37 remained to serve points in the continental U.S. (Duffy, 1989:474), with six mega-carriers controlling nearly 90 percent of the passenger business (Winpisinger, 1989:368). Furthermore, three major airlines sought protection from creditors and relief from collective bargaining agreements through bankruptcy. Similarly, Harper and Johnson offered evidence of destructive competition in the motor carrier industry following deregulatory changes. They noted that the industry went through a chaotic period subsequent to deregulation in 1980, exemplified by oversupply of service, rate cutting, financial difficulty, and bankruptcy (1987:140). Kling pointed out motor carrier bankruptcies rose dramatically after deregulation, from 162 in 1978 to 1409 in 1984 and 1533 in 1985. Such increases are out of proportion to the increase in the number of firms serving the industry (Kling, 1988:1202).

Moreover, since the arguments supporting motor carrier deregulation focused almost exclusively on economic issues, other considerations were virtually ignored. Specifically,
the potential repercussions that increasing competition might have on labor, and consequentially on motor carrier safety, were not addressed. Kling (1988:1203) stated,

One important result of the financial pressures signaled by these bankruptcy numbers has been a trend toward deunionization of the industry, as high-cost unionized firms fail or find ways to circumvent union wages and work rules...we may observe that deterioration of union-enforced work rules, while partly responsible for observed productivity gains, is also a possible cause of safety degradation resulting from increased work hours and decreased equipment maintenance.

This observation reveals the linkage between an increasingly competitive market environment and a firm’s approach to labor relations. Such environmental changes focus management’s attention on cost control which frequently impacts labor through wage cuts or production process modifications.

Ease of market entry and market concentration define a firm’s competitive environment. Rapid changes in the number of other firms attempting to deliver similar goods or services to a finite consumer base and the ease with which new firms are able to break into these established relationships can have a potentially harmful effect on an entire industry. In fact, this understanding prompted passage of the original Motor Carrier Act (MCA) of 1935, granting the Interstate Commerce Commission (ICC) regulatory authority over motor carriers. The express purpose of the act was to “promote adequate, economical and efficient service by motor carriers, and reasonable charges therefore, without unjust discrimination, undue preferences or advantages, and unfair or destructive competitive practices.” Charles Perry argues,

The passage of the MCA of 1935 brought an end to ruinous competition within the trucking industry, and for the next forty-five years, until the passage of the MCA of 1980, established trucking firms were spared the hazards of easy entry and rate cutting by the protective regulation of a benevolent ICC determined to fulfill its mandate to prevent destructive competitive practices (1986:11).

Clearly, the primary objective of the MCA of 1935 was market protection which was maintained through control of entry, control of operations, and control of rates. Carri-

ers seeking authority had to justify the public need for their service in a hearing, and any existing carrier serving the market in question could contest that need (Perry, 1986:23). If granted, such authority would define the scope and nature of transportation services that a particular carrier could offer the public.\(^8\)

However, economic regulation of the industry under the MCA of 1935 was not uniform. Some carriers were granted authority which allowed them to transport general commodities over specific routes.\(^9\) General commodity carriers were able to offer transportation services to a wider range of clientele than were special commodity carriers whose authorities restricted them to specific commodities, such as refrigerated food stuffs or building materials. Furthermore, general commodity carriers dominated the less than trailer load (LTL) market because the majority of customers being served by special commodity carriers required truck load (TL) service only. Generally speaking, special commodity carriers were smaller firms with operations designed to meet the needs of a few specific shippers. Conversely, general commodity carriers were very large firms who specialized in moving LTL freight for numerous shippers.

Deregulatory legislation, in the the form of The Motor Carrier Act of 1980, modified the process for obtaining ICC operating authority. This legislation relaxed market entry requirements, potentially increasing competition throughout the industry.\(^10\) However, the impact of these changes were not universally felt given the existing structure of the industry. For example, large established general commodity carriers had a significant

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\(^8\) For a complete discussion of motor carrier regulatory structure, see MacAvoy and Snow, 1977 or Felton and Anderson, 1989.

\(^9\) General commodity authority specifies points of origin and destination and the routes over which freight may be carried, but it does not restrict the types of freight that may be transported (Perry, 1986:16).

\(^10\) For a comprehensive discussion of ICC general commodity regular route market entry restrictions from 1935 to the present, see Felton and Anderson, 1989.
advantage over potential upstart competition. Established carriers were already operating systems of terminals which were necessary to sort and forward smaller LTL shipments. To effectively compete in the LTL general commodity market, a newcomer would need adequate capital to finance similar facilities, thus sharply raising start-up costs. Therefore, newcomers hoping to gain entry into the industry, but lacking substantial financial resources, turned to truck load (TL) clientele. The TL market, while requiring less initial capitalization, also generated substantially lower revenues than LTL freight. For example, LTL rates are frequently three or four times greater than rates for TL shipments. In practical terms, this means the revenue for a 40,000 pound load shipped at a TL rate of $2.40 per hundred weight would generate $960.00 whereas 40,000 pounds of LTL freight at $7.20 per hundred weight would generate $2880.00.

Following deregulation, many established special commodity carriers were granted general commodity authority. This action effectively removed the commodity restrictions which tied such carriers to specific shippers. Additionally, numerous brand-new carriers were also entering the general commodity market on a TL basis, provoking highly competitive conditions in the TL market. Likewise, competition intensified among LTL carriers. Many such firms were granted expanded authority which allowed them to extend their operations into regions already being served by an established LTL firm. In an effort to attract business, the regional newcomer frequently offered services at rates below those charged by the established carrier. This led to competitive rate cutting and sometimes to bankruptcy for the less solvent firm.
2.3 *Work Relations in the Motor Carrier Industry*

Prior to deregulation, variations in motor carrier work relations were closely linked to the markets served which, in turn, were a direct reflection of the type of authority a carrier held. Basically, three major work relationships dominated for-hire motor carrier operations: (1) union drivers (2) nonunion drivers and (3) owner-operators.

Before 1980, union drivers were most closely associated with carriers holding general commodity authority. After 1964, but prior to 1980, such operations fell almost exclusively under the umbrella of the National Master Freight Agreement administered by the International Brotherhood of Teamsters (IBT).\(^{11}\) This agreement provided drivers with wage and benefit packages far superior to those offered by non-union firms. Additionally, such agreements increased job security by neutralizing the legal potency of employment-at-will and terminability-at-will rules.

Prior to 1980, most firms whose drivers were covered under IBT contracts derived at least some portion of carrier revenue from LTL operations. Of IBT affiliated carriers, those supplementing LTL revenues with lower paying TL freight frequently negotiated special commodity riders which permitted TL loads to be moved by owner-operators. TL rates were generally not sufficient when the union's normal wages and work practices were applied, so special commodity riders were established which, while requiring owner-operators to become union members, specified an alternative pay and benefit structure based on a percentage of the load revenue (Levinson, 1980:108).\(^{12}\)

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\(^{11}\) For a complete discussion of the development of the National Master Freight Agreement, see Levinson (1980).

\(^{12}\) Owner-operators in “right to work” states were exempted from the mandatory union membership clause.
However, problems developed with union efforts to organize both owner-operators driving under special commodity riders and owner-operators leased to nonunion firms. Two fundamental difficulties seemed to undermine the IBT’s organizing efforts. First, owner-operators maintained an independent, entrepreneurial attitude (Perry, 1986:62) generally reflecting strong antiunion sentiments. Second, the legal status of owner-operators was debatable. If a legal determination upheld the employee status, then the provisions of the National Labor Relations Act applied and owner-operators could enter into collective bargaining agreements. However, if legal proceedings reaffirmed the independent contractor status, then owner-operators were legally barred from collective bargaining action under antitrust laws (Levinson, 1980:122). The court has typically upheld the independent contractor status, thus presenting a formidable obstacle to union organizing.

