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Behavioral Factors and Lotteries Under No-Fault with a Monetary Threshold: A Study of Massachusetts Automobile Claims

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ABSTRACT

The primary causes of rapidly increasing auto bodily injury insurance rates in the late 1980s and early 1990s are an increase in the number of claims filed per accident and the escalation of medical costs at twice the overall rate of inflation. Changes in claiming behavior can arise from the operation of a personal injury insurance lottery. Claimants, perhaps assisted by a lottery "manager," make behavioral choices to incur the monetary and psychic costs of filing a fraudulent or exaggerated claim for the payment of general (noneconomic) damages as the lottery payoff. This article provides operational meaning to the personal injury lottery and evidence of its existence under the Massachusetts no-fault system with a monetary threshold for tort claims. A random sample of claims arising from 1989 Massachusetts accidents is used to identify claims for simple soft-tissue strain and sprain injuries as the likely conduit for lottery-type claims. The cost/benefit effectiveness of specialized claim handling techniques employed by insurers to expose and reduce lottery claims is explored through a model of the total auto insurance compensation.

Introduction

Rapidly increasing bodily injury (BI) claim costs constitute the primary automobile insurance problem of the 1990s. A study by the Insurance Research Council (1990) documents a disturbing national trend: bodily injury claim frequencies are rising despite stable or falling accident rates. Cummins and Weiss (1991) find increasing bodily injury claim frequencies in national data reported for 1983 through 1987. They determine that rapidly increasing medi-

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cal costs are the single most important factor in determining the BI pure premium (the loss cost per insured car) but that the type of compensation system (tort or no-fault) also plays a significant role.[1] Cummins and Tennyson (1992) point out that, between 1984 and 1989, bodily injury losses grew at an annual rate of nearly 9 percent in no-fault states and 11 percent in tort states, despite annual declines of about 2 percent in property damage liability claims. Claims in both tort and no-fault states exhibited the same rising bodily injury claim per personal damage liability claim ratio identified by the Insurance Research Council. This latter phenomenon is often described as a change in claiming behavior but may be more properly identified as one effect of the operation of a personal injury lottery (Cummins and Tennyson, 1994). A lottery will be said to exist when claimants, perhaps assisted by a lottery "manager," make behavioral choices to incur the monetary and psychic costs of filing fraudulent or exaggerated claims with the expectation of general (noneconomic) damages as the lottery payoff. We include the disutility of the fear of being detected for the filing of a totally (planned) or partially (opportunistic) fraudulent claim as a psychic cost for the claimant and/or the lottery manager in appropriate cases.

The situation in Massachusetts private passenger automobile insurance in the 1990s shows an exacerbation of the national trends of the 1980s. Rate increases for bodily injury coverages for 1990 through 1994 averaged about 18 percent per year (Automobile Insurers Bureau, 1993).[2] Bodily injury liability (BIL) claim frequencies for 1989 through 1992, the latest data available, show an average increase of slightly more than 9 percent per year. At the same time, property damage liability frequencies fell an average of about 3 percent per year causing the bodily injury liability claims per 100 accidents—more precisely, 100 times the ratio of bodily injury frequency to property damage liability frequency—to rise from 23.1 in 1989 to 33.6 in 1992. This 45 percent increase in the claims per accident rate is consistent with the increasing operation of personal injury lotteries.

This article provides operational meaning for an auto personal injury insurance lottery and evidence of its operation in Massachusetts. We rely on the detailed analysis of a random sample of bodily injury claims arising from 1989 accidents to identify claims for simple soft-tissue strains and sprains as the likely conduit for the lotteries. After describing the Massachusetts no-fault automobile insurance system, we provide descriptive models of the traditional and lottery claiming operations. Testable hypotheses are proposed for each claim operation type. Then, it is shown that the no-fault personal injury pro-

[1] For the sample period 1975 through 1986, Cummins and Weiss (1991) use data from multiple sources to show pure premiums higher in add-on and monetary threshold no-fault states, but lower by about 22 percent in verbal threshold no-fault states, than pure premiums in tort states. This finding means that bodily injury costs can vary widely across no-fault states.

[2] Automobile insurance rates are set annually on January 1 by the Commissioner of Insurance. While loss costs provided the primary impetus for the large increases, falling interest rates also contributed to higher rates through smaller present value discounts from nominal losses (cf. Cummins and Tennyson, 1992).

tection (PIP) coverage is not really fault-neutral, especially for soft-tissue injury claims. A close examination of the determinants of claimed medical charges, and their relationship to the $2,000 tort threshold, provide the initial evidence of the presence of insurance lotteries. Next, we model the total BIL + PIP compensation package to measure the effects of claims adjusters' reactions to inflated medical charges produced by the lotteries. Finally, we explore the cost/benefit effectiveness of a range of specialized claims handling techniques that can be used to expose and reduce lottery claims. We conclude with a discussion of the public policy implications and avenues for future research.

Claims Filing Behavior

The National Situation

The specific nature of claims filing behavior is influenced by the type of auto accident compensation system in place. No-fault systems that limit the right to sue in exchange for some form of guaranteed first-party reimbursement often have been proposed as a cost-saving measure. By restricting the eligibility to file a tort claim to those whose injuries cross a specified "threshold" of severity, these systems are intended to eliminate payment of general damages (pain and suffering) for minor injuries and to reduce transaction costs (Carroll and Kakalik, 1993).

At the present time, there are twelve states in which all drivers are covered by some form of no-fault insurance. In nine of these states, the tort threshold is defined primarily as a monetary amount of medical expenses. In the remaining three (Florida, Michigan, and New York), the threshold is a verbal specification of what constitutes a serious injury. In addition, three states (Kentucky, New Jersey, and Pennsylvania) have adopted "choice" systems in which drivers can choose between the traditional tort system and a variant of no-fault. Choice systems have attracted much attention since they were first proposed by O'Connell and Joost (1986).

