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An Economic Analysis of Auto Compensation Systems: Choice Experiences From New Jersey and Pennsylvania

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Abstract

Nearly since the first automobile traveled on U.S. soil, questions about how best to compensate people injured by their use have been raised. As early as in 1932, in fact, the tort system of imposing costs on negligent drivers was strongly criticized, and a system of compensation without regard to negligence recommended. Yet despite various efforts to identify and implement improved systems during the past more than 70 years, no clear best compensation mechanism has been found. Current discussions have focused on the "choice" system, under which insureds are allowed to select either a tort system or a no-fault system of compensation at the time of insurance purchase. New Jersey and Pennsylvania, which implemented very similar choice programs in 1989 and 1990, respectively, offer an opportunity to observe the effects of choice on outcomes such as: use of attorneys, speed of payment, and consistency (equity) of payment. Our results indicate outcomes consistent with expectations in New Jersey (NJ), which switched from no-fault to choice, but inconsistent with expectations in Pennsylvania (PA), which switched from tort to choice. Furthermore, analysis of tort versus no-fault selectors postchoice in New Jersey and Pennsylvania does not offer clear evidence of no-fault's lower administrative costs and speedier, more equitable payment in these jurisdictions.

Introduction

Involving more than 6.3 million accidents annually, at a cost in excess of $135 billion, the automobile accident reparation systems in the United States are economically and socially important. Yet, despite years of study and debate, no clear best mechanism for compensating those injured in automobile accidents has been found.

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Most automobile accidents in the United States are subject to the tort system, which requires proof of driver negligence (fault) for an injured party to be compensated. For decades, the tort system has been criticized as being administratively wasteful, time consuming, and inequitable in payment (see Lascher and Powers, 2001). During the 1970s and 1980s, 16 states and Puerto Rico responded by enacting no-fault plans, which permit all injured parties to receive some, if not total, compensation from their own insurers regardless of fault while limiting the use of litigation to obtain compensation for those injuries.[1] The intention was to assure timely payment for injuries while reducing administrative costs.

Yet, by the mid 1980s, the public interest in no-fault seems to have waned. Possible reasons for the change in attitude include a general leveling in automobile insurance premiums, lack of clear experience demonstrating that no-fault reduces insurance costs, and public debate over the role of personal responsibility for negligent driving. "Choice," a system under which motorists select between tort and no-fault when they purchase insurance, evolved as an apparent response to these conditions, and became law in New Jersey and Pennsylvania approximately a decade ago.[2] With the availability of the Insurance Research Council's (IRC) most recent closed claim study, we are able to assess the effect of choice on various claim characteristics. These data also allow direct comparisons of no-fault and tort systems within the same jurisdiction.

The purpose of the research reported here, therefore, is to present empirical evidence of the effects of choice in Pennsylvania and New Jersey as well as differences between tort and no-fault systems within these two jurisdictions. Specific attention is given to the three areas of automobile tort compensation systems generally highlighted in the literature as needing improvement: involvement of legal counsel (generally considered representative of administrative costs), speed of payment, and variability of payment.

LITERATURE REVIEW

With approximately half of all property-liability insurance premiums in the United States going to automobile coverages, the area has been the focus of numerous theoretical and empirical studies. These include interest in the effects of regulatory regimes, ownership structure, distribution methods, and, of course, compensation schemes. Two lines of literature are particularly relevant here, one comparing outcomes under tort and no-fault, and the other offering discussion of choice systems. Because we believe choice has been recommended in response to limitations of both tort and no-fault systems, we begin with a discussion of literature regarding those systems, and follow with consideration of choice.

Comparisons of Tort Versus No-Fault

One of the primary objectives of no-fault automobile compensations systems is to achieve cost efficiencies. Because of variations in plans, driving conditions, and

[1] Three states (Connecticut, Georgia, and Nevada) later repealed their laws, and Pennsylvania and New Jersey switched to a choice system, as described here (Vaughan and Vaughan, 2001).

[2] Kentucky implemented the first choice system in 1970s; however, it has become a *de facto* no-fault state. Furthermore, we do not have pre-1970 data, which prevents us from conducting a pre- and postchoice analysis. Therefore, we do not incorporate Kentucky's experience in this research.

general economic and social characteristics across jurisdictions, comparisons of tort and no-fault is challenging. Not surprisingly, the results of numerous studies are mixed, depending on variable measurement and time spans analyzed.

A number of early studies (Johnson, Flanigan, and Weeks, 1983; Lilly and Webb, 1983; DOT, 1985) indicated that premiums in no-fault states rose faster than had premiums in tort states, although difficulty in separating compensation system effects from state effects made the results tenuous. Later studies attempted to address this issue by measuring the portion of each premium dollar used to pay claimants for their injuries, a method of testing no-fault's efficiency, regardless of state variations that could lead to higher premiums in no-fault states. Using U.S. data, these later studies generally found positive effects on loss ratios in no-fault states, particularly the verbal (strict) threshold states (Witt and Urrutia, 1984; Cummins and Weiss, 1991). Canadian loss ratios do not appear to respond similarly (Kleffner and Schmit, 1999).

U.S. data further indicate that no-fault reduces bodily injury liability payments while raising first-party injury payments (Johnson et al., 1992), although overall costs still may rise if system design encourages build-up of claims (Derrig, Weisberg, and Chen, 1994). Build-up is more likely where weak tort limitations, which involve low dollar thresholds, are combined with large first-party coverage limits. Plans with strong tort limitations in the form of a strict verbal threshold are more likely to reduce total costs, especially when first-party coverage limits are modest (Harrington, 1991; Cummins and Tennyson, 1992). An important issue still being debated is whether or not no-fault also increases fatal accident rates (Cummins, Weiss, and Phillips, 2001; Loughran, 2001).

The ultimate conclusion from currently available research comparing tort and no-fault, therefore, remains murky. Evidence certainly exists that no-fault *can* lead to greater levels of compensation per premium dollar; however, no-fault also can lead to build-up of claims and possibly greater fatality rates. Furthermore, the philosophical issue of justice has not been resolved.

Choice No-Fault

In an apparent effort to encourage greater participation in no-fault plans, proponents have devised a system under which drivers can select either no-fault or tort schemes when they purchase insurance. Choice is offered in part as a response to concerns about justice (O'Connell and Joost, 1986). The plan is controversial, with proponents and opponents offering evidence of reasons for and against its implementation. These debates have taken on national importance as choice is considered at by the U.S. Congress (auto choice reform acts were proposed in both the 1997 and 1999 Congresses).

Choice has been proposed in a variety of forms, but all proposals offer similar core concepts, most notably the availability to motorists of selecting between tort and no-fault options when they purchase insurance. The selection generally affects a party's right to sue for noneconomic damages, with no-fault selectors losing some of those rights in exchange for lower insurance premiums. Variations across choice plans focus on whether or not a threshold to sue exists under the no-fault option, and if so what it is, as well as the source of payment to tort selectors. Under some plans, an injured party's own insurer pays tort costs, whereas under others, tort damages are paid from

either a state fund or the negligent no-fault driver's insurer. Safety incentives clearly differ under each scenario.

In NJ and PA, insureds choose between no-fault and tort at the time they purchase insurance. The most significant effect of the choice is to limit one's ability to receive noneconomic damages. Motorists who choose the no-fault option receive payment for their injuries from their own insurers up to the statutory minimum limit of coverage, just as in any no-fault jurisdiction. The statutory requirements are $15,000 Personal Injury Protection (PIP) covering medical expenses in NJ, and $5,000 PIP covering medical expenses in PA. Any *economic damages* above these limits can be sought from a negligent third party. Noneconomic damages are available only if injuries exceed a stated verbal threshold of seriousness.

