The Effect of No-Fault Automobile Insurance on Driver Behavior and Automobile Accidents in the United States

David S. Loughran

Prepared for the RAND Institute for Civil Justice
This research was supported by RAND Institute for Civil Justice core funds.

Library of Congress Cataloging-in-Publication Data

Loughran, David, 1969–

The effect of no-fault automobile insurance on driver behavior and automobile accidents in the United States / David Loughran.

p. cm.
“MR-1384.”
Includes bibliographical references.
ISBN 0-8330-3021-3

HG9970 .L68 2001
363.12'50973—dc21
2001031974

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Published 2001 by RAND
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
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PREFACE

The RAND Institute for Civil Justice has been conducting research on auto insurance issues since its inception in 1979. A large proportion of these studies have focused on the effects of a no-fault or choice system on the costs of compensating individuals for injuries sustained in automobile accidents.

This report looks at the policy question of no-fault automobile insurance from a different angle: It investigates the possibility that no-fault auto insurance lowers the incentive to drive carefully and so increases accident rates along with the cost of insurance. This report will be of interest to consumer advocates, the insurance industry, policymakers, and others concerned with auto insurance policy.

Contrary to some earlier research, this report finds no evidence that U.S. states’ adoption of no-fault auto insurance between 1971 and 1976 increased their fatal accident rates. The report also finds no correlation between the presence of no-fault auto insurance and a state’s overall accident rate or rate of driver negligence. The author concludes that while reasons may exist to oppose the concept of no-fault auto insurance, its effect on driver behavior and accidents should not be among them.

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SUMMARY

Thirteen states currently either mandate no-fault auto insurance or allow drivers to choose between no-fault and tort insurance. No-fault auto insurance requires individuals to carry personal injury protection (PIP) insurance that compensates them for economic losses sustained in automobile accidents, regardless of who is at fault, and prohibits individuals from suing for non-economic damages (for example, for pain and suffering) unless their injuries exceed some established threshold. Under a traditional tort-based auto insurance system, all drivers must carry liability insurance that compensates third parties for injuries caused by the insured driver. First-party insurance under tort is typically voluntary.

Proponents of no-fault auto insurance claim the system delivers speedier and more equitable compensation at lower cost than traditional tort insurance; however, its opponents frequently counter that no-fault may ultimately lead to higher auto insurance costs by reducing drivers’ incentives to drive carefully and thereby increasing the accident rate. The intuition behind this criticism of no-fault is simple: No-fault auto insurance lowers the cost of driving negligently by limiting first-party liability for the injuries suffered by third parties in auto accidents. This study evaluates this criticism of no-fault by examining trends in fatal and non-fatal automobile accident rates and rates of driver negligence in the United States between 1967 and 1989.

THE EFFECT OF NO-FAULT ON FATAL ACCIDENT RATES

Previous empirical work in this area has focused almost exclusively on the relationship between no-fault and fatal accident rates. For example, the earliest study on this topic found that the adoption of no-fault auto insurance increased fatal accident rates by as much as 10 percent annually in no-fault states between 1971 and 1975 (Landes, 1982). A number of subsequent studies drew the opposite conclusion that no-fault has no effect on fatal accident rates. More recently, several studies have revisited the question with data from Australia, New Zealand, and Canada, as well as more recent data for the United States (Devlin, 1992; McEwin, 1989; Cummins, Weiss, and Phillips, 1999). These studies have all found evidence in favor of the hypothesis that no-fault leads to higher fatal accident rates. The contradictory findings in this literature arise from differences in the years and countries analyzed as well as from important differences in empirical methods.

Notably, none of the previous studies examines the relationship between no-fault and fatal accident rates using data that span the years in which states first implemented no-fault laws (1971
to 1976). This methodological weakness leaves these studies open to the criticism that they failed to control adequately for characteristics correlated with both the adoption of no-fault and the fatal accident rate. That is, states that adopted no-fault auto insurance in the 1970s were not a random subset of all states; they adopted no-fault for a reason, and that reason could be correlated with fatal accident rates in those states. Failing to control for the factors that led some states to adopt a no-fault auto insurance system, and others to retain a tort system, can introduce bias into estimates of the effect of no-fault on fatal accident rates.

This present study takes a simple approach to examining the effects of no-fault auto insurance on fatal accident rates by comparing differences in fatal accident rates between tort and no-fault states both before and after the 1971 to 1976 period of no-fault implementation. In both tort and no-fault states, fatal accident rates fell steadily over the study period 1967 to 1989 (see Figure S-1). Fatal accident rates fell particularly sharply between 1967 and 1978, and the fact that they fell sharply in both tort and no-fault states suggests that factors common to both tort and no-fault states influenced fatal accident rates over this period. Such factors might include greater seat-belt use, declining rates of drinking and driving, and heightened vehicle and road safety.

![Figure S-1](image)

**NOTE:** No-fault states are those states that passed no-fault by 1976.

**SOURCE:** U.S. Department of Transportation.

*Figure S-1—Fatal Accident Rates in Tort and No-Fault States: 1967 to 1995*
The key question here is whether fatal accident rates fell relatively more in tort than in no-fault states between the years before and after implementation of no-fault laws. If so, it could be argued that implementation of no-fault laws caused fatal accident rates in no-fault states to decline less rapidly than they otherwise would have. Or, in other words, such a finding would indicate that no-fault laws caused fatal accident rates to be higher than they would have been under tort. This study performs just such a “difference-in-differences” analysis by controlling for differences both across and within states over time in the level of urbanicity, climate, and per capita income and, importantly, state-specific pre-implementation time trends in fatal accident rates. Contrary to the set of recent studies, the analysis finds no evidence that the implementation of no-fault laws influenced the fatal accident rate in no-fault states. A different empirical approach using within-state variation in dollar thresholds also rejects the hypothesis that no-fault auto insurance influences fatal accident rates.

THE EFFECT OF NO-FAULT ON THE OVERALL ACCIDENT RATE

Many things must be true if one were to observe a causal relationship between no-fault insurance and fatal accident rates. First, drivers must believe the expected cost of getting into an accident is lower under no-fault than under tort. Second, a decrease in the expected cost of getting into an accident must cause drivers to drive less carefully than they would otherwise. Third, the degree of this effect must be large enough to cause a statistically significant change in accident rates generally. And fourth, this induced change in accident rates must translate into higher fatal accident rates.

Given how far removed fatal accident rates are from the immediate impact of no-fault on driver behavior and the highly idiosyncratic nature of many fatal accidents, it is perhaps not entirely surprising that the data do not reveal an empirical relationship between no-fault and fatal accident rates. Consequently, this study takes a step back and asks whether no-fault affects the overall accident rate and whether it affects driver negligence more generally.

Past researchers have avoided examining the overall accident rate because of poor data. Many accidents go unreported to the police and, more significantly, the incentive to report accidents to the police might vary between tort and no-fault states. This study avoids this data problem by employing a proxy measure for the overall accident rate—the ratio of property damage claims to property damage exposure. Whereas this measure no doubt underestimates the overall accident rate, it is measured consistently across tort and no-fault states and over time. Controlling for state characteristics, this report finds that accident rates are no higher in no-fault states than in tort states over the period 1976 to 1998.
Even though no pre-implementation data on accident rates are available, and therefore a difference-in-differences approach is not feasible, this report argues that any bias introduced into these empirical estimates should be in the direction of finding a positive relationship between no-fault and the accident rate. Thus, one can be reasonably confident that the finding here of no effect would hold were one to have access to data on accident rates prior to 1971. In addition, an alternative empirical approach using within-state variation in dollar thresholds also rejects the hypothesis that no-fault auto insurance influences accident rates.

**THE EFFECT OF NO-FAULT ON DRIVER NEGLIGENCE**

A final empirical test of the no-fault hypothesis is conducted using data from the Department of Transportation’s (DOT’s) Fatal Accident Reporting System (FARS), a census of all fatal accidents in the United States between 1975 and 1998. Among the elements recorded in the FARS data are indicators for whether some traffic violation or other negligent behavior on the part of any of the drivers precipitated the accident. These elements include speeding, improper lane changing, failure to stop or signal, unsafe passing, and other negligent actions. FARS also reports on the blood alcohol content (BAC) of drivers involved in accidents when available.

This study uses this FARS information to test the hypothesis that the incidence of negligence as a contributory factor in fatal accident rates should be higher in no-fault states than in tort states. Controlling for detailed characteristics of the accidents themselves, the study finds little support for the hypothesis that no-fault affects rates of driver negligence in fatal accidents.

**THE EFFECT OF NO-FAULT ON THE EXPECTED COST OF ACCIDENTS**

As argued earlier, if no-fault is to lower the level of care drivers exercise, it must be the case that no-fault lowers the expected cost of getting into an accident. Whereas a rigorous empirical test of this hypothesis is not possible with available data, this report argues on a priori grounds that there is little reason to believe that no-fault as implemented in the United States significantly affects expected accident costs.

Presumably, the overriding reason to drive carefully is self-preservation, an incentive that does not vary between no-fault and tort states. Moreover, no-fault insurance creates many of the same incentives to drive carefully as tort insurance. First, no evidence exists that insurance companies are any less likely to penalize drivers for accidents they may cause under no-fault insurance. Getting into an accident in a no-fault state is just as likely to increase insurance premiums as getting into an accident in a tort state. Second, property damage is covered under third-party liability in all states but Michigan. Therefore, expected property damage costs should be the same in both tort and no-fault states.
Previous research frequently cites the limitation no-fault places on liability for non-economic damages as a major reason why no-fault lowers the incentive to drive carefully. There are several problems with this argument, however. First, no-fault insurance systems in the United States shield only a fraction of claims from non-economic damages (typically less than 75 percent). Furthermore, the expected cost of non-economic damages to the at-fault driver in tort states is quite low (median non-economic damages amounted to roughly $1,600 in 1997) and, in any case, these damages are typically insured. Thus, compared with self-preservation and the desire to avoid traffic citations, the margin over which no-fault might change the incentive to drive with care seems rather small indeed.

Given the weakness of the theoretical link between no-fault and expected accident costs, it is somewhat surprising, then, that the question of the incentive effects of no-fault have played such a powerful role in the debate over no-fault in both state legislatures and in the federal arena. Empirical estimates can have a major influence on policy debates, however. If we were to take the findings of Landes (1982), Devlin (1992), and Cummins, Weiss, and Phillips (1999) at face value, no-fault could be construed to have led to as many as 5,600 additional highway fatalities in no-fault states between 1991 and 1995 alone. If this were true, it would be hard to justify the adoption of no-fault insurance.

The previous empirical estimates are not credible, however. The results of the present study show convincingly that not only does no statistically significant relationship exist between the adoption of no-fault and fatal accident rates, but no statistically significant relationship exists between no-fault and accident rates overall or other measures of driver care. Also, no-fault auto insurance as implemented in the United States, even in its strictest form, is unlikely to significantly lower the expected cost of an auto accident to the at-fault driver. Therefore, even a priori, it seems implausible that no-fault auto insurance could have a substantive impact on driver behavior. Consequently, while there may be reasons to oppose the concept of no-fault auto insurance, its effect on driver behavior and accidents should not be among them.
ACKNOWLEDGMENTS

This research has benefited enormously from the careful reviews of RAND colleagues Stephen Carroll, Kanika Kapur, and Michelle White. I thank them for their many helpful suggestions and insights. I am also indebted to members of the ICJ’s Insurance Advisory Committee and Board of Overseers who provided comments on earlier drafts. Lastly, many thanks to Elizabeth Giddens, Communications Director for the ICJ, for her detailed editorial comments, which greatly improved the overall presentation of this research.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>ATLA</td>
<td>Association of Trial Lawyers of America</td>
</tr>
<tr>
<td>BAC</td>
<td>Blood alcohol content</td>
</tr>
<tr>
<td>BI</td>
<td>Bodily injury</td>
</tr>
<tr>
<td>DOT</td>
<td>Department of Transportation</td>
</tr>
<tr>
<td>FARS</td>
<td>Fatal Accident Reporting System</td>
</tr>
<tr>
<td>IRC</td>
<td>Insurance Research Council</td>
</tr>
<tr>
<td>NAIH</td>
<td>National Association of Independent Insurers</td>
</tr>
<tr>
<td>NOAA</td>
<td>National Oceanographic and Atmospheric Admin</td>
</tr>
<tr>
<td>OLS</td>
<td>Ordinary least squares</td>
</tr>
<tr>
<td>PIP</td>
<td>Personal injury protection</td>
</tr>
<tr>
<td>PD</td>
<td>Property damage</td>
</tr>
<tr>
<td>VMT</td>
<td>Vehicle miles traveled</td>
</tr>
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</table>
CHAPTER 1
INTRODUCTION

Between 1971 and 1976, 16 states passed some form of no-fault automobile insurance reform in the United States. These state laws require individuals to carry personal injury protection (PIP) insurance that compensates them for economic losses sustained in automobile accidents, regardless of who is at fault, and prohibits individuals from suing for non-economic damages (for example, pain and suffering) unless their injuries exceed some established threshold.