The record of no-fault systems in controlling costs has been mixed. Michigan and New York, with their strong (i.e., restrictive) verbal thresholds, have achieved significant savings in bodily injury claim costs. Harrington (1989) points out the remarkable record of Michigan's no-fault compensation system in keeping 88 percent of bodily injury-related claims out of the tort system compared to 71 percent for New York and an average of 61 percent for all no-fault states in 1987.[3] Hammitt (1985) reports similar results for Michigan with 1977 data. About half the potential bodily injury claimants were excluded in the weak threshold states of New Jersey and Massachusetts at that time. Florida's weak verbal threshold has proved relatively easy to circumvent (Mahoney, Hill, and Norman, 1991). Premiums in monetary threshold states are

[3] The favorable bodily injury claiming record in Michigan is no doubt a result of the generous unlimited medical benefits provided under the no-fault system in that state. See Harrington (1989) for a full discussion of the Michigan system.

generally higher than in pure tort states (Cummins and Weiss, 1991). Despite higher premiums in no-fault states, drivers may prefer no-fault as the system that leads to their highest expected wealth position, even in the presence of deadweight fraudulent and exaggerated claims.

Cummins and Tennyson (1992) attribute much of the problem in both tort and low monetary threshold states to the ease and profitability of filing bodily injury liability claims on auto insurance. They argue that many potential claimants regard the situation as a lottery with a high probability of payoff and a relatively low cost. Increased awareness of these potential rewards, particularly in certain urban areas, has played a major role in the observed cost increases.

O'Connell and Joost (1986) suggested the choice approach primarily because of the failure of weak no-fault laws to control claim costs and the political difficulties of imposing strong verbal thresholds. In their view, the compromises reflected in most existing no-fault systems create perverse economic incentives. Raising the monetary threshold simply leads to additional padding and further claim cost increases.[4] Moreover, the increased levels of rewards provide even more incentive to enter the insurance lottery.

Anecdotal accounts of insurance lottery scams have been well publicized, and there is a growing perception that fraudulent or exaggerated claims are driving up auto insurance premiums. However, aside from indirect inferences based on actuarial or state-level data (Cummins and Tennyson, 1994), there has been no empirical investigation of the nature and extent of auto insurance lotteries. This article reports some relevant results from a study of personal injury protection and bodily injury claims in Massachusetts. The data allow us to test several hypotheses about the way a monetary threshold no-fault auto insurance system operates in practice.

The Massachusetts Situation

In 1971, Massachusetts became the first state to adopt a no-fault system. Between 1971 and 1988, the tort threshold in Massachusetts consisted of a verbal component (fracture, disfigurement, death, dismemberment, loss of sight or hearing) and a monetary component (at least $500 in medical expenses). Accident victims could sue for general damages if they qualified under either criterion. Payment for economic damages could be obtained under the personal injury protection coverage.

In 1971, the $500 threshold served as a formidable barrier to claims based on minor injuries. However, by 1988, economic inflation of medical care costs had greatly reduced the deterrent effect of this threshold. Medical costs, as measured by the Consumer Price Index U.S. city average for medical care, rose by a factor of four (143.8/35.2; 1982-84 = 100) while hospital room rates increased six-fold (151.5/25.3). The erosion of the tort threshold over time was

[4] See Weisberg and Derrig (1992a, 1992c) for the effect on padded claims when Massachusetts raised the monetary threshold from $500 of medical charges to $2,000 in 1989.

regarded as a major cause of rapidly escalating bodily injury claim costs and premiums. Consequently, as part of a major reform law implemented in 1989, the monetary tort threshold for bodily injury liability was raised from $500 to $2,000 and the basic PIP limit from $2,000 to $8,000, matching the 1971-1989 rise in medical costs.

To formulate a response to the problem of increasing bodily injury claims costs, the insurance industry in Massachusetts sponsored two studies of BI claims. The Baseline Study delineated the specific characteristics of Massachusetts bodily injury claims in 1985 through 1986, particularly in terms of injuries and associated medical costs, and assessed the nature and extent of fraudulent and inflated claims (Weisberg and Derrig, 1991a). The follow-up study of 1989 bodily injury claims examined the situation just after implementation of the reform law (Weisberg and Derrig, 1992a).

The Baseline Study revealed that one-third (33.1 percent) of all 1985 through 1986 bodily injury claims involved apparent buildup and 11.8 percent reflected apparent fraud. *Buildup* was defined as an attempt on the part of the claimant or health care provider to inflate the damages for which compensation was being sought. *Fraud* was defined as an attempt to obtain compensation for the consequences of an injury that never occurred or was unrelated to the accident.

The follow-up study of 1989 claims aimed primarily to assess the effectiveness of the reform law in limiting bodily injury claims associated with relatively minor injuries, especially strains and sprains. This study found that BI liability claim payments decreased by only 11.7 percent from the value projected on the basis of pre-reform assumptions, about half of the anticipated decline, and total claim cost for BI and PIP combined remained essentially unchanged from the projected value. Moreover, the frequency of claims that involved only soft-tissue strains and sprains actually increased by 38.7 percent from 1985-1986 levels.

Buildup of medical expenses contributed most to the failure of the reform law. Statewide, nearly half of all 1989 claims (46.8 percent) appeared to involve buildup. Treatment charges rose much faster than the rate of medical inflation because of increased utilization of medical services. Very large numbers of visits to certain health care providers and routine use of sophisticated diagnostic procedures were principal vehicles for this buildup of medical expenses. These findings are consistent with the hypothesis that many Massachusetts drivers are participating in insurance lotteries.