As a result of both the legal barriers and the seemingly inherent friction between the IBT and owner-operators, special commodity carriers discovered a driver and equipment windfall. These primarily nonunion firms eagerly offered owner-operators permanent lease agreements because they provided a ready supply of equipment and drivers, without the capital investment normally associated with these items. Following deregulation, subcontracting of owner-operators expanded rapidly to all types of regulated carriers. With regard to this expansion, Edwards and Podgursky noted,

Owner-operators have come to bear much of the risk attached to changes in the market for trucking services. Under current conditions, they typically must keep their equipment in continuous operation in order to make their payments. They commonly submit to very long and grueling hours of work....To a considerable extent deregulation in the trucking industry has provided trucking companies with the ultimate flexibility in the form of owner-operators (1986:40).

13 Legally, the maximum duration of a lease agreement is one year, with an option for either party to renew or terminate at expiration. Since such leases are frequently renewed they have come to be known as “permanent”.

Review of the Literature
Bohlander and Farris (1984:234) reported other substantial changes in the industry’s labor composition following deregulation. They estimated approximately 250,000 to 300,000 IBT members had lost employment through firm bankruptcy or reorganization, while thousands of nonunion, low-cost, TL carriers had initiated new operations. Although some of the new entrants utilized owner-operators, many employed nonunion drivers at substantially lower wages and reduced benefits than union firms. Perry notes the union’s shrinking organizational control over TL motor carrier operations since deregulation has left union representation largely confined to carriers serving the LTL market (1986:116).

Overall, the trend in the motor carrier industry has been toward bifurcation, resulting in the development of a few, very large LTL carriers employing primarily union labor, and a multitude of smaller, very competitive TL firms employing nonunion labor or relying on owner-operators. Perry pointed out that growing competition for TL freight forced pre-deregulatory general commodity carriers to either become competitive in that market or to abandon it and concentrate their attention and resources on the LTL market (1986:96). The consequences of these market shifts have been a reduction in the number of available union jobs, an increased demand for drivers at nonunion firms, and increased utilization of subcontracted labor.

The motor carrier industry has undergone dramatic transformation as a result of deregulation, both in terms of economic stability and the organization of work relations. Theoretically, such changes would be expected to have an adverse impact on motor carrier safety in general. Consequently, I hypothesize the effects of firm economic well-being on preventable accident rates to be stronger following the passage of deregulatory legislation than prior to its enactment. However, due to variations in work re-
lations I do not anticipate all firms to reflect such effects uniformly. For example, at union firms protective work rules hamper management's efforts to introduce potentially unsafe labor process modifications. Hence, deteriorating financial conditions at union firms are hypothesized to have less effect on preventable accident rates than at either nonunion or owner-operator firms. Moreover, the significance of such protective work rules increased following deregulation. While nonunion and owner-operator firms enhanced their competitive position through cost cutting strategies which potentially threatened safety, union firms had to devise other coping strategies. As a result, I hypothesize the effects of worsening financial conditions on preventable accident rates to differ less across time for union firms than for other types of firms.
Chapter III

Methodology

The research problem indicates a trend design, which is appropriate for evaluating changes within a general population over time (Babbie, 1986:81). Indicators of carrier economic well-being and organization of work relations are expected to predict preventable accident rates. Models reflecting two points in time, pre-deregulatory 1975-76 and post-deregulatory 1985-86, are estimated using ordinary least squares regression techniques. Typically, hypotheses are developed around each of the independent variables contained in the regression model. While the direction of those effects are predicted, such hypotheses are not the primary focus of this study. Instead, this research emphasizes differences in effects caused by variations in work relations and the passage of deregulatory legislation. Three major hypotheses are addressed. First, deregulatory changes are expected to have an overall detrimental effect on motor carrier financial stability which, in turn, is potentially threatening motor carrier safety. Hence, the economic well-being of the firm is hypothesized to have a greater effect on the firm's preventable accident rate after deregulation than before deregulation. Second, union
presence is expected to safeguard workplace safety conditions regardless of firm economic well-being. Hence, the economic well-being of the firm is hypothesized to have less effect on preventable accident rates for union firms than for other types of firms. Third, union presence is expected to protect workplace safety, even under the highly competitive market conditions produced by deregulation. Hence, changes in the effects of firm economic well-being on preventable accident rates are hypothesized to differ less across time for union firms than for other types of firms. These hypotheses will be tested by comparing models across time to identify changes in effects.

Theoretically, accident-prone work environments develop as worsening economic conditions prompt organizational changes. However, such organizational change does not occur overnight. Time is required for motor carrier management to recognize the deteriorating financial situation, to develop strategies to cope with it, and finally, to implement policies reflecting those strategies. It would take several months or longer before this process had an effect on preventable accident rates. Therefore, this project analyzes carrier financial data which was reported for the year prior to the accident data. That is, 1975 financial data will be used to predict 1976 accident data and 1985 financial data will be used to predict 1986 accident data.

The unit of analysis for the study is the firm. The population consists of all for-hire ICC regulated motor carriers operating in the years 1975-76 and 1985-86 with the exclusion of: (1) movers of household goods who utilize their own specific Uniform System of Accounts needed to report revenues and expenses not common to the rest of the industry (American Trucking Association, 1986); (2) all exempt commodity carriers because of the unavailability of financial information; (3) all carriers generating less than $500,000 annual revenue in 1975, and all carriers generating less than $1,000,000 annual
revenue in 1985, neither of which were required to comply with ICC rules regarding financial reporting; (4) carriers operating less than 125 power units. This size restriction was imposed because virtually no union firms are small. Consequently, the potential effects of small firm size would be nonexistent for union carriers, but present for non-union and owner-operator firms. Restricting smaller carriers from the samples reduces such size bias. Selection of two samples, one for each of the desired points in time, is determined by the availability of both financial data and accident data for each carrier. There are adequate data for 117 carriers in the 1975-76 sample and 236 carriers in the 1985-86 sample.

3.1 Dependent Variable

The dependent variables are preventable fatal and injury accidents per million miles for 1976 and 1986. These are continuous variables, calculated by dividing the total number of preventable fatal and injury accidents for each carrier by the total annual mileage reported by that carrier for the respective year and then multiplying that result by one million. Accident Data Files (50T) were obtained from the U.S. Department of Transportation (1976;1986). These files are stored on machine readable data tape and contain all legally reportable motor carrier accidents for the years 1976 and 1986, approximately 52,000 observations. Accident Data Files contain adequate information to assess the preventability of each accident using an algorithm developed expressly for that purpose by Analysis Group, Incorporated (1989).14 In general, an accident was determined preventable if it was linked to specific types of mechanical defects or if the driver’s condition indicated alcohol or drug use, fatigue, or other impairment. Single vehicle acci-

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14 See Appendix B.
idents and rear end collisions, in the absence of extenuating circumstances and conditions, typically indicated a preventable accident.

