Risk Aversion, Negotiation, and Claims Settlement Strategies

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Abstract

We examine the optimal claims settlement strategy for a liability insurer negotiating with classes of claimants who differ in risk attitude and negotiating skill. Our model demonstrates that a profit-maximizing insurer will be systematically less generous in claims payment to claimants who are more risk averse and who experience greater negotiating costs. We test our theory empirically using the 1997 Insurance Research Council automobile claims data. Following the existing literature we use claimant gender and age to identify classes of claimants with different risk preferences and negotiation costs. Empirical analysis is consistent with systematically less generous payment to claimants in those classes.

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Introduction

The automobile is the most widely owned major asset in the U.S and is the most likely source of individual liability. Auto claims costs in the aggregate are relatively large, exceeding $X in 2002, and third party liability claims (where the defendant driver's insurer compensates the injured claimant) represent X% of that total (cite). Many factors affect third–party claim settlement amounts, such as the claimant's degree of accident fault, the extent of the claimant's bodily injury, state comparative negligence rules, attorney involvement, etc. Our purpose here is to investigate how two particular factors, claimant risk aversion and claimant negotiation costs, affect third-party settlement strategies.

Following Picard (2000), Crocker and Tennyson (2002), and Loughran (2003) we develop a theoretical model of claims payment for compensating third-party claimants injured by insured defendant drivers. Our model predicts that risk averse claimants with higher negotiation costs receive lower claims payments from insured defendant drivers *ceteris paribus*. The testable implication of the theory is that third-party insurance claims settlement amounts should be relatively lower at the margin for claimants with higher negotiation costs and greater relative risk aversion. Following the prior literature on risk aversion and negotiation costs, we use age and gender to identify classes of claimants with these characteristics.

We test our hypothesis using accident data from the 1997 Insurance Research Council Closed Claim Survey, which contains extensive information on claims closed within a two week period during 1997 across multiple insurers whose business represents approximately sixty percent of all personal automobile insurance sold in the United States. We focus on bodily injury liability claims for two-car accidents in which the claimant receives payment from the insured driver's insurer. Our empirical results are consistent with the prediction of less generous payment for claimants with higher negotiation cost and greater relative risk aversion. Female claimants receive about 5 percent less and youthful claimants about 11 percent less in payment, given our controls.

Model

When a two-party accident occurs, a third-party claimant seeks bodily injury payment from the defendant driver's insurer based on the claimant's economic damages, Ω. Economic damages (i.e., special damages such as medical expenses and lost wages) are documented and known to both the claimant and the defendant driver's insurer. Based on accident information, the insurer assigns a degree of fault to both parties and sets a payment offer amount, *x*, which is the insurer's perception of the claim value. The offer is based on the combined value of economic damages and non-economic costs, traditionally handled through general damages.

The claimant may accept the offer or negotiate for a higher settlement. Negotiating for more is costly to the claimant, for example, through time costs or the psychic costs of confrontation (see Stuhlmacher and Walters (1999)). An individual with relatively high negotiating costs may prefer to achieve a lower objective monetary settlement in order to achieve more intangible outcomes such as more congenial interaction with the adjuster or quicker claim resolution.

The claimant's optimal choice of the claim value, y ($\geq x$), is determined by utility maximization, where utility is a function of the net payment, P_n.

$$P_n = P(y;x) - \tfrac{c}{2}(y-x)^2 , \qquad (1)$$

where P is the final claims payment, and c is the negotiating cost parameter (such that higher values of c imply higher negotiating costs).

The final payment of the claim is a weighted average somewhere between the insurer's initial offer and the claimant's asking amount such that

$$P(y;x) = g \cdot y + (1-g)x , \qquad (2)$$

where g is the generosity parameter of the insurer, chosen by the insurer to minimize the sum of the loss costs and administrative costs. The variable $g = 1$ represents the highest level of generosity [$P = y$ in this case] and $g = 0$ the lowest level [$P = x$ in this case]. The insurer's generosity is unknown to the claimant, providing the source of uncertainty for the claimant in negotiating the claim.[1]

The higher expected net payment yields higher utility, while the volatility of the net payment generates disutility for risk-averse claimants. We express the claimant's expected utility as

$$EU(P_n) = EP_n - \tfrac{r}{2}Var(P_n)\,, \qquad (3)$$

where r is the risk aversion parameter (such that higher values of r imply a higher level of risk aversion, i.e., the uncertainty of the net claim payment would give the more risk-averse claimant greater disutility).

Prior evidence with gambles, investment decisions, and personal safety choices, indicates that more risk averse individuals prefer lower, certain payment to larger, less certain payment, other factors being equal. We know that individual risk preferences differ with wealth (see, for example, Friend and Blume (1975), Weber, (1975), Hansen and Singleton (1983), Mankiw (1985), and Szpiro (1986)). Evidence suggests that women are more risk averse than men (see, for example, Levin, Snyder, and Chapman (1988), Powell and Ansic (1997), Jiankoplos and Bernasek (1998), Sunden and Surette (1998), Schubert (1999), and Haleck and Eisenhauer (2001)). Riley and Chow (1992), Zuckerman (1994) and Barsky et al. (1997) provide evidence of age-related risk aversion differences as well. It is well-known that risk averse individuals are willing to pay more for insurance (see, for example, Harrington and Niehaus, 2004), but our study is the first to examine how individual risk preferences affect claiming behavior.

From Equations (1) and (2), we find that

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[1] We do not observe y, x, and g, but P is observable in the IRC data.

$$E\left(P_n\right) = \mu_g \cdot y + x - \mu_g \cdot x - \tfrac{c}{2}(y-x)^2 \quad (4)$$

and

$$Var(P_n) = (x^2 + y^2) \cdot \sigma_g^2 , \quad (5)$$

where μ_g and σ_g^2 represents the mean and variance of the insurer generosity, respectively, from the claimant's viewpoint.[2]

The claimant chooses *y* to maximize his or her expected utility:

$$\max_y \quad EU = \mu_g \cdot (y-x) + x - \tfrac{c}{2}(y-x)^2 - \tfrac{r}{2}(y^2 + x^2) \cdot \sigma_g^2 . \quad (6)$$

$$\text{s.t.} \quad y - x \geq 0 . \quad (6a)$$

The first-order condition requires

$$\mu_g - c \cdot (y-x) - r \cdot y \cdot \sigma_g^2 = 0 . \quad (7)$$

Rearranging terms, we find

$$y^* = \frac{\mu_g + cx}{c + r\sigma_g^2} . \quad (8)$$

It can be easily checked that the second-order condition is satisfied.

The boundary condition (6a) requires that $y^* - x = \dfrac{\mu_g + cx}{c + r\sigma_g^2} - x = \dfrac{\mu_g - rx\sigma_g^2}{c + r\sigma_g^2} \geq 0$. In other words, $r \leq \dfrac{\mu_g}{x\sigma_g^2} \equiv \bar{r}$. That is, the interior solution will be achieved only if *r* is less than $\bar{r}$. If the claimant's level of risk aversion is so high that it is greater than or equal to $\bar{r}$, then the boundary condition will apply and the claimant will simply accept the insurer's offer, *x*, rather than negotiating for a higher claims payment. Let us call $\bar{r}$ the acceptance lower bound. Since

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$\overline{r} \equiv \frac{\mu_g}{x\sigma_g^2}$, we can show that the higher the value of the insurer's initial offer, *x*, the lower the claimant's acceptance lower bound, implying that there will be more claimants in the same information class that fall into the acceptance region. On the other hand, the lower the value of the insurer's initial offer, the higher the number of claimants who will want to negotiate. Figure 1 provides a graphical representation of the claimant's utility and optimal compensation "ask amount."