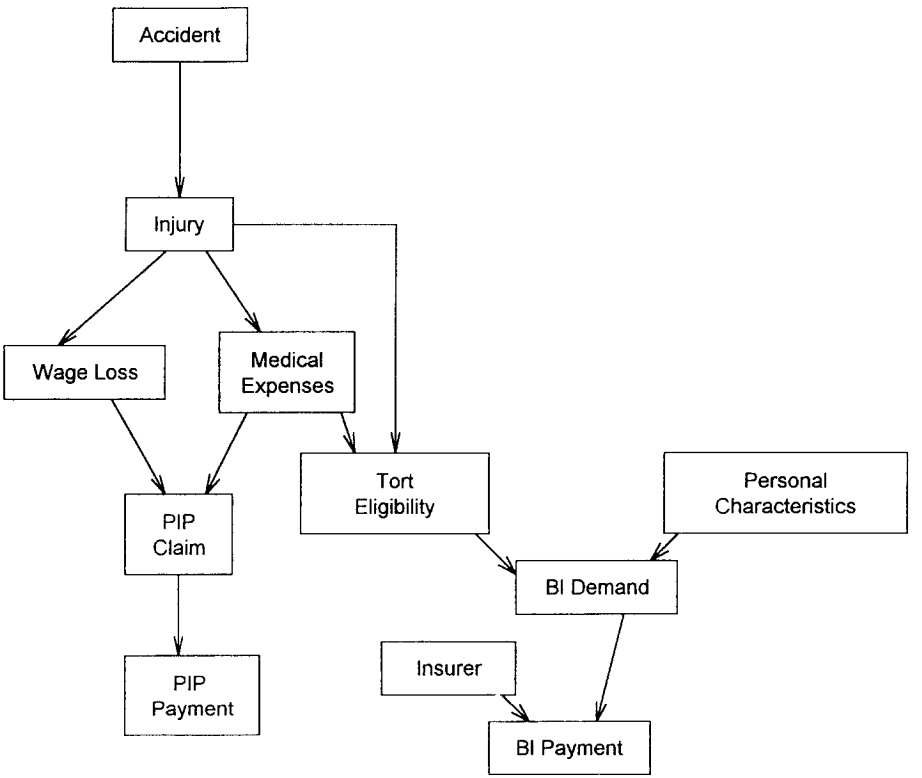
The Traditional Claim Model

Figure 1 represents a conceptualization of how the traditional monetary no-fault system is intended to operate in theory.[5] An accident victim may suffer an

[5] Our models are descriptive models of the claim operation rather than economic equilibrium models. Economic incentive-based models for claiming behavior that include fraudulent and built up claims have been developed by Bond and Crocker (1993) and Cummins and Tennyson (1994).

injury, which can then lead to lost wages and medical expenses. The individual reports the accident and injury to his or her personal injury protection insurer and begins to submit documentation of incurred expenses (e.g., medical bills). These expenses are routinely paid by the first-party insurer within a short time of receipt in accordance with the policy benefit structure. In Massachusetts, PIP covers 100 percent of medical charges and 75 percent of lost earnings up to a total policy limit of $8,000. However, a provision for partial coordination of benefits requires that private health coverage (if available) pay for all medical expenses in excess of $2,000.

Figure 1
Traditional Model



If the injury is relatively serious, the accident victim will inevitably wonder whether additional compensation for economic losses not fully covered by PIP or for "pain and suffering" might be obtainable. Our potential tort claimant will, of course, take into account his or her possible liability in causing the accident. In Massachusetts, a lawsuit or tort claim can be instituted if the claimant is no more than 50 percent at fault. However, according to the prin-

ciple of comparative negligence, the resulting award is reduced by the claimant's proportion of fault.

In addition, a variety of individual considerations and personal characteristics will influence the degree to which a tort action is seriously entertained. It is quite likely that a lawyer will be consulted at this stage. Perhaps with assistance from the attorney, the potential claimant will learn about the tort threshold. Finally, on the basis of all these considerations, a decision whether to file a bodily injury claim is made.

The desire to obtain third-party compensation is conveyed to the liability insurer in the form of a demand for payment, often by the claimant's attorney. The insurer, through a claims adjuster, attempts to settle the case through negotiation, taking into account what a court might award and the BI policy limits available. In those rare instances in which no settlement proves possible, the case is ultimately decided in court (Donaldson and Hirsch, 1992).

In Massachusetts, the personal injury protection payment is offset against the bodily injury award in order to avoid "double-dipping." That is, the claims adjuster is permitted to reduce the BI offer by the amount of the PIP payment in negotiating a settlement.

Implicit in this naive portrayal of traditional monetary no-fault claims are several null hypotheses that can be tested.

H1: No-fault provides compensation routinely for all injuries, without regard to fault.

H2: The amount of medical expenses incurred is a reasonable indicator of injury severity.

H3: In addition to personal characteristics, the decision to file a tort claim depends primarily on injury severity.

H4: The amount of the bodily injury claim payment is primarily a function of injury severity.

To the extent that the insurance lottery model prevails, a very different model of the claimant's decision-making process should be reflected in the data.

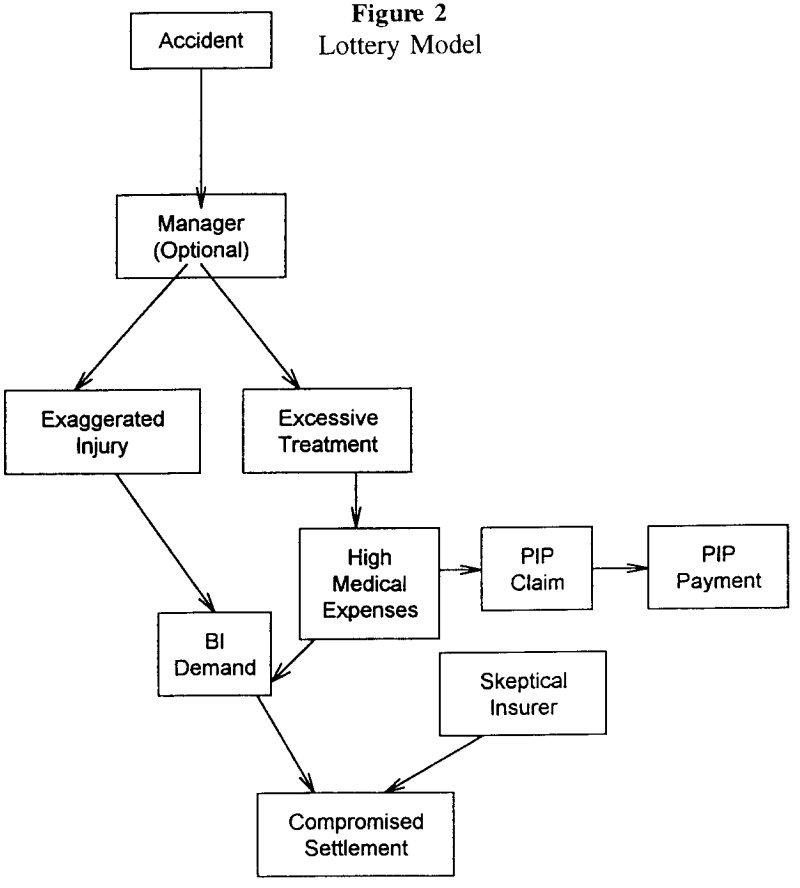
The Lottery Claim Model

Figure 2 portrays the operation of a lottery claim in its pure form. In practice, we would expect to see a mixture of claim filing behaviors rather than these simple pure forms. The pure lottery model is characterized by sharp distinctions from the traditional model.