Proponents of no-fault auto insurance claim the system delivers speedier and more equitable compensation at lower cost than traditional tort insurance. Opponents present two main arguments against no-fault. First, they claim that the cost savings of no-fault auto insurance have been exaggerated. In addition, opponents argue that no-fault may ultimately lead to higher auto insurance costs by reducing drivers’ incentives to drive carefully, thereby increasing the accident rate. This report addresses the latter criticism of no-fault auto insurance by reanalyzing data on auto fatalities and presenting new evidence on auto accidents and driving behavior.

The question whether no-fault auto insurance encourages careless driving behavior did not play a prominent role in legislative debates over the adoption of no-fault between 1971 and 1976. Instead, the question seems to have arisen first among academics who were interested in evaluating the deterrent effect of the tort system in general. It is not difficult to formulate an economic model in which no-fault liability results in higher rates of driver negligence. The intuition behind such a model is simple: No-fault auto insurance lowers the cost of driving negligently by limiting first-party liability for the injuries suffered by third parties in auto accidents. Whether no-fault auto insurance as enforced in the United States in fact lowers the cost of driving negligently and the extent to which drivers respond to these lower costs are empirical matters, however.

---

1 Since 1976, three of those 16 states have repealed no-fault and returned to a pure tort insurance system, and two states, New Jersey and Pennsylvania, have enacted “choice” plans, which offer drivers the choice between no-fault and tort insurance. Kentucky has always offered a choice plan with virtually all its drivers choosing no-fault coverage. The Territory of Puerto Rico enacted no-fault in 1970, and the District of Columbia enacted no-fault in 1983 and repealed it in 1986. A number of jurisdictions in Australia, New Zealand, and Canada also have enacted no-fault auto insurance laws.

2 See Carroll et al. (1991), O’Connell et al. (1996), and Kabler (1999) for arguments for and against no-fault auto insurance.
The empirical literature has focused almost exclusively on the relationship between no-fault and fatal accident rates. Landes (1982) first explored this issue, finding that the adoption of no-fault auto insurance increased fatal accident rates by as much as 10 percent annually in no-fault states between 1971 and 1975. This finding prompted a trio of studies in the early 1980s (Zador and Lund, 1986; Kochanowski and Young, 1985; U.S. Department of Transportation, 1985), which all came to the opposite conclusion that no-fault has no effect on fatal accident rates. More recently, several studies have revisited the question with data from Australia, New Zealand, and Canada, as well as more recent data for the United States (Devlin, 1992; McEwin, 1989; Cummins and Weiss, 1999; Cummins, Weiss, and Phillips, 1999; Kabler, 1999). These more recent studies have all found evidence in favor of the hypothesis that no-fault leads to higher fatal accident rates.

That no-fault insurance could alter driving behavior enough to cause fatal accident rates to be as much as 10 percent higher than they might otherwise be is a striking conclusion, and one that has had a significant effect on recent debates over no-fault. A commonly made argument against no-fault is that individuals should be held accountable for their negligent actions. A tort system provides redress for those injured and serves to deter negligent actions overall. No-fault insurance, opponents reason, weakens this deterrent effect and so should significantly increase accident rates. Consumer organizations, academics, and public officials have made this point in both the popular press and academic literature in arguing against federal auto choice legislation that would allow consumers to choose between tort and no-fault liability (Association of Trial Lawyers of America, 2000; Priest, 1998; Nader, 1999).

If we take the findings of Landes (1982), Devlin (1992), and Cummins, Weiss, and Phillips (1999) at face value, no-fault led to as many as 5,600 additional highway fatalities in no-fault states between 1991 and 1995 alone. If true, it is hard to justify the adoption of no-fault insurance. I think these numbers are implausibly large, however, and I believe the results of the present study show convincingly that not only does no statistically significant relationship exist between the adoption of no-fault and fatal accident rates but also no statistically significant relationship exists between no-fault and accident rates overall or other measures of driver care. I argue further that no-fault auto insurance as implemented in the United States, even in its strictest form, is unlikely to significantly lower the expected cost of an auto accident to the at-fault driver. So, even a priori, it seems unlikely that no-fault auto insurance could have a substantive impact on driver behavior.

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3 Cummins, Weiss, and Phillips (1999) is a revised version of Cummins and Weiss (1999). In the remainder of this report, I refer only to the former.
In Chapter 2 of this report, I provide a general explanation of the differences between no-fault and tort insurance and how these differences, in principle, could affect driving behavior. I then offer in Chapter 3 three tests of whether no-fault affects driving behavior and outcomes. Chapter 3 reviews the empirical literature on the relationship between no-fault and the fatal accident rate focusing on econometric weaknesses that cast serious doubt on the conclusions of previous studies. I then test the hypothesis that no-fault auto insurance leads to higher fatal accident rates using state-level data that span the period over which no-fault was first implemented in the United States.

Even if no-fault has no discernible impact on the fatal accident rate, no-fault could nevertheless affect the overall accident rate and the propensity to drive negligently more generally. Therefore, in Chapter 3, I test whether such relationships exist using data not previously employed to study the impact of no-fault. I then offer some concluding remarks in Chapter 4.
CHAPTER 2

THE RELATIONSHIP BETWEEN NO-FAULT INSURANCE
AND DRIVER BEHAVIOR

Under a traditional tort system, at-fault drivers are liable for the economic and non-economic damages they inflict on third parties. In all tort states, such drivers must insure themselves against this potential liability. This insurance comes in the form of third-party bodily injury (BI) and property damage (PD) liability insurance that covers the insured against claims for damages made by third parties up to some specified limit.

Typically, states require drivers to carry some minimum level of liability coverage specified in both per-person and per-accident terms (for example, $10,000 per person/$20,000 per accident). Thus, the insurance company of the at-fault driver will compensate a third party for the losses sustained in an accident up to the policy limits.\(^1\) The at-fault driver’s own insurance covers his or her own injuries (for example, Medpay) and property damage (for example, collision), assuming he or she chooses to carry such insurance.

Under a typical no-fault system, economic damages from injuries sustained in an accident are covered by a driver’s own insurance, known as personal injury protection insurance, without regard to fault. Thus, compensation for injuries does not depend on the determination of fault; injured parties who were in no way responsible for the accident recover economic damages from their own insurance as does the at-fault driver. Property damages, however, are typically handled under the traditional tort system.\(^2\) Table 2-1 summarizes differences in liability standards and insurance coverage by type of damage under typical no-fault and tort insurance systems.

In addition, no-fault systems restrict compensation for non-economic damages. Injured parties must demonstrate that their economic damages exceed some threshold before they are allowed to sue for non-economic damages. In most no-fault states, economic damages must exceed a dollar threshold before the injured party can pursue compensation for non-economic damages. The mean value of dollar thresholds in 1990 was approximately $2,600.

In three states—Michigan, Florida, and New York—the threshold is expressed in verbal terms. In Michigan, for example, non-economic damages can be pursued only in the case of a

\(^1\) In most tort states, the rule of comparative negligence holds, so that at-fault drivers are liable only for the proportion of damages for which they are held liable.

\(^2\) Only the state of Michigan has a no-fault property damage law.
Table 2-1

<table>
<thead>
<tr>
<th>Damage</th>
<th>Tort</th>
<th>No-Fault</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First-Party</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property damage</td>
<td>Optional collision coverage</td>
<td>Optional collision coverage</td>
</tr>
<tr>
<td>Economic</td>
<td>Optional Medpay or other first-party health/disability insurance coverage</td>
<td>Compulsory PIP coverage</td>
</tr>
<tr>
<td>Non-economic</td>
<td>No insurance coverage</td>
<td>No insurance coverage</td>
</tr>
<tr>
<td><strong>Third-Party</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property damage</td>
<td>Full liability/ Compulsory property damage insurance</td>
<td>Full liability/ Compulsory property damage insurance</td>
</tr>
<tr>
<td>Economic</td>
<td>Full liability/ Compulsory BI insurance</td>
<td>No liability below statutory PIP limits/ Compulsory BI insurance for damages above PIP limits</td>
</tr>
<tr>
<td>Non-economic</td>
<td>Full liability/ Compulsory BI insurance</td>
<td>No liability below statutory threshold/ Compulsory BI insurance for damages above threshold</td>
</tr>
</tbody>
</table>

fatality, serious impairment of a body function, or serious permanent disfigurement. Table 2-2 lists the 17 states (including the District of Columbia) that have enacted a no-fault auto insurance law to date, the year of enactment, the year of repeal (if applicable), whether the tort threshold is verbal or a dollar value, and, if dollar, the real value (in 1982 dollars) of the threshold as enacted and in 1990.

As White and Liao (1999) note, it is important to distinguish between no-fault as a liability rule and as an insurance system when considering its probable effect on driving incentives. Strictly as a liability rule, the effect of no-fault on driving incentives is relatively unambiguous. If all drivers self-insure, then it is generally agreed that drivers will exercise no more, and possibly less, care under pure no-fault than under tort because drivers are not liable for the economic or non-economic damages they inflict on others.\(^3\) Formal models of the incentive effects of a pure no-fault liability rule can be found in Cummins, Weiss, and Phillips (1999) and White and Liao (1999).

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\(^3\) This result may not hold in the presence of uncertainty and risk aversion (Cummins, Weiss, and Phillips, 1999). It is also not clear that no-fault will necessarily reduce incentives to drive carefully when drivers consider the behavior of other drivers. Further discussion of uncertainty, risk aversion, and general equilibrium considerations appears later in this chapter.
Table 2-2
State No-Fault Laws

<table>
<thead>
<tr>
<th>State</th>
<th>Year Enacted</th>
<th>Year Repealed</th>
<th>Threshold (1982 Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
<td>1974</td>
<td>—</td>
<td>5,071</td>
</tr>
<tr>
<td>Connecticut</td>
<td>1973</td>
<td>1994</td>
<td>811</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>1983</td>
<td>1986</td>
<td>Verbal</td>
</tr>
<tr>
<td>Florida</td>
<td>1972</td>
<td>—</td>
<td>2,392</td>
</tr>
<tr>
<td>Georgia</td>
<td>1975</td>
<td>1994</td>
<td>929</td>
</tr>
<tr>
<td>Hawaii</td>
<td>1974</td>
<td>—</td>
<td>2,788</td>
</tr>
<tr>
<td>Kansas</td>
<td>1974</td>
<td>—</td>
<td>1,014</td>
</tr>
<tr>
<td>Kentucky</td>
<td>1975</td>
<td>—</td>
<td>1,859</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>1971</td>
<td>—</td>
<td>1,235</td>
</tr>
<tr>
<td>Michigan</td>
<td>1973</td>
<td>—</td>
<td>Verbal</td>
</tr>
<tr>
<td>Minnesota</td>
<td>1975</td>
<td>—</td>
<td>3,717</td>
</tr>
<tr>
<td>Nevada</td>
<td>1974</td>
<td>1980</td>
<td>1,521</td>
</tr>
<tr>
<td>New Jersey</td>
<td>1973</td>
<td>1989</td>
<td>450</td>
</tr>
<tr>
<td>New York</td>
<td>1974</td>
<td>—</td>
<td>1,014</td>
</tr>
<tr>
<td>North Dakota</td>
<td>1976</td>
<td>—</td>
<td>1,757</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>1975</td>
<td>1984</td>
<td>1,318</td>
</tr>
<tr>
<td>Utah</td>
<td>1974</td>
<td>—</td>
<td>1,014</td>
</tr>
</tbody>
</table>

Threshold values in dollars, as enacted and as adjusted to 1990 dollars.