[Figure 1 ABOUT HERE]

Recall that the insurer's choice of the generosity factor is determined by minimization of two conflicting functions, the loss costs, $P(g) = g \cdot y^* + (1-g)x$, and the administrative costs, $A(g)$ (see Browne and Wells (1999)). Note that $P'(g) = y^* - x \geq 0$, $A'(g) \leq 0$, implying that greater generosity will lead to higher claim payments but lower administrative costs. We also assume $A''(g) \geq 0$ to make sure that the second-order condition is satisfied. This is consistent with insurers choosing higher loss costs when the cost of argument exceeds the cost of the difference in loss payments.

We assume the administrative cost function to be

$$A(g) = a(g) \cdot (y-x)^{\theta}, \qquad (9)$$

where $a'(g) \leq 0$, $a''(g) \geq 0$. In other words, the administrative cost function is composed of two parts: the administrative generosity function and the disagreement of claim values between the claimant and the insurer. The impact of the disagreement on the administrative costs can be linear

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[2] A nonnegative condition should satisfy, that is, $E(P_n) \geq 0$. Hence, the range of the cost parameter *c* should be specified as $\frac{2[\mu_g \cdot y + (1-\mu_g)x]}{(y-x)^2} > c > 0$. If the claimant's negotiating cost parameter *c* is so large that negotiation is not justifiable, then s/he will simply take the insurer's offer, *x*, to avoid a negative net payment.

($\theta = 1$), more than linear ($\theta > 1$), or less than linear ($\theta < 1$). However, θ must be greater than or equal to zero, otherwise the disagreement will be negatively related to the administrative costs.[3]

The insurer cost minimization problem becomes:

$$\min_g \quad P(g) + A(g) = g \cdot y^* + (1-g) \cdot x + a(g) \cdot (y^* - x)^{\theta}. \tag{10}$$

The first-order condition yields

$$(y^* - x) + a'(g) \cdot (y^* - x)^{\theta} = 0. \tag{11}$$

From Equation (11), the insurer chooses the optimal level g^*. Differentiating it with respect to r and c, we see the relationship between the insurer's optimal generosity and the claimant's negotiating costs and risk aversion.

To simplify notation, let D stand for the disagreement between the claimant's and the insurer's perception of the claims value (see Shavell (2003) for a discussion of differences in loss perceptions). That is, $D \equiv y^* - x = (\frac{\mu_g - rx\sigma_g^2}{c + r\sigma_g^2})$. (12)

Note that $D \geq 0$, as $y^* \geq x$. Furthermore, it is straightforward to obtain

$$D_c^{'} \equiv \frac{dD}{dc} = -\frac{\mu_g - rx\sigma_g^2}{[c + r\sigma_g^2]^2} \leq 0 \text{ and } D_r^{'} \equiv \frac{dD}{dr} = -\frac{(cx + \mu_g)\sigma_g^2}{[c + r\sigma_g^2]^2} \leq 0. \tag{13}$$

The comparative statics provide additional insight here. Differentiating (11) with respect to c and r, we get

$$\frac{dg}{dc} = \frac{(\theta - 1) \times D^{-\theta} \times D_c^{'}}{a''(g)}, \text{ and} \tag{14}$$

$$\frac{dg}{dr} = \frac{(\theta - 1) \times D^{-\theta} \times D_r^{'}}{a''(g)} \tag{15}$$

[3] The disagreement cost, (y - x), has quadratic power in the claimant's negotiating cost function. (Note that it is a quadratic falsification cost function in the fraud literature.) For the sake of simplification we can also assume θ = 2. Using θ rather than 2, however, is more general and later it becomes evident that the value of θ matters.

Since $a''(g) \geq 0$ and $D_c^{'} \leq 0$ and $D_r^{'} \leq 0$, the equations (14) and (15) are negative (positive, zero) if θ > (<, =) 1. Therefore, whether the insurer's generosity is a decreasing or increasing function of *r* and *c* depends on the value of θ, which is the impact of the disagreement between the claimant's and insurer's perception of the claims value on the insurer's administrative costs. If it is more than linear (θ > 1), then the generosity will be negatively associated with the claimant's negotiating costs and degree of risk aversion. In other words, (a) the higher the claimant's negotiating cost, and (b) the higher the degree of risk aversion, the less generous the insurer will be. This relationship between the insurer's optimal generosity and claimant's risk aversion is shown in Figure 2(a). On the other hand, when θ < 1, we see the insurer's optimal generosity increases with the claimant's negotiating costs and degree of risk aversion, as depicted in Figure 2(b).

[Figures 2(a) and 2(b) about HERE]

For illustration let us now use a simple example to obtain a closed-form solution for the insurer's optimal generosity. Assume that $A(g) = \frac{(y^* - x)^{\theta}}{g}$. (16)

The insurer cost minimization problem becomes:

$$\min_g \quad P(g) + A(g) = g \cdot y^* + (1-g) \cdot x + \frac{(y^* - x)^{\theta}}{g} \tag{17}$$

As expected, increasing generosity will increase the claims payment, but decrease the administrative costs. The optimum will be reached when the marginal cost of increased generosity equals the marginal cost of decreased administrative cost (and vice versa). The first-order condition yields

$$g^* = (y^* - x)^{\frac{\theta-1}{2}} = \left(\frac{\mu_g - rx\sigma_g^2}{c + r\sigma_g^2}\right)^{\frac{\theta-1}{2}} \equiv D^{\frac{\theta-1}{2}}. \tag{18}$$

The equation (18) presents a closed-form solution of the insurer's optimal generosity. The comparative statics provide insight here. Differentiating *g** with respect to *c* and *r*, we get

$$\frac{dg^*}{dc}=\frac{\theta-1}{2}\times D^{\frac{\theta-3}{2}}\times D_c^{'}, \text{ and} \tag{19}$$

$$\frac{dg^*}{dr}=\frac{\theta-1}{2}\times D^{\frac{\theta-3}{2}}\times D_r^{'} \tag{20}$$

The equations (19) and (20) are negative (positive, zero) if θ > (<, =) 1, as indicated previously using the general form of *A*(*g*).[4]

Finally, with a closed-form formula of *g**, we can insert this into the claims payment function to get the representation of the claims payment. It is straightforward to see

$$P(x,y^*,g^*)=g^*\cdot y^*+(1-g^*)\cdot x=\left(\frac{\mu_g-rx\sigma_g^2}{c+r\sigma_g^2}\right)^{\frac{\theta+1}{2}}+x\equiv D^{\frac{\theta+1}{2}}+x \tag{21}$$

Differentiating $P(x,y^*,g^*)$ with respect to *c* and *r*, we get

$$\frac{dP(x,y^*,g^*)}{dc}=\frac{\theta+1}{2}\times D^{\frac{\theta-1}{2}}\times D_c^{'}\le 0, \text{ and} \tag{22}$$

$$\frac{dP(x,y^*,g^*)}{dr}=\frac{\theta+1}{2}\times D^{\frac{\theta-1}{2}}\times D_r^{'}\le 0 \tag{23}$$

Hence, the theoretical model shows that the claim payment, *P*, is a decreasing function of (a) the negotiating cost parameter *c*, and (b) the degree of risk aversion *r*. Figure 3 shows the relationship between claimant risk aversion and the payment amounts. Empirically, we would expect more risk averse claimants with higher negotiating costs (i.e., women and the elderly) to be paid less in third-party auto insurance claims, *ceteris paribus*.