After an actual or planned accident, a claim will be made for an injury that is minor or nonexistent. A willingness to incur monetary costs, and psychic costs in the event of a fabricated claim, for the chance at the general damage (pain and suffering) lottery payoff is assumed. The injury claimed will be one with a wide latitude for the extent of proper medical treatment.[6] The claimant may pursue the claim with or without the assistance of a lottery manager,

[6] Dionne and St-Michel (1991) study the extent of moral hazard in the Canadian workers' compensation system and find evidence of its existence in difficult-to-diagnose lower back claims.

Figure 2
Lottery Model



typically a treating physician or attorney. The injury will be exaggerated for the purpose of increasing the outpatient treatment and diagnostic medical charges to at least the level of the monetary threshold needed to file a tort claim. A bodily injury claim will be filed as soon as the monetary threshold is crossed. Insurance claims adjusters will be skeptical of the claimed injury but may attempt to "compromise" the claim by offering a reduced settlement because the circumstances compel some payment for the claimed injury. Specialized claims handling investigative techniques, such as independent medical examinations, can be used when the situation warrants.

Implicit in this portrayal of the operation of a lottery are several alternative hypotheses that can be tested against those of the traditional model:

AH1: Considerations of liability can affect whether a personal injury protection claim is filed; there exist disincentives for an at-fault driver (or close acquaintance) that may offset the potential gain.

AH2: The amount of medical expenses claimed is primarily a function of deliberate buildup and is unrelated to true injury severity.

AH3: The decision to file a tort claim is based primarily on avarice, possibly encouraged by an attorney, and the injury is fabricated or exaggerated in order to justify the claim.

AH4: The bodily injury award is based primarily on the inflated medical charges claimed, possibly compromised by a skeptical adjuster, and is unrelated to true injury severity.

This article examines the Massachusetts bodily injury claiming system with the objective of detecting any presence of a personal injury lottery.

Methodology

The empirical data analyses are based on a random sample of Massachusetts personal injury protection claims from accidents that occurred in calendar year 1989 as reported under the Commissioner's Statistical Plan. As in the two bodily injury claim studies (Weisberg and Derrig, 1991a, 1992a), the sample was drawn from the claims reported by a set of ten large insurers, which comprise approximately 70 percent of the insurance market in Massachusetts.

As in our earlier studies of bodily injury liability claims, the sampling unit for this study was an individual claim rather than an accident. The total number of claims selected for retrieval was 1,199, which resulted from a 1.5 percent sampling of the total population of personal injury protection claims known as of June 1991. However, we found that 269 were "duds" in the sense that no claim was really pursued, although a reserve had been established. In addition, 91 claims could not be found. There remained 839 claims, representing approximately 1.4 percent of the population of "real" PIP claims.

Ideally, we would have liked to obtain comprehensive data on any BI claim that arose from a PIP claim in our sample. Unfortunately, only limited information was typically available in the claim file on whether a tort claim was filed and how much compensation was received. We therefore attempted to collect some supplementary data. For each personal injury protection claim in the sample, we attempted to locate any possible bodily injury claim associated with it by culling the actuarial (Statistical Plan) data base for potential matches. If no potential matches existed, we assumed that no BI claim was filed. If a unique match could be identified, we assumed that the BI claim corresponded with the PIP claim. If multiple potential matches were found, we obtained the claimant names for each possible candidate from the insurer to determine which, if any, of the possibilities actually corresponded to the PIP claim.

For each personal injury protection claim, both objective information and a subjective assessment were coded. The two coding forms, modified versions of those used for the 1989 bodily injury study, were extremely comprehensive. As in the two earlier BI studies, experienced claims adjusters or supervisors were recruited as coders from the ten participating insurers.

The traditional null hypotheses imply a certain set of relationships among measurable factors such as medical costs and types of injuries. Our main ana-

lytic approach involves statistical modeling of these relationships to determine whether they have been distorted toward the insurance lottery alternative.[7]

The Role of Fault

Is Personal Injury Protection Really a No-Fault Coverage?

Our first traditional hypothesis was that personal injury protection is utilized routinely to compensate all accident victims, regardless of fault. However, although the reimbursement obtainable under PIP is purely no-fault, certain tangible and intangible penalties may depend on liability considerations. For example, in Massachusetts, substantial insurance premium surcharges for at-fault accidents can be imposed through the Safe Driver Insurance Plan. Thus, an injured driver who is more than 50 percent at fault may be reluctant to file a PIP claim because of the real or imagined negative consequences. Similarly, a friend or relative who is injured as a passenger may be hesitant to implicate the driver. Unless the injury is severe, these considerations may outweigh the potential gain from a PIP claim and (in the case of passengers) a BI claim, especially if other insurance coverage is available.

From this alternative perspective, we would expect to find the pool of personal injury protection claimants to be weighted toward those accident victims who have more positive than negative incentives. In particular, insurance lottery participants would be strongly over-represented, especially those whose injuries were entirely fabricated.

Before presenting the data, it is helpful to understand some basic facts about the main accident scenarios that can occur. Specifically, we examine the various combinations of the insured driver's liability and the claimant's position in the accident in terms of the potential for a tort claim based upon liability considerations. Table 1 illustrates the range of potential tort claim filing scenarios from no claim (N) to potential claims against the PIP insurer (P), an insurer other than the PIP insurer (O), or both insurers (B).

First, a possible claim against an insurer other than the claimant's PIP insurer arises if the PIP claimant is the insured driver with 50 percent or less fault or if the claimant is a passenger or pedestrian and the insured driver has zero liability. A total of 55.1 percent of all PIP claimants might be able to file a tort claim only against another insurer. Second, a possible claim against the PIP insurer arises when the claimant is a passenger or pedestrian and the insured driver is 100 percent at fault (14.3 percent of claimants). Third, there is no possibility of a bodily injury claim if the claimant is an at-fault driver (23.2 percent). Finally, if the driver is between 1 and 99 percent at fault and the personal injury protection claimant is a passenger or pedestrian, the "joint tortfeasor" doctrine applies. Under Massachusetts law, the two (or more) liable

[7] The use of statistical models built upon random samples of automobile claims has been used in the past to infer characteristics of the entire population of claims (see, e.g., Kahane and Levy, 1975).