NOTE: Three states—Kentucky, New Jersey, and Pennsylvania—currently offer “choice” plans that offer drivers the choice between no-fault and tort insurance.

It is often pointed out, however, that no-fault is not just a rule of liability; no-fault is an insurance system that has much in common with traditional tort insurance. In fact, I would argue the incentive to drive carefully remains largely unchanged in moving from a tort to no-fault insurance system. Indeed, the principal motivation for exercising care—avoiding injury to oneself and civil or criminal penalties for traffic violations—is unaffected by no-fault insurance. The marginal change in liability under no-fault can at best affect only a minor portion of the overall incentive to drive carefully. Moreover, as many researchers have noted, no-fault, as currently implemented in the United States at least, is far from pure. Tort thresholds in most states shield only a fraction of all accidents from the tort system.

Why might incentives differ for drivers subject to tort and no-fault insurance? And are these differences in incentives likely to matter? I answer these questions by way of example rather than through formal modeling. Consider the following thought experiment: A driver gets into his or her car and decides before turning the ignition key how much care he or she will exercise on this trip. Assume for now that this decision is driven solely by the expected financial cost of getting into an automobile accident for which this driver is 100-percent at-fault. The driver may or may not be insured. We can divide the potential costs this driver will incur as a result of
this accident into three categories: (1) damages incurred by the at-fault driver; (2) damages incurred by the third party; and (3) changes in the at-fault driver’s insurance premiums.

Potential damages to the at-fault driver include property damage, bodily injury, wage loss, and non-economic damages. In both tort and no-fault states, personal collision insurance compensates at-fault drivers for their own property damages, and under neither system are the at-fault driver’s own non-economic damages eligible for compensation (see Table 2-1). Consequently, no-fault does not differentially affect incentives through its treatment of the at-fault driver’s property and non-economic damages.

In terms of bodily injury and wage loss, it is conceivable that no-fault creates an additional moral hazard not present in tort states for those drivers who elected not to carry insurance for economic damages they sustain in accidents in which they are at fault. Under tort, first-party bodily injury insurance is not compulsory. Under no-fault, however, all drivers must carry PIP insurance that compensates them for economic damages regardless of fault. Thus, compulsory first-party bodily injury insurance under no-fault may induce this marginal driver to drive less carefully because his or her own bodily injury and wage loss will now be compensated whereas under tort they would not be. How important this effect could be is difficult to determine because there is no direct figure on how many drivers in tort states do not insure themselves for their own injuries. Nor is it known how many drivers who did not have coverage for their own injuries in tort states would continue to drive uninsured in no-fault states. Nonetheless, it seems unlikely that this moral hazard alone could affect the incentives of many drivers.

Now, consider third-party damages. The tort system governs compensation of third-party property damages under both insurance systems (except in Michigan) and therefore does not alter incentives. For those individuals who carry liability insurance under both regimes, the compensation of third-party economic damages also has no effect on incentives. Under tort, bodily injury liability insurance covers third-party economic damages, and under no-fault, PIP insurance provides coverage. The presence of PIP insurance under no-fault, however, could alter the incentives of those individuals who choose to drive without insurance under no-fault. The reason, of course, is that no-fault drivers are not responsible for third-party economic losses. Under tort, uninsured at-fault drivers can be sued for third-party damages. This may be of minor importance, however, given that presumably most uninsured drivers have no assets to protect, and therefore whether they are financially liable for third-party damages makes little difference in the incentives they have to drive carefully.

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4 Except in terms of the effect such damages may have on subsequent premiums (experience rating is discussed later in this chapter).

5 More precisely, they are not responsible for third-party losses below PIP limits.
The difference in the treatment of non-economic damages is often cited as the major reason why no-fault drivers may exercise less care than tort drivers. The reason is simple: Under pure no-fault the threat of suit for non-economic damages by a third party is substantially less than under tort. It is doubtful, however, that the magnitude of this effect could be very large in the United States for three reasons. First, a sizable fraction of no-fault auto claimants can pursue non-economic damages under no-fault law as it currently stands in most states; second, the average amount of non-economic damages sought by third parties is small; and, third, the probability of being sued for non-economic damages at a level that exceeds the limits of a bodily injury liability policy is low.

The Insurance Research Council (IRC) periodically collects data on a sample of auto insurance claims closed over a two-week period. Using such data from 1977, 1987, 1992, and 1997, the IRC (1999a; 1994) and State Farm (1993) estimated the fraction of PIP claims eligible for non-economic damages in no-fault states. Table 2-3 reproduces these estimates, which show that about 17 percent of PIP claims in 1977 and 29 percent of PIP claims in 1997 exceeded tort thresholds.

In 1977, the percentage of claims eligible for non-economic damages ranged from 3 percent in Hawaii to 35 percent in New Jersey. By 1997, this range had increased to between 15 percent (in Michigan) and 52 percent (in Massachusetts). This increase largely reflects the deterioration in the real value of dollar thresholds over this period. Thus, whereas no-fault prohibits many claimants from pursuing compensation for non-economic damages, drivers in no-fault states nevertheless face a substantial risk of being sued for non-economic damages.

Even if we were to assume the existence of pure no-fault shielding all claims from non-economic damages, this prohibition would have little effect on the expected cost of an accident. This conclusion comes from examining the distribution of non-economic damage awards in the 1997 closed-claims data (see Table 2-4). Overall, median non-economic damage awards in tort states totaled $1,609 in 1997. Even in the upper tail of the distribution, non-economic damage awards are not severe: $8,117 at the 90th percentile and $13,679 at the 95th percentile.

In the "<$2,500" and "<Verbal" columns in Table 2-4, I restrict the sample to those claims in which economic damages fall below $2,500 or involved injuries other than a fatality or permanent disability (typical dollar and verbal thresholds). The median value of non-economic damage awards in these cases is $1,000 and $1,201, respectively, and even at the 95th percentile,

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6 These data cover approximately 60,000 claims from roughly 30 insurance companies representing 60 to 70 percent of the private passenger automobile insurance market.
Table 2-3  
Percentage of PIP Claims Eligible for Non-Economic Damages

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
<td>16</td>
<td>26</td>
<td>34</td>
<td>30</td>
</tr>
<tr>
<td>Connecticut</td>
<td>19</td>
<td>41</td>
<td>63</td>
<td>—</td>
</tr>
<tr>
<td>Florida</td>
<td>31</td>
<td>33</td>
<td>37</td>
<td>34</td>
</tr>
<tr>
<td>Georgia</td>
<td>24</td>
<td>49</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Hawaii</td>
<td>3</td>
<td>20</td>
<td>36</td>
<td>21</td>
</tr>
<tr>
<td>Kansas</td>
<td>13</td>
<td>29</td>
<td>17</td>
<td>22</td>
</tr>
<tr>
<td>Kentucky</td>
<td>10</td>
<td>25</td>
<td>33</td>
<td>42</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>26</td>
<td>54</td>
<td>63</td>
<td>52</td>
</tr>
<tr>
<td>Michigan</td>
<td>6</td>
<td>12</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>Minnesota</td>
<td>10</td>
<td>22</td>
<td>34</td>
<td>29</td>
</tr>
<tr>
<td>New Jersey</td>
<td>35</td>
<td>63</td>
<td>NA</td>
<td>—</td>
</tr>
<tr>
<td>New York</td>
<td>27</td>
<td>29</td>
<td>31</td>
<td>22</td>
</tr>
<tr>
<td>North Dakota</td>
<td>3</td>
<td>13</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Utah</td>
<td>19</td>
<td>19</td>
<td>23</td>
<td>24</td>
</tr>
</tbody>
</table>

SOURCE: Reproduced from IRC (1999a; 1994).

*aReproduced from State Farm (1993).

Table 2-4  
Distribution of Non-Economic Damage Awards in Tort States

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Economic Damages (1997 Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
</tr>
<tr>
<td>50</td>
<td>1,609</td>
</tr>
<tr>
<td>75</td>
<td>3,900</td>
</tr>
<tr>
<td>90</td>
<td>8,117</td>
</tr>
<tr>
<td>95</td>
<td>13,679</td>
</tr>
</tbody>
</table>

NOTES: Sample restricted to one or two car accidents in which the insured was 100-percent at fault and the claimant was either the driver of the other car or a pedestrian. All claims are in tort states and against voluntary policies (n = 12,337).

*aVerbal threshold is defined as a fatality or temporary or permanent disability.

DATA SOURCE: 1997 IRC Closed-Claims Data.

these awards amount to only $4,665 and $8,142. Thus, under a typical no-fault insurance system in the United States, restrictions on non-economic damage awards shield at-fault drivers from relatively minor financial liability.

In any case, most tort drivers carry BI insurance that shields them from all but the most extreme non-economic damage awards. According to the 1997 closed-claims data, only 11 percent of all claims in tort states had combined damages of more than $10,000, and virtually all states require drivers to insure themselves against at least that level of liability. Moreover, in fewer than 5 percent of all cases did total damages paid come within $5,000 of an individual’s
policy limits. So whereas the probability of being sued for non-economic damages is higher in tort states, the expected cost of such a suit to the at-fault driver is actually quite low due to the presence of liability insurance.

According to data from the IRC’s 1998 Survey of Auto Accident Victims, individuals involved in auto accidents receive only a small fraction of total compensation (economic plus non-economic) from at-fault drivers directly, and this fraction does not vary significantly between tort and no-fault states. The expected value of out-of-pocket expenditures for at-fault drivers was $589 in tort states and $622 in no-fault states in 1998, 6.7 and 5.0 percent, respectively, of total reimbursements made to injured parties to date.

A final difference between tort and no-fault states in the expected cost of an accident is in the degree to which premiums reflect negligent driving. Under both systems, we expect total premiums to cover total expenditures. If the assignment of fault in no-fault states is less certain than in tort states, however, it could be that good drivers subsidize bad drivers to a greater extent under no-fault than under tort. This subsidy, in turn, lowers the direct cost of negligent driving to at-fault drivers and so encourages greater negligence under no-fault. It could also be that limited liability for non-economic damages under no-fault implies any given accident will result in a smaller percentage increase in premiums for the at-fault driver.

The question, then, is whether insurance companies raise premiums in a comparable fashion in tort and no-fault states to account for negligent driving. It is true that most states prohibit insurance companies from leveling premium surcharges on PIP insurance. Nevertheless, insurance companies in no-fault states can and do level surcharges on property damage insurance, and it is rare that an accident involving an injury does not also involve property damage. In addition, insurance companies in no-fault states level surcharges on bodily injury insurance. Whether these surcharges result in an actuarially fair assignment of total insurance costs to at-fault drivers in no-fault states is an outstanding research question. I am aware of no evidence, however, suggesting at-fault drivers in no-fault states escape surcharges for their negligence.

The preceding analysis provides an admittedly simplistic comparison of expected accident costs and incentives under no-fault and tort insurance. The effect of no-fault insurance on expected accident costs should also take into account an individual’s level of risk aversion and how he or she believes other individuals will behave under a no-fault insurance system. This latter consideration is particularly important. One drives carefully, in part, in order to compensate for the negligent driving habits of others. If individuals choose to drive less carefully under no-

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7 See IRC (1999b) for a description of this survey of 5,768 individuals involved in auto accidents some time after January 1, 1995.
fault, they may also reasonably believe that others will also choose to drive less carefully. In turn, this behavior may cause individuals to revise their level of care upward to defend against the careless driving of others under no-fault.

In short, the benefits of driving carefully include not only avoiding costs associated with an at-fault accident, as discussed earlier in this chapter, but also avoiding accidents caused by others. Note, too, that the restriction on non-economic damages cuts both ways: No-fault drivers are less liable for non-economic damage suits against them but also forgo the right to sue for non-economic damages themselves. In equilibrium, therefore, it is not a given that even as a pure liability rule no-fault will induce more careless driving.  

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8 See White and Liao (1999) for an equilibrium model of no-fault and driver care.
CHAPTER 3
THREE TESTS OF THE NO-FAULT HYPOTHESIS

Suppose that no-fault auto insurance does reduce the expected cost of an accident to a given individual. How might one measure the effect of this savings on driver behavior empirically?