For insureds in either state who select the tort option, no limitation on noneconomic damages exists. Both, Bodily Injury (BI) liability and PIP coverages, therefore, must be purchased by all NJ and PA drivers. Premiums, however, are required by law to incorporate a reduction for insureds who select the no-fault option, and therefore do not reflect directly the tort obligations of no-fault drivers. To protect insurers who provide no-fault coverage against these unfunded liabilities, New Jersey has created a Risk Exchange. The Risk Exchange reimburses no-fault insurers for the noneconomic damages their insureds must pay to tort claimants. Table 1 presents the compensation systems pre- and postchoice. Note that the default option in the two states differs. In New Jersey, the default option is no-fault whereas in Pennsylvania it is tort. A large majority of insureds operate under the default option.

A few studies have considered the potential effects of choice on various outcomes. From a theoretical perspective, Powers (1992) examined equity considerations of the

TABLE 1
Compensation Systems in New Jersey and Pennsylvania Pre- and Postchoice

	Prechoice		Postchoice
New Jersey	(Before January 1, 1984) No-fault system with $200 threshold	(After January 1, 1984) No-fault system with monetary threshold options: $200 or $1,500. Lower premium for higher threshold.	(After January 1, 1989) Choose between no limit on tort compensation with add-on PIP, and limit on tort with verbal threshold. Lower premium for no-fault. Default is no-fault.
Pennsylvania	(Before October 1, 1984) No-fault system with $750 threshold	(After October 1, 1984) Add-on system with no limit on tort claims	(After July 1, 1990) Choose between no limit on tort compensation with add-on PIP, and limit on tort with verbal threshold. Lower premium for no-fault. Default is tort.

Source: Hammitt et al. (1985); Insurance Research Council (1999).

various automobile compensation systems. He concluded that choice is more "tort equitable" and "rate equitable" than other currently observed systems. That is, Powers concludes that choice is tort equitable because it does not involuntarily restrict injured parties from using the tort system, and also rate equitable by offering lower rates to insureds who chose not to use the litigation system.

Carroll and Abrahamse (1998) and the Joint Economic Committee of the U.S. Congress (1998) analyzed the effects of choice through simulations of system costs under various assumptions. These simulated results suggest that the implementation of choice could reduce overall automobile insurance premiums by 24 percent nationwide and yield payment relative to economic loss more consistent across injured parties. The reduction of costs as well as the consistency of payment generate primarily from assumptions of lower general damages paid to injured parties. Interestingly, the cost reductions do not derive primarily from significant reductions in administrative expenses. The results are also dependent on assumptions regarding the distribution of losses across tort and no-fault selectors. Carroll and Abrahamse (1998) assume no adverse selection.

Carr (1989) and Kabler (1999) contend that choice would lead to problems of adverse selection and as a result be less efficient due to the existence of externalities. Adverse selection will occur if "good" risks select the tort system and "bad" risks select no-fault. Under this scenario, the poor drivers will not pay the true costs of their poor driving because the tort obligations of no-fault selectors are not factored into the no-fault selector's insurance premium. In a similar vein, the American Academy of Actuaries (1998) notes that choice is likely to result in cost shifting; for instance, costs will tend to shift from heavier vehicles to lighter ones, which may lead to undesired distortions in the market.

Despite enactment of choice systems in New Jersey (NJ) and Pennsylvania (PA) more than a decade ago, we know of no empirical studies of choice systems' actual effects. The ultimate effects of choice, therefore, remain the subject of debate. By examining auto insurance claims data before and after the choice legislation in these two states, and across no-fault and tort selectors postchoice, compensation related issues of efficiency, timeliness, and equity can be analyzed and become a part of the debate.

HYPOTHESES

Three primary criticisms of automobile compensation systems in the United States led to state no-fault enactments: (1) excessive cost of the legal system (i.e., too many lawyers); (2) delay in payment; and (3) incomplete and inequitable compensation (Keeton and O'Connell, 1965; Rolph, Hammitt, and Houchens, 1985). These criticisms also have provided the foundation for most empirical studies of no-fault's effectiveness.[3] From these criticisms our hypotheses are derived.

Recognize, however, that these criticisms focus on efficiency aspects of automobile compensation systems. They do not address the behavioral effect of placing fault on

[3] A very important additional question, which we do not consider, is whether or not no-fault encourages moral hazard. Evidence exists that no-fault leads to greater incidence of fatalities (Cummins et al., 2001).

negligent drivers. Negligence is often considered important from a safety standpoint as well as a social justice perspective. We believe choice is proposed and enacted as an effort to provide a middle ground opportunity between social justice and cost efficiencies, especially in those proposals that offer greater elements of true selection by drivers. Generally we consider choice as an option falling between no-fault and tort. As such, and because no-fault is promoted as a mechanism to address tort system problems, we anticipate an improvement following choice in PA, which switched from tort to choice, but a worsening in NJ, which switched from no-fault to choice. Additionally, we anticipate that under the choice system, no-fault selectors will be involved in claims that result in less attorney usage, speedier time to payment, and more consistent payment than will tort selectors.

Attorney Involvement (Administrative Waste)

One of the fundamental objectives of no-fault is to reduce the involvement of attorneys, and therefore reduce administrative costs. Contingency fees alone represent at least one-third of compensation to represented plaintiffs, whereas court costs and adjuster time adds approximately nine percent of insurer premium dollars (Carroll and Abrahamse, 1998). By eliminating the need to prove negligence as well as the existence and/or size of noneconomic damages, no-fault systems are expected to lower the use of attorneys.

Because NJ switched from no-fault to choice, we hypothesize that NJ will experience higher attorney usage after choice. Because PA switched from tort to choice, we hypothesize that PA will experience lower attorney usage after choice. Furthermore, we anticipate that no-fault selectors will use attorneys less often than will tort selectors.

H1a: Incidence of attorney usage will rise (decline) after choice in NJ (PA)

H1b: Incidence of attorney usage will be lower for no-fault selectors than tort selectors under choice

Settlement Duration

A second important objective of no-fault is for injured parties to receive compensation more quickly. More than half of all BI liability claimants receive payment later than 1 year after the relevant accident (IRC, 1999). Especially for claimants without other forms of compensation, such delay can be devastating financially. No-fault has been offered as a method for speeding up the payment process because determination of fault is unnecessary. As above because of their positions prechoice, we anticipate NJ will experience a longer duration between the accident date and actual payment postchoice whereas PA will experience a shorter settlement duration.

H2a: Settlement duration will rise (decline) after choice in NJ (PA)

H2b: Settlement duration will be lower for no-fault selectors than for tort selectors

Variability (Equity) in Payment

A third, related, objective of no-fault is to provide a more expansive and equitable payment to claimants. That is, if no-fault functions as intended, a larger percentage

of injured parties would receive payment and the amount of compensation received relative to economic loss incurred would be less variable across claimants than under tort. Because we do not have data on accidents in which no payment is made, we cannot test the extent of payment. We can, however, test the variability of payment for those claims with payment. Moving from no-fault to choice, we anticipate NJ will experience increased variability in payment, whereas PA, which moved from tort to choice, will experience decreased variability.

H3a: Variability in payment will rise (decline) after choice in NJ (PA)

H3b: Variability in payment will be lower for no-fault selectors than for tort selectors

DATA AND METHODOLOGY

The purpose of this research is to test the effects of choice automobile compensation plans on three factors generally considered important in evaluating the effectiveness of such systems: administrative costs, timeliness of payment, and consistency of payment across injured parties. We also consider differences across dimensions between tort and no-fault systems within choice. A rich data set of closed claims allows us to undertake such analyses.

Data

The IRC conducted national automobile insurance personal injury closed-claims surveys in 1977, 1987, 1992, and 1997. The surveys focused on claims closed with payment during a designated 2-week period in each survey year. The questionnaires contained information regarding the claimant, insured, characteristics of the accident, type of injury, medical treatment, losses incurred and payments received, attorney involvement, relevant coverage, and case disposition—creating approximately 250 variables for each claim. Because the participating companies together wrote more than 60 percent of the U.S. private passenger automobile insurance at the time the data were collected, these data sets provide a representative source for analysis of auto compensation systems in the United States.

To consider the effect of choice, we utilize claims data from NJ and PA found in the year 1987 and 1997 data sets. The 1992 data set, although containing both pre- and postchoice claims, was excluded in the analysis because it is biased in the postchoice sample by including only claims that take a very short time to settle. Remaining are 11,411 observations, of which 4,472 are excluded because of missing values.