Table 1
Distribution of PIP Claimants by Insured Driver
Liability Percentage and Claimant Position in the Accident

Insured Driver Liability	*PIP Claimant Position*						
	Driver		*Passenger*		*Pedestrian/Cyclist*		
	Potential Tort Claim Insurers	*%*	*Potential Tort Claim Insurers*	*%*	*Potential Tort Claim Insurers*	*%*	*Total*
0	O	34.2	O	14.3	O	0.6	49.1
1-49	O	2.3	B	1.3	B	0.4	4.0
50	O	3.7	B	3.1	B	0.7	7.5
51-99	N	2.3	B	1.5	B	0.4	4.2
100	N	20.9	P	12.6	P	1.7	35.2
Total		63.5		32.8		3.8	100.0

Source: Automobile Insurers Bureau of Massachusetts.
Note: Table entries represent the percentage distribution of a random sample of 839 Massachusetts PIP claims for 1989 accidents. Insured driver liability is the percentage of fault assigned by the driver's PIP insurer. P = PIP insurer, O = insurer other than PIP insurer, B = both PIP and other insurer, N = no tort claim possible.

parties must participate equally in compensating the victim. Thus, a BI claim against both the insured driver's insurer and another insurer becomes possible (7.4 percent of all claimants).

As shown in Table 1, PIP claimants who were drivers of the insured vehicle tended to have low liability, with a majority having zero fault. To a lesser degree, the same pattern applies to passengers as well. Note, however, that many accidents involve a single vehicle, and the driver must therefore be 100 percent at fault. Consequently, the distribution of driver liability among a population of accidents would ordinarily be skewed toward 100 percent. Thus, the disproportion in favor of low liability appears to represent self-selection.

The evidence that PIP is not really fault-neutral becomes even more compelling when we restrict considerations to soft-tissue injury claims for neck and back strains and sprains. Very few claims with high liability are attributed to the insured driver (see Table 2). Indeed, for these pure strains and sprains, we find that, among PIP claimants who were insured drivers, 74 percent had no liability and only 14 percent were 100 percent at fault. Among the strain/sprain claimants who were passengers, 56 percent were in vehicles whose driver had zero liability and only 25 percent were in vehicles whose driver was 100 percent liable.

We view these results within the framework of accident victim discretion with respect to claim filing. For a given physical condition that results from an accident, a potential claimant must decide whether it is worthwhile to register a claim for personal injury protection and possibly for bodily injury as well. For these "discretionary injuries," the victim's propensity to file a claim depends in part on the balance of perceived rewards and sanctions. We suggest that the relatively small number of pure strain/sprain claims by at-fault drivers and their passengers reflects in part their belief that the potential rewards do not outweigh the costs. Conversely, the cost-benefit calculus usually favors filing a claim when the claimant is not at fault even if the injury is minor or nonexistent. In particular, the claimant in a planned fraud will *never* be at fault.

Do Medical Expenses Reflect Injury Severity?

Our second traditional hypothesis was that the amount of total medical charges incurred represents an indication of injury severity. The alternative lottery hypothesis is that medical expenses are primarily a function of deliberate buildup and are not related to true injury severity. In this section, we discuss three analyses that focused on this issue.

The Distribution of Medical Charges

The lottery model implies that minor injuries can result in extensive medical treatment, primarily for the purpose of building up the claim to surmount the threshold and inflate the general damage recovery. Under this scenario, the amount of medical charges may bear little relationship to other indicators of injury severity, particularly for strains and sprains. Hammitt (1985) argued that

Table 2
Distribution of PIP Claimants by Insured Driver Liability Percentage and Claimant Position in the Accident
Strain/Sprain Injuries Only

	PIP Claimant Position						
	Driver		*Passenger*		*Pedestrian/Cyclist*		
Insured Driver Liability	*Potential Tort Claim Insurers*	*%*	*Potential Tort Claim Insurers*	*%*	*Potential Tort Claim Insurers*	*%*	*Total*
0	O	51.8	O	16.6	O	0.3	68.7
1-49	O	1.7	B	1.7	B	0.0	3.4
50	O	4.5	B	2.5	B	0.3	7.3
51-99	N	1.7	B	1.4	B	0.0	3.1
100	N	9.9	P	7.3	P	0.3	17.5
Total		69.6		29.6		0.9	100.0

Source: Automobile Insurers Bureau of Massachusetts.
Note: Table entries represent the percentage distribution of a random sample of 839 Massachusetts PIP claims for 1989 accidents. There are 357 strain/sprain claims. Insured driver liability is the percentage of fault assigned by the driver's PIP insurer. P = PIP insurer, O = insurer other than PIP insurer, B = both PIP and other insurer, N = no tort claim possible.

such padding of medical expenses might produce a bulge in the distribution of medical losses just above the tort threshold. Because his analysis of the Insurance Research Council's 1977 closed-claim data failed to disclose such a bulge in 12 of 16 states tested, Hammitt discounted the buildup phenomenon.[8] However, O'Connell and Joost (1986) posited that buildup was more likely to be observed in systems with higher thresholds and more generous PIP benefits than those prevailing in 1977.

To test this hypothesis in our Massachusetts data, we display the distribution of total claimed medical charges for two kinds of claims (see Figure 3). The non-strain/sprain injuries have the kind of highly skewed distribution that is typical for insurance losses, with a relatively small proportion of very high values accounting for a disproportionate share of total charges. There is no evidence of a substantial bulge just above the $2,000 threshold. The distributions for the strain/sprain claims, however, are not at all typical of natural economic phenomena. These distributions are clearly "bimodal," with a second peak just above the $2,000 tort threshold. Moreover, there are very few values between $1,000 and $2,000, perhaps because many of the claims that normally would have resulted in less than $2,000 in medical charges have been artificially inflated to achieve this level.