The approach employed in the empirical literature to date has been to examine the correlation between no-fault and the fatal accident rate. This approach is popular for two reasons: (1) there is a compelling public interest in reducing fatal accidents, and (2) state agencies compile data on fatal accidents in a consistent and comprehensive manner.

Although fatalities are certainly well measured and, moreover, something we care about, many things must be true if we are to observe a causal relationship between no-fault insurance and fatal accident rates. First, drivers must believe the expected cost of getting into an accident is lower under no-fault than under tort. Second, a decrease in the expected cost of getting into an accident must cause drivers to drive less carefully than they would otherwise. Third, the degree of this effect must be large enough to cause a statistically significant change in accident rates generally. And fourth, this induced change in the accident rate must translate into higher fatal accident rates. Thus, fatalities reside far down the causal chain of events.

Nonetheless, the fatal accident rate is still an attractive measure of the incentive effects of no-fault. It is reasonably certain that fatal accidents are well-measured events, and the data extend back to the mid-1960s, prior to changes in no-fault laws. Furthermore, as the standard metric of driver care in this literature, fatalities provide a logical starting point for an empirical analysis of the incentive effects of no-fault. I review and critique the empirical literature on the effect of no-fault on fatalities in the next section and then present my own estimates in the section that follows.

A rejection of the hypothesis that no-fault leads to higher fatal accident rates does not rule out the possibility that no-fault affects the overall accident rate. Researchers have avoided examining the accident rate, however, because of poor data. Many accidents go unreported to the police and, more significantly, the incentive to report accidents to the police might vary between tort and no-fault states. Later in this chapter, I employ a proxy for the overall accident rate—the ratio of property damage claims to property damage exposure—to study the effect of no-fault on accidents in general. I assume the incentive to make property damage claims should be no different under tort and no-fault because property damage is subject to tort liability in all states but Michigan.
The direct effect of no-fault insurance is in lowering the expected cost of driving negligently. Unfortunately, a rigorous empirical test of this claim is not possible because little data are available on how accident costs incurred by drivers vary from state to state. Whereas the cost of negligence cannot be observed, perhaps negligence itself can be observed. That is, if no-fault lowers the cost of driving negligently, one should then observe an increase in negligent driving.

Using data from the Department of Transportation’s (DOT’s) Fatal Accident Reporting System (FARS)—a census of all fatal accidents in the United States between 1975 and 1998—later in this chapter, I test the hypothesis that fatal accidents in no-fault states are more likely to involve negligent behavior than fatal accidents in tort states. Together, the three analyses presented in this chapter on the effect of no-fault on fatal accidents, accidents in general, and negligent driving provide no evidence that no-fault insurance in the United States affects driving behavior.

LITERATURE REVIEW AND METHODOLOGICAL ISSUES

A lengthy empirical literature exists on the relationship between no-fault policy and the fatal accident rate. Landes (1982) was the first to investigate this issue empirically. Using state-level data for the period 1967 to 1975, Landes concluded that the adoption of no-fault policy had increased fatalities in no-fault states by as much as 10 percent. This striking result inspired a number of subsequent papers reexamining state-level fatality data (Zador and Lund, 1986; Kochanowski and Young, 1985; U.S. Department of Transportation, 1985). These researchers uniformly rejected the hypothesis that no-fault leads to higher fatal accident rates. McEwin (1989) and Devlin (1992) then reported finding large effects of no-fault on fatal accident rates—on the order of 9 to 10 percent—in New Zealand and Quebec. More recent work by Sloan, Reilly, and Schenzler (1994), Cummins, Weiss, and Phillips (1999), and Kabler (1999) using state-level data also reports positive effects of no-fault on fatal accident rates.

The most difficult problem in establishing the effect of no-fault on fatal accident rates or other outcomes is in separating the effect of no-fault itself from the underlying forces that led to the implementation of no-fault in the first place. This basic problem is generally recognized in the research just cited. One approach to solving this problem has involved examining fatal accident rates in tort and no-fault states around the time no-fault laws were first implemented in the early 1970s. Another approach has been to explicitly account for the factors that led some states to enact no-fault and others to retain tort.

In the following, I first outline what has become a standard approach to identifying policy effects with panel data that cover periods both before and after implementation of a given
policy—the method of difference-in-differences. I then note that most of the previous research cited earlier in this chapter has failed to properly employ this technique and therefore may have produced misleading results. I end this section by discussing the most recent paper in this literature, Cummins, Weiss, and Phillips (1999), which takes a fundamentally different approach from previous studies to estimating the effect of no-fault on fatal accident rates by explicitly modeling the decision to adopt no-fault policy. I cite a number of weaknesses in the authors’ approach and explain why a properly executed difference-in-differences approach will likely produce more reliable estimates of the effect of no-fault on fatal accident rates.

The goal of the panel data approach to identifying the effect of no-fault on fatal accident rates is to establish the counterfactual: What would have happened to fatal accident rates in no-fault states had no-fault not been implemented? The most naive estimate of this counterfactual question would be to examine fatal accident rates both before and after the implementation of no-fault laws in no-fault states. Doing so, one would conclude that the adoption of no-fault laws in no-fault states lowered fatal accident rates by 32 percent: Fatal accident rates fell from 4.7 to 3.1 fatalities per 100 million vehicle miles traveled between 1970 and 1977 in no-fault states (see Figure 3-1).\(^1\)

Of course, there are many reasons why fatal accident rates fell over that period that have nothing to do with the implementation of no-fault, including greater seat-belt use, declining rates of drinking and driving, and heightened vehicle and road safety. Indeed, Figure 3-1 shows that fatal accident rates have fallen more or less steadily in no-fault states since 1967, the earliest point for which state-specific data are available on fatal accident rates. The problem with this simple before-and-after comparison in no-fault states is that one does not know from these data alone what would have happened to fatal accident rates in no-fault states had they not adopted no-fault. Consequently, one needs to form a control group that provides some basis for comparison. A natural control group in this case would be those states that retained tort between 1971 and 1976. Again, looking at Figure 3-1, fatal accident rates declined in tort states over this period as well, no doubt for some of the same reasons noted previously.

Figure 3-1 shows that fatal accident rates are lower in no-fault states than in tort states following the implementation of no-fault laws. No-fault states had lower fatal accident rates than tort states in the pre-implementation period as well, however. This initial difference suggests that the simple difference between no-fault and tort states in fatal accident rates following imple-

\(^1\) Note that the no-fault line is somewhat misleading for the period 1971 to 1976 because only one state, Massachusetts, had no-fault in effect over the entire period.
Figure 3-1—Fatal Accident Rates in Tort and No-Fault States: 1967 to 1995

Implementation cannot be attributed solely to the adoption of no-fault because these differences existed before implementation. That is, conditions that cause no-fault states to have relatively low fatal accident rates existed before the adoption of no-fault, and therefore must be controlled for.

It is unlikely, however, that one can control for all these conditions, therefore a common approach to identifying the effect of policy changes with panel data is to compare the difference in the outcome of interest before and after implementation in states that adopted the policy with the same difference in outcomes for states that did not adopt the policy. This difference-in-differences estimate represents the effect of no-fault policy on fatalities, assuming time-invariant state fixed-effects (discussed further in the next section) and the absence of other unobserved factors correlated with the adoption of no-fault and fatal accident rates.

Surprisingly, only one of the studies cited earlier in this chapter employs this simple empirical strategy for identifying the effect of no-fault on fatal accident rates. Landes (1982) comes close, with data spanning the years 1967 to 1975, but her regressions fail to make the proper pre- and post-implementation comparisons, and the data arguably do not include a sufficiently long post-implementation period. Zador and Lund (1986) run separate regressions for the periods 1967 to 1975 and 1976 to 1980, but strangely they do not conduct a difference-in-differences analysis over the entire period.
Kochanowski and Young (1985) and the U.S. Department of Transportation (1985) employ short periods of post-implementation data and therefore cannot control for pre-implementation differences. McEwin (1989) employs pre- and post-implementation data in his study of the effect of no-fault in New Zealand, but his regressions do not identify the difference-in-differences estimator. Devlin (1992) identifies a large difference-in-differences estimate of the effect of no-fault on fatal accident rates using data from Quebec and Ontario that span the adoption of no-fault in Quebec in 1978. Her results, however, are subject to the criticism that they fail to control for state-specific time trends, a point I return to in the next section. Also, Cummins and Weiss (1999) point out that at the same time Quebec adopted no-fault, it also abolished experience rating, which also might have been expected to lower the incentive to drive carefully.

Kabler (1999) reports regression results using post-implementation data for the United States indicating that states with verbal thresholds have higher fatal accident rates than tort states. His results also show that states with monetary thresholds have lower fatal accident rates than tort states. In neither case, though, do Kabler’s estimates identify the difference-in-differences estimator. The difference-in-differences estimator is not the only way to identify the effect of no-fault on fatal accident rates. Cummins, Weiss, and Phillips (1999) find a large effect of no-fault on fatal accident rates using state-level data between 1982 and 1994, many years after the implementation of no-fault between 1971 to 1976. At first glance, this seems to be a strange finding given that from Figure 3-1, it can be seen that fatal accident rates are on average lower in no-fault states than in tort states over that period.

Now there may be important differences between no-fault and tort states, such as the degree of urbanicity, that can account for the lower fatal accident rates in no-fault states. Cummins, Weiss, and Phillips (1999) in fact show that after controlling for differences in state characteristics, such as urbanicity, no statistically significant difference in fatal accident rates exists between tort and no-fault states.

Cummins, Weiss, and Phillips go on to argue, however, that there may be other characteristics correlated with fatal accident rates, but omitted from simple analyses, that caused some states to adopt no-fault and others to remain with tort. Failing to control for these characteristics could result in drawing the false conclusion that no-fault has no effect on fatal accident rates. Econometricians often refer to this type of bias as endogeneity bias.

An approach to correcting for this type of endogeneity bias is to model the adoption of no-fault policy itself and then use that information in estimating the effect of no-fault on fatal accident rates. Cummins, Weiss, and Phillips (1999) adopt this strategy by employing a two-step estimation method in which they first estimate the probability a given state has a no-fault law in effect as a function of various state characteristics and then include a nonlinear transformation of
that estimated probability as a control variable in a separate regression predicting the effect of no-fault on fatal accident rates.² Using this approach produces an estimate that implies a switch from tort to no-fault increases fatal accident rates by 6.8 percent. Cummins, Weiss, and Phillips interpret these results as implying that failure to control for unobserved differences between tort and no-fault states correlated with fatal accident rates biases conventional estimates of the effect of no-fault on fatalities downward substantially.

A number of reasons exist to be suspicious of the Cummins, Weiss, and Phillips estimates. First, the method they employ requires several strong statistical assumptions that have been widely questioned in the econometrics literature, especially, as is true here, when the estimates come from a small sample.³ Given the tremendous difficulty in finding credible sources of exogenous variation in the adoption of no-fault laws, the difference-in-differences approach, which admittedly has weaknesses of its own, is nonetheless, I think, a more reliable estimation strategy in this case.

Even if I thought modeling the adoption of no-fault in the manner of Cummins, Weiss, and Phillips was justified econometrically, it is still not clear on a priori grounds why conventional estimates of the effect of no-fault on fatal accident rates should be biased downward as those authors suggest. The adoption of no-fault, they argue, could have been in response to rising auto insurance costs, which in turn is more severe in states with high accident rates.⁴ This may be true, and therefore if states with high accident rates have high fatal accident rates, the conventional estimate of no-fault on fatal accident rates should be upwardly biased. Cummins, Weiss, and Phillips, however, argue that the conventional estimate of the effect of no-fault is downwardly biased. To do so, they note that states with high accident rates tend to have low fatal accident rates. This is true but only because accidents are more common in urban areas and urban accidents are less likely to result in fatalities because of the lower speeds involved.


³ The selection model relies strongly on the assumption of the joint normality of the error terms in the equation predicting no-fault and the equation predicting fatal accident rates. If this distributional assumption does not hold, which is difficult to test, the selection model is inherently misspecified. Even with the assumption of joint normality, this identification strategy can still produce seriously biased estimates unless implemented with strong exclusion restrictions (Vella, 1998; Nawa, 1993; Greene, 1993). The exclusion restrictions employed by Cummins, Weiss, and Phillips (1999)—per-day cost of hospital care, percent of state legislators who are Democrats, presence of a Democratic governor, population density, and percent of the population living in urban areas—are hard to justify econometrically. It is difficult to find examples in the recent econometrics literature that employ a selection model of this type to address the problem of endogenous policy adoption.