An additional 35 observations are excluded for purposes of avoiding the bias resulting from the fact that the prechoice claims in the 1997 data set are at least 7 years old, which tend to be the more serious and complex cases. To eliminate this bias, we remove observations from the 1997 data set for accidents occurring before the date of choice implementation, January 1, 1989 for PA and July 1, 1990 for NJ. To provide consistency across the 1987 and 1997 data sets, we also limit claims from the 1987 data set to accidents that occurred after January 1, 1979 in PA and July 1, 1980 in NJ. Therefore, the 1987 data set contains prechoice claims exclusively whereas the 1997 data set, as we have defined it, contains postchoice claims exclusively. We are left with

TABLE 2
Number of BI and PIP Claims in NJ and PA: Pre- and Postchoice

Jurisdiction	Year	BI	PIP	Total
NJ	Prechoice	1,384	2,858	6,790
	Postchoice	1,166	1,382	
PA	Prechoice	957	1,103	4,621
	Postchoice	1,305	1,256	
Total		4,812	6,599	11,411

Source: Insurance Research Council (1989, 1999).

6,904 observations: 4,098 from NJ and 2,806 from PA. Of these, 2,492 are postchoice claims.

From these data, we test three equations related to: use of attorneys, time-to-payment, and variability in payment. We do this for NJ and PA pre- and postchoice and for no-fault/tort selectors postchoice. A logistic regression is employed for the attorney equation. Ordinary least squares is utilized for the time-to-payment equation. Tobit regression is employed to fit the variability in payment equation.

Our interest is in measuring the effects of the *system* pre- and postchoice. To undertake this analysis, we must consider both BI liability and PIP claims in the analysis. For example, a jurisdiction such as PA, which switched from an add-on tort system to choice, is expected to experience more BI claims that appear serious because the no-fault selectors must exceed a seriousness threshold to file a claim. If we analyze only BI claims, we are likely to observe increased attorney usage, longer time to payment, and greater variability solely because the BI claims are more often *on top of* PIP claims under choice than under the prior tort system. In contrast, NJ, which switched from a no-fault system with a dollar threshold to choice, is likely to experience increased numbers of BI claims at lower values because tort selectors are not subject to a threshold for BI claims. Our interest is in understanding how choice affects the use of attorneys, duration before payment, and variability in payment across all claims. One reviewer recommended the analysis of PIP claims and BI claims separately, suggesting that failure to do so "is picking up effects of both the change in regime and the mix of claims in the sample." Our argument is that the change in mix of claims *represents* the effect of change in regime. That is, we believe that the change in regime is intended to and is all about altering the mix of claims by allowing insureds to choose the system under which they will function, either tort or no-fault; therefore, we compare combined PIP and BI pre- and postchoice.[4]

Tables 2 and 3 report the number of observations in each state and across claim category. An interesting observation is the large number (over 1/3 of all observations) of claims under choice where the claims adjuster did not record the legal option to which

[4] We conducted the analysis as requested by the reviewer, however, and later report results of those tests. These results support our view of testing the effects of choice by combining PIP and BI claims.

TABLE 3
No-Fault/Tort Selectors in Postchoice Claims

Jurisdiction	No-Fault/Tort	BI	PIP
New Jersey	No-Fault	541	839
	Tort	442	187
	Unknown	183	356
	Total	1,166	1,382
Pennsylvania	No-Fault	212	277
	Tort	757	393
	Unknown	336	586
	Total	1,305	1,256

Source: Insurance Research Council (1999).

the claim was subject. We speculate that some period of transition is occurring, both in the general public and within insurance organizations regarding full understanding of the effects of the choice system. A review of the summary statistics, shown in the Appendix, offers some indication that these claims may represent the default option of the state. We conducted the analyses under this assumption and found our results not to differ substantially; hence, to be conservative in the postchoice analyses, we have omitted these observations.

TESTABLE EQUATIONS

Attorney Involvement

As presented by Cooter and Rubinfeld (1989), injured parties are expected to utilize the legal system to attain compensation when the expected benefits of such action exceed expected costs. People injured in automobile accidents, therefore, will hire attorneys when they perceive the attorney's value as exceeding the expense (the contingency fee, court costs, and time). As shown by Cooter and Rubinfeld, attorney value is relatively higher under various general conditions, including when: a disparity exists between the parties about the claim value; the stakes are high; and the claimant is less risk averse. Each of these conditions leads to greater likelihood of continued litigation rather than settlement, and therefore, greater use of attorneys.

Disparity in "Perceived" Claim Value. A number of conditions may cause plaintiffs and defendants to differ in their perception of claim value, leading to greater perceived value of and therefore use of attorneys. These conditions generally involve case complexity, including: whether or not the claim is subject to tort or no-fault; clarity of claimant fault; and number of vehicles involved in the accident.

Parties in litigation are more likely to differ in their perceptions about the claim value under a tort than no-fault regime. Under tort, both liability (i.e., negligent behavior) and damages must be proven for payment to occur. The determination of liability or negligence often involves complex legal conditions that can be interpreted in multiple ways. Similarly, measurement of damages, especially noneconomic damages, can

involve significant dispute. Under no-fault, in contrast, the mere occurrence of injuries leads to payment. No need exists to prove complex legal conditions associated with negligence. Furthermore, payment for injuries is typically stipulated by law, and excludes noneconomic damages, leaving far less room for disagreement under no-fault than under tort. Because we anticipate greater use of attorneys in a tort than no-fault system, we expect attorney involvement *postchoice* in NJ to rise and to fall in PA. Recall that NJ switched from no-fault to choice whereas PA switched from tort to choice. Considering only postchoice claims, we also anticipate greater use of attorneys by claimants who have selected tort than who have selected no-fault.

Perceptions about claim value are also likely to differ as proof of fault is more nebulous. As Ross (1980) discusses, attorneys are less valuable in situations where liability is certain (near 0 percent and 100 percent) and more valuable where liability is unclear (near 50 percent), which describes a curvilinear relationship. The data set includes an estimate by the claims adjuster of the *claimant's percent fault*. We use this estimate and its square to capture the curvilinear relationship between attorney usage and liability, anticipating a positive coefficient on the linear term and a negative coefficient on the quadratic term. Such a finding would be consistent with Browne and Puelz (1999).[5]

The *number of vehicles* involved in the accident is a further indication of case complexity, leading to greater perceived value in hiring an attorney. With increasing numbers of vehicles and therefore disputants involved in the litigation, sorting out relative fault and responsibility becomes more challenging. Employment of an expert, the attorney, will have greater value in these situations. We anticipate a positive relationship between the number of vehicles involved in the accident and attorney usage.

Claim Size (or Stakes). Cooter and Rubinfeld indicate that parties are more likely to pursue additional steps of litigation when the stakes are high. Therefore, a positive relationship between claim size and attorney usage is anticipated. Such a finding would be consistent with prior empirical work (Fields and Venezian, 1991; Browne and Puelz, 1999). We measure claim size as the *total economic loss*, as reported in the file. While Cooter and Rubinfeld assume case stakes are exogenous, another possibility is that attorneys actually affect size, either through expert identification of true costs or through build-up of claims (see, e.g., Conners and Feldblum, 1998). Under this scenario, claim size is endogenous. To account for endogeneity, we conducted the tests using an instrumental variable for total loss and found no substantial difference in results; hence, we report results using the original loss value.

The net stakes of a claim are also affected by the costs of litigation itself. Other studies have shown litigation rates to be positively related to *urbanization*. The general theoretical explanation for this outcome is that litigation is easier and less costly in urban than rural areas, in part because of easier access to legal representation (Ross, 1980; Browne and Puelz, 1996; Cummins and Tennyson, 1996). We anticipate, therefore, that an accident in an urban area would be more likely associated with attorney involvement than one in a rural area.

[5] For each equation we also considered whether or not the insured driver was covered in the residual market, but the variable was insignificant and the remaining results were unchanged.