The Determinants of Medical Charges

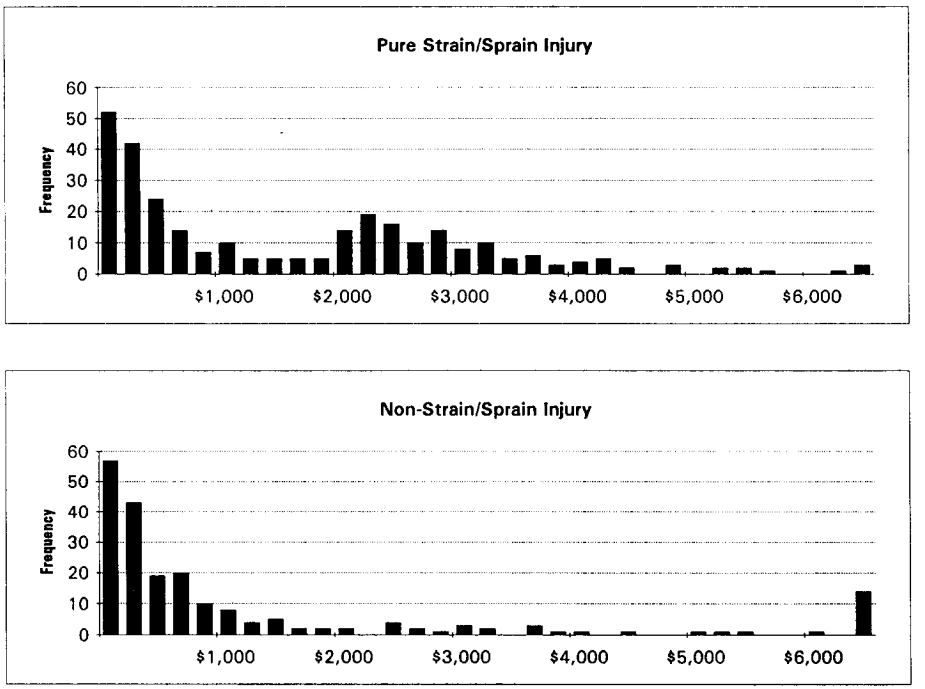
We obtained information on several aspects of the accident and injury that are expected to impact on the severity of injury. If total medical expenses were strongly correlated with injury severity, then a regression model should be able to "explain" much of the variation in expenses by these measures of severity. Under the lottery scenario, however, we expect behavioral factors correlated with claim buildup to better predict medical charges, especially for pure soft-tissue injuries.

A set of multiple regression models was developed to structure the sample data. The claims in our PIP sample were divided into three categories: pure strain/sprain (357), mixed (199), and non-strain/sprain (264). For each category, we found those claim characteristics that best predicted the total medical expenses. Our first set of analyses included possible predictors of accident or injury seriousness, but excluded measures of medical treatment utilization or lawyer involvement. Our second set of analyses included any variable that significantly improved our ability to predict medical expenses. The estimation results are presented in Table 3.

For claims that involved strains or sprains, variables that reflected the seriousness of the injury explained little of the variation in medical expenses. For pure strains/sprains, the R^2 was only 0.04, and for mixed claims with strains/sprains and "hard" injuries, the R^2 was 0.21. Only for the non-strain/sprain injuries was a large proportion of the variation explained by mea-

[8] Hammit (1985, p. 56, fn. 15) does detect a large amount (13 percent) of estimated claims built-up to within $100 in excess of the threshold in Massachusetts.

Figure 3
Distribution of Total Medical Charges
All Claims



sures of injury severity ($R^2 = 0.62$). However, when variables related to treatment utilization and claimant behavior were added, the value of R^2 for strain/sprain claims jumped to 0.78 and that for mixed claims to 0.79, while the R^2 for non-strains/sprains increased only slightly to 0.68.

Crossing the $2,000 Threshold

The Massachusetts tort threshold consists of a verbal component and a monetary component.[9] However, reaching $2,000 in medical charges was by far the more common route to a bodily injury liability claim. In this section, we delineate the factors that determine whether and how the threshold was crossed.

A total of 37.8 percent of all personal injury claimants appeared to cross the tort threshold. However, among those claimants who were possible tort claimants (about 16 percent of PIP claimants are 50 percent or more at-fault drivers who are not eligible for tort), 45.1 percent were tort eligible.[10] Table 4 provides the tort eligibility profile by type of injury.

[9] Mass. G.L.c., 231, §6D requires death, disfigurement, dismemberment, fracture, loss of sight or hearing, or $2,000 in medical expenses in order to file a tort claim.

[10] Hammit (1985, Table 5.3) reports that the $500 threshold allowed about 40 percent of Massachusetts PIP claimants to cross the threshold for claims closed in 1977.

Table 3
Regression Models of PIP Claimant Medical Charges

Variable	*Strain/Sprain*			*Mixed*			*Non-Strain/Sprain*		
	Coefficient	*P-Value*	*F*	*Coefficient*	*P-Value*	*F*	*Coefficient*	*P-Value*	*F*
				Injury Severity Variables Only					
Intercept	6.42	—	—	7.10	—	—	5.27	—	—
Severe Collision	0.58	0.0004	12.9	—	—	—	0.40	0.02	6.1
Permanent Partial Disability	—	—	—	1.28	0.02	5.7	2.08	0.003	9.3
Hospital Admission	—	—	—	1.59	<0.0001	32.2	1.48	<0.0001	19.3
Very Serious Injury	—	—	—	—	—	—	1.36	0.0004	12.9
Serious Laceration or Fracture	—	—	—	—	—	—	0.89	<0.0001	20.0
Serious Trauma	—	—	—	—	—	—	0.87	0.0005	12.6
R^2		0.04			0.21			0.62	
				All Variables					
Intercept	5.18	—	—	5.72	—	—	5.04	—	—
Log Outpatient Visits	0.60	<0.0001	216.9	0.59	<0.0001	300.5	0.61	<0.0001	49.5
Lawyer Involved	0.46	0.001	13.2	—	—	—	—	—	—
Severe Collision	0.27	0.001	11.2	—	—	—	0.47	0.003	9.6
MRI Used	0.54	0.003	9.3	0.38	0.02	5.8	—	—	—
CT Scan Used	—	—	—	0.43	0.001	12.0	0.59	0.02	6.2
Serious Visible Injury	—	—	—	—	—	—	0.71	0.001	13.4
At-Fault Driver	-0.37	0.007	7.6	—	—	—	—	—	—
Log of Hospital Days	—	—	—	0.83	<0.0001	76.8	1.08	<0.0001	79.8
Treated by MD Only	-0.42	<0.0001	16.3	—	—	—	—	—	—
R^2		0.78			0.79			0.68	

Source: Automobile Insurers Bureau of Massachusetts.

Note: Regression models are ordinary least squares models with log claimed medical charges for a random sample of 839 PIP claims from 1989 accidents as the dependent variable. A total of 820 claims (357 strain/sprain, 264 no strain/sprain, 199 mixed) were used in this analysis. Log outpatient visits (plus 1), log hospital days (plus 1), and various (0, 1) dummy variables are the potential independent regressors. Only significant ($p < 0.05$) results are shown together with their F-test and p-values, where p-value is the probability that the nonzero coefficient could have arisen by chance.