⁴ Note that fatalities are relatively inexpensive from an insurance perspective, so it is unlikely that differences in fatal accident rates across states can explain the adoption of no-fault directly.
Thus, the endogeneity of no-fault is with respect to the accident rate and only incidentally related to the fatal accident rate. This type of spurious correlation is best addressed by controlling for differences between states that cause some states to have high accident rates, but low fatal accident rates. Measures of urban concentration, which Cummins, Weiss, and Phillips include in their basic regression, should be sufficient to control for this spurious correlation. Later in this chapter, I go into further detail on the political economy of no-fault and why, if anything, conventional estimates of the effect of no-fault on fatality and accident rates are likely to be upwardly, not downwardly, biased.

A final approach used in the literature to identify the effect of no-fault on fatal accident rates is to exploit variation in dollar thresholds both within and across no-fault states. The idea here is that states with low dollar thresholds can be thought of as having lenient no-fault laws and states with high dollar thresholds as having more strict no-fault laws. The hypothesis, then, is that fatal accident rates should be positively correlated with the level of the dollar threshold. A more stringent form of this test, which I employ in the next section, uses only within-state variation in dollar thresholds to identify the effect of dollar thresholds on fatal accident rates. Sloan, Reilly, and Schenzer (1994) take such an approach in finding that within-state variation in the fraction of claims barred from the tort system between 1982 and 1990 was positively correlated with fatal accident rates in those states.

Although there are no studies that examine the effect of no-fault on accident rates, two studies test whether no-fault affects the rate of negligent driving generally. Using self-reported data, Sloan, Reilly, and Schenzer (1995) test whether the frequency of binge drinking and the tendency to drink and drive is higher in no-fault states than in tort states. While they find a small effect of no-fault insurance on the self-reported frequency of binge drinking, they find no effect on the propensity to drink and drive. Drinking and driving, however, is a particularly severe form of negligence, so broader tests of this hypothesis may be desirable.

Devlin (1999) conducts an indirect test of the negligence hypothesis. She argues that not only should the greater negligence caused by no-fault lead to more accidents, but the severity of those accidents should increase. To test this hypothesis, Devlin uses 1987 IRC closed-claims data on more than 28,000 bodily injury claims. The data contain elements describing the severity of the injury-causing accident, which Devlin then uses to test whether accidents in no-fault states resulted in more-severe injuries. The problem with this approach, though, is that BI claims in no-fault states should on average be more severe than in tort states because BI claims can only be brought in no-fault states if the economic damages caused by the accident exceed some threshold value. In tort states, third-party injuries, no matter how minor, are compensated under BI liability insurance. Not surprisingly, Devlin finds that the injuries reported in the BI claims data are more
severe in no-fault states. This result, of course, may simply reflect how injuries are compensated in tort and no-fault states rather than the effect of no-fault on driving behavior per se.

**THE EFFECT OF NO-FAULT ON FATAL ACCIDENT RATES**

I begin this analysis by modeling state fatal accident rates as a linear function of state characteristics in the post-implementation period 1977 to 1989, as shown in Equation 3-1.\(^5\)

\[
F_{it} = \beta_1 X_{it} + \beta_2 \text{NOFAULT}_{it} + \nu_t + \varepsilon_{it}
\]

where \(F_{it}\) is the log of the fatal accident rate in state \(i\) in year \(t\). I define the fatal accident rate to be the number of fatalities divided by vehicle miles traveled \((10^8 \text{ VMT})\). The denominator controls for differences between states in automobile travel. Results are qualitatively similar in models in which the denominator was the state’s population age 18–64.\(^6\) The vector \(X_{it}\) includes a variety of state characteristics thought to affect fatal accident rates, including the proportion of vehicle miles traveled on rural highways \((R\_{VMT})\), log population density \((POP\_{DEN})\), proportion of the population age 18–24 \((POP\_{1824})\), log average annual temperature \((TEMP)\), log annual total precipitation \((PRECIP)\), log per capita income \((PC\_{INC})\), and log bachelor degrees awarded as a fraction of the population age 18–24 \((BA)\).\(^7\) I also control for year effects common to all states with the term \(\nu_t\). I code \(\text{NOFAULT}_{it} = 1\) for states with no-fault in effect in year \(t\). The model tests whether no-fault states have different fatal accident rates than tort states in the post-implementation period. The data cover the lower 48 states and Hawaii.

No-fault states are different in several important ways from tort states. These differences can be seen in Table 3-1, which lists the means and standard deviations of the variables just listed. First, over the 20-year period, fatal accident rates were on average 23 percent lower in no-fault states than in tort states. No-fault states are more urban as indicated by the relatively low proportion of vehicle miles traveled on rural highways. Median population density (not shown in the table) and real per capita income are also substantially higher in no-fault states. Although

---

\(^5\) I was unable to obtain consistent state data on covariates after 1989.

\(^6\) Some researchers (for example, McEwin [1989]) have questioned whether it is appropriate to express fatalities in terms of VMT or population, fearing these variables themselves could be a function of no-fault policy. Some measure of scale must be employed, however, and modeling the choice to drive in terms of no-fault policy seems to me to be of second-order importance.

\(^7\) A more complete model might also control for differences in insurance systems (for example, differences in experience rating) and traffic law enforcement across states. These data are not readily available, however, and it is not clear that systematic differences exist in these variables between no-fault and tort states in any case. Year effects in Equation 3-1 will control for any general trend in these variables common to all states.
there is no significant difference in mean temperature between no-fault and tort states, the median temperature is substantially lower and mean heating days substantially higher in no-fault states than in tort states. Cummins, Weiss, and Phillips (1999) also show that no-fault states have greater average annual snowfall.

Table 3-1
Sample Means by No-Fault Status: 1970 to 1989

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Source</th>
<th>State Type</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No-Fault</td>
<td>Tort</td>
<td></td>
</tr>
<tr>
<td>$F$</td>
<td>Fatalities per 100 million VMT</td>
<td>U.S. DOT</td>
<td>2.76</td>
<td>3.58</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.77)</td>
<td>(1.21)</td>
<td></td>
</tr>
<tr>
<td>$R_{VMT}$</td>
<td>Rural VMT per total VMT</td>
<td>U.S. DOT</td>
<td>0.42</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.16)</td>
<td>(0.15)</td>
<td></td>
</tr>
<tr>
<td>$DENSITY$</td>
<td>Population density (population per square mile)</td>
<td>U.S. Census</td>
<td>265.19</td>
<td>381.44</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(306.53)</td>
<td>(1,589.32)</td>
<td></td>
</tr>
<tr>
<td>$POP_{1824}$</td>
<td>Proportion of population age 18–24</td>
<td>U.S. Census</td>
<td>0.13</td>
<td>0.13</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td></td>
</tr>
<tr>
<td>$TEMP$</td>
<td>Area weighted average annual temperature</td>
<td>NOAA</td>
<td>521.05</td>
<td>527.42</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(92.14)</td>
<td>(74.52)</td>
<td></td>
</tr>
<tr>
<td>$PRECI$</td>
<td>Area weighted annual total precipitation</td>
<td>NOAA</td>
<td>3,722.82</td>
<td>3,670.16</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1,571.71)</td>
<td>(1,506.23)</td>
<td></td>
</tr>
<tr>
<td>$PC_{INC}$</td>
<td>Real per capita income (1982 dollars)</td>
<td>U.S. Census</td>
<td>12,935.80</td>
<td>11,369.09</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2,112.31)</td>
<td>(1,803.68)</td>
<td></td>
</tr>
<tr>
<td>$BA$</td>
<td>Bachelor degrees awarded per population age 18–24</td>
<td>U.S. Dept. of Education</td>
<td>0.03</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.01)</td>
<td>(0.15)</td>
<td></td>
</tr>
</tbody>
</table>

Because we expect these various state characteristics to affect fatal accident rates, controlling for differences in these characteristics across tort and no-fault states is important in isolating the effect of no-fault itself on fatal accident rates. For example, it may be that much of the difference in fatal accident rates between tort and no-fault states is attributable to the fact that no-fault states are more urban than tort states. This difference is evident in Table 3-2, which presents the results of estimating Equation 3-1 by ordinary least squares (OLS).

In Column 1 of Table 3-2, the coefficient on $NOFAULT$ of $-0.14$ indicates that fatal accident rates were about 14 percent lower in no-fault states than in tort states after accounting for common year effects. Column 2 shows, however, that once I control for differences in other characteristics of no-fault and tort states, the difference in fatal accident rates diminishes substantially. The coefficient on $NOFAULT$ drops to a statistically significant $-0.05$. 

### Table 3-2

**OLS Estimates of the Effect of No-Fault on State Fatal and Overall Accident Rates**

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$F_a$</td>
<td>$P_{D_a}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NOFAULT</strong></td>
<td>-0.14</td>
<td>-0.05</td>
<td>-0.01</td>
<td>-0.04</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td><strong>R_VMT</strong></td>
<td>—</td>
<td>0.42</td>
<td>—</td>
<td>-0.23</td>
</tr>
<tr>
<td></td>
<td>(0.08)</td>
<td></td>
<td>(0.06)</td>
<td></td>
</tr>
<tr>
<td><strong>DENSITY</strong></td>
<td>—</td>
<td>-0.03</td>
<td>—</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td></td>
<td>(0.01)</td>
<td></td>
</tr>
<tr>
<td><strong>POP_1824</strong></td>
<td>—</td>
<td>-1.52</td>
<td>—</td>
<td>2.42</td>
</tr>
<tr>
<td></td>
<td>(0.87)</td>
<td></td>
<td>(0.65)</td>
<td></td>
</tr>
<tr>
<td><strong>TEMP</strong></td>
<td>—</td>
<td>0.80</td>
<td>—</td>
<td>-0.21</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td></td>
<td>(0.04)</td>
<td></td>
</tr>
<tr>
<td><strong>PRECIP</strong></td>
<td>—</td>
<td>-0.13</td>
<td>—</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td></td>
<td>(0.02)</td>
<td></td>
</tr>
<tr>
<td><strong>PC_INC</strong></td>
<td>—</td>
<td>-0.05</td>
<td>—</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td></td>
<td>(0.05)</td>
<td></td>
</tr>
<tr>
<td><strong>BA</strong></td>
<td>—</td>
<td>-0.004</td>
<td>—</td>
<td>-0.01</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td></td>
<td>(0.01)</td>
<td></td>
</tr>
<tr>
<td><strong>INTERCEPT</strong></td>
<td>-1.04</td>
<td>-4.40</td>
<td>1.87</td>
<td>1.34</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.83)</td>
<td>(0.02)</td>
<td>(0.60)</td>
</tr>
</tbody>
</table>

**$R^2$**

0.40 0.68 0.62 0.69

NOTES: Dependent variable in Columns 1 and 2 is the log of the fatal accident rate. Dependent variable in Columns 3 and 4 is log of PD claims per 100 PD exposure. Period of analysis is 1977 to 1989. Regressions include year effects. Standard errors are in parentheses.

In this simple analysis, then, it appears that even after controlling for differences in observable characteristics across tort and no-fault states, no-fault states have lower fatal accident rates than tort states. The other covariates of the model generally have the expected sign and explain a substantial portion of the overall variance in fatal accident rates as evidenced by the large increase in $R^2$ between Columns 1 and 2 in Table 3-2.\(^8\) For example, an increase in the proportion of vehicle miles traveled on rural highways by 10 percentage points increases fatal accident rates by 4 percentage points. An increase in mean temperature of 10 percent raises fatal accident rates by 8 percent and an increase in total precipitation by 10 percent decreases fatal accident rates.

\(^8\) The one exception is the negative coefficient on **POP_1824**. One might think fatal accident rates would increase with larger numbers of young drivers. Cummins, Weiss, and Phillips (1999) report a statistically insignificant coefficient on this variable.
accident rates by 1 percent.\(^9\) Increases in density and per capita income also lead to small decreases in fatal accident rates.