Risk Aversion. Cooter and Rubinfeld's analysis further indicates that risk averse parties are more likely to settle early in the process (or never initiate litigation) than to continue. We anticipate, therefore, a negative relationship between risk aversion and employment of attorneys. Several recent studies have shown gender and age to be related to risk aversion. Using life insurance purchases as reported in the University of Michigan Health and Retirement Survey, Halek and Eisenhauer (2001) observe greater relative risk aversion among women than in men. They also observe decreasing relative risk aversion with increasing age until approximately the age of 65 when the relative risk aversion rises. These findings are consistent with prior studies, both empirical and experimental (see Levin, Snyder, and Chapman (1988) and Powell and Ansic (1997), regarding gendered risk attitudes, and Brown (1987) and Riley and Chow (1992) regarding age-related risk attitudes). Claimants who are *female* and younger in *age*, therefore, are expected to utilize attorneys less than men and older claimants until *age* 65.[6]

Using similar arguments, Cummins and Tennyson (1996) contend that the tort system is a lottery. As such, a win of a given size would be more valuable to someone with few resources than to someone with extensive resources. Following this argument, and consistent with Cummins and Tennyson's empirical results, we anticipate that *unemployed* parties will be greater risk takers and therefore utilize attorneys more often than will employed claimants.

Lastly we add an indicator variable in the PA analyses to recognize that our prechoice PA data come across two legal regimes. The insured policy issued or renewed before October 1, 1984 was under no-fault (with monetary threshold) and claims after that date belonged to an add-on tort system. Because those are older claims, the accidents having occurred before 1984 but not settled until 1987, they are likely to differ from the other observations.

Our testable equation is represented as:

$$\begin{aligned}\text{Logit}(\Pr(A=1)) = {} & \beta_0 + \beta_1\,\text{Choice} + \beta_2\,\text{Clmtfault} + \beta_3\,\text{Clmtfault\_sq} + \beta_4\,\#\text{Vehicles} \\ & + \beta_5\,\text{Ln(Econ Loss)} + \beta_6\,\textit{U}\text{rban} + \beta_7\,\text{Female} + \beta_8\,\text{Ln(Age)} \\ & + \beta_9\,\text{Age 65} + \beta_{10}\,\textit{U}\text{nemployed} + \beta_{11}\,\text{PA\_84} + \varepsilon. \qquad (1)\end{aligned}$$

A second equation utilizing only postchoice data is also estimated. The second equation replaces "choice" with "no-fault" to distinguish between no-fault selectors and tort selectors. The intention of this second analysis is to observe variations in claiming patterns between no-fault and tort selectors. We anticipate, for example, that no-fault selectors will be less likely to employ an attorney than will tort selectors, given the lower level of disputed damages (only special damages are available unless the claim is deemed serious). We do not distinguish between PIP and BI claims, however, because we consider the overall claiming pattern to be the key element of interest. Even if PIP claims are less likely to incorporate attorney involvement, if no-fault selectors are frequently utilizing the BI option, the overall effect of no-fault selection may be distorted in the PIP data. We recognize an important limitation of this analysis, however,

[6] As pointed out by an anonymous reviewer, some of these results may also reflect differing negotiating styles across groups.

which is the likelihood of endogeneity of choice itself. As discussed in "Literature Review," no-fault selectors can be expected to be higher risk than tort. Because we do not have data on insureds who do not make claims, however, we are unable to address this endogeneity issue.

Both equations are analyzed separately for NJ and PA in order to avoid confounding effects of state factors. Because our dependent variable (whether or not an attorney is involved in the claims settlement) is binary, a logistic regression technique is appropriate. We utilize maximum likelihood to estimate the logistic regression equations.

Settlement Duration

The second element we examine in this article is the effect of legal systems on settlement duration, which is the number of days from the accident report date to the final payment date for the claim. We use the natural log of this measure as the dependent variable. As above, we can look to Cooter and Rubinfeld for theoretical expectations of relevant factors, and as above, we would anticipate lower likelihood of early settlement with increased disparity in perceptions between parties, increased stakes, and decreased risk aversion. In each of these situations, parties will perceive the value of continued litigation to exceed the costs, leading to longer settlement duration.

Disparity in "Perceived" Claim Value. As above, tort claims are expected to yield greater instances of perceived differences in claim value between plaintiffs and defendants than are no-fault claims. Under tort, disputes arise about the existence of negligence as well as the size of damages; neither of these issues should arise generally in no-fault claims. Our expectation, therefore, is that no-fault will require less time than will tort, and as a result, *postchoice* NJ will experience an increase in settlement time whereas PA will experience a decrease. We also expect a shorter time to settlement for no-fault selectors than tort selectors postchoice.

Similarly, we anticipate a positive relationship between attorney representation and settlement time (Ross, 1980). A represented claim is expected to be associated with longer length of time to settle than is a nonrepresented case, *ceteris paribus*, because the use of an attorney adds another layer of complexity in the process. An attorney will negotiate more extensively with the insurer, assist the claimant in identifying all of the costs incurred from the accident, and manage the legal aspects of the case. Use of an attorney is also a signal to the opposing party about perceived value of the claim.

A confounding factor in identifying the effect of an attorney is that claimants are likely to hire attorneys when cases are complex, whereas complex cases themselves are likely to take longer to settle. In an effort to isolate the attorney effect from the complexity effect, the net attorney representation from Equation (1) will be used as an explanatory variable for time to completion. Equation (1) is used to estimate the expected probability of attorney involvement in seeking compensation for losses associated with automobile accidents. We use the residuals from this expected representation model to estimate the extent to which a given claim's choice of attorney is above or below its expected (target) probability. This residual (the deviation from

the expected probability of involvement) represents the net uncontaminated legal presence.

Previous studies generally use the attorney variable as an exogenous predictor. However, this approach does not control the "selection bias" as noted above, nor does it control the collinearity effects of attorney with other variables such as size of economic loss. We use the *attorney residuals* of Equation (1), which should be relatively independent from variables such as size of economic loss, type of coverage, etc., as an explanatory variable of time to settlement. The coefficients ought to capture the net effect of legal presence on time to settlement, which we expect to be positively related with net attorney representation.

Whether or not an attorney is employed, the filing of a *lawsuit* is further indication that the parties are unable to find a mutually acceptable settlement. These cases, therefore, are expected to take longer to reach conclusion. As Ross (1980) discusses, the tenor of the claim changes dramatically when the claimant files a lawsuit, causing both the insurer and the claimant to be more deliberate and careful in their interactions.

Additionally, *claimant fault* provides a measure of likely differences in perceived claim value. Where fault is quite obvious (near 0 percent and near 100 percent), less disparity is likely to exist than where fault is unclear (near 50 percent). As with the attorney equation, we utilize variables representing both claimant fault and its square to define this curvilinear relationship, anticipating a positive coefficient on fault and a negative coefficient on its square. We further incorporate a measure discussed above in the attorney equation regarding complexity: the *number of vehicles* involved in the accident.

Claim Size (or Stakes). As discussed above, Cooter and Rubinfeld demonstrate that as claim stakes rise, willingness to settle declines. Here, the value of litigation grows because the possible benefit of winning is larger. Furthermore, the relative cost of dealing with the claim declines as the claim value rises. Where an insurer or claimant may be willing to settle a small-valued claim quickly, that insurer or claimant is likely to argue longer and more extensively over a large-valued claim. Therefore, we anticipate longer settlement time for larger-valued claims, measured as the natural logarithm of *total economic loss*.

Urbanization is a further measure of cost, with less cost to litigate in urban than in rural areas. Because litigated cases are likely to take longer to settle, we anticipate a positive relationship between urbanization and time to payment.

Risk Aversion. We again include variables to account for risk aversion, anticipating that claimants who are *female* will demonstrate greater risk aversion whereas those at older *age*s (to the age of 65) and who are unemployed will demonstrate less risk aversion. The greater the risk aversion, the shorter the duration until payment, given the claimant's lower willingness to "gamble" for larger proceeds. Women, younger, and employed claimants, therefore, will be involved in cases with shorter time to payment.

As above, we add an indicator variable in the PA analyses, to account for the pre-1984 claims.