All information contained in the Accident Data Files is carrier reported. As such, questions regarding reporting error arise. Two factors decrease the likelihood a carrier would misrepresent, falsify, or fail to file the required documentation. First, failure to comply with ICC or FHWA reporting requirements leaves offenders subject to penalties, generally in the form of fines. In extreme cases the ICC may declare a carrier unfit, causing operating authority to be suspended or cancelled. Second, all carrier-filed reports are subject to auditing, with a random sample routinely selected each reporting period for such examination. While monitoring will not prevent all falsifications and omissions, it seems reasonable to assume it has a moderating effect on noncompliance. Similarly, the incentive to file accident reports would be reinforced in the case of a fatal or injury accident where failure to comply could be used in future litigation to discredit the firm. Consequently, this study will analyze only those preventable accident rates involving fatalities or injuries because such accidents are more likely to have been uniformly reported, regardless of other firm characteristics.

3.2 Independent Variables

Three independent variables measure various aspects of the carrier’s financial stability and economic well-being: revenue per mile, net debt to equity ratio, and operating ratio. Revenue per mile is calculated by dividing the carrier’s annual gross revenue by their reported total mileage for the respective year. Net debt to equity ratio is calculated by dividing total long-term debt, less net working capital, by equity. Operating ratio is de-
terminated by dividing total annual operating expenses by annual gross revenue. Carrier financial information is reported annually to the ICC by all regulated carriers whose annual gross revenue exceeded $500,000 prior to 1977 or exceeded $1,000,000 in subsequent years. The American Trucking Association publishes these reports on an annual basis and those publications for 1975 and 1985 are the source of all carrier financial data used in the study.

Revenue per mile captures the potential profitability of the carrier’s operation expressed in dollars on a per mile basis. Many motor carrier expenses, such as fuel, maintenance costs, and drivers’ wages, accrue by the mile. Hence, failure to generate adequate revenue per mile to cover such expenses portends serious financial problems. Following deregulation, rate cutting became a popular marketing strategy designed to lure customers away from competitors. When established firms were forced to cut rates to avoid losing business, revenue per mile dropped while costs per mile remained fixed. The ability to remain solvent under such conditions was largely a function of the firm’s overall financial condition, reflected in net debt to equity ratio. The operating ratio offers a measure of the firm’s long-term profitability. Any firm which indicated expenses are outstripping revenues on an annual basis and which also reported a large net debt to equity ratio is likely to be in a perilous financial position. Consequently, I hypothesize that as revenue per mile increases, preventable fatal and injury accidents per million miles will decrease. Additionally, I hypothesize that as net debt to equity ratio increases, preventable fatal and injury accidents per million miles will increase. Similarly, as operating ratio increases, preventable accidents per million miles are hypothesized to increase.
Two independent variables are designed to reflect motor carriers' organization of work relations. First, a dichotomous nominal-level variable indicates the presence of a union contract. Information regarding union affiliation was provided by the International Brotherhood of Teamsters (1990). Firms covered under union agreements are coded 1 while nonunion firms are coded 0. I hypothesize union firms to be associated with lower preventable fatal and injury accident rates for two reasons. First, union drivers are generally covered under IBT union contracts which contain protective work rules reinforcing conformity to hours of service regulations. Second, the majority of union firms are involved in LTL operations. As such, freight is moved between carrier-owned terminals. These terminals are generally located so drivers can traverse the distance between them in less than ten hours, the maximum time legally permissible for one continuous driving shift. Shorter trip lengths, coupled with restrictive work rules, reduce the possibility of fatigue-related accidents.

The second work relations variable indicates the percentage of owner-operators subcontracted by the carrier. The Motor Carrier Annual Reports published by the American Trucking Association contains data reflecting the number of power units leased with drivers for each firm and the total number of power units operated by the firm. This information is sufficient to calculate the percentage of owner-operators at a given fleet. An earlier study by Corsi, Fanara, and Roberts reported a relationship between accidents and the use of owner-operator vehicles, with owner-operators appearing to have a higher accident propensity than wage drivers (1984:163). Carriers subcontracting the majority of their business shift much of the financial risk and costs associated with trucking operations to owner-operators. However, such firms retain control of the rates being charged. Under highly competitive conditions, the leasing firm is likely to cut rates

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15 For a listing of the union firms contained in each sample see Appendix C.
without notice to subcontractors. When compensation is based on a percentage of load revenue, any form of rate cutting has an immediate negative effect on owner-operator income. Given that the majority of owner-operators have limited cash reserves, these individuals would be facing the same alternatives as any financially troubled firm. Hence, they frequently adopt strategies, such as intensification of the work pace or cost cutting, to improve productivity, hopeful of increasing net profits. Theoretically, these strategies increase the likelihood of preventable accidents and hence, I hypothesize that as the percentage of owner-operators at a firm increases, preventable fatal and injury accidents will similarly increase.

Corsi, Fanara, and Roberts (1984) also reported a negative relationship between firm size and accident rates. That is, larger carriers tended to have lower accident rates. Corsi et al. utilized ICC financial classifications based on gross revenue as the indicator of firm size, using it to predict total carrier reported accidents, regardless of preventability. I also hypothesize larger firms to be associated with lower rates of preventable fatal and injury accidents, but I do not attribute this expectation to size alone. The largest motor carriers are LTL firms utilizing drivers covered under JBT contracts. Therefore, for the same reasons union firms are expected to be associated with lower preventable accident rates, large firms are hypothesized to be similarly related, since union firms and large firms are essentially one and the same. For purposes of this study, firm size is captured by the total number of power units operated by the carrier. Such data is contained in the Motor Carrier Annual Reports compiled by the American Trucking Association.

Finally, the models contain two trend measures indicative of improvement or deterioration in firm economic performance across time: revenue-per-mile-change and
percent-net-income-change. Both measures capture the direction of change from 1975 to 1976 and from 1985 to 1986. The revenue-per-mile-change values were calculated by subtracting revenue per mile for the earlier year from revenue per mile for the later year. In practical terms, then, if a carrier's revenue per mile were higher in 1986 than in 1985, it would indicate entry into higher revenue markets. This shift theoretically would contribute to improved firm economic well-being which would reduce the necessity for cost cutting strategies, and hence, yield lowered preventable fatal and injury accident rates. Consequently, I hypothesize positive values for revenue-per-mile-change to predict lower rates of preventable fatal and injury accidents. Similarly, positive values for percent-net-income-change reflect improving financial conditions and so I hypothesize such values to predict lower rates of preventable accidents.
Chapter IV

Results

Three major hypotheses were investigated in this research. First, the economic well-being of the firm was hypothesized to have a greater effect on the firm's preventable accident rate after deregulation than before deregulation. Second, the economic well-being of the firm was hypothesized to have less effect on preventable accident rates for union firms than for other types of firms. Third, changes in the effects of firm economic well-being on preventable accident rates were hypothesized to differ less across time for union firms than for other types of firms. Hypotheses were tested through a series of comparisons which noted changes in models across time and across different forms of work relations.

Ideally, models for each point in time would have included continuous variables, dummy variables designating time period and union/nonunion status, and the appropriate interaction terms. However, a preliminary analysis revealed that such models exhibited unacceptably high levels of multicollinearity. Consequently, three discrete models were
developed for each time period, one for union firms, one for nonunion firms, and one for owner-operator firms. Unfortunately, this approach reduced statistical power by fragmenting the overall sample size for each time period into three smaller samples.