**A Difference-in-Differences Estimate**

The specification in Equation 3-1, however, does not address the possibility that I have omitted from the model other differences between no-fault and tort states that are correlated with fatal accident rates. These unobserved differences, whatever they may be, could bias the estimated coefficient on $NOFAULT$. The difference-in-differences strategy outlined earlier in this chapter addresses this problem by comparing fatal accident rates in tort and no-fault both before and after implementation of no-fault between 1971 and 1976.

Perhaps the easiest way to see the logic of the difference-in-differences estimator is to examine Panel A of Table 3-3, which reports fatal accident rates by year and no-fault status. Reading along the columns, in the pre-implementation period 1967–70, fatal accident rates were 0.73 higher in tort states than in no-fault states.\(^{10}\) In the post-implementation period, this difference fell to 0.38. The difference in these differences, reported in the third column, is 0.35.

Similarly, Table 3-3 shows that fatal accident rates declined by a greater amount in tort states than they did in no-fault states between the pre- and post-implementation periods. The difference in these differences is also 0.35. If the assumption is made that no-fault states would have experienced the same decline in fatal accident rates as tort states over this period were it not for the implementation of no-fault law, then one can interpret the difference-in-differences, 0.35, as the causal effect of no-fault on fatal accident rates. That is, the estimate implies fatal accident rates were a little more than 10 percent higher (0.35/3.24) in no-fault states in the post-implementation period than they would have been in the absence of no-fault.

This difference-in-differences estimate is in levels. A more appropriate model of the effect of $NOFAULT$ on fatalities may be in percentage terms. That is, one might hypothesize that the implementation of no-fault increases fatal accident rates in no-fault states by $x$ percent, regardless of the initial level of fatal accident rates in those states.

A natural specification for this model is with fatalities expressed in logs. Panel B in Table 3-3 presents the difference-in-differences estimate for this model. Here, fatal accident rates declined by approximately 46 percent between the pre- and post-implementation periods in tort.

---

\(^9\) These climate variables should be interpreted with caution. First, temperature and precipitation most likely interact in their effect on fatal accident rates (that is, rain may have a different effect than snow on fatal accident rates). Second, these numbers represent within-state means. A single state (for example, California) may have many different climatic zones and therefore it is not clear how meaningful state means are.

\(^{10}\) Here, $NOFAULT_i$ = 1 if no-fault was enacted in state $i$ between 1971 and 1976.
Table 3-3
Fatal Accident Rates by Year and No-Fault Status

<table>
<thead>
<tr>
<th>State Type</th>
<th>1967–70</th>
<th>1977–80</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Fatalities in levels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tort</td>
<td>5.72</td>
<td>3.62</td>
<td>2.10</td>
</tr>
<tr>
<td>No-fault</td>
<td>4.99</td>
<td>3.24</td>
<td>1.75</td>
</tr>
<tr>
<td>Difference</td>
<td>0.73</td>
<td>0.38</td>
<td>0.35</td>
</tr>
<tr>
<td>B. Fatalities in logs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tort</td>
<td>-0.58</td>
<td>-1.04</td>
<td>0.46</td>
</tr>
<tr>
<td>No-fault</td>
<td>-0.72</td>
<td>-1.15</td>
<td>0.43</td>
</tr>
<tr>
<td>Difference</td>
<td>0.14</td>
<td>0.11</td>
<td>0.03</td>
</tr>
</tbody>
</table>

states and by 43 percent in no-fault states. The difference in these differences is a statistically insignificant 3 percentage points, suggesting no-fault had no effect on fatal accident rates.

Another way to recover the difference-in-differences estimate is in a regression context, as shown in Equation 3-2,

\[
F_{it} = \beta_1 X_{it} + \beta_2 POST_{76} + \beta_3 NOFAULT_{it} + \beta_4 POST_{76} \cdot NOFAULT_{it} + \epsilon_{it}
\]

where \(POST_{76}\), equals one for the years 1977 to 1980 and zero for the years 1967 to 1970. I drop the implementation years 1971 to 1976 from the analysis.\(^{11}\) In this specification, \(\hat{\beta}_2\) captures the difference in fatal accident rates across the two periods common to both tort and no-fault states, \(\hat{\beta}_3\) represents the difference in fatal accident rates between no-fault and tort states in both the pre- and post-implementation periods, and \(\hat{\beta}_4\) tells us whether fatal accident rates changed more or less between periods in no-fault states than in tort states (the difference-in-differences). The advantage of this specification over the simple comparison of means in Table 3-3 is that it controls for other time-varying state characteristics that influence fatal accident rates.

Controlling for state characteristics in this regression does not appear to affect the simple difference-in-differences estimates in Table 3-3. Looking first at Column 1 of Table 3-4, one sees, as in Table 3-3, that fatal accident rates are lower in the post-implementation period for both tort and no-fault states (\(\hat{\beta}_{post76} = -0.46\)) and fatal accident rates are, on average, lower in no-fault states than in tort states (\(\hat{\beta}_{nofault} = -0.11\)). The statistically insignificant coefficient of 0.03 on the

\(^{11}\) I drop the implementation years in order to form clear treatment and control groups. Experiments with a variety of treatment and control groups over the implementation period, including a full fixed-effects model \((F_{it} = \beta_1 X_{it} + \beta_2 NOFAULT_{it} + \lambda_i + \nu_t + \epsilon_{it})\), that accounts for states adopting no-fault in different years, yielded comparable results. The results are not sensitive to the number of years analyzed in the post-implementation period.
interaction of \textit{POST\_76} and \textit{NOFAULT} indicates that fatal accident rates fell equivalently in percentage terms in tort states and no-fault states between the pre- and post-implementation periods. This is the difference-in-differences estimate in Panel B in Table 3-3.

\begin{table}[h]
\centering
\caption{Difference-in-Differences Estimates of the Effect of No-Fault on State Fatal Accident Rates}
\begin{tabular}{lcccc}
\hline
Variable & 1 & 2 & 3 & 4 \\
\hline
\textit{POST\_76} & -0.46 & -0.38 & -0.37 & 0.06 \\
 & (0.03) & (0.02) & (0.07) & (0.01) \\
\textit{NOFAULT} & -0.11 & 0.002 & --- & -0.004 \\
 & (0.03) & (0.024) & --- & (0.016) \\
\textit{POST\_76}*\textit{NOFAULT} & 0.03 & 0.04 & --- & -0.01 \\
 & (0.05) & (0.03) & --- & (0.02) \\
\textit{STRONG} & --- & --- & 0.10 & --- \\
 & --- & --- & (0.03) & --- \\
\textit{POST\_76}*\textit{STRONG} & --- & --- & 0.03 & --- \\
 & --- & --- & (0.05) & --- \\
\textit{R\_VMT} & --- & 0.70 & 0.74 & 0.39 \\
 & --- & (0.07) & (0.07) & (0.28) \\
\textit{TEMP} & --- & 0.72 & 0.72 & 1.38 \\
 & --- & (0.06) & (0.06) & (0.26) \\
\textit{PRECIP} & --- & -0.20 & -0.20 & -0.07 \\
 & --- & (0.02) & (0.02) & (0.03) \\
\textit{PC\_INC} & --- & -0.18 & -0.22 & 0.67 \\
 & --- & (0.07) & (0.07) & (0.21) \\
\textit{INTERCEPT} & -1.04 & -2.61 & -2.32 & 0.01 \\
 & (0.02) & (0.97) & (0.96) & (0.01) \\
\textit{R}^2 & 0.52 & 0.79 & 0.80 & 0.12 \\
\hline
\end{tabular}
\end{table}

NOTES: The dependent variable in Columns 1–3 is the state fatal accident rate in logs. The dependent variable and time-varying covariates in Column 4 are in first differenced form. Standard errors are in parentheses.

In Column 2 of Table 3-4, this difference-in-differences estimate is basically unchanged with the inclusion of additional covariates in the model.\textsuperscript{12} In Column 3, I show that these results do not change if we restrict the comparison between states that enacted a strong version of no-fault and those that did not.\textsuperscript{13} Finally, in Column 4, I specify the model in first differences (for example, $\Delta F_{it} = F_{it} - F_{i(t-1)}$), which has the effect of controlling for time trends specific to tort and

\textsuperscript{12} Pre-1970 data were unavailable for population density, population age 18–24, and bachelor degrees awarded.

\textsuperscript{13} I define strong no-fault states as those with either verbal thresholds or dollar thresholds exceeding $1,000 at the time of enactment.
no-fault states that could influence the rate of change in fatal accident rates. Again, the basic result does not change; the implementation of no-fault laws did not affect the relative change in fatal accident rates between tort and no-fault states before and after the implementation of no-fault between 1971 and 1976.

**A Test Using Variation in Dollar Thresholds**

There is one more test of this hypothesis I can conduct with the available data. Fifteen of the 16 states that enacted no-fault by 1976 did so with dollar thresholds. These thresholds vary both across and within states over time due to explicit legislative changes and the erosion of the real value of dollar thresholds due to inflation.

If one believes a continuum exists between no-fault and tort characterized by the threshold at which individuals can sue for non-economic damages (where tort states essentially have no threshold and verbal no-fault states have a very high threshold), then it is possible that higher dollar thresholds lead to higher fatal accident rates. If that hypothesis is true, then it would lend some credence to the claim that no-fault insurance leads to higher fatal accident rates.

One way to test this hypothesis is to test whether within-state variation in dollar thresholds is correlated with fatal accident rates holding other state characteristics constant. A fixed-effects specification is a common way to do this, as in Equation 3-3,

\[
F_{it} = \beta_1 X_{it} + \beta_2 \text{THRESHOLD}_{it} + \lambda_i + \nu_i + \epsilon_{it}
\]

where \( \text{THRESHOLD}_{it} \) is the real log value of a no-fault state’s dollar threshold and \( \lambda_i \) is a vector of individual state dummy variables. The fixed-effects specification controls for unobserved heterogeneity across states that may simultaneously affect fatal accident rates and the relative size of the dollar threshold.

I estimate Equation 3-3 with data on 13 no-fault states with dollar thresholds in force sometime between 1970 and 1989.\(^\text{14}\) The inclusion of fixed state effects means that the identification of \( \hat{\beta}_1 \) comes solely from within-state variation in the dollar threshold. Figure 3-2 graphs the real value of the dollar threshold between 1970 and 1989 in no-fault states. Much of the within-state variation is due to inflation, which is common across all states. Importantly, however, variation exists across states in the timing of adoption, repeal, and adjustments to thresholds. Hawaii, for example, went from having no threshold in 1974 to a threshold of $2,788

\(^{14}\) I exclude New York and Florida, which adopted no-fault with dollar thresholds but changed to verbal thresholds shortly thereafter.
in 1975. This threshold fell with inflation to $2,066 in 1979 and then steadily increased by legislative mandate throughout the 1980s. Discrete jumps in dollar thresholds are evident in other states as well, such as Massachusetts, Minnesota, and Kansas.

![Dollar Thresholds in No-Fault States: 1970 to 1989](image)

Figure 3-2—Dollar Thresholds in No-Fault States: 1970 to 1989

The results of estimating Equation 3-3 indicate that within-state increases in dollar thresholds lead to very small, but precisely estimated, declines in fatal accident rates (see Table 3-5). This result is contrary to the hypothesis that fatal accident rates should increase as the no-

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15 I should also note that this result is contrary to the results of Sloan, Reilly, and Schenzler (1994), who find that within-state increases in the fraction of claims barred from tort liability, which is a positive function of the dollar threshold, increases the fatal accident rate. I prefer these estimates, however, because Sloan, Reilly, and Schenzler could only calculate their claims fraction variable for two years (1977 and 1987). They filled in the intervening years with a linear interpolation of those two data points. Whereas the claims fraction variable is a more direct measure of no-fault stringency, I think the greater within-state variation afforded by using dollar thresholds produces more reliable estimates.
fault threshold increases providing further evidence against the claim that the implementation of no-fault laws could have raised fatal accident rates in no-fault states.