To test our hypotheses, we estimate the following equation:

$$\begin{aligned}\text{Ln(Settlement Duration)} = {} & \beta_0 + \beta_1 \text{ Choice} + \beta_2 \text{ Resid\_Attorney} + \beta_3 \text{ Lawsuit} \\ & + \beta_4 \text{ Clmtfault} + \beta_5 \text{ Clmtfault\_sq} + \beta_6 \text{ \#Vehicles} \\ & + \beta_7 \text{ Ln(Econ Loss)} + \beta_8 \text{ Urban} + \beta_9 \text{ Unemployed} \\ & + \beta_{10} \text{ Female} + \beta_{11} \text{ Ln(Age)} + \beta_{12} \text{ Age 65} \\ & + \beta_{13} \text{ PA\_84} + \varepsilon. \end{aligned} \tag{2}$$

A second equation utilizing only postchoice data is also estimated. The second equation replaces "choice" with no-fault to distinguish between no-fault selectors and tort selectors. As above NJ and PA are analyzed separately. And also as above, we are unable to account for possible endogeneity of the choice itself in this second equation.

A linear regression model is employed for testing the effects of choice and no-fault/tort selection on settlement duration. We take natural logarithms of the skewed-to-the-right dependent variable, settlement duration, so as to make it relatively symmetrical. A conventional ordinary least square method is used to estimate the model.

Variability in Payment

Proponents of no-fault contend that while some claimants will receive lower payments than are available under tort, the distribution of payment relative to economic loss will be more stable under no-fault (and more people will receive payment). That is, while the tort system tends to pay higher multiples of economic loss to smaller-valued claims than to larger-valued claims, no-fault is believed to provide more consistency in ratios of payment to economic loss regardless of the size of the claim. We use a measurement of variability in payment equal to the absolute value of (payment − economic loss)/(economic loss) as our dependent variable.[7] If no-fault does provide more stability than tort, we expect that postchoice, NJ will experience greater variability in payment, whereas PA will experience less variability in payment. We also expect less variability in payment for no-fault selectors than tort selectors postchoice.

A Cooter and Rubinfeld analysis of variability in claim payment is more difficult to apply than the prior two analyses because many of the factors affecting relative payment are structural rather than negotiated. For instance, application of insurance limits, comparative negligence standards, and collateral source rules will alter relative payment, regardless of the parties' perception of the claims or risk attitudes. Because most variability generates from upside values and predominantly from noneconomic and punitive damages, we anticipate less variability when the claim exceeds the defendant's insurance limits, when payment is affected by the claimant's percent fault per comparative negligence standards, and when other sources of payment exist, such as workers' compensation or additional liable parties. To account for the effect of limits, we employ a Tobit censoring model as described below.

[7] We also attempted the analysis with a pure reimbursement ratio equal to the claim payment divided by the total economic losses. That analysis was less satisfactory in explanatory power than the one we report here.

Some elements affecting negotiations, such as risk attitudes, however, are also likely to be relevant. Cooter and Rubinfeld would anticipate less variability in relative payment with greater risk aversion, given parties' unwillingness to gamble the outcome. Risk averse claimants, therefore, will be willing to take lower-valued claims with certainty than the chance of a higher uncertain outcome. The dominant upside variability, therefore, is reduced. Given the prior discussion regarding greater risk aversion among younger and female drivers as well as employed individuals, we anticipate variability in payment will be positively related to *age* and being *unemployed*, and negatively related with being *female* and over *age 65*.

Variability in payment is also likely to arise when a defendant finds it advantageous to settle the claim. These situations are more likely when the *economic loss* is of low value (better to pay twice the economic losses when those losses equal $100 than $100,000). They are also more likely when the plaintiff signals perceptions of higher claim value through employment of an *attorney* and/or filing a *lawsuit*.

Once a claimant hires an attorney and/or files a lawsuit, the claim takes on more seriousness. Perceptions of claim value are likely to be revised upward by the defendant under these circumstances, leading to greater willingness to pay increased general damages. A negative relationship is expected with the size of economic loss whereas a positive relationship is anticipated with use of an attorney, filing of a lawsuit, and where a citation is issued against the insured driver.

Again we add an indicator variable for the PA analyses to recognize that our prechoice PA data come across two legal regimes.

The resulting equation is as follows:

$$\begin{aligned}\ln|[(\text{Payment} - \text{Econ Loss})/(\text{Econ Loss})]| &= \beta_0 + \beta\,\text{Choice} + \beta_2\,\text{Clmtfault} + \beta_3\,\text{Otherpay} + \beta_4\,\text{Female} + \beta_5\,\text{Ln(Age)} \\ &\quad + \beta_6\,\text{Age 65} + \beta_7\,\text{Unemployed} + \beta_8\,\text{Ln(Econ Loss)} + \beta_9\,\text{Resid\_Attorney} \\ &\quad + \beta_{10}\,\text{Lawsuit} + \beta_{11}\,\text{PA\_84} + \varepsilon. \end{aligned} \tag{3}$$

A second equation utilizing only postchoice data is also estimated. The second equation replaces "choice" with no-fault to distinguish between no-fault selectors and tort selectors. As we did with the first two models, these equations are tested separately for NJ and PA. Similarly, we recognize the limitation that endogeneity of choice may affect these results.

The test of relative variability is done through a Tobit model (Tobin, 1958) to account for the censoring of the claims data due to insured policy limits. Our data indicate that payments for 144 of the NJ claims and 143 of the PA claims are affected (i.e., censored) by the policy limits, thus the regression model estimated by a conventional OLS approach may yield biased parameter estimates.[8] The Tobit model, which accounts specifically for censored and truncated dependent variables, is used to fit the equation by the method of maximum likelihood.

[8] We thank an anonymous referee for this suggestion.

RESULTS AND DISCUSSION

Model Fit

Table 4 displays the logistic regression results for attorney involvement pre- and postchoice for NJ and PA separately. Table 5 presents results postchoice, comparing no-fault selectors to tort selectors for NJ and PA separately. For each model, the model fit statistics (−2 Log L, AIC, SC) indicate a reasonably good fit. Chi-square values for overall significance are large and *P*-values are less than 0.0001. The generalized coefficient of determination as described in the footnote of Table 4 (5) indicates that the explanatory variables together explain 38 (44) percent and 51 (52) percent of the total variation of the response in the NJ and PA models, respectively.

TABLE 4
Logistic Regression Results for Attorney Involvement

	New Jersey ($N = 4{,}098$)		Pennsylvania ($N = 2{,}806$)	
Variables	Parameter Estimates	Standard Error	Parameter Estimates	Standard Error
INTERCPT	−4.4685	0.3207	−5.7743	0.3882
Choice	0.3324**	0.0852	−0.1968*	0.1022
% Fault	1.9123**	0.4709	4.5893**	0.7674
% Fault_SQ	−3.8795**	0.5033	−6.4290**	0.8006
#Vehicles	−0.0138	0.1236	0.5129**	0.1585
Ln(Econ Loss)	0.7933**	0.0333	0.8379**	0.0385
Urban	0.3900**	0.0857	1.0751**	0.0998
Female	−0.2013**	0.0755	−0.0123	0.0997
Ln(Age)	−0.4173**	0.0748	−0.3854**	0.0939
Age_65	0.5384**	0.1869	−0.0458	0.2048
Unemployed	0.8964**	0.1318	0.8083**	0.1705
PA_84	NA	NA	1.2154**	0.2908
χ^2 for overall significance		1383.8114 ($P < 0.0001$)		1343.0052 ($P < 0.0001$)
Generalized coefficient of determination (R^2)[a]		0.2866		0.3804
Max-rescaled generalized coefficient of determination ($\tilde{R}^2$)[b]		0.3830		0.5074

*Statistically significant at 0.1 level.
**Statistically significant at 0.01 level.
[a]In their book on the analysis of binary data, Cox and Snell (1989, pp. 208-209) propose the generalized R^2 for general regression models: $R^2 = 1 - \{\frac{L(0)}{L(\hat{\beta})}\}^{\frac{2}{n}}$, where $L(0)$ is the likelihood of the intercept-only model, $L(\hat{\beta})$ is the likelihood of the specified model, and n is the sample size. This definition is consistent with classical R^2, and has an interpretation as the proportion of explained "variation."
[b]Since the quantity R^2 achieves a maximum of less than one for discrete models, where the maximum is given by $R^2_{\max} = 1 - \{L(0)\}^{\frac{2}{n}}$, Nagelkerke (1991) proposes the following adjusted coefficient, which can achieve a maximum value of one: $\tilde{R}^2 = \frac{R^2}{R^2_{\max}}$.