4.1 Descriptive Statistics

Table 1 contains means and standard deviations for the dependent variable and for continuous independent variables, organized by the firms' prevailing form of work relations for both pre-deregulatory 1975-76 and post-deregulatory 1985-86. In general, these data indicate a reduction in preventable accident rates between 1976 and 1986 regardless of the firm's organization of work relations. However, owner-operator firms exhibited a higher preventable accident rates in both time periods that did either union firms or nonunion firms. Nonunion firms consistently reflected the lowest preventable accident rates regardless of time frame.

Union firms tended to be substantially larger than either nonunion firms or owner-operator firms, with an average number of power units in 1975-76 of 1027, growing to an average of 1353 by 1985-86. The average number of power units operated at non-union firms or at owner-operator firms was typically half the number utilized at union firms. Additionally, the average revenue per mile generated at union firms exceeded that of both nonunion and owner-operator firms by approximately one dollar per mile regardless of time frame. Union firms also demonstrated the the healthiest increases in the trend measure, revenue-per-mile-change, both before and after deregulation. Pre-deregulation revenue per mile grew an average 7.6 cents at union firms between 1975 and 1976, while only increasing 5.3 cents during the same time period at nonunion firms and
Table 1. Means and Standard Deviations for Variables Included in the Regression Models

<table>
<thead>
<tr>
<th></th>
<th>Union 1975-76 (n = 49)</th>
<th>Union 1985-86 (n = 33)</th>
<th>Nonunion 1975-76 (n = 43)</th>
<th>Nonunion 1985-86 (n = 135)</th>
<th>Owner-Operator 1975-76 (n = 25)</th>
<th>Owner-Operator 1985-86 (n = 68)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preventable Fatal/Injury Accidents</td>
<td>.470 (.28)</td>
<td>.298 (.21)</td>
<td>.404 (.23)</td>
<td>.294 (.22)</td>
<td>.549 (.19)</td>
<td>.312 (.22)</td>
</tr>
<tr>
<td>Power Units</td>
<td>1027 (1119)</td>
<td>1353 (1952)</td>
<td>523 (546)</td>
<td>402 (472)</td>
<td>438 (225)</td>
<td>330 (247)</td>
</tr>
<tr>
<td>Operating Ratio</td>
<td>.96 (.048)</td>
<td>.98 (.046)</td>
<td>.94 (.058)</td>
<td>.96 (.062)</td>
<td>.96 (.027)</td>
<td>.98 (.038)</td>
</tr>
<tr>
<td>Net Debt to Equity Ratio</td>
<td>.46 (1.49)</td>
<td>.72 (2.03)</td>
<td>.61 (1.20)</td>
<td>.90 (1.72)</td>
<td>-.10 (.58)</td>
<td>.27 (1.44)</td>
</tr>
<tr>
<td>Percent-Net-Income-Change</td>
<td>.005 (.019)</td>
<td>.004 (.042)</td>
<td>.011 (.035)</td>
<td>.010 (.056)</td>
<td>.012 (.033)</td>
<td>-.007 (.049)</td>
</tr>
<tr>
<td>Revenue Per Mile</td>
<td>1.84 (.74)</td>
<td>3.05 (.99)</td>
<td>1.07 (.48)</td>
<td>1.84 (1.17)</td>
<td>.70 (.11)</td>
<td>1.37 (.80)</td>
</tr>
<tr>
<td>Revenue-Per-Mile-Change</td>
<td>.076 (.264)</td>
<td>.058 (.403)</td>
<td>.053 (.104)</td>
<td>.050 (.418)</td>
<td>.039 (.037)</td>
<td>-.046 (.252)</td>
</tr>
</tbody>
</table>
3.9 cents at owner-operator firms. Following deregulation, revenue per mile at union firms grew an average 5.8 cents between 1985 and 1986 while nonunion firms experienced revenue per mile growth of 5.0 cents over the same time period. Post-deregulation revenue per mile at owner-operator firms actually declined by an average 4.6 cents between 1985 and 1986.

Average operating ratios for all types of firms remained relatively stable across time, ranging from a low of .94 to a high of .98. On the other hand, average net debt to equity ratio grew between 1975 and 1985 regardless of the prevailing form of work relations, with owner-operator firms experiencing the largest gain. The trend measure percent-net-income-change indicated slower growth during 1985-86 than during 1975-76 for all types of firms. Average percent-net-income-change was positive at both points in time for all types of firms with one notable exception. Owner-operator firms exhibited a negative .007 average percent-net-income-change during the 1985-86 time period.

4.2 Multivariate Analysis

Tables 2, 3, and 4 respectively contain regression results for preventable fatal and injury accidents at union firms, owner-operator firms, and nonunion firms. Each table reports the unstandardized regression coefficients for six independent variables. Regression results are reported for each type of firm at two points in time, pre-deregulatory 1975-76 and post-deregulatory 1985-86. This format permitted comparisons of regression coefficients across time for each type of firm, as well as a comparison within time periods across firm types. Additionally, the tables report results of Chow tests. The Chow test is an F-test designed to assess the equality of coefficients contained in two regression
<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>1975-76</th>
<th>1985-86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Total Power Units</td>
<td>-.025</td>
<td>-.026</td>
</tr>
<tr>
<td></td>
<td>(0.87)</td>
<td>(1.08)</td>
</tr>
<tr>
<td>Operating Ratio</td>
<td>.354</td>
<td>.100</td>
</tr>
<tr>
<td></td>
<td>(1.23)</td>
<td>(0.33)</td>
</tr>
<tr>
<td>Net Debt to Equity Ratio</td>
<td>-.005</td>
<td>.013*</td>
</tr>
<tr>
<td></td>
<td>(0.66)</td>
<td>(1.75)</td>
</tr>
<tr>
<td>Percent-Net-Income-Change</td>
<td>.414</td>
<td>-.130</td>
</tr>
<tr>
<td></td>
<td>(0.57)</td>
<td>(0.41)</td>
</tr>
<tr>
<td>Log Revenue Per Mile</td>
<td>.059</td>
<td>-.091</td>
</tr>
<tr>
<td></td>
<td>(0.79)</td>
<td>(1.19)</td>
</tr>
<tr>
<td>Revenue-Per-Mile-Change</td>
<td>.004</td>
<td>-.035</td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
<td>(0.96)</td>
</tr>
<tr>
<td>Constant</td>
<td>-.124</td>
<td>0.118</td>
</tr>
<tr>
<td>N</td>
<td>49</td>
<td>33</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.141</td>
<td>0.191</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.019</td>
<td>.004</td>
</tr>
</tbody>
</table>

Chow Test:
Union 1975-76 / Union 1985-86
$F = 2.615$, $p < .05$ (d.f. = 6,70)

NOTE: For each regressor, unstandardized regression coefficients are shown with corresponding absolute t-ratios in parentheses.