[Figure 3 about HERE]

Empirical Estimation

To test the hypothesis that insurers are systematically less generous in claims payment to claimants who are more risk averse and have higher negotiating costs, we consider variations in claims payments across claimant characteristics previously shown to be related to risk aversion and negotiating costs: gender and age. Specifically, we consider bodily injury liability claims handled by automobile insurers. Liability payments involve two critical elements, fault and damages. Without fault on the part of the insured defendant driver, liability payments are unlikely. If fault rests at least in part with the insured defendant driver, we would expect the damage payment amount to be affected by the degree of fault. More fault leads to greater relative liability for any given loss value.

To test our hypothsis, we estimate a two-part settlement process where the adjuster first assigns accident fault and then negotiates the settlement amount based in part on this fault value. In the first equation, we estimate the degree of fault assigned by the claims adjuster to the insured defendant driver in a two-party accident as a percent of the entire fault assigned in the case. In the second equation we estimate the claimant settlement amount. We use various location and claim characteristics as predictors of settlement amount, including the fitted fault values obtained from the first equation. The degree of claimant fault is expected to affect total payment through application of comparative negligence rules. Although these rules differ in particular details across states, generally speaking the greater the defendant driver's fault, the greater the claimant payment.

It is possible that in all cases insurer settlement may not occur as a two-step process. Fault may be assigned at the same time that payment is set or may occur after payment is negotiated

[4] If we believe the incurred disagreement costs should be quadratic ($\theta = 2$) on the insurer's part (as it is in the claimant's part), then the insurer indeed will be less generous toward more risk averse claimants with higher negotiating costs, i.e., female, youthful, and elderly claimants.

(simply to complete paperwork and close the file). To accommodate this possibility, we also estimate claims payment using the actual fault assigned by the claims adjuster rather than the two-step process described above. The results are similar across both approaches.

Data

We use the 1997 Insurance Research Council Closed Claim Survey data to test the effect of claimant risk aversion and negotiation skill on insurer claims payment strategies. Our data set consists of claims involving two cars in which the claimant is the driver of the “other car” and the defendant is the driver of the insured car, and both are at least 14 years old. We use only claims in tort states that do not have compulsory first party coverage (i.e., “add on” coverage) and that follow a comparative negligence rule. We estimate results using the full data sample and then (following Loughran, 2001) estimate results using a subsample where the claimant is assessed zero percent fault by the insured defendant driver’s claims adjuster.

In addition to the IRC data, we use statewide data from the U.S. Statistical Abstracts and the U.S. Bureau of the Census on the degree of urbanization, the state employment rate, and the percentage of the state’s population without health insurance. Table 1 presents the independent and dependent variable definitions and expected signs of the estimated coefficients and Table 2 presents the variable summary statistics.

Tables 1 and 2 appear about here

Fault Equation and Variable Measures

To estimate fault we use ordinary least squares (OLS) estimation with the dependent variable equal to the percent insured defendant driver fault divided by the total percent fault assessed in the case. Given the fractional dependent variable, OLS is problematic, so we also estimate the equation using a generalized linear model (GLM) described by Papke and Wooldridge (1996).

Following Doerpinghaus, Schmit and Yeh (2003), we estimate claimant fault as.

$$F_i = \alpha + D_i\Delta + V_i\varsigma + C_iX + e_i \qquad \textbf{Equation 1}$$

where F_i = insured defendant driver fault for the ith claim

D_i = a vector of defendant driver demographic characteristics of the ith claim

Δ = a vector of regression coefficients for defendant driver demographic characteristics

V_i = a vector of traffic violations for ith claim

ς = a vector of regression coefficients for traffic violations

C_i = a vector of claim characteristics of the ith claim

X = a vector of regression coefficients for claim characteristics

e_i = the random error term

Our purpose is to consider the effect of claimant risk attitude and negotiating costs on insurer claims payment strategies. Following prior literature on risk aversion and negotiating costs we use gender and age to identify classes of claimants who are risk averse and experience higher negotiating costs. Differences in risk aversion across gender have been explained both by biological and sociological factors (see Zuckerman, 1994). Specifically, theory predicts that hormonal and enzymatic differences alter attitudes toward risk as do cultural expectations about appropriate behavior and values. Sociological factors reflect the influence of long-standing expectations about self and others. Expectations over time drive behaviors (see Snyder et al., 1977; King et al., 1991; Matheson, 1991; Akerlof and Kranton, 2000). These norms and expectations can cause individuals to behave in ways that appear detrimental to their own well-being (Batjelsmit and Bernasek, 1996;Akerlof and Kranton, 2000).

Empirical evidence on risk aversion follows the theory. Levin, Snyder, and Chapman (1988) find that women are more risk averse than men in gambling behavior. Powell and Ansic (1997) find similar results in an experimental study of risk attitudes with respect to property insurance and foreign currency exchange. Jianakoplos and Bernasek (1998) find similar results in their study of demographic effects on investment behavior. Sorrentino et al. (1992) find that women prefer a moderate payoff with certainty over a higher payoff with uncertainty. Haleck and Eisenhaurer (2001) investigate risk attitudes with pure and speculative risks and find that woman demonstrate greater relative risk aversion than men in both settings.

Gender differences have been observed in negotiating behavior as well. Here again the causes for gender differences are difficult to establish but the empirical evidence suggests that women have higher negotiating costs than do men. Stuhlmacher and Walters (1999) find women more conflict averse in dispute settlement, negotiating less generous outcomes than men. Graddy and Pistaferri (2000) observe that women place relatively greater value on interpersonal outcomes (such as being perceived as a fair player) and men place greater value on maximizing economic outcomes.

With respect to the effect of age on risk aversion and negotiating skill, researchers offer biological and sociological explanations as well. Physical fragility and dependency as well as a shorter time horizon for consumption contribute to a preference for less risk and quicker settlement (see Fuchs (1982) and Posner (1995)). Brown (1987) provides empirical evidence that relative risk aversion in wealth is highest for the elderly, and Riley and Chow (1992) and Haleck and Eisenhauer (2001) find that risk aversion declines until age 65 at which point it increases.

Given the theoretical explanations as well as the empirical evidence to date we expect that women are generally more risk averse and have higher negotiation costs than men, resulting in lower claims settlement amounts for women. We expect that age also matters when there is an age difference between the insured defendant and the claimant. Following Riley and Chow (1992) and Haleck and Eisenhauer (2001), we expect risk aversion to decline with age up to age 65, resulting in the very young and the elderly receiving lower settlements. We expect the middle-aged to have a negotiating advantage over younger parties, resulting in lower settlements here again for the very young and the elderly.