TABLE 5
Logistic Regression Results for Attorney Involvement Under Choice

	New Jersey ($N = 967$)		Pennsylvania ($N = 825$)	
Variables	Parameter Estimates	Standard Error	Parameter Estimates	Standard Error
INTERCPT	−4.4001	0.7466	−7.4223	0.8329
Post_NF	−0.8626**	0.2092	−0.3495	0.2167
% Fault	4.0333**	1.3548	4.5224**	1.6279
% Fault_SQ	−6.2028**	1.4134	−6.2559**	1.7099
#Vehicles	0.0310	0.3008	0.5672*	0.3327
Ln(Econ Loss)	0.9257**	0.0744	0.9747**	0.0742
Urban	0.7352**	0.2369	0.7016**	0.1889
Female	−0.3311*	0.1760	−0.3063	0.1872
Ln(Age)	−0.4521	0.1691	−0.1303	0.1851
Age_65	0.4294	0.3832	−0.6010*	0.3558
Unemployed	1.3183**	0.3394	1.3432**	0.3110
χ^2 for overall significance		361.0831 ($P < 0.0001$)		411.9498 ($P < 0.0001$)
Generalized coefficient of determination (R^2)		0.3116		0.3931
Max-rescaled generalized coefficient of determination ($\tilde{R}^2$)		0.4400		0.5241

*Statistically significant at 0.1 level.
**Statistically significant at 0.01 level.

Table 6 illustrates results of the time-to-completion pre- and postchoice for NJ and PA separately. Table 7 presents results postchoice, comparing no-fault selectors to tort selectors for NJ and PA separately. The degree of variation explained across states and data sets is rather consistent, resulting in adjusted R-squared's between 0.53 and 0.55. Variation Inflation Factors (VIFs) under 2.0 for all explanatory variables (other than claimant fault and its square, which we would anticipate to demonstrate high multicollinearity) suggest little concern over multicollinearity. Tests of heteroscedasticity, however, indicate the need to adjust the analysis according to White's (1980) consistent covariance matrix. The correction did not change the results substantially and did not change our conclusion regarding the major variables of interest.

Variability in payment analyses is shown in Tables 8 and 9. As above, the first table presents results pre- and postchoice for NJ and PA separately, whereas the second table presents results postchoice across tort and no-fault selectors for NJ and PA separately. The estimation results generally show smaller adjusted R-squared's across states and data sets compared to the previous two tests, although still acceptable at 23 to 33 percent. The lower adjusted R-squared may be due to the fact that the data do not include zero-payment claims, which may distort analyses of compensation. Similarly to the analyses of time-to-settlement, tests indicate no multicollinearity problem but a heteroscedasticity problem and so the adjusted standard errors are reported in Tables 8

TABLE 6
Ordinary Least Square Results for Settlement Duration

	New Jersey ($N = 4{,}098$)		Pennsylvania ($N = 2{,}806$)	
Variables	Parameter Estimates	Standard Error	Parameter Estimates	Standard Error
INTERCPT	3.13468	0.09220	3.22790	0.11879
Choice	0.19556***	0.02595	0.05914*	0.03327
Resid_A	0.45600***	0.02802	0.84113***	0.04056
Lawsuit	0.78633***	0.03292	0.69580***	0.05227
%Fault	0.34730**	0.14504	0.41572*	0.24290
%Fault_SQ	−0.65735***	0.15092	−0.72795***	0.24873
#Vehicles	0.15334***	0.03615	0.18079***	0.04884
Ln(Econ Loss)	0.29993***	0.00867	0.25168***	0.01090
Urban	0.07198***	0.02623	0.26920***	0.03324
Unemployed	0.19448***	0.03719	0.23565***	0.05327
Female	0.05435**	0.02298	0.06250*	0.03195
Ln(Age)	−0.05836***	0.02190	−0.06903**	0.03014
Age_65	−0.03718	0.05485	0.04410	0.06515
PA_84	NA	NA	1.03048***	0.07571
R^2	0.5342		0.5481	
Adjusted R^2	0.5328		0.5460	

*Statistically significant at 0.1 level.
**Statistically significant at 0.05 level.
***Statistically significant at 0.01 level.

and 9. The heteroscedasticity correction again did not change our conclusion regarding the major variables of interest and did not change the results substantially.

Attorney Involvement

As predicted and shown in Table 4, attorney involvement increases postchoice in NJ. PA results, however, are weakly indicative of decreased attorney involvement. We believe several factors may explain the PA results, including the initial small number of no-fault selectors in the state (see Regan, 2001) and/or the fact that PA switched from an add-on system to choice, which may not represent much of a system change. Referring to Tables 2 and 3, we observe that the distribution of BI and PIP claims in PA is similar pre- and postchoice whereas a much larger percentage of claims were PIP claims in NJ prechoice compared with postchoice.

Recall an earlier comment from a reviewer suggesting that our results reflect changes in claim mix rather than regime change effects. The reviewer requested analyses incorporating a PIP dummy and a choice∗PIP interaction term, which we performed. We observe the following. By including a control for PIP, which is the intent of this analysis, we are left with effects pre- and postchoice on BI claims. In NJ we would anticipate these effects to reflect (BI) claims that are less severe and less prone to use of attorneys, given that prechoice claims were above a PIP threshold. In PA, in contrast,

TABLE 7
Ordinary Least Square Results for Settlement Duration Under Choice

	New Jersey ($N = 967$)		Pennsylvania ($N = 825$)	
Variables	Parameter Estimates	Standard Error	Parameter Estimates	Standard Error
INTERCPT	3.59529	0.17950	2.44241	0.26134
Post_NF	−0.15742***	0.04783	−0.03449	0.07343
Resid_A	0.50761***	0.06238	0.88926***	0.09080
Lawsuit	0.88424***	0.05381	1.12484***	0.09389
%Fault	0.54371*	0.31175	0.50339	0.53981
%Fault_SQ	−0.80920**	0.32924	−0.67338	0.55900
#Vehicles	0.10503	0.07328	0.29490***	0.10972
Ln(Econ Loss)	0.30624***	0.01604	0.35237***	0.02079
Urban	0.03228	0.05418	0.24668***	0.06677
Unemployed	0.15121**	0.06535	0.26817***	0.10119
Female	−0.02407	0.04347	0.05989	0.06496
Ln(Age)	−0.09914***	0.03831	−0.09288	0.06386
Age_65	−0.08728	0.09284	0.09596	0.12156
R^2	0.5622		0.5485	
Adjusted R^2	0.5567		0.5419	

*Statistically significant at 0.1 level.
**Statistically significant at 0.05 level.
***Statistically significant at 0.01 level.

we do not anticipate any effect on BI claims, given a prechoice tort regime. These expectations are predominantly borne out in the analysis. Controlling for PIP in NJ, attorney usage declines postchoice but shows no statistical change in PA.[9]

In reviewing the postchoice results presented in Table 5, we observe that NJ and PA both show lower usage of attorneys by no-fault selectors than tort selectors, although PA's results show no effect of tort/no-fault selection on attorney involvement. We note that NJ has an unusually high usage of attorneys, both pre- and postchoice, and for PIP as well as BI claims. Prechoice, 60 percent of NJ claims were represented by attorneys, whereas only 50 percent of PA claims were represented. Remember that PA was a tort state and NJ a no-fault state prior to choice. Postchoice, 64 percent of NJ (83 percent of BI and 47 percent of PIP) and 45 percent of PA (59 percent of BI and 25 percent of PIP) claims were represented. The national average in the IRC data was 46 percent in the 1987 data set and 45 percent in the 1997 data set. Further complicating the comparisons here is that PA was an add-on state prior to choice. A possibility is that the shift to choice for PA merely formalized the *de facto* situation prechoice. Therefore, while we incorporate various population variables in the analyses, the results may not extend easily to other locales with different driving, political, and social environments.