***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$ (one-tailed tests)
### Table 3. Regression Models for Preventable Fatal and Injury Accidents at Owner-Operator Firms

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>1975-76</th>
<th>1985-86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Total Power Units</td>
<td>-.048</td>
<td>.027</td>
</tr>
<tr>
<td></td>
<td>(0.83)</td>
<td>(1.06)</td>
</tr>
<tr>
<td>Operating Ratio</td>
<td>.917*</td>
<td>.741***</td>
</tr>
<tr>
<td></td>
<td>(2.15)</td>
<td>(3.96)</td>
</tr>
<tr>
<td>Net Debt to Equity Ratio</td>
<td>-.012</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>(0.58)</td>
<td>(0.02)</td>
</tr>
<tr>
<td>Percent-Net-Income-Change</td>
<td>-.380</td>
<td>-.761***</td>
</tr>
<tr>
<td></td>
<td>(1.19)</td>
<td>(4.47)</td>
</tr>
<tr>
<td>Log Revenue Per Mile</td>
<td>.161</td>
<td>.103</td>
</tr>
<tr>
<td></td>
<td>(0.87)</td>
<td>(1.72)</td>
</tr>
<tr>
<td>Revenue-Per-Mile-Change</td>
<td>.400</td>
<td>.049</td>
</tr>
<tr>
<td></td>
<td>(1.32)</td>
<td>(1.31)</td>
</tr>
<tr>
<td>Constant</td>
<td>-.555</td>
<td>-.691</td>
</tr>
<tr>
<td>N</td>
<td>25</td>
<td>68</td>
</tr>
<tr>
<td>R²</td>
<td>0.319</td>
<td>0.372***</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.092</td>
<td>0.310</td>
</tr>
<tr>
<td>Chow Test: Owner-Operator 1975-76 / Owner-Operator 1985-86</td>
<td>F = 6.727, p &lt; .01 (d.f. = 6,81)</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: For each regressor, unstandardized regression coefficients are shown with corresponding absolute t-ratios in parentheses.

***p ≤ 0.001; **p ≤ 0.01; *p ≤ 0.05 (one-tailed tests)
Table 4. Regression Models for Preventable Fatal and Injury Accidents at Non-union Firms

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>1975-76</th>
<th>1985-86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Total</td>
<td>.030</td>
<td>-.006</td>
</tr>
<tr>
<td>Power Units</td>
<td>(0.96)</td>
<td>(0.34)</td>
</tr>
<tr>
<td>Operating Ratio</td>
<td>.190</td>
<td>-.094</td>
</tr>
<tr>
<td></td>
<td>(0.94)</td>
<td>(0.96)</td>
</tr>
<tr>
<td>Net Debt to Equity</td>
<td>-.007</td>
<td>.004</td>
</tr>
<tr>
<td>Ratio</td>
<td>(0.64)</td>
<td>(1.26)</td>
</tr>
<tr>
<td>Percent-Net-Income-Change</td>
<td>-.763*</td>
<td>.063</td>
</tr>
<tr>
<td></td>
<td>(2.29)</td>
<td>(0.58)</td>
</tr>
<tr>
<td>Log Revenue Per Mile</td>
<td>-.015</td>
<td>.007</td>
</tr>
<tr>
<td></td>
<td>(0.23)</td>
<td>(0.26)</td>
</tr>
<tr>
<td>Revenue-Per-Mile-Change</td>
<td>-.191*</td>
<td>.051++</td>
</tr>
<tr>
<td></td>
<td>(1.78)</td>
<td>(3.61)</td>
</tr>
<tr>
<td>Constant</td>
<td>-.091</td>
<td>0.203</td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>135</td>
</tr>
<tr>
<td>R²</td>
<td>0.231</td>
<td>0.109*</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.102</td>
<td>0.067</td>
</tr>
</tbody>
</table>

Chow Test:
Nonunion 1975-76 / Nonunion 1985-86
F = 3.509, p < .01 (d.f. = 6,166)

NOTE: For each regressor, unstandardized regression coefficients are shown with corresponding absolute t-ratios in parentheses.

***p ≤ 0.001; **p ≤ 0.01; *p ≤ 0.05 (one-tailed tests)
+++p ≤ 0.001; ++p ≤ 0.01; +p ≤ 0.05 (two-tailed tests)
models utilizing the same dependent and independent variables. Chow tests were conducted to determine whether regression models for union firms, nonunion firms and owner-operator firms reflected changes across time which were unlikely to be attributable to mere chance.

Table 2 reports regression results for preventable fatal and injury accidents per million miles at union firms for 1975-76 and 1985-86. During pre-deregulatory 1975-76, none of the independent variables contained in the model were shown to be significant predictors of preventable fatal and injury accident rates at union firms. During post-deregulatory 1985-86, only net debt to equity ratio was shown to be a significant predictor (at the .05 alpha level) and that relationship was in the predicted direction. As net debt to equity ratio increased one unit, preventable fatal and injury accidents increased by .013 accident per million miles.

Table 3 reports regression results for preventable fatal and injury accident rates per million miles at owner-operator firms. During pre-deregulatory 1975-76, only operating ratio is shown to be a significant predictor of such accident rates. For each unit increase in operating ratio, accident rates rose .917 accident per million miles operated. This outcome is in the predicted direction. During 1985-86, the significance level of the relationship between operating ratio and preventable accident rates was again statistically significant and of a similar magnitude. In addition, the trend measure percent-net-income-change also became a significant predictor (at the .001 alpha level). This relationship was negative, which is in the predicted direction.

Table 4 reports regression results for preventable fatal and injury accidents per million miles at nonunion firms. For the pre-deregulation model both trend measures, percent-net-income-change and revenue-per-mile-change, were negatively related to preventable
accident rates at the .05 alpha level. These relationships occur in the predicted directions. However, the post-deregulatory model produced an unexpected result. The trend measure, revenue-per-mile-change, became positively related to preventable accident rates ($p < .001$, two-tailed test). This counterintuitive finding indicates that a one unit increase in revenue-per-mile-change produces a .051 increase in preventable accident rates per million miles. No other independent variables in the 1985-86 model were shown to be significant predictors of preventable accident rates.

4.3 Comparison of Models Across Time and Across Variations in Work

Relations

The major hypotheses were tested by comparing various regression models. First, the economic well-being of the firm was hypothesized to have a greater effect on the firm’s preventable accident rate after deregulation than before deregulation. Results support this hypothesis for both union firms and owner-operators firms, but not for nonunion firms. Regression models for union firms and owner-operator firms reflect an increase in the number of statistically significant (i.e., non-zero) predictor variables across time, with the post-deregulatory models containing more significant predictors than the pre-deregulatory models. Regression models for nonunion firms exhibit a reduction in the number of significant predictor variables from two to one. Furthermore, the remaining significant predictor variable in the 1985-86 nonunion post-deregulatory model predicts a relationship in an unexpected direction.

Second, the economic well-being of the firm was hypothesized to have less effect on preventable accident rates for union firms than for other types of firms. This hypothesis
was partially supported. In pre-deregulatory 1975-76 none of the independent variables in the union model were significant predictors of preventable accident rates. Alternatively, the owner-operator model and the nonunion model for pre-deregulatory 1975-76 produced at least one independent variable which was shown to be a significant predictor of preventable accident rates. Also supportive of this second hypothesis is the fact that the post-deregulatory 1985-86 union model contained fewer significant predictors than the 1985-86 owner-operator model. However, the comparison of post-deregulatory union and nonunion models contradicts the hypothesis. Each of these two models included one significant predictor variable, but in the case of the 1985-86 nonunion model, the relationship between the significant predictor variable and preventable accident rates was actually in an unexpected direction.