Demographic variables in our equation identify the gender of both parties since the gender of the negotiating opponent as well as the claimant can affect outcome (see, for example, Nadler and Nadler (1987)). Binary age variables identify defendants age 65 and over, defendants under age 22, and young male defendants. In addition, we include a measure of the difference between the defendant and claimant's age given that in general greater age difference between parties is correlated with greater difference in negotiation experience.[5]

We control for claim and legal jurisdiction characteristics that are expected to affect both risk and negotiating costs. These include whether either party received a traffic citation, the severity of any assessed violation, the size of the economic loss, and whether the injury was a strain (discouraging easy measurement and more latitude in negotiation) or fatality (where negotiation is not necessary to demonstrate loss). We control for whether an attorney is employed by the claimant (negotiating roles change in this setting), and whether the claim is immediately settled or continues through the successive stages of legal filing, pre-trial settlement, settlement during trial, or judgment.

We control for jurisdictional legal factors which influence fault assignment, particularly the type of comparative negligence rules employed by the state (see Kessler, 1995). In states where claimants recover damages only when driver fault exceeds a given threshold (i.e., "modified" states), we expect relatively higher fault assignment compared to states without thresholds (i.e., "pure rule" states). With respect to the effect of urbanization, Danzon (1986) provided early evidence that litigation in urban areas tended to be more favorable toward plaintiffs (since urban areas house more attorneys, making litigation less costly to claimants, and urban conditions give claimants a greater sense of disconnect from their communities, making litigation a more efficient way to deal with disputes than other less formal and more personal processes).

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[5] An age difference of six years between negotiators aged 58 and 52, for example, is less likely to have a consequential effect on negotiating experience than between ages 28 and 22.

Grace *et al. (2002)*, however, provide contrary evidence on urbanization, leaving the expected sign on the estimated coefficient open for question.

Payment Equation and Variable Measures

Following estimation of the insured defendant driver fault, we estimate claims payment (Equation 2), where the dependent variable equals the log of total payment by the defendant driver's insurer to the claimant. We first use the fitted fault values (from Equation 1) to control for insured driver fault, and, second, we use the adjuster's assignment of driver fault (rather than fitted fault). Finally we estimate claims payment using a subsample of the data: given that about 90 percent of claims have a 100:0 fault assignment split, we include 4947 observations where the defendant insured is assessed 100 percent of the accident fault by the claims adjuster and the claimant is assessed zero percent of the fault. Using these three approaches to control for the effect of fault on payment allows us to test the robustness of our results across variable specifications.

Our estimate of claimant payment, therefore, is represented as

$$P_i = \alpha + \hat{F}_i \Phi + D_i \Delta + S_i \Sigma + H_i \gamma + M_i \lambda + e_i$$ **Equation 2**

where P_i = natural logarithm of total payment to claimant in the ith claim

α = intercept term

$\hat{F}_i$ = insured defendant driver fault (estimated in Equation 1) for the ith claim

Φ = a regression coefficient for claimant fault for the ith claim

D_i = measures of claimant risk aversion and negotiating characteristics

Δ = a vector of regression coefficients for claimant risk aversion and negotiating characteristics

S_i = measures of claim severity

Σ = a vector of regression coefficients for claim severity measures

H_i = a vector of other claim characteristics associated with the ith claim

γ = a vector of regression coefficients for claim characteristics

M_i = a vector of state control variables for the ith claim

λ = a vector of regression coefficients for the state control variables

e_i = the random error term

The demographic variables allow testing for the effects of risk aversion and negotiation costs on payment amounts. Having accounted for gender differences in the fault equation (e.g., male claimants versus male insured drivers, male claimants versus female insured drivers, etc.), in the payment equation we use one binary variable that identifies female claimants. Three binary variables measure age factors: one to identify elderly claimants, one to identify claimants under age 22, and an interaction term for young female claimants.

The remaining variables in the payment equation are intended to control for claim characteristics as well as state effects. We use a series of characteristics associated with claim severity, including the dollar values associated with special damages: lost wages and medical expenses. The larger the special damages, the larger the payment, everything else equal. The dollar values of special damages are augmented by other severity measures that could influence general damages. These include the length of the hospital stay, any claimed disability, whether a claimed disability is temporary or permanent, and the type of injury. We use the injury categories reported in the survey, and for most claims more than one injury type is indicated; therefore, no hold-out group is used.

Given that Loughran (2003) and Derrig and Weisberg (2003) find higher payments when wage losses are claimed, we control for employment status. If unemployed claimants receive lower payments because their claimed special damages do not include wage loss, we would expect a negative coefficient estimate here. Cummins and Tennyson (1996), however, found evidence of a "lottery effect" where unemployed claimants receive relatively higher payments. This may be due to "hold out" behavior where claimants have little to lose by waiting for a larger settlement.

Derrig and Weisberg (2003) also found the use of an independent medical examiner relevant in claim payment amount. We include a binary variable to identify where an examiner is used and we expect the sign of the estimated coefficient to be positive. We control for claims in which the loss exceeds the insured defendant driver's insurance policy limit and we expect the sign here to be negative.

We include an indicator variable for the claimant's use of an attorney. The attorney effect on payment is ambiguous. The decision to employ an attorney may indicate that the claim is more contentious, leading to lower payment because of the difficulty of argument and extensive negotiating costs. Alternatively, the use of an attorney may yield greater payment because the attorney is more expert in dealing with the legal system.

The point in the legal process at which the claimant agrees to settle may affect payment amount. The claimant's willingness to pursue the claim through legal proceedings (i.e., filing a claim, going to trial, or allowing the court to make a judgment) is consistent with individual willingness to accept risk and extend negotiation, especially if the claimant believes that the claim value is high. The insurer, however, is more likely to settle earlier for potentially high cost claims. Given that the insurer has extensive experience with the legal process, we expect a negative relationship between protracted legal proceedings and payment amounts.

We control for state differences in comparative negligence law, percent of population living in metropolitan areas, the state employment rate, and the percentage of the population without health insurance coverage. We anticipate higher payment in modified (rather than pure) states because of the fault threshold and in states with a greater percentage of the population without health insurance because of the need to rely on auto payments for medical expense payment. We expect a negative relationship between employment rates and payment if the "lottery effect" is present. We expect a positive relationship between metropolitan population and payment if Danzon's urbanization theory holds.

Empirical Findings

Table 3 presents results of our OLS and GLM estimation of Equation 1, measuring relative driver fault. Results follow Doerpinghaus, Schmit, and Yeh (2003) and are consistent with lower fault assessment by claims adjustors for male insured drivers than for female insured drivers, controlling for other factors. We do not find an age effect in fault assignment. The OLS R^2 is 0.0754 and the adjusted R^2 is 0.0726. The F-value is 26.72, which has a *p*-value of less than .0001, suggesting that the overall OLS regression model is statistically significant despite the low R^2. The variance inflation factors (VIFs) for all variables are less than 2.6, consistent with a low degree of multicollinearity.

The evidence from estimation of Equation 1 is consistent with higher (lower) fault when defendant (claimant) drivers are assessed violations and when violations are severe. Similar results hold for claims involving strains. Use of attorneys and the incidence of fatalities are associated with lower insured defendant driver fault, as are claims closed during some form of litigation rather than prior to litigation. The size of the loss and the location of the accident are not important predictors of fault assignment.

Tables 3 appears about here

We estimate Equation 2 using three specifications of claim payment. The first specification uses the fitted fault values (see Table 4), the second uses the adjuster assigned fault values reported in the IRC data set (see Tale 5), and the third uses only those claims where the insured defendant driver is assessed 100 percent of the fault (no fault assigned to the claimant) (see Table 6). Note that Table 4 reports an R^2 of 0.7303 and an adjusted R^2 of 0.7285. Table 5 reports an R^2 of 0.7340 and an adjusted R^2 of 0.7322. Table 6 reports an R^2 of 0.7347 and an adjusted R^2 of 0.7329. In Tables 4, 5 and 6, the VIFs are all below 2.7.