Table 3-5
The Effect of Within-State Variation in Dollar Thresholds on State Fatal and Overall Accident Rates

<table>
<thead>
<tr>
<th>Variable</th>
<th>$F_u$</th>
<th>$PD_{D_u}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$THRESHOLD$</td>
<td>-0.010</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>$R_{YMT}$</td>
<td>0.71</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>(0.33)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>$DENSITY$</td>
<td>-0.05</td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.14)</td>
</tr>
<tr>
<td>$POP_{1824}$</td>
<td>3.47</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>(1.68)</td>
<td>(1.50)</td>
</tr>
<tr>
<td>$TEMP$</td>
<td>0.15</td>
<td>-0.23</td>
</tr>
<tr>
<td></td>
<td>(0.33)</td>
<td>(0.25)</td>
</tr>
<tr>
<td>$PRECIP$</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>$PC_{INC}$</td>
<td>0.29</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(0.16)</td>
</tr>
<tr>
<td>$BA$</td>
<td>0.08</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.04)</td>
</tr>
</tbody>
</table>

$R^2$ 0.92 0.90

NOTES: Regressions control for state and year effects and are restricted to no-fault states with dollar thresholds. Sample period for fatality regression is 1970 to 1989 and for $PD_{D_u}$ regression 1976 to 1989. Robust standard errors are in parentheses.

Summary
The difference-in-differences results reported in Table 3-4 provide no evidence that the implementation of no-fault between 1971 and 1976 had a statistically significant effect on fatal accident rates in no-fault states. The results in Table 3-5 using variation in dollar thresholds provide further evidence against claims that no-fault law diminishes the incentive to drive with care and therefore increases the fatal accident rate.

While contrary to several recent studies, I am not surprised by these results given the highly idiosyncratic nature of many fatal accidents. Even if the presence of no-fault insurance diminishes incentives to drive carefully, it is not at all clear that increased negligence would translate directly into higher fatal accident rates. More plausibly, no-fault could affect the overall accident rate, a topic to which I now turn.
THE EFFECT OF NO-FAULT ON OVERALL ACCIDENT RATES

The focus on fatal accident rates in the existing literature is driven largely by data constraints. Unlike fatalities, there is no state-by-state census of automobile accidents available for analysis in the United States. The DOT does maintain data on a nationwide sample of accidents from local police reports beginning in 1988 in its General Estimates System, but the data cannot be aggregated to the state level. Even if these data could be aggregated to the state level, the resulting sample is not likely to be random. A large number of accidents do not get recorded by the police, and it seems likely that these unrecorded accidents are much less serious on average than those that do get recorded.

Here, I use data on property damage liability claims collected by the National Association of Independent Insurers (NAII) since 1976. For each state and year, the NAII’s auto experience data record the number of property damage claims made as well as the number of property damage policies in effect (referred to as “exposure”). I treat the ratio of these two variables as an unbiased measure of the accident rate to test whether accident rates are higher in no-fault states than in tort states.

In all states but Michigan, property damage resulting from automobile accidents is handled under the traditional tort system. This uniformity in liability law implies that the incentive to make property damage claims should not vary between tort and no-fault states. Thus, property damage claims normalized by some appropriate factor, say vehicle miles traveled or number of insured vehicles, should provide a consistent estimate of the accident rate over time and across states.16

The analysis of accident rates in the post-implementation period parallels the analysis of fatal accident rates, as in Equation 3-4,

\[ PD_i = \beta_1 X_{it} + \beta_2 NOFAULT_i + \nu_t + \varepsilon_{it} \]

where \( PD_i \) is the log of the accident rate in state \( i \) in year \( t \) as defined earlier and the vector \( X_{it} \) includes the same state characteristics as in Equation 3-3.17 I examine the time period 1976 to 1989.

---

16 The measure probably underestimates the accident rate in both tort and no-fault states because drivers may not report minor accidents if they fear their premiums will rise more than the actual damages sustained.

17 The auto experience data do not include Massachusetts, North and South Carolina, and Texas, so I drop these states from the analysis. As before, I do not include Alaska or the District of Columbia. Finally, I drop Michigan since it has a no-fault property damage insurance law.
As with fatalities, the accident rate, as measured by PD, fell substantially over the period of analysis (see Figure 3-3). In both tort and no-fault states, PD falls by about one-third between 1976 and 1981 and remains fairly constant thereafter. In tort states, the ratio of claims to exposure falls from 6.5 to 4.6 claims per 100 policies between 1976 and 1981. In no-fault states, this ratio falls from 6.4 to 4.4 over the same period. Between 1976 and 1981, PD is lower in no-fault states than in tort states. The difference is generally insignificant between 1982 and 1990.

![Graph showing accident rates in tort and no-fault states](image)

**Figure 3-3—Overall Accident Rates in Tort and No-Fault States**

The results of estimating Equation 3-4 indicate that no-fault insurance has little effect on accident rates overall. In Column 3 of Table 3-2, the coefficient on NOFAULT is small and statistically insignificant at conventional levels. In Column 4, it is shown that the addition of controls for state characteristics to the model cause the coefficient on NOFAULT to fall to −0.04. Thus, contrary to the hypothesis, these estimates indicate that no-fault states have lower accident rates overall than tort states. Where significant, the estimated effects of state characteristics have the expected sign and seem to be of a reasonable magnitude. For example, the coefficients tell us that accident rates are higher in more urban states and states with lower temperatures, greater precipitation, and a relatively young population.

One should be cautious in interpreting these estimates, however, because without pre-implementation data there is no way of controlling for unobservable differences across tort and
no-fault states that may simultaneously influence $PD$ and $NOFAULT$. The concern is that the adoption of no-fault insurance could be correlated with omitted variables that are also correlated with either the numerator (claims) or denominator (exposure) of $PD$.

I can think of no reason why exposure should be correlated with the adoption of no-fault. It is possible, however, that states with relatively high numbers of PD claims were more likely to adopt no-fault insurance than states with relatively low numbers of PD claims, which would tend to bias the estimated coefficient on $NOFAULT$ upward in magnitude.

By most accounts, the adoption of no-fault in the early and mid-1970s was driven largely by concerns over high auto insurance costs (Lascher, 1999). Massachusetts, for example, had the most expensive auto insurance in the nation when it became the first state to adopt no-fault in 1970, and many of the states that followed suit in the heavily urbanized eastern corridor (Connecticut, New York, New Jersey, and Pennsylvania) also had comparatively high auto insurance costs. Harrington (1994) shows a positive correlation between the propensity to adopt no-fault and premium growth between 1966 and 1970, even after controlling for population density. Accident rates are a significant determinant of premium growth, but not the only one, and therefore the magnitude of the endogeneity bias is not clear. Whatever the magnitude of this bias, however, its direction should be upward. If anything, then, the true effect of $NOFAULT$ is even more negative than reported in Table 3-2.

Although I cannot estimate a difference-in-differences model, I can examine the effect of within-state variation in dollar thresholds on accident rates. As with fatal accident rates, such an analysis corrects for any unobserved heterogeneity between states correlated with both the size of dollar thresholds and $PD$. The results of this fixed-effects regression, identical to that in Equation 3-3 with $PD$ as the dependent variable, are reported in the $PD_a$ column in Table 3-5. The coefficient on $THRESHOLD$ indicates a small positive effect of within-state changes in dollar thresholds on accident rates, but this effect is not statistically significant at conventional levels.

**THE EFFECT OF NO-FAULT ON DRIVER NEGLIGENCE**

Even if no-fault has no measurable effect on the overall or fatal accident rate, it is conceivable one could observe an effect on the level of care exercised by drivers. Lower accident costs, under certain assumptions (see Chapter 2), should lead drivers to exercise less care under no-fault than under tort. Unfortunately, driver care is difficult to measure in the population at large.

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18 There is a variety of other reasons why no-fault passed in some states and not in others, including the strength of the trial lawyers bar (Dyer, 1976; Harrington, 1994) and particular political circumstance (Lascher, 1999).
It is no surprise, then, that only one study to date has directly tested whether liability laws affect the propensity to drive negligently—Sloan, Reilly, and Schenzler’s (1995) test of the effect of no-fault on binge drinking and drinking and driving discussed earlier in this chapter. Here, I rely on detailed data on fatal accidents to test whether driver negligence in a variety of forms varies between no-fault and tort states. The most comprehensive state-level data on driver negligence comes from the DOT’s Fatal Accident Reporting System, which records information on all fatal accidents in the United States beginning in 1975.

Among the elements recorded in the FARS data are indicators for whether some traffic violation or other negligent behavior on the part of any of the drivers precipitated the accident. These elements include speeding, improper lane changing, failure to stop or signal, unsafe passing, and other negligent actions. FARS also reports on the blood alcohol content (BAC) of drivers involved in the accident when available.

The FARS data are derived from reports produced by state transportation agencies that collect information about fatal accidents from medical examiners, coroners, and emergency medical and police accident reports. Although the DOT is confident that the number of fatal accidents is accurately portrayed in these data, substantial variation in the data elements reported across states and over time for each fatal accident may exist. There is some concern, therefore, that the propensity to report negligence in the FARS data might be correlated with state liability laws. Specifically, it is possible that accident officials face more pressure to report negligent behavior in tort states than in no-fault states because the assignment of fault presumably has a greater impact on the distribution of accident costs in tort states.

Limiting the analysis to fatal accidents, however, should minimize this type of bias because the seriousness of fatal accidents demands investigation of the possibility of criminal negligence, and the incentive to assign criminal negligence should not differ dramatically between no-fault and tort states. Thus, I expect differences in reporting across states to result in potentially noisy measures of negligence in the FARS data, but not biased ones. Analyses of negligence in general accident data could cause us to draw misleading conclusions.

I use FARS data between 1979 and 1994. Coding of many variables is unreliable in earlier years (U.S. Department of Transportation, 1996). For each accident, state officials recorded information on the accident itself, each of the vehicles involved in the accident, and then each of the passengers in those vehicles (and pedestrians, if any). I merged data from each of these accident, vehicle, and person files to create a single file with information on all drivers involved in fatal accidents between 1979 and 1994. I exclude accidents involving special-use vehicles (taxis, emergency vehicles, military vehicles, and school buses). The final data set contains records for 508,773 fatal accidents in 50 states involving 897,985 drivers. I aggregate these data
over drivers to the state-year level, weighting the analyses that follow in this section accordingly. Thus, the dependent variables in the analyses below measure the proportion of drivers involved in a fatal accident in a given state and year who were cited for some type of negligent driving behavior.

State officials identify driver-related contributing factors for each vehicle involved in a fatal accident. These factors range from driving while sleepy, to speeding, to obscured vision due to weather conditions. Out of the total universe of 95 contributing factors, I classified 25 as involving negligent behavior (see Appendix A). By far the most common contributing factors identified in the FARS data are inattentive driver; failure to keep in proper lane; erratic, reckless, or negligent driving; failure to yield right of way; failure to obey traffic signs; and speeding. I classify these six factors as “principal” negligent actions in the tables that follow. Other examples of negligent driving behavior are improper lane changing, dangerous passing, and following too closely. If no-fault encourages negligent driving, we should observe a higher incidence of negligence as a contributory factor in fatal accidents in no-fault states than in tort states.19

There is little variation across states in the proportion of fatal accidents in tort and no-fault states involving negligent behavior. As can be seen in Table 3-6, approximately 58 percent of drivers involved in fatal accidents in tort states were classified as having engaged in a negligent act compared with 54 percent in no-fault states. This finding is contrary to the hypothesis that negligence should contribute to a higher proportion of fatal accidents in no-fault states than in tort states. In only one category—erratic, reckless, or negligent driving—does the proportion of drivers cited with a negligent action in no-fault states exceed that of tort states (0.14 versus 0.07). Table 3-6 also reports the proportion of fatal accidents in which one or more drivers was thought to be drunk and the proportion of drivers charged with a specific traffic violation in the accident itself or in the previous three years. Once again, little difference exists in the means of these variables across states.

It is conceivable that the propensity to classify a given driver as having engaged in some negligent act depends on the particular circumstances of the accident and the characteristics of the driver. If these circumstances or characteristics vary systematically by whether a state has no-fault insurance, then these simple comparisons of means could be misleading.20 To address this potential problem, I run weighted least squares with the variables listed in Table 3-6 as dependent

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19 This follows so long as the incidence of negligent driving in a state affects the number of fatal accidents reported as involving negligence more strongly than the number of fatal accidents reported as not involving negligence. A superior test of this hypothesis would employ data on the negligence of all drivers, not just those involved in fatal accidents. Unfortunately, no such data exist.