For non-strain/sprain injuries, 35.7 percent qualified, and most of these satisfied the verbal component of the tort threshold. Over half (62.7 percent) of the mixed claims qualified, most by virtue of the $2,000 monetary component. For strains/sprains 43.4 percent were tort eligible, all by virtue of the monetary threshold. To the extent that the no-fault compensation system was intended to restrict bodily injury claims based on relatively minor soft-tissue injuries, these results must be viewed as very disappointing. Our results both here and in our previous studies of bodily injury liability strongly suggest that buildup of medical charges artificially increases the number of tort claims.

Table 4
How The Threshold Is Crossed
(Excludes At-Fault Drivers)

	Strain/ Sprain	*Mixed*	*Non-Strain/ Sprain*	*Total*
Verbal Component Only	0	3.9	12.7	4.2
Dollar Component Only	43.4	49.0	8.5	34.9
Verbal and Dollar Components	0	9.8	14.6	6.0
Below Threshold	56.7	37.3	64.2	54.9

Source: Automobile Insurers Bureau of Massachusetts.
Note: Percentages shown are of a random sample of 839 PIP claimaints for 1989 accidents and of subsamples of 357 strain/sprain, 199 mixed, and 264 no strain/sprain injuries. A total of 195 at-fault driver PIP claimants were not included. Verbal component = death, disfigurement, dismemberment, fracture, loss of sight or hearing. Dollar component = $2,000 in medical charges.

Theoretically, the dollar threshold is intended to identify claims that are relatively serious and eliminate from the tort system the less serious, fraudulent, and exaggerated claims (Keeton and O'Connell, 1965). The results reported above reinforce our belief that a fixed dollar amount can no longer be regarded as a valid proxy for the severity of injury and may often represent merely a target of opportunity. To explore this issue further, we have developed a multivariate model to predict whether a claim that fails the verbal component criterion will cross the dollar tort threshold, and, if so, do the major factors relate to severity of injury or to claim filing propensities?

Because the outcome to be predicted is dichotomous (over $2,000 or under $2,000 in medical expenses) we have utilized logistic regression for this analysis. We excluded claims by at-fault drivers and by claimants whose injuries satisfied the verbal component of the threshold in order to isolate those personal injury claimants who must surpass the monetary threshold to file a bodily injury tort claim. A stepwise regression procedure was used to select independent variables. The pool of potential variables was identical to that used in the total medical charge regression model (see Table 3) with one exception.

In our previous regression analyses of total charges, we found that the number of outpatient visits was a very powerful predictor. Obviously, a large number of visits would also be correlated with exceeding the $2,000 threshold. However, our interest here is in the more subtle claim characteristics that might explain such a pattern of utilization and the resulting medical expenses. There-

fore, we have excluded outpatient visits as a potential predictor in this analysis. The results of the logistic model are presented in Table 5.

The factors that exerted the greatest impact on the likelihood of crossing the threshold were admission to a hospital, presence of a lawyer, treatment by a chiropractor, and the number of outpatient health care providers. Other significant factors were treatment by both an MD and chiropractor and a lengthy period of partial or total disability.

Table 5
Logistic Model Describing Who Crossed the $2,000 Tort Threshold (Excludes At-Fault Drivers and Claims Satisfying Verbal Component of Threshold)

Variable	*Coefficient*	*Wald Chi-Square*	*P-Value*
Intercept	-7.48		
Hospital Admission	4.72	17.8	<0.0001
Lawyer Involved	2.66	30.7	<0.0001
Log (Total Disability Weeks +1)	0.75	11.6	0.0007
Log (Partial Disability Weeks +1)	0.65	12.2	0.0005
Treated by MD and Chiropractor	1.90	11.3	0.0008
Treated by Chiropractor Only	2.89	23.5	<0.0001
Log (No. OP Provider + 1)	3.56	22.9	<0.0001

Source: Automobile Insurers Bureau of Massachusetts.
Note: Logistic regression model is applied to a random sample of 839 PIP claimants for 1989 accidents. At-fault drivers (195) and those satisfying the verbal component of the tort threshold (65) are omitted. Dependent variable = Log (π/1-π), where π = probability of crossing the tort threshold. Independent variables as shown with hospital admission (1 = yes, 0 = no), lawyer involved, treatment by MD and chiropractor, treatment by chiropractor only appear as (0, 1) dummy variables. P-value is the probability that the nonzero coefficient could have arisen by chance.

For example, suppose that a claimant had an attorney, was treated by a chiropractor only, and was partially disabled for five weeks. Then, inserting the appropriate values in the equations, we calculate

$$\log (\pi/1\text{-}\pi) = -7.48 + 2.66 + \ln(6)0.65 + 2.89 + \ln(2)3.56 = 1.703$$

and, therefore, $\pi = 0.85$.

However, if the same claimant saw an MD only and did not have an attorney, we obtain

$$\log (\pi/1\text{-}\pi) = -7.48 + \ln(6)0.65 + \ln(2)3.56 = -3.847$$

and, therefore, $\pi = 0.02$.

The logistic model supports the view that the presence of an attorney and the pattern of treatment, much more than the injury itself, determine whether the monetary tort threshold will be attained.[11] Even after accounting for possible effects of several other more direct measures of accident and injury severi-

[11] The presence of an attorney is not a proxy for serious injuries, as shown by the outcomes for mixed and non-strain/sprain injuries presented in Table 3.

ty, the predictive power of these variables remains strong. It is almost as if the intensity of treatment is independent of the nature of the injury.

At a minimum, this finding reinforces our belief that the monetary threshold no longer provides a meaningful definition of a serious injury. The logistic model is more consistent with a lottery model where the lawyer serves as the lottery manager, utilizing willing medical providers for excessive treatment.

Who Files a Bodily Injury Liability Claim?

For those potential tort claimants who qualify by virtue of the monetary component only, our third traditional hypothesis states that the decision to file a bodily injury claim should be correlated with indicators of injury severity. However, if the lottery model prevails we would expect most tort qualifiers to file bodily injury claims.

The statistical models used to test this hypothesis are based on closed paid claims that crossed the tort threshold. Once again, because the dependent variable was dichotomous, we utilized logistic regression analysis. The outcome is based on supplemental data regarding whether a bodily injury or uninsured motorist claim developed from the personal injury protection claim. Note, however, that this outcome really indicates whether a liability claim has been paid or is currently reserved. Because some claimants attempt to file a BI claim and later give up or are denied by the BI insurer, the proportion of PIP claimants who make some attempt to file a liability claim will be underestimated. However, to define what constitutes an "attempted" claim and to find such duds and denials in the Statistical Plan data base is difficult if not impossible.