Results across all three estimations are consistent with the hypothesis that optimal insurer claims settlements are lower for classes of claimants who are more risk averse and have higher negotiation costs. The evidence is consistent with women and young claimants receiving lower payment, controlling for other factors. On average female claimants receive about 5 percent less in claims payment and youthful claimants receive about 11 percent less, controlling for other factors. There is no evidence in any of the three analyses consistent with age effects on payment.

Tables 4, 5, and 6 appear about here

Results in Tables 4, 5, and 6 are consistent with more severe injuries resulting in greater claimant payment. There is a positive relationship between payment and the size of medical expenses, wage loss, length of hospital stay, extent of disability, and use of an independent medical examiner. The sign of the estimated coefficient for claimant unemployment status is positive and statistically significant at the .001 level, which is consistent with Cummins and Tennyson's (1996) "lottery effect." Results suggest that reaching the insured defendant drivers' limit of coverage has the expected effect of curtailing payment. Similarly, there is a negative relationship between payment amount and claims brought in states with modified comparative negligence rules. This result may be indicative of the sample construction, which includes only cases closed *with payment.* Claims where the insured defendant driver's fault falls below the required threshold for modified comparative negligence receive no payment, and are therefore not included in this data set.

Results are consistent with larger payment with attorney assistance, consistent with the argument that legal counsel strengthens the bargaining position of the claimant. To control for selection bias, we also estimated the equations using only claims in which the claimant does not employ an attorney. Demographic effects are consistent with (and generally stronger than) those reported in Tables 4, 5, and 6. (These results are available from the authors on request.)

The effect of extending negotiation through court filing, trial, and verdict, are somewhat puzzling. Claims that are filed but do not reach court involve greater payment than those that are closed before such filing, which could indicate a measure of signaling to the insurer about the value of the claim. This issue deserves further study, and could be indicative of differences in information about litigation outcomes between insurers and claimants.

The effect of state urbanization on payment does not support Danzon's theory, but provides additional evidence following Grace et al. (2002). The effect of statewide employment status on payment amount is consistent with the "lottery effect." There is no evidence consistent with auto insurance substituting for health insurance since the greater the state's percentage of medically uninsured, the lower the total claims payment.

Results and Implications

The purpose of the research is to investigate how differences in risk aversion and negotiation preferences affect third-party insurance claims strategies. We develop a theoretical model which shows that claimants who are relatively more risk averse and have higher negotiation costs receive lower claims payments, all else equal. The testable implication of the theory is that insurance claim settlement amounts should be relative lower for claimants with higher negotiation costs and greater relative risk aversion. Following prior economic literature we identify women and the elderly as claimants with higher negotiation cost and greater relative risk aversion. Our empirical results are consistent with the theory: women and youthful drivers receive lower claims payment, controlling for other factors. The empirical estimates suggest that on average female claimants receive about 5 percent less than male claimants and youthful claimants receive about 11 percent less than non-youthful claimants. We do not find any effect on claims payment to elderly claimants. Given the prior evidence that risk and negotiating preferences play an important role in other financial decisionmaking processes, there is no reason to believe that they would not also play a role in claiming behavior.

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Figure 1: The Claimant's Utility and Optimal Ask for Compensation

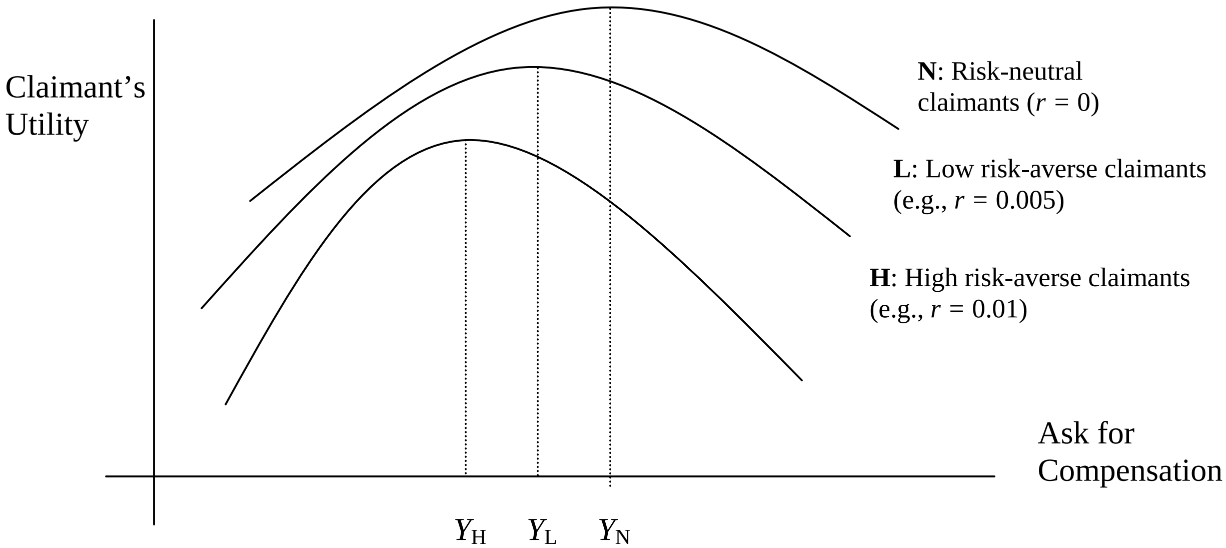

Figure 2(a): The Insurer's Optimal Generosity and Claimant's Risk Aversion (when $\theta > 1$)

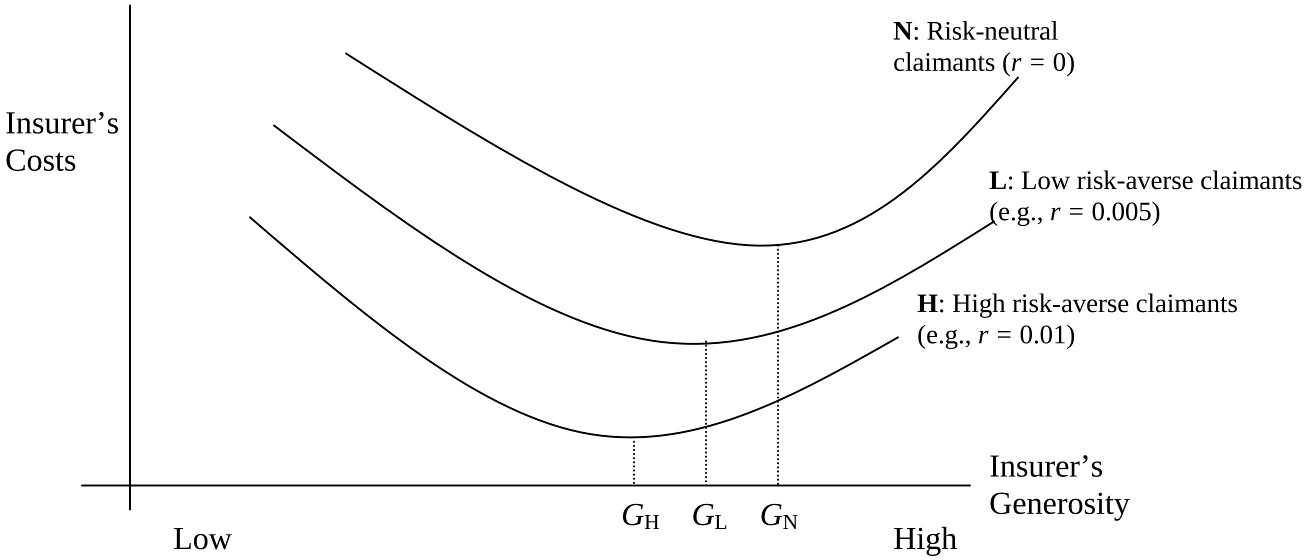

Figure 2(b): The Insurer's Optimal Generosity and Claimant's Risk Aversion (when $\theta < 1$)