[9] The other equations, to be discussed below, follow similar patterns. In addition, the control variables and goodness of fit are not substantially affected. Therefore, we feel comfortable that our analyses are correct.

TABLE 8
Tobit Model Results for Variability in Payment

	New Jersey ($N = 4{,}098$)		Pennsylvania ($N = 2{,}806$)	
Variables	Parameter Estimates	Standard Error	Parameter Estimates	Standard Error
INTERCPT	0.6462	0.0598	0.6098	0.0719
Choice	0.1345***	0.0171	0.0891***	0.0203
%Fault	−0.2526***	0.0214	−0.2741***	0.0259
Otherpay	0.0933***	0.0198	0.0426	0.0314
Female	−0.0307**	0.0153	−0.0131*	0.0197
Ln(Age)	0.0022	0.0146	0.0247	0.0184
Age_65	0.0612*	0.0363	−0.0529	0.0403
Unemployed	0.0395	0.0246	0.0525	0.0329
Ln(Econ Loss)	−0.0416***	0.0059	−0.0307***	0.0067
Resid_A	0.2978***	0.0186	0.3049***	0.0249
Lawsuit	0.4843***	0.0217	0.3000***	0.0320
PA_84	NA	NA	0.0957**	0.0469
Generalized R^2	0.2660		0.1527	
Max-rescaled generalized R^2	0.3264		0.2263	

*Statistically significant at 0.1 level.
**Statistically significant at 0.05 level.
***Statistically significant at 0.01 level.

TABLE 9
Tobit Model Results for Variability in Payment Under Choice

	New Jersey ($N = 967$)		Pennsylvania ($N = 825$)	
Variables	Parameter Estimates	Standard Error	Parameter Estimates	Standard Error
INTERCPT	1.1857	0.1403	0.4584	0.1517
POST_NF	−0.0375	0.0381	−0.0799*	0.0440
%Fault	−0.1492***	0.0555	−0.2148***	0.0545
Otherpay	−0.1292***	0.0418	−0.1326**	0.0593
Female	−0.0127	0.0347	−0.0404	0.0389
Ln(Age)	0.0366	0.0310	0.0778**	0.0380
Age_65	−0.0239	0.0740	−0.0957	0.0735
Unemployed	−0.0561	0.0523	0.0045	0.0606
Ln(Econ Loss)	−0.0938***	0.0131	−0.0098	0.0128
Resid_A	0.2096***	0.0498	0.3300***	0.0547
Lawsuit	0.4491***	0.0428	0.2167***	0.0560
Generalized R^2	0.1328		0.2210	
Max-rescaled generalized R^2	0.1498		0.2402	

*Statistically significant at 0.1 level.
**Statistically significant at 0.05 level.
***Statistically significant at 0.01 level.

Generally the control variables operate as expected. In most of the models, attorney usage is higher with larger-valued claims, with less certainty of fault (positive coefficient on claimant fault and negative coefficient on its square), for accidents that occur in urban areas, and when the claimant is unemployed. Attorney usage is lower in some of the models (NJ more often than PA) when the claimant is a woman, as anticipated, but also at higher claimant ages, which was not anticipated.

Settlement Duration

As anticipated and shown in Table 6, we observe a longer settlement duration in NJ after choice. Results for PA, however, also show weak evidence of longer settlement duration. Further, while postchoice results reported in Table 7 indicate that NJ no-fault selectors are involved with claims that take a shorter time to settle than do tort selectors, PA results indicate no significant difference. The same reasons why we observed no difference in attorney usage pre- and postchoice in PA may account for the unexpected results with duration.

Generally the control variables operate as expected. Claims where attorneys are employed and lawsuits filed, that are larger in economic value, where claimant fault is uncertain, and where the claimant is unemployed are associated with longer durations. Cases in which the claimant is a woman take a longer time to settle, as do cases with younger claimants.

Variability (Equity) in Payment

The final set of results involves testing whether or not choice affects the extent to which claims differ in how much is paid relative to economic loss incurred. The expectation is that no-fault will lead to less variability (negative coefficients) than tort, and hence, NJ will rise while PA falls postchoice. Tables 8 and 9 illustrate the results of the tests on variability for NJ and PA using full and postchoice only data separately.

Similar to the prior two tests, we observe NJ following expectations for the choice analysis, whereas PA violates them. Indeed, implementation of choice is associated with more variability in payment relative to loss in NJ as expected. Variability, however, also rises in PA, where we anticipated a decline. Between no-fault and tort selectors, we observe no statistical difference of claim payment variability in NJ. PA no-fault selectors show some decline in variability in payment.

The control variables included in this equation relate primarily to case qualities that would be more relevant in a BI cases than PIP cases, such as claimant fault, employment of an attorney, and whether or not the policy limits have been exceeded. They may, in fact, be acting as proxies for distinguishing between BI and PIP cases, with BI cases demonstrating greater variability.[10] For the most part, however, we observe results consistent with our expectations, although the overall explanatory power of the equation is quite a bit lower than for the other two sets of equations, and we feel less confident with these results than the others. We note, however, that even

[10] We conducted the analysis with a dichotomous variable to represent whether or not the claim was BI or PIP and found the coefficient highly significant and positive. Furthermore, the coefficient of the tort or no-fault selection is no longer significant in either equation.

accounting for other factors, claim size remains highly important in explaining variability in payment.

IMPLICATIONS AND FUTURE RESEARCH

Criteria for decisions about how best to design compensation systems for injured parties seem generally to seek a balance between accurate placement of responsibility with efficient processes. In the automobile compensation system, that balance has teetered between tort and no-fault, with no clear and overall best solution emerging. By offering motorists a choice between tort and no-fault rather than imposing one or the other system upon them, NJ and PA offer a third option, one we are able to test with a rich data set available from the IRC. We are also able to test tort versus no-fault systems within each jurisdiction and for a common time period, eliminating some of the difficulties inherent in earlier studies.

NJ's results are clearly consistent with expectations, demonstrating that a move from no-fault to choice increases attorney involvement, settlement duration, and variability in payment. PA, in contrast, shows weak evidence of decreased attorney usage, weak evidence of a longer duration, and strong evidence of increased variability in payment relative to loss. We had speculated that PA's change would yield lower attorney usage, shorter time to payment, and less variability, given its switch from a tort system to choice. Perhaps PA's results are still in transition, and these results will be observed ultimately as increasing numbers of insureds choose no-fault.[11] Alternatively, our observations may reflect the possibility that a move from an add-on tort state to choice may not represent a significant modification in the automobile compensation system. If a pure tort state were to switch to choice, the effect might well be statistically obvious.

Another possible explanation deserving of future research is that an inherent bias toward litigation exists, at least in these two states and particularly in NJ. If such a bias exists, a movement from no-fault to choice is a move consistent with the bias whereas a movement from tort to choice is a move counter to that bias. The move from tort, therefore, would be less likely to show results consistent with the expectations expressed here because it would be fighting against the natural bias.

Such a bias would provide a similar justification for our observations when comparing tort and no-fault selectors (postchoice), with NJ's experience generally consistent with expectations whereas PA's experience is less clear. In NJ, no-fault selectors use fewer attorneys and take a shorter time to settle, although we observe no statistically significant difference between no-fault and tort selectors with regard to variability in payment. No-fault selectors in PA show weakly significantly less variability in relative payment, but no statistical difference in attorney usage or time-to-settlement when compared with tort selectors.

We cannot ignore the possibility as well that NJ is the unusual jurisdiction in that it involved such significant litigation under its no-fault system that preceded choice. Our results may be more a reflection of NJ's extreme nature than of choice.

[11] The evidence is that increasing numbers of motorists are switching to no-fault (see Regan, 2001).