Third, changes in the effects of firm economic well-being on preventable accident rates were hypothesized to differ less across time for union firms than for other types of firms. The results do not support this hypothesis. The pre-deregulatory 1975-76 union firm model contained no significant predictor variables. In the post-deregulatory 1985-86 model, that number had increased to one. The owner-operator models also gained one predictor variable from 1975-76 to 1985-86, increasing from one to two. Even less congruent with the third hypothesis is the fact that for nonunion firms the number of significant predictors declined from two to one between 1975-76 and 1985-86, and that the single significant predictor in the 1985-86 model had a coefficient with a sign opposite that expected.
Chapter V

Conclusions

In general, workplace safety issues have been approached and investigated at the level of the individual, with relatively little attention given to underlying social conditions that may systematically contribute to unsafe working conditions. Failure to address such underlying factors oversimplifies our understanding of workplace safety issues. One is lulled into the belief that workplace safety is merely a function of isolated and random unsafe behavior. Given that assumption, improved workplace safety becomes contingent on weeding out the few specific individuals who engage in such behavior. This study attempted to challenge that view by suggesting that unsafe workplace behavior is not exclusively the product of isolated decision-making, but rather a cogent and predictable response to managerial pressures exerted on workers in firms experiencing financial distress. I argued that firms do not operate in a vacuum, but rather exist in a larger economic context which is subject to change and fluctuation. Such shifts in the external economic environment can sometimes threaten firm financial well-being, thus forcing organizations to develop coping mechanisms if they are to survive in the new
competitive environment. I further posited that certain managerial strategies designed to address these increasingly competitive market conditions inherently threaten workplace safety.

Specifically, this research investigated changes in the motor carrier industry triggered by passage of deregulatory legislation in 1980. Such legislation produced highly competitive market conditions, thus forcing existing motor carriers to modify their operations if they hoped to compete with low cost upstart carriers. Union firms scrambled to negotiate concessionary collective bargaining agreements or sought protection from existing contracts through bankruptcy. Other firms turned to owner-operators whose personal financial investment in their equipment reinforced their commitment to work excessive hours. Still others firms introduced compensation schemes which paid drivers only for laden miles while ignoring hours worked performing other required duties, such as loading or unloading. I noted that any of these cost cutting strategies could potentially increase the likelihood of motor carrier accidents.

The literature supports the notion that deregulation provoked economic instability in the motor carrier industry. The literature also documents the various coping mechanisms employed by carriers whose economic survival was at stake. I have provided a detailed discussion theoretically linking these coping mechanisms to unsafe behaviors which were likely to contribute to rising accident rates at financially weakened firms. It is important to note that this line of reasoning is not being used to make the prediction that accident rates overall should be expected to increase following deregulation. In fact, the descriptive statistics presented in this study indicate that accident rates per se actually declined between 1976 and 1986. In part this reduction can be attributed to factors beyond the scope of this research. For example, during that ten year period substantial portions
of the interstate highway system were completed, thus reducing the number of miles operated on two-lane highways. Two-lane highways supporting traffic traveling in opposing directions offer greater risks for collisions than do divided highways. Additionally, various technological improvements such as anti-locking brake systems were introduced between 1976 and 1986, further reducing the likelihood for some types of motor carrier accidents.

While this research did not try to predict industry-wide accident rate trends, it did attempt to demonstrate the existence of a relationship between firm economic well-being and preventable accident rates. I noted, however, that such a relationship would be mediated by the firm's prevailing form of work relations. I expected employees at financially weakened union firms to experience less managerial pressure than at other types of firms because of restrictive language contained in labor contracts limiting managerial decision-making. As a result of union involvement, I expected union firms to exhibit lower preventable accident rates than those seen at either nonunion firms or owner-operator firms. Data in this study did not support that expectation. Instead, nonunion firms reported lower mean accident rates both before and after deregulation than did union firms. However, this finding may be a function of inaccuracies in the motor carrier accident data file utilized in this study. Paul Jovanis (1989) noted with regard to this data source:

...there is colloquial evidence that the self-reporting system of motor carrier accident data collection is being abused. Many large national carriers have well-structured safety programs; a system for reporting accidents is part of their routine operations. This may not be so with all carriers (1989:280).

Union firms tend to be quite large, on average twice the size of nonunion firms. Given Jovanis' observation, we should expect that large union firms would have well-established reporting practices whereas, smaller nonunion firms may not. Consequently, the accident rates reported for nonunion firms in this study may be severely understated.
Findings of this study supported the notion that a relationship exists between motor carrier economic well-being and preventable accident rates and that such a relationship was mediated by the carrier's prevailing form of work relations. Additionally, findings of this study supported the expectation that the relationship between firm economic well-being and preventable accident rates was changed for all types of firms following passage of deregulatory legislation. However, all such changes were not in the anticipated direction. While the relationship between firm economic well-being and preventable accident rates at union firms and owner-operator firms was strengthened following deregulation, it was weakened at nonunion firms. The literature noted that following deregulation, nonunion firms were able to expand their operations by obtaining general commodity authority. Such authority provided nonunion carriers with access to numerous new shippers thus increasing their potential revenue base. Under such circumstances, nonunion firms were likely to have actually benefitted financially from deregulatory changes in ways union firms and owner-operator firms did not. Hence, the relationship between deteriorating economic well-being and preventable accident rates at nonunion firms deviated from expectations most probably because the financial situation at these firms had improved while it had deteriorated for the other types of firms.

Such deterioration was quite evident at owner-operator firms. A brief examination of post-deregulatory descriptive statistics reveals the depth of financial distress being experienced at owner-operator firms relative to other types of firms. Owner-operator firms reported an average revenue per mile of $1.37 in 1985, over forty cents per mile lower than the average revenue per mile at nonunion firms and a staggering $1.68 less than the average revenue per mile at union firms. Additionally, the trend measure, revenue-per-mile-change, indicated an average decline in revenue per mile between 1985 and 1986 of $.046 at owner-operator firms, while union and nonunion firms were enjoying increased
revenue-per-mile-change over the same time period. Similarly, the trend measure percent-net-income-change indicated declining net income for owner-operator firms in the post-deregulatory period, while nonunion firms and union firms exhibited positive growth over the same time period. These figures seem to indicate that owner-operator firms were trying to survive in an economic environment more hostile than the one being experienced by other types of firms. As a result, individual owner-operators leased to such firms would be induced to redouble their work efforts simply to maintain their economic status quo. Such increased work commitment would be mandatory if these owner-operators hoped to keep pace with the heavy financial obligations associated with equipment ownership and maintenance. Increased work commitment would typically translate into increased hours on the road which in turn would produce increased fatigue which would finally lead to an increase in preventable accident rates at financially weakened owner-operator firms. Regression results reported in this study support this line of reasoning. The pre-deregulatory owner-operator model demonstrated a weaker relationship between firm economic well-being and preventable accident rates than did the post-deregulatory model.

The relationship between firm economic well-being and preventable accident rates also changed at nonunion firms, but in an unexpected direction. Initially, such results appear counterintuitive. During the pre-deregulatory time period, relationships are in the predicted directions with both trend measures negatively related to preventable accident rates. However, following deregulation, the trend measure revenue-per-mile-change becomes significantly related to preventable accident rates in a positive direction. In essence, this finding implies that improving revenues are somehow related to an increase in preventable accident rates. Such an outcome appears totally incompatible with the theoretical foundation on which this study was based. I argued that healthier revenues
should negate management’s need to implement cost cutting strategies which could potentially compromise safety. Yet, at post-deregulatory nonunion firms we see improving revenue per mile contributing to higher accident rates. This result can be understood, however, through an analysis of the historical conditions in which post-deregulatory firms were developing. The literature indicated that numerous low-wage nonunion carriers commenced operations following passage of the MCA of 1980. Increases in the number of nonunion firms would have caused the demand for qualified drivers to sharply increase. Under such circumstances, low cost nonunion firms would find driver recruitment particularly challenging. Their low-wage compensation strategy would preclude successful recruitment of former union drivers who may have been available for employment, but who would have been unwilling to accept wages less than half those they had formerly been paid. In light of these constraints, I suggest that upstart nonunion carriers faced with a driver shortage and an unwillingness to pay higher wages, began recruiting inexperienced graduates from truck driving schools. Such persons would be willing to work for low wages simply to obtain the experience necessary to gain access to higher paying opportunities later. Consequently, the unexpected direction exhibited between the trend measure revenue-per-mile-change and preventable accident rates exhibited in the post-deregulatory nonunion model is most likely a reflection of rapid expansion at nonunion firms which exhausted the supply of experienced drivers who were willing to work for low wages which in turn increased dependence on drivers with very little over-the-road experience.