20 As noted earlier in this chapter, I maintain the assumption that the propensity for state officials to classify an accident as involving negligence does not vary across tort and no-fault states.
Table 3-6

Proportion of Drivers Involved in Fatal Accidents Cited with Negligent Behavior

<table>
<thead>
<tr>
<th>Negligent Behavior</th>
<th>State Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tort</td>
</tr>
<tr>
<td><strong>Negligent Contributing Factors</strong></td>
<td></td>
</tr>
<tr>
<td>All(^a)</td>
<td>0.58</td>
</tr>
<tr>
<td>Principal(^b)</td>
<td>0.55</td>
</tr>
<tr>
<td>Inattentive driver</td>
<td>0.08</td>
</tr>
<tr>
<td>Failure to keep in proper lane</td>
<td>0.29</td>
</tr>
<tr>
<td>Erratic, reckless, or negligent driving</td>
<td>0.07</td>
</tr>
<tr>
<td>Failure to yield right of way</td>
<td>0.08</td>
</tr>
<tr>
<td>Failure to obey traffic signs</td>
<td>0.05</td>
</tr>
<tr>
<td>Speeding</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>Other Negligence</strong></td>
<td></td>
</tr>
<tr>
<td>Drunk driver</td>
<td>0.29</td>
</tr>
<tr>
<td>Violation charged</td>
<td>0.16</td>
</tr>
<tr>
<td>Previous violation</td>
<td>0.41</td>
</tr>
</tbody>
</table>

NOTES: Sample includes all drivers involved in fatal accidents between 1979 and 1994. Fatal accidents involving special-use vehicles are excluded. Means are weighted by number of observations in each state-year cell.

DATA SOURCE: 1979–1994 FARS.

\(^a\)All = All negligent factors listed in Appendix A.

\(^b\)Principal = Inattentive driver; failure to keep in proper lane; erratic, reckless, or negligent driving; failure to yield right of way; failure to obey traffic signs; and speeding.

variables and the following accident and driver characteristics as explanatory variables: light and weather conditions; year, month, and day of the accident; number of lanes; urban or rural location; speed limit; number of vehicles and persons involved; number of fatalities; whether a pedestrian was involved; the vehicle’s role in the accident; and the driver’s age, sex, and severity of injury.

With few exceptions, negligence rates are no higher in no-fault states than in tort states after controlling for accident and driver characteristics (see Table 3-7). Overall, negligence rates are about 2 percentage points lower in no-fault states. The major exception is in the category of erratic, reckless, or negligent driving. State authorities appear more likely to cite drivers in no-fault states with this particular contributing factor than in tort states. However, this particular contributing factor exhibits more variation both across and within states than any other. In many states, both tort and no-fault, the incidence of this contributing factor varies by 30 or more percentage points from year to year. One explanation for this high level of variation is that state authorities receive varying instructions from year to year regarding citing drivers with erratic, reckless, or negligent driving, which may be related to changes in administrations, insurance, or auto-safety related legislation. I cannot rule out, though, that erratic, reckless, or negligent driving
### Table 3-7

The Effect of No-Fault on Negligent Behavior in Fatal Accidents

<table>
<thead>
<tr>
<th>Negligent Contributing Factors</th>
<th>Regressor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>\text{NOFAULT}</td>
</tr>
<tr>
<td>All(^a)</td>
<td>-0.023</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
</tr>
<tr>
<td>Principal(^b)</td>
<td>-0.026</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
</tr>
<tr>
<td>Inattentive driver</td>
<td>-0.037</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
</tr>
<tr>
<td>Failure to keep in proper lane</td>
<td>-0.054</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
</tr>
<tr>
<td>Erratic, reckless, or negligent driving</td>
<td>0.020</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
</tr>
<tr>
<td>Failure to yield right of way</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
</tr>
<tr>
<td>Failure to obey traffic signs</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
</tr>
<tr>
<td>Speeding</td>
<td>-0.019</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
</tr>
<tr>
<td>Other Negligence</td>
<td></td>
</tr>
<tr>
<td>Drunk driver</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
</tr>
<tr>
<td>Violation charged</td>
<td>-0.008</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
</tr>
<tr>
<td>Previous violation</td>
<td>-0.014</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
</tr>
</tbody>
</table>

**NOTES:** Sample includes all drivers involved in fatal accidents between 1979 and 1994. Fatal accidents involving special-use vehicles are excluded. All regressions control for light and weather conditions; year, month, and day of accident; number of lanes; urban or rural location; speed limit; number of vehicles and persons involved; number of fatalities; vehicle impact; whether a pedestrian was involved; and the driver’s age, sex, and severity of injury. Sample in \text{THRESHOLD} regression includes only no-fault states with dollar thresholds. \text{THRESHOLD} regression also controls for state fixed-effects. Estimates generated by weighted least squares.

**DATA SOURCE:** 1979–1994 FARS.

\(^a\)All = All negligent factors listed in Appendix A.

\(^b\)Principal = inattentive driver; failure to keep in proper lane; erratic, reckless, or negligent driving; failure to yield right of way; failure to obey traffic signs; and speeding.

is more often a real contributing factor in fatal accidents in no-fault than in tort states based on the available data.

Again, there may be some worry that these regressions fail to control for omitted variables correlated with both negligence levels and the adoption of no-fault.\(^{21}\) To address this concern, I

\(^{21}\) The direction of the bias this introduces is unclear because we do not know how the incidence of negligence influences attitudes toward no-fault.
test whether negligence is correlated with changes in the level of dollar thresholds within no-fault states over time. The *Threshold* column in Table 3-7 shows that a small positive correlation exists between changes in dollar thresholds and the incidence of erratic, reckless, or negligent driving and drunk driving. Overall, however, increases in dollar thresholds are associated with decreases in negligence.

In summary, this analysis of negligence data generally rejects the hypothesis that no-fault influences negligence levels in fatal accidents. The small, but statistically significant, positive correlation between no-fault and citations for erratic, reckless, or negligent driving is the one major exception. The fact that all other citations for negligent behavior, such as speeding, improper lane changing, and failure to obey traffic signs, are the same or lower in no-fault states along with the high level of within-state variation in this negligence category draws this one exception into question, however.
CHAPTER 4
CONCLUSIONS

The evidence presented in this report casts serious doubt on contentions that no-fault auto insurance as implemented in the United States has led to greater driver negligence and higher accident rates. Inspection of the differences in fatal accident rates in tort and no-fault states both before and after the implementation of no-fault between 1971 and 1976 shows no-fault had no effect on fatal accident rates during that time. Moreover, there is little reason to believe that failure to control for factors that influenced the adoption of no-fault, such as rising insurance costs, should bias the effect of no-fault on fatalities toward zero.

Additional analyses found little evidence that the overall accident rate or the rate of driver negligence in fatal accidents in no-fault states exceeds that in tort states. If anything, no-fault states appear to have lower overall accident rates and a lower rate of driver negligence generally than found in tort states.

Presumably, the overriding reason to drive carefully is self-preservation, an incentive that does not vary between no-fault and tort states. Indeed, the FARS data show quite clearly that driver negligence is more likely to result in the fatality of a negligent driver than in the fatality of a non-negligent driver. First, 41 percent of all fatal accidents between 1979 and 1994 involved a single vehicle for which the fault for the accident (if any) rests with a single driver. Moreover, in two-car accidents, 52 percent of all negligent drivers died compared with 32 percent of non-negligent drivers. The margin over which no-fault might change the incentive to drive with care seems rather small in comparison.

In the United States, there exists little reason to believe that no-fault auto insurance affects incentives to drive safely for the vast majority of drivers. Therefore, there may be reasons to oppose the concept of no-fault auto insurance, but its effect on driver behavior and accidents should not be among them.
APPENDIX A

FACTORS CONTRIBUTING TO FATAL ACCIDENTS

The following is a list of 95 factors from the FARS database that contribute to fatal accidents. I classify 25 of these factors (numbers 6, 21 through 23, 26 through 36, 38 through 44, and 46 through 48) as involving negligent behavior. These 25 contributing factors are shown in italics. In addition, I classify six contributing factors (numbers 6, 28, 36, 38, 39, and 44) as “Principal” ones because they are by far the most commonly cited.

PHYSICAL/MENTAL CONDITION

01  Drowsy, sleepy, asleep, fatigued
02  Ill, passed out/blackout
03  Emotional (for example, depressed, angry, disturbed)
04  Drugs/medication
05  Other drugs (marijuana, cocaine, and others)
06  Inattentive (talking, eating, and such)*
07  Restricted to wheelchair
08  Paraplegic
09  Impaired due to previous injury
10  Deaf
11  Other physical impairment
12  Mother of dead fetus
13  Mentally challenged
14  Failure to take drugs/medication

MISCELLANEOUS FACTORS

18  Traveling on prohibited traffic-ways
19  Driving on suspended or revoked license
20  Leaving vehicle unattended with engine running; leaving vehicle unattended in roadway
21  Overloading or improper loading of vehicle with passengers or cargo
22  Towing or pushing vehicle improperly
23  Failing to dim lights or to have lights on when required
24  Operating without required equipment
25 Creating unlawful noise or using equipment prohibited by law
26 Following improperly
27 Improper or erratic lane changing
28 Failure to keep in proper lane or running off road*
29 Illegal driving on road shoulder, in ditch, on sidewalk, or on median
30 Making improper entry to or exit from traffic-way
31 Starting or backing improperly
32 Opening vehicle closure into moving traffic or vehicle is in motion
33 Passing where prohibited by posted signs, pavement markings, hill or curve, or school bus displaying warning not to pass
34 Passing on wrong side
35 Passing with insufficient distance or inadequate visibility or failing to yield to overtaking vehicle
36 Operating the vehicle in an erratic, reckless, careless, or negligent manner, or operating at erratic or suddenly changing speeds*
37 High-speed chase with police in pursuit
38 Failure to yield right of way*
39 Failure to obey traffic signs, traffic control devices, or traffic officers; failure to observe safety zone traffic laws*
40 Passing through or around barrier
41 Failure to observe warnings or instructions on vehicle displaying them
42 Failure to signal intentions
43 Giving wrong signal
44 Driving too fast for conditions or in excess of posted speed limit*
45 Driving less than posted minimum speed
46 Operating at erratic or suddenly changing speeds
47 Making right turn from left turn lane; making left turn from right turn lane
48 Making improper turn
49 Failure to comply with physical restrictions of license
50 Driving wrong way on one-way traffic-way
51 Driving on wrong side of road (intentionally or unintentionally)
52 Operator inexperience
53 Unfamiliar with roadway
54 Stopping in roadway (vehicle not abandoned)
55 Under-riding a parked truck
56  Improper tire pressure
57  Locked wheel
58  Over-correcting
59  Getting off/out of or on/in to moving vehicle
60  Getting off/out of or on/in to non-moving vehicle

VISION OBSCURED BY
61  Rain, snow, fog, smoke, sand, or dust
62  Reflected glare, bright sunlight, or headlights
63  Curve, hill, or other design features (including traffic signs, embankment)
64  Building, billboard, and such
65  Trees, crops, or vegetation
66  Motor vehicle (including load)
67  Parked vehicle
68  Splash or spray or passing vehicle
69  Inadequate defrost or defog system
70  Inadequate lighting system
71  Obstructing angles on vehicle
72  Mirrors—rear view
73  Mirrors—other
74  Head restraints
75  Broken or improperly cleaned windshield
76  Other obstruction

AVOIDING, SWERVING, OR SLIDING DUE TO
77  Severe crosswind
78  Wind from passing truck
79  Slippery or loose surface
80  Tire blowout or flat
81  Debris or objects in road
82  Ruts, holes, or bumps in road
83  Live animals in road
84  Vehicle in road
85  Phantom vehicle
86  Pedestrian, cyclist, or other non-motorist in road
87  Ice, water, snow, slush, sand, dirt, oil, or wet leaves on road
OTHER MISCELLANEOUS FACTORS

89  Carrying hazardous cargo improperly
90  Hit-and-run vehicle driver
91  Non-traffic violation charged—manslaughter or other homicide offense
92  Other non-moving traffic violation

POSSIBLE DISTRACTIONS (INSIDE VEHICLE)

93  Cellular telephone
94  Fax machine
95  Computer
96  On-board navigation system
97  Two-way radio
98  Head-up display
99  Unknown

*Classified as a “Principal” factor
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