We conclude that the ultimate effect of choice remains uncertain. Making firm conclusions regarding no-fault versus tort selectors is also challenging, with no clear obvious pattern observed. In both states, evidence of lower attorney usage for no-fault selectors exist, but otherwise the results are mixed. Additionally, any pattern we do observe could result from a more efficient system or they could be the result of adverse selection. To test for adverse selection, we need data on insureds who do not experience claims as well as those who have claims (we also need data on claims closed without payment).

We also note outcomes associated with some of our control variables. Halek and Eisenhauer (2001) recently presented evidence of greater risk aversion among women and younger people than among men and older people (until we reach approximately the age of 65). Our results neither strongly support nor reject their hypotheses. The relationships between demographic characteristics and risk attitude present interesting intellectual issues worthy of further investigation. The answers are particularly important in public policy debate regarding automobile compensations systems because of possible conflicting objectives across categories of drivers.

APPENDIX

Variable Description and Summary Statistics

TABLE A1
Variable Descriptions

Variable	Description
Attorney	1 if claimant hired an attorney; 0 if claimant did not hire an attorney
Ln(duration)	natural log of number of days from the accident date to final payment date
Ln(variability)	natural log of the absolute value of (payment − econ loss)/(econ loss)
Choice	1 if accident occurred postchoice; 0 if prechoice
Post_NF	1 if insured policy is no-fault; 0 if tort
% Fault	claims adjuster's estimate of the claimant's percent fault
% Fault_SQ	square of claimant's percent fault
#Vehicles	number of vehicles in the accident
Ln(Econ Loss)	natural log of the claimant's lost wages and medical expenses
Urban	1 if accident occurred in an urban area; 0 otherwise
Ln(Age)	the natural log of the claimant's age
Age_65	1 if the claimant is of 65 years of age or older; 0 otherwise
Female	1 if claimant is female; 0 if male
Unemployed	1 if claimant was unemployed at the time of the accident; 0 otherwise
Exceed	1 if the claimant's economic losses exceed policy limits; 0 otherwise
Otherpay	1 if other sources of payment are available for the loss; 0 otherwise
Resid_A	residual of attorney equation from Equation (1)
Lawsuit	1 if claimant filed a lawsuit against insured driver; 0 otherwise
PA_84	1 for Pennsylvania claims under no-fault regime (policy issued or renewed before October 1, 1984)

TABLE A2
New Jersey Summary Statistics—Full Data

Variable	Prechoice ($N = 2,866$)	Postchoice ($N = 1,232$)
Attorney	0.491 (0.500)	0.663 (0.473)
Ln(duration)	5.429 (1.054)	5.925 (1.020)
Ln(variability)	0.344 (0.548)	0.527 (0.567)
Choice	0.000 (0.000)	1.000 (0.000)
% Fault	0.256 (0.374)	0.172 (0.328)
% Fault_SQ	0.206 (0.365)	0.137 (0.314)
#Vehicles	0.663 (0.342)	0.684 (0.312)
Ln(Econ Loss)	7.494 (1.471)	8.183 (1.429)
Urban	0.289 (0.453)	0.210 (0.408)
Ln(Age)	3.392 (0.555)	3.434 (0.627)
Age_65	0.049 (0.216)	0.066 (0.248)
Female	0.554 (0.497)	0.516 (0.500)
Unemployed	0.099 (0.299)	0.127 (0.334)
Otherpay	0.177 (0.382)	0.222 (0.416)
Resid_A	−0.000 (0.456)	0.000 (0.443)
Lawsuit	0.154 (0.361)	0.255 (0.436)

TABLE A3
Pennsylvania Summary Statistics—Full Data

Variable	Prechoice ($N = 1,535$)	Postchoice ($N = 1,271$)
Attorney	0.507 (0.500)	0.445 (0.497)
Ln(duration)	5.320 (1.194)	5.285 (1.285)
Ln(variability)	0.427 (0.566)	0.511 (0.532)
Choice	0.000 (0.000)	1.000 (0.000)
% Fault	0.237 (0.382)	0.203 (0.379)
% Fault_SQ	0.202 (0.375)	0.185 (0.373)
#Vehicles	0.621 (0.368)	0.653 (0.324)
Ln(Econ Loss)	7.476 (1.726)	7.548 (1.691)
Urban	0.497 (0.500)	0.393 (0.489)
Ln(Age)	3.406 (0.570)	3.489 (0.629)
Age_65	0.059 (0.235)	0.101 (0.301)
Female	0.532 (0.499)	0.555 (0.497)
Unemployed	0.100 (0.300)	0.095 (0.3294)
Otherpay	0.121 (0.326)	0.101 (0.302)
Resid_A	0.000 (0.424)	−0.000 (0.451)
Lawsuit	0.122 (0.327)	0.149 (0.357)
PA_NF	0.101 (0.301)	0.000 (0.000)

TABLE A4
NJ Summary Statistics—Postchoice Data Only

Variable	Post_NF = missing ($N = 265$)	Post_NF = 0 ($N = 290$)	Post_NF = 1 ($N = 677$)
Attorney	0.551 (0.498)	0.821 (0.384)	0.640 (0.480)
Ln(duration)	5.686 (1.031)	6.169 (0.873)	5.913 (1.051)
Ln(variability)	0.428 (0.449)	0.597 (0.641)	0.536 (0.571)
Post_NF	. (.)	0.000 (0.000)	1.000 (0.000)
% Fault	0.200 (0.362)	0.122 (0.260)	0.182 (0.338)
% Fault_SQ	0.171 (0.351)	0.082 (0.234)	0.147 (0.326)
#Vehicles	0.683 (0.333)	0.699 (0.297)	0.677 (0.310)
Ln(Econ Loss)	7.940 (1.446)	8.318 (1.310)	8.221 (1.461)
Urban	0.230 (0.422)	0.272 (0.446)	0.176 (0.381)
Ln(Age)	3.418 (0.645)	3.420 (0.610)	3.446 (0.627)
Age_65	0.053 (0.224)	0.059 (0.235)	0.074 (0.262)
Female	0.513 (0.501)	0.483 (0.501)	0.532 (0.499)
Unemployed	0.125 (0.331)	0.169 (0.375)	0.111 (0.314)
Otherpay	0.185 (0.389)	0.190 (0.393)	0.251 (0.434)
Reside_A	. (.)	0.000 (0.375)	0.000 (0.444)
Lawsuit	0.136 (0.343)	0.310 (0.463)	0.278 (0.448)

TABLE A5
PA Summary Statistics—Postchoice Data Only

Variable	Post_NF = Missing ($N = 446$)	Post_NF = 0 ($N = 613$)	Post_NF = 1 ($N = 212$)
Attorney	0.359 (0.480)	0.522 (0.500)	0.401 (0.491)
Ln(duration)	5.150 (1.143)	5.406 (1.366)	5.218 (1.299)
Ln(variability)	0.418 (0.431)	0.585 (0.589)	0.491 (0.517)
Post_NF	. (.)	0.000 (0.000)	1.000 (0.000)
% Fault	0.240 (0.412)	0.168 (0.344)	0.225 (0.397)
% Fault_SQ	0.227 (0.411)	0.146 (0.332)	0.207 (0.391)
#Vehicles	0.621 (0.337)	0.675 (0.305)	0.655 (0.346)
Ln(Econ Loss)	7.390 (1.726)	7.693 (1.659)	7.461 (1.683)
Urban	0.370 (0.483)	0.423 (0.494)	0.354 (0.479)
Ln(Age)	3.413 (0.718)	3.537 (0.547)	3.513 (0.639)
Age_65	0.110 (0.313)	0.088 (0.284)	0.118 (0.323)
Female	0.543 (0.499)	0.569 (0.496)	0.538 (0.500)
Unemployed	0.061 (0.239)	0.116 (0.320)	0.108 (0.312)
Otherpay	0.063 (0.243)	0.124 (0.330)	0.118 (0.323)
Resid_A	. (.)	−0.000 (0.450)	−0.000 (0.442)
Lawsuit	0.089 (0.276)	0.194 (0.396)	0.160 (0.368)

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