Regression models for union firms, both before and after deregulation, were relatively weak predictors of preventable accident rates. These findings were to be expected since union firms confronting deteriorating profit margins would have been unable to implement the cost cutting strategies available to either nonunion or owner-operator firms.
The literature noted that numerous union carriers ceased operations following deregulation. Such firms, unable to respond to rapidly changing market conditions, were simply forced out of the picture. While it is true that some financially strapped union carriers closed their doors only to reopen later as either an owner-operator operation or a low cost nonunion operation, this strategy would not affect preventable accident rates in the post-deregulatory union model because such firms would no longer be represented in that sample. The theoretical underpinnings of this study maintain that safety is potentially threatened when firms experience deteriorating economic well-being and attempt to address that problem by introducing cost cutting strategies. Since such strategies were unavailable to union firms, their effects never translated into increased preventable accident rates at those carriers. Hence, models trying to link firm economic well-being to preventable accident rates for union firms prove to be rather ineffective predictors.

Findings of this study have implications beyond the motor carrier industry. During the past fifteen years, increased market competition has affected numerous industries. In some instances, increased competition was engineered by policy changes enacted by the government. Such was the case in the motor carrier industry, as well as in the airline, telecommunication, and banking industries. Harrison and Bluestone (1988) noted that throughout these industries, management has relied almost exclusively on cost cutting strategies to address shrinking profit margins, with employees bearing the majority of the burden through wage concessions coupled with intensified pressure to become more productive. In other instances, increased competition emanated from foreign firms which were able, through cheaper labor costs and/or more efficient production technologies, to erode the market share of U.S. firms. Such has been the experience of U.S.
automobile manufacturers. In general, managerial response to such competitive challenges has involved plant closures, wage reductions, or loss of employee benefits.

Such trends are very disturbing. They suggest that many firms are essentially maintaining corporate profitability at the expense of employee welfare. Reduced margins of workplace safety are but one manifestation of these trends. Others include failure to provide access to group health plans, increased reliance on part-time workers who are ineligible for many of the benefits available to full-time workers, and the relocation of production facilities to regions where labor costs are lower. Additionally, while the tendency for corporations to employ such practices has increased over the past few years, the number of workers protected by union contracts has steadily declined in the private sector. This trend is equally troubling since only employees covered by written contracts have meaningful legal voice regarding the conditions of their employment relationship. As the literature indicated, other employees are considered at-will and as such enjoy little legal protection from corporate decision-making which might adversely impact them. Decreased union membership coupled with the lack of legal protection available to at-will employees paints a grim picture for American workers. Such workers are likely to experience less job security combined with deteriorating working conditions in the future. As demonstrated by this study, that scenario is more likely to play itself out when firms are experiencing financial distress and workers lack sufficient collective power to protect their interests. Overall, the response of U.S. firms facing financial difficulty has been to shift the burden of declining profits on to labor, a politically weakened group who lacks adequate reserve resources or alternative opportunities to do much other than accept deteriorating working conditions, reduced incomes, and a general decline in their standard of living.
Bibliography


Bibliography


Appendix A

Motor Carrier Accident Reporting Form

The following two pages contain copies of the Motor Carrier Accident Report form. Data collected on these forms is contained in the Accident Data Files (50-T) utilized in this study (U.S. Department of Transportation, 1976; U.S. Department of Transportation, 1986). Additionally, information taken from these reports was used to determine accident preventability in conjunction with the algorithm developed by Analysis Group, Incorporated (1989).
MOTOR CARRIER ACCIDENT REPORT

1. Name of carrier (Corporation business name) (7-21)  
2. Principal Address (Street and no., City, State, ZIP Code): (23-46)

3. Type of carrier:  
   a. ICC authorized.  
   b. Other (Specify)  
   c. Self-insured or exempt  

4. Type of trip:  
   a. Local  
   b. Long-distance

5. Place accident occurred (Nearest Town or City, State): (53-78)
   a. Type of district  
   b. Rural  
   c. Primarily business

6. Street or highway (Name of Highway): (57-82)
   a. Location if off highway:

7. Day of week:  
   a. 1. Sunday  
   b. 2. Monday  
   c. 3. Tuesday  
   d. 4. Wednesday  
   e. 5. Thursday  
   f. 6. Friday  
   g. 7. Saturday

8. Time accident occurred (Military time to nearest hour): (59-64)

9. Accident Type (Primary Event):

10A. Collision (Check appropriate box)  
   a. Not applicable  
   b. Collision with moving object  
   c. Collision with fixed or parked object

10B. Collision (Check other object involved):  
   a. Pedestrian  
   b. Animal  
   c. Commercial truck  
   d. Bus  
   e. Motorcycle  
   f. Fixed object  
   g. Train  
   h. Other (Specify)

10C. Collision with another vehicle—Accident Classification (Check appropriate box):  
   a. Not applicable  
   b. Hit-and-run

11A. Name of your driver: (79-82)  
11B. Age: (73-76)  
11C. Social Security No.: (7-18)

11D. How long employed as your driver (To nearest year): (71-72)

11E. Hours actually driving within past period of 8 consecutive hours off duty:
   a. 1 hr.  
   b. 2 hrs.  
   c. 3 hrs.  
   d. 4 hrs.  
   e. 5 hrs.  
   f. 6 hrs.  
   g. 7 hrs.  
   h. 8 hrs.  
   i. 9 hrs.  
   j. 10 hrs.  
   k. 11 or more

11F. Estimated hours of driving for entire trip or portion of trip, since last period of 8 consecutive hours off duty:
   a. 1 hr.  
   b. 2 hrs.  
   c. 3 hrs.  
   d. 4 hrs.  
   e. 5 hrs.  
   f. 6 hrs.  
   g. 7 hrs.  
   h. 8 hrs.  
   i. 9 hrs.  
   j. 10 hrs.  
   k. 11 or more

11G. Condition of driver:
   a. Apparantly normal  
   b. Medical waiver  
   c. Other (Specify)

11H. Date of last medical examination (83-86)  

Form MCS-50-T (Provided Carrying On. 6-78) Previous copies of this form are obsolete (9/77)

Appendix A  57
12. CARRIER’S VEHICLES

<table>
<thead>
<tr>
<th>Type</th>
<th>Year</th>
<th>No. of Axles</th>
<th>Model</th>
<th>Make</th>
<th>GVWR</th>
<th>Wt. (lbs)</th>
<th>Wt. (lbs)</th>
</tr>
</thead>
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<td></td>
<td></td>
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</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13. Total length of vehicle(s)/vans. 14A. Total width of vehicle or cargo
(2-9) PL (15-17) PL 14B. Weight (tons) 14C. Weight (gross)

14. Type of fuel
A. Diesel  B. L.P.G.  C. Other (Specify)

15. Hazardous materials
A. None  B. Non-hazardous materials in cargo (Specify)

16. Check one of the following as principal type of cargo
A. General freight  B. Household goods or unsold furniture/fixture  C. Meat
    Cuts, shields, etc.  D. Jewelry  E. Radios  F. Records