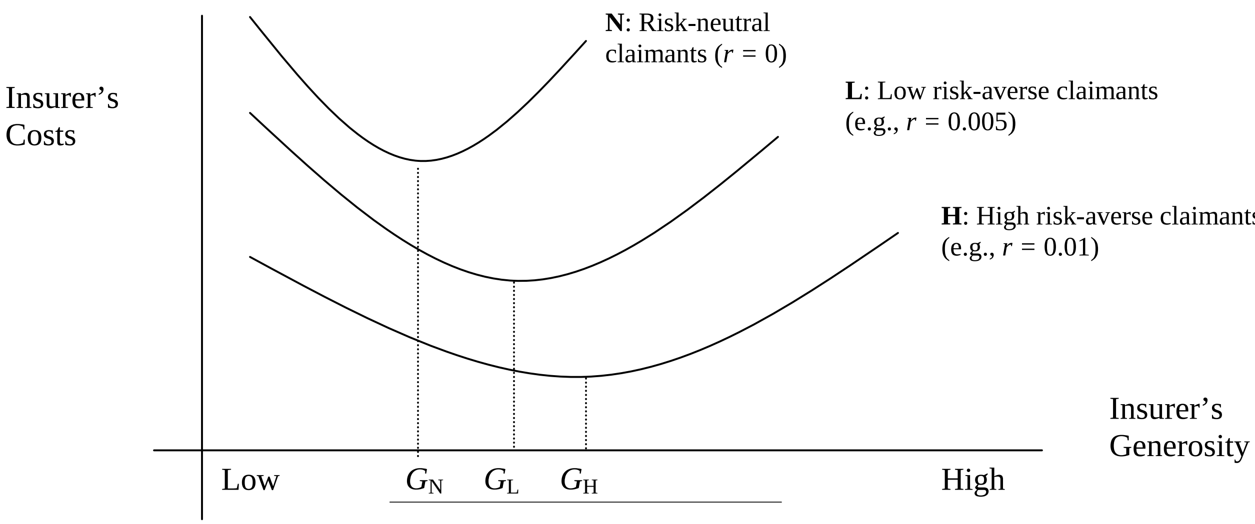

Figure 3: The Final Claims Payment versus Claimant's Risk Aversion

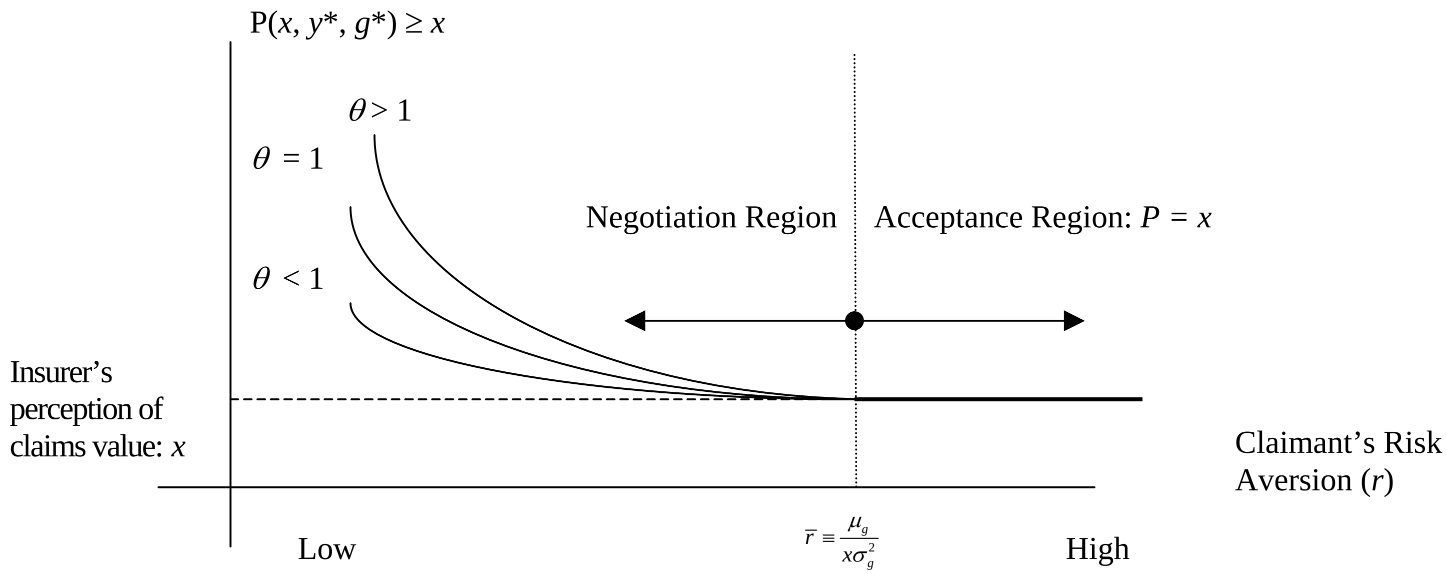

Table 1

Variable Definitions and Expected Signs

Variable Name	Variable Definition	*Expected Sign* Eqn 1	Eqn 2
F	insured defendant fault as % total fault	N/A	N/A
LNTOTALPAY	ln ($total payment to claimant)	N/A	N/A
DFEMALE	1 if defendant female, claimant male; 0 else	+	N/A
DMALE	1 if defendant male, claimant female; 0 else	-	N/A
BOTHMALE	1 if both male; 0 else	-	+
AGEDIFF	claimant age – insured defendant age	-	N/A
DYOUTHFUL	1 if defendant < 22 yrs; 0 else	+	N/A
DYMALE	interaction of youth and male defendant	+	N/A
DELDERLY	1 if defendant $\geq$ 65 yrs; 0 else	+	N/A
$\hat{F}$	fitted driver fault from estimation of Eqn 1	N/A	+
CFEMALE	1 if claimant female, defendant male; 0 else	N/A	-
CELDERLY	1 if claimant $\geq$ 65 yrs; 0 else	N/A	-
CYOUTH	1 if claimant < 22 yrs; 0 else	N/A	-
CFYOUTH	interaction of youth and female claimant	N/A	?
DVIOLATE	1 if defendant with violation, claimant none; 0 else	+	N/A
CVIOLATE	1 if claimant with violation, defendant none; 0 else	–	N/A
DSEVERE	1 if defendant with severe violation, claimant not; 0 else	+	N/A
CSEVERE	1 if claimant with severe violation, insured defendant not; 0 else	–	N/A
LNLOSS	ln ($ loss amount)	?	N/A
STRAINS	1 if claimant has strain or sprain, 0 else	+	N/A
IME	1 if claimant has independent medical exam; 0 else	N/A	+
NECK	1 if claimant neck injury; 0 else	N/A	+
BACK	1 if claimant back injury; 0 else	N/A	+
OTHRSPRN	1 if claimant other sprain; 0 else	N/A	+
FATALITY	1 if claimant fatality; 0 else	-	+
MODIFIED	1 if modified comparative negligence rule; 0 else	+	?
ATTORNEY	1 if claimant has attorney; 0 else	?	+
HOSP	1 if hospital stay 2-7 days; 0 else	N/A	+
HOSP8	1 if hospital stay $\geq$ 8 days; 0 else	N/A	+
TDISABLE	1 if temporary disability claimed; 0 else	N/A	+
PDISABLE	1 if permanent disability claimed; 0 else	N/A	+
NOINJURY	1 if no injury claimed; 0 else	N/A	-
LACERAT	1 if laceration reported; 0 else	N/A	+
FRACTURE	1 if fracture reported; 0 else	N/A	+
DISFIGURE	1 if disfigurement reported; 0 else	N/A	+