17. Was your driver injured? 17A. Was driver injured? 17B. Was your vehicle driver injured?
A. Yes  B. No

18. Number of other authorized persons at your vehicle

19. Total number of other persons killed, injured, 20. Were mechanical defects or failures apparent on your vehicle at time of accident?
A. 0  B. Yes  C. No

21. Check applicable boxes (Mechanical defects or failures)
A. Tires  B. Brakes  C. Engine  D. Transmission

22. Were seat belts in use by your driver(s) at time of accident?
A. Yes  B. No

23. Company name or operator (Vehicle 2)
23A. Address 23B. Type of vehicle

23C. Type of vehicle

24. Weather (2-9)
A. Clear  B. Fog/Smog  C. Articulated lights

25. Road surface
A. Dry  B. Snow  C. Other (Specify)

26. Total number of lanes
A. One lane  B. Two lanes  C. Four or more lanes

27. Account of accident by carrier (Attach)

28. Name and title of person signing report
29. Signature

Form MN-1-7 (8-72)
Appendix B

Accident Preventability Algorithm

If Question 21 (Mechanical Defects or failures) = B (Fuel System) or C (Wheels and Tires) or D (Steering System) or E (Suspension) or F (Transmission) or G (Driveline) or H (Engine) or I (Brakes) or J (Lights) or K (Coupling) then Preventable.

Else if Question 11G (Condition of Driver) = C (Has Been Drinking) or D (Dozed at Wheel) or F (Drugs or Drowsy or Fatigue or Impaired or Inattentive or Tired or Urine) then Preventable.

Else if Question 10A (Collision Type) = A (Not Applicable) or Question 10B = A (Not Applicable) and Question 10D (Non-Collision) = F (Fire) then Non-Preventable.

Else if Question 10A = A (Not Applicable) or Question 10B = A (Not Applicable) then Preventable.

Else if in Question 10C, Vehicle #1 = B (Stopped) or C (Parked), then Non-Preventable.

Else if Vehicle #1 = H (Making U-Turn) or R (Out-of-Control) or S (Roll-away) or Q (Skidding), then Preventable.

Else if Question 10B = I (Animal), then Non-Preventable.
Else if Question 10B = C (Fixed Object) or 10A = C (Collision with Fixed or Parked Object) then Preventable.

Else if Question 10B = G (Train) then Preventable.

Else if Vehicle #2 = {B (Stopped) or C (Parked)} and Vehicle #3 = {Q (Skidding) or R (Out-of-Control) or S (Roll-Away) or D (Rear-End) or E (Backing) or J (Merging) or K (Entering Traffic) or P (Head-On)} then Non-Preventable.

Else if Vehicle #2 = B (Stopped) or C (Parked), then preventable.

Else if Vehicle #2 = Q (Skidding) or R (Out-of-Control) or S (Roll-Away) then Non-Preventable.

Else if Vehicle #1 = D (Rear-End) and Vehicle #2 = D (Rear-End) then Non-Preventable.

Else if Vehicle #1 = D (Rear-End) and Vehicle #2 = {J (Merging) or K (Entering Traffic)} then Non-Preventable.

Else if Vehicle #1 = D (Rear-End) and Vehicle #2 = {M (Passing) or N (Changing Lanes)} then Non-Preventable.

Else if Vehicle #1 = D (Rear-End) then Preventable.

Else if Vehicle #1 = J (Merging) or K (Entering Traffic) then Preventable.

Else if Vehicle #1 = M (Passing) or N (Changing Lanes) then Preventable.

Else if Vehicle #1 = {O (Sideswipe) or P (Head-on)} and Vehicle #2 = {Z (No Action Given) or O (Sideswipe) or P (Head-On)}, then Non-Preventable.

Else if Vehicle #1 = O (Sideswipe) or P (Head-On) then Preventable.

Else if Vehicle #2 = D (Rear-End) then Non-Preventable.

Else if Vehicle #1 = {A (Slowing or Stopping) or I (Proceeding Straight)} and Vehicle #2 = {H (Making U-Turn) or J (Merging) or K (Entering Traffic) or M (Passing) or N (Changing Lanes) or O (Sideswipe) or P (Head-On)}, then Non-Preventable.

Else if Vehicle #1 = A (Slowing or Stopping) or I (Proceeding Straight) or V (Other) or Z (No Action Given) or T
(Controlled Railroad Crossing) or U (Uncontrolled Railroad Crossing) then Non-Preventable.

Else, Non-Preventable.
Appendix C

Union Firms Contained in Samples

1976 Sample

Advance Transportation Company
Alamo Express, Inc.
Anchor Motor Freight, Inc.
Bender & Loudon Motor Freight
Blue Ridge Transfer Company, Inc.
Branch Motor Express, Inc.
C W Transport, Inc.
Campbell 66 Express, Inc.
Carolina Freight Carriers Corporation
Central Transport, Inc.
Central Truck Lines, Inc.
Churchill Truck Lines, Inc.
Consolidated Freightways Corp. of Delaware
Cooper Jarrett, Inc.
Crescent Truck Lines
Crouse Cartage Company
Dart Transportation Service
Delta Lines, Inc.
Di Salvo Trucking Company
Duff Truck Line, Inc.
Express Freight Lines, Inc.
Holland Motor Express, Inc.
Hyman Freightways, Inc.
I M L Freight, Inc.
Illinois-California Express, Inc.
Interstate Motor Freight System
Jones Motor
Jones Transfer Company
Jones Truck Lines, Inc.
L C L Transit Company
Lyons Transportation Lines, Inc.
Matlack, Inc.
Mc Lean Trucking Company
Milne Truck Lines, Inc.
Navajo Freight Lines, Inc.
Pacific Motor Trucking Company
Quinn Freight Lines, Inc.
Red Ball Motor Freight, Inc.
Roadway Express, Inc.
Ryder Truck Lines, Inc.
Saint Johnsbury Trucking Company, Inc.
Shippers Imperial, Inc.
Smith's Transfer Corporation
Suwak Trucking Company
T I M E-D C, Inc.
The Mason & Dixon Lines, Inc.
The O K Trucking Company
Transcon Lines
Yellow Freight System, Inc.

1986 Sample

ABF Freight System, Inc.
Advance Transportation Company
Alamo Express, Inc.
Anchor Motor Freight, Inc.
Beaufort Transfer Company
Bender & Loudon Motor Freight, Inc.
Blue Ridge Transfer Company, Inc.
C W Transport, Inc.
Carolina Freight Carriers Corporation
Central Transport, Inc.
Central Truck Lines, Inc.
Churchill Truck Lines, Inc.
Consolidated Freightways Corp. of Delaware
Crouse Cartage Company
Dart Transportation Service
Di Salvo Trucking Company
Duff Truck Line, Inc.
Fore Way Express, Inc.
Gra-Bell Truck Line, Inc.
Holland Motor Express, Inc.
Holmes Freight Lines, Inc.
Hyman Freightways, Inc.
Jones Transfer Company
Jones Truck Lines, Inc.
L C L Transit Company
Matlack, Inc.
Milne Truck Lines, Inc.
Motor Cargo
P. I. E. Nationwide, Inc.
Pacific Motor Trucking Company
Red Arrow Freight Lines, Inc.
Roadway Express, Inc.
Yellow Freight System, Inc.
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