Variable Name	Variable Definition	*Expected Sign*	
		Eqn 1	Eqn 2
CONCUSS	1 if concussion reported; 0 else	N/A	+
OTHINJURY	1 if other claimant injury; 0 else	N/A	+
LIMIT	1 if defendant policy limit reached; 0 else	N/A	-
FILE	1 if lawsuit filed, but settled pretrial; 0 else	-	+
TRIAL	1 if lawsuit filed, but settled during trial; 0 else	-	-
VERDICT	1 if judgment rendered through trial; 0 else	-	-
LNWAGELOSS	ln ($ wage loss claimed)	N/A	+
LNMEDLOSS	ln ($ medical loss claimed)	N/A	+
METRO	1 if accident in metro area; 0 else	?	?
UNEMP	1 if claimant unemployed; 0 else	N/A	?
METROPOP	% state population in metropolitan area	N/A	?
EMPPOP	% state population employed	N/A	-
NOHLTHINS	% state population without health insurance	N/A	+

Table 2

Summary Statistics for Dependent and Independent Variables

Summary Statistics for
Dependent and Independent Variables

Variable Name	Full Sample: N=6573				Reduced Sample: N=6011			
	Mean	Std Dev	Min	Max	Mean	Std Dev	Min	Max
F	97.353	10.918	0.000	100.000	100.000	0.000	100.000	100.000
LNTOTALPAY	8.080	1.310	2.485	13.122	8.073	1.308	2.485	13.122
CFEMALE	0.548	0.498	0.000	1.000	0.551	0.497	0.000	1.000
CELDERLY	0.052	0.221	0.000	1.000	0.050	0.219	0.000	1.000
CYOUTH	0.147	0.354	0.000	1.000	0.143	0.350	0.000	1.000
CFYOUTH	0.082	0.275	0.000	1.000	0.082	0.274	0.000	1.000
MODIFIED	0.512	0.500	0.000	1.000	0.513	0.500	0.000	1.000
ATTORNEY	0.502	0.500	0.000	1.000	0.487	0.500	0.000	1.000
DFEMALE	0.196	0.397	0.000	1.000	0.195	0.396	0.000	1.000
DMALE	0.277	0.448	0.000	1.000	0.277	0.447	0.000	1.000
BOTHMALE	0.256	0.437	0.000	1.000	0.254	0.435	0.000	1.000
AGEDIFF	2.061	23.358	-72.000	73.000	2.079	23.395	-72.000	73.000
DYOUTHFUL	0.226	0.418	0.000	1.000	0.225	0.417	0.000	1.000
DYMALE	0.124	0.330	0.000	1.000	0.124	0.330	0.000	1.000
DELDERLY	0.132	0.338	0.000	1.000	0.133	0.340	0.000	1.000
PURE	0.488	0.500	0.000	1.000	0.487	0.500	0.000	1.000
DVIOLATE	0.547	0.498	0.000	1.000	0.563	0.496	0.000	1.000
CVIOLATE	0.032	0.175	0.000	1.000	0.029	0.167	0.000	1.000
DSEVERE	0.024	0.152	0.000	1.000	0.024	0.154	0.000	1.000
CSEVERE	0.001	0.035	0.000	1.000	0.000	0.022	0.000	1.000
LNLOSS	7.347	1.385	2.303	13.820	7.322	1.387	2.303	13.820
STRAINS	0.895	0.307	0.000	1.000	0.898	0.302	0.000	1.000
IME	0.036	0.186	0.000	1.000	0.036	0.187	0.000	1.000
NECK	0.751	0.433	0.000	1.000	0.756	0.429	0.000	1.000
BACK	0.617	0.486	0.000	1.000	0.614	0.487	0.000	1.000
OTHRSPRN	0.096	0.295	0.000	1.000	0.096	0.295	0.000	1.000
FATILITY	0.001	0.030	0.000	1.000	0.001	0.029	0.000	1.000
HOSP	0.018	0.133	0.000	1.000	0.016	0.124	0.000	1.000
HOSP8	0.004	0.064	0.000	1.000	0.003	0.059	0.000	1.000
TDISABLE	0.240	0.427	0.000	1.000	0.238	0.426	0.000	1.000
PDISABLE	0.031	0.175	0.000	1.000	0.030	0.171	0.000	1.000
NOINJURY	0.007	0.085	0.000	1.000	0.007	0.086	0.000	1.000
LACERAT	0.103	0.305	0.000	1.000	0.100	0.300	0.000	1.000
FRACTURE	0.030	0.170	0.000	1.000	0.027	0.163	0.000	1.000
DISFIGURE	0.010	0.098	0.000	1.000	0.009	0.093	0.000	1.000
CONCUSS	0.021	0.144	0.000	1.000	0.020	0.140	0.000	1.000
OTHINJURY	0.228	0.420	0.000	1.000	0.226	0.418	0.000	1.000
LIMIT	0.011	0.106	0.000	1.000	0.011	0.103	0.000	1.000

Variable Name	Full Sample: N=6573				Reduced Sample: N=6011			
	Mean	Std Dev	Min	Max	Mean	Std Dev	Min	Max
FILE	0.142	0.349	0.000	1.000	0.129	0.336	0.000	1.000
TRIAL	0.002	0.048	0.000	1.000	0.002	0.045	0.000	1.000
VERDICT	0.007	0.083	0.000	1.000	0.006	0.079	0.000	1.000
LNWAGELOSS	2.227	3.185	0.000	13.816	2.244	3.185	0.000	13.816
LNMEDLOSS	7.081	1.589	0.000	11.918	7.052	1.591	0.000	11.618
METRO	0.557	0.497	0.000	1.000	0.555	0.497	0.000	1.000
UNEMP	0.228	0.420	0.000	1.000	0.223	0.416	0.000	1.000
METROPOP	78.685	16.566	27.700	96.600	78.620	16.611	27.700	96.600
EMPPOP	63.410	3.171	51.600	71.400	62.100	3.192	51.600	71.400
NOHLTHINS	16.755	4.132	8.800	25.600	16.785	4.119	8.800	25.600

Table 3
Estimation Results: Equation 1, Full Sample
Dependent Variable: Insured Defendant Driver Fault (N=6573)

Predictor Variable	OLS		GLM	
	Coefficient	*t*-statistic	Coefficient	z-statistic using robust standard error
INTERCEPT	95.76594	105.84***	3.383013	9.98***
DFEMALE	-0.56988	-1.48	-.2472542	-1.62
DMALE	-0.89909	-2.36**	-.3906254	-2.51**
BOTHMALE	-1.07056	-2.79**	-.4370714	-2.81***
AGEDIFF	0.00180	0.24	.0008144	0.27
DYOUTHFUL	-0.43339	-0.89	-.2172625	-1.14
DYMALE	0.97851	1.57	.3746274	1.52
DELDERLY	0.31803	0.67	.1959888	1.01
DVIOLATE	3.30916	12.15***	1.509625	13.45***
CVIOLATE	-5.29215	-6.99***	-.8331414	-4.41***
DSEVERE	1.96345	2.25**	.6682075	1.66*
CSEVERE	-20.23163	-5.41***	-2.676787	-5.57***
LNLOSS	-0.06791	-0.61	-.0271244	-0.59
STRAINS	1.89188	4.39***	.7178866	4.82***
FATALITY	-10.62282	-2.46**	-1.542563	-1.29
MODIFIED	1.34709	5.08***	.5863336	5.50***
ATTORNEY	-1.12754	-3.50***	-.6201563	-4.47***
FILE	-3.98953	-9.70***	-.9659905	-7.39***
TRIAL	-6.77286	-2.48**	-1.270014	-1.94*
VERDICT	-3.98110	-2.54**	-.9197914	-1.97**
METRO	-0.37664	-1.40	-.1521531	-1.42

*Statistically significant at 0.10 level, ** statistically significant at 0.05 level, ***statistically significant at 0.01 level; OLS: R^2 = 0.0754, Adj.: R^2 = 0.0726.

Table 4
Estimation Results: Equation 2, Full Sample, Fitted Driver Fault
Dependent Variable: Ln(TOTALPAY) (N=4947)

Variable	Coefficient	*t*-statistic
INTERCEPT	2.60657	5.05***
$\hat{F}$	0.02424	5.58***
CFEMALE	-0.05564	-2.59***
CELDERLY	0.02429	0.53
CYOUTH	-0.12731	-2.99***
CFYOUTH	0.09440	1.71*
IME	0.16458	3.09***
NECK	0.04960	2.01**
BACK	0.12088	5.50***
OTHRSPRN	0.09979	2.99***
HOSP	0.43225	5.56***
HOSP8	0.35274	2.18**
TDISABLE	0.15857	6.50***
PDISABLE	0.54870	9.58***
NOINJURY	-0.11227	-0.92
LACERAT	0.13511	4.07***
FRACTURE	0.59122	9.34***
DISFIGURE	0.48761	5.29***
CONCUSS	0.18364	2.85***
OTHINJURY	0.16619	6.96***
FATALITY	2.09675	4.29***
LIMIT	-0.26335	-2.83***
LNWAGELOSS	0.06910	19.74***
LNMEDLOSS	0.48344	64.50***
UNEMP	0.12288	4.39***
MODIFIED	-0.18349	-6.01***
ATTORNEY	0.45319	18.24***
FILE	0.12939	3.55***
TRIAL	0.24004	1.14
VERDICT	-0.44510	-3.75***
METRO	-0.4768	-2.30**
METROPOP	-0.00066	-1.00
EMPPOP	-0.00809	-2.13**
NOHLTHINS	-0.01556	-4.13***

*Statistically significant at 0.10 level, ** statistically significant at 0.05 level, ***statisticallysignificant at 0.01 level; OLS: R^2 = 0.7303, Adj.: R^2 = 0.7285.

Table 5
Estimation Results: Equation 2(b), One Stage Decision, Full Sample, Assigned Driver Fault Dependent Variable: Ln(TOTALPAY) (N=4947)

Variable	Coefficient	*t*-statistic
INTERCEPT	4.10491	13.96***
F	0.00919	10.01***
CFEMALE	-0.04708	-2.21**
CELDERLY	0.03187	0.70
CYOUTH	-0.11067	-2.62***
CFYOUTH	0.08060	1.47
IME	0.20234	3.90***
NECK	0.05462	2.23**
BACK	0.11623	5.34***
OTHRSPRN	0.10505	3.17***
HOSP	0.39885	5.20***
HOSP8	0.17429	1.14
TDISABLE	0.16430	6.79***
PDISABLE	0.55174	9.70***
NOINJURY	-0.08937	-0.74
LACERAT	0.12953	3.93***
FRACTURE	0.55848	8.98***
DISFIGURE	0.46509	5.09***
CONCUSS	0.17411	2.72***
OTHINJURY	0.16600	7.00***
FATALITY	2.13087	4.41***
LIMIT	-0.23987	-2.60***
LNWAGELOSS	0.06904	19.87***
LNMEDLOSS	0.48395	65.05***
UNEMP	0.10124	3.71***
MODIFIED	-0.15515	-5.30***
ATTORNEY	0.43817	18.04***
FILE	0.06676	2.11**
TRIAL	0.11394	0.55
VERDICT	-0.51343	-4.42***
METRO	-0.05470	-2.67***
METROPOP	-0.00079	-1.21
EMPPOP	-0.00886	-2.36**
NOHLTHINS	-0.01392	-3.75***

*Statistically significant at 0.10 level, ** statistically significant at 0.05 level, ***statistically significant at 0.01 level; OLS: R^2 = 0.7340, Adj.: R^2 = 0.7322.

Table 6
Estimation Results: Reduced Sample, Claimant Assessed 0% Fault Only
Dependent Variable: Ln(TOTALPAY) (N=4533)

Variable	Coefficient	*t*-statistic
INTERCEPT	5.09329	17.80***
CFEMALE	-0.05588	-2.53**
CELDERLY	0.02798	0.58
CYOUTH	-0.11438	-2.54**
CFYOUTH	0.08077	1.39
IME	0.17583	3.24***
NECK	0.05219	2.04**
BACK	0.11848	5.25***
OTHRSPRN	0.9648	2.81***
HOSP	0.35576	4.14***
HOSP8	0.06408	0.37
TDISABLE	0.14500	5.75***
PDISABLE	0.57367	9.55***
NOINJURY	-0.06278	-0.51
LACERAT	0.11905	3.44***
FRACTURE	0.56616	8.57***
DISFIGURE	0.49216	4.96***
CONCUSS	0.15829	2.31**
OTHINJURY	0.16409	6.64***
FATALITY	1.90649	2.82***
LIMIT	-0.19880	-2.01**
LNWAGELOSS	0.07136	19.76***
LNMEDLOSS	0.48331	62.48***
UNEMP	0.11333	3.96***
MODIFIED	-0.15922	-5.21***
ATTORNEY	0.43761	17.43***
FILE	0.06847	2.03**
TRIAL	-0.05458	-0.24
VERDICT	-0.69555	-5.48***
METRO	-0.05282	-2.47**
METROPOP	-0.00069	-1.01
EMPPOP	-0.01007	-2.61***
NOHLTHINS	-0.01348	-3.52***

*Statistically significant at 0.10 level, ** statistically significant at 0.05 level, ***statistically significant at 0.01 level; OLS: R^2 = 0.7347, Adj.: R^2 = 0.7329.