Overall, 76.8 percent of those apparently eligible to make a BI claim chose to do so. That such a high proportion of bodily injury claimants follows through lends support to the presence of the lottery mentality in Massachusetts. However, it is also possible that Massachusetts accident victims are just very litigious. Unfortunately, we have no comparative data from other states on the percentage of tort-eligible victims who actually pursue tort claims. The results of the logistic regression model predicting who files bodily injury claims are presented in Table 6.

Table 6
Logistic Model Describing Who Filed a BI Claim
(Includes Only Claimants Who Crossed the Tort Threshold)

Variable	*Coefficient*	*Wald Chi-Square*	*P-Value*
Intercept	-6.08		
Log of Total Medical Charges	0.72	5.6	0.02
Lawyer Involved (1 = yes, 0 = no)	1.98	12.5	0.0004

Source: Automobile Insurers Bureau of Massachusetts.
Note: Dependent variable = log (π/1-π), where π = probability of filing a bodily injury claim. P-value is the probability that the nonzero coefficient could have arisen by chance.

The strongest predictor of who will file a bodily injury claim was the presence of a lawyer. The role of legal representation is somewhat ambiguous,

however. On one hand, since the presumed purpose of hiring a lawyer is to pursue a possible liability claim, this result is not surprising. On the other hand, one might expect some other indicators of injury severity to be stronger predictors.

For claimants who crossed the threshold, 91.1 percent are represented by a lawyer in dealing with the PIP insurer. Among the claimants with attorneys, 80.9 percent actually filed a BI claim. Of the 8.9 percent who are unrepresented, only 34.6 percent filed a bodily injury claim. Thus, a strong correlation between attorney representation and seeking a BI settlement is evident.

Of the claimants who did not cross the threshold, a small but not trivial proportion (19.1 percent) retained an attorney. Since personal injury protection is a no-fault coverage and attorneys traditionally receive a contingent fee based only on the liability award, it is surprising that so many of these claimants had legal representation. The most likely explanation is that the lawyer is assisting the accident victim on a variety of interrelated matters, including property damage claims and claims against other nonauto insurance coverage. Thus, the PIP claim may be part of a broader package of services for which adequate compensation will be received by the lawyer. These cases appear to follow the traditional model of claiming behavior.

Bodily Injury Settlement Awards for General Damages

Subject to the bodily injury policy limits, a claimant who files a BI claim can receive compensation for medical expenses and wage losses not recovered under personal injury protection and for *general damages*. General damages are meant to compensate the claimant for the pain and suffering attributable to the injury. Unlike economic damages (medical charges and lost wages), which can be measured directly, these noneconomic losses are valued subjectively and are typically negotiated between the claims adjuster and the claimant or his or her representative (Donaldson and Hirsch, 1992, chap. 13).

One purpose of the current investigation is to refine a previously developed statistical model (see Weisberg and Derrig, 1991b) that describes the way claims are valued during the claims adjustment process. That is, for personal injury claims that go on to become bodily injury claims, what claim characteristics determine the general damages?

Under a pure tort system, the BI payment incorporates compensation for both economic losses and general damages. However, under the Massachusetts no-fault system, at least part of the economic damages are paid under PIP and are therefore deducted from the BI settlement. Consequently, the value of the claim is indicated by the total compensation (sum of personal injury and bodily injury payments) rather than the BI settlement alone.

To determine total compensation, one must know the amounts of both the BI and PIP payments. Measuring the factors taken into account by the adjuster (e.g., total wage loss, disability, etc.) required detailed information from the bodily injury claim file. Thus, we needed both PIP and BI data for a representative set of claims. It was not technically feasible to link the personal injury

protection claims in our entire sample with the corresponding bodily injury claims. However, for a subset of 387 BI claims from our 1989 bodily injury study, we were able to identify the corresponding PIP claim and to code the information in the claim file. This supplementary sample of BI claims was then used in our model of total compensation.

In principle, we could have treated the sum of PIP and BI payments simply as a dependent variable in a regression modeling framework. However, the bodily injury payment could have been cut off, or censored, by the policy limits. We utilized a Tobit regression analysis (Tobin, 1958) to account for the censoring. Hammit (1985) and Carroll et al. (1991) use similar procedures in their RAND studies to cope with the policy limit censoring. Because we had already conducted a substantial modeling effort, we began with the previously developed model as a starting point. The results of the final Tobit regression model are presented in Table 7.

Table 7
Tobit Regression Model for Total Bodily Injury Compensation

Variable	*Coefficient*	*Chi-Square*	*P-Value*
Intercept	4.74		
Log (Total Medical Charges + 1)	0.52	79.0	<0.0001
Log (Wages + 1)	0.043	26.7	<0.0001
Log (Fault Proportion)	0.49	17.1	<0.0001
Lawyer Involved	0.40	11.1	0.001
Fracture Involved	0.31	8.3	0.004
Apparent Buildup	-0.25	11.5	0.001
Log (Total Disability Weeks + 1)	0.075	7.6	0.006
Serious Visible Injury	0.25	5.3	0.03

Source: Automobile Insurers Bureau of Massachusetts.
Note: Tobit regression model is applied to a random sample of 387 claims for PIP and BI liability payments for 1989 accidents. Dependent variable = log (BI payment + PIP payment). Independent variables are described with (0, 1) dummy variables for lawyer involved (1 = yes, 0 = no), fracture involved, apparent buildup, and serious visible injury. P-value is the probability that the estimated nonzero coefficient could have arisen by chance.

By far the most powerful predictor of the total bodily injury compensation awarded was the amount of medical charges incurred. The predominance of this factor is consistent with traditional lore about claims adjustment and with the RAND estimations. Indeed, a common rule of thumb is to multiply the medical expenses (or total economic loss) by some multiple, such as three or four, to use as a first cut in bodily injury claim valuation (see Hammitt, 1985, p. 9). The rationale for such an approach rests on the interpretation of medical expenses as an indicator of injury severity. However, under the lottery model, total medical expenses accrued might bear little relationship to the injury or to the accompanying pain and suffering.

Although the amount of lost wages was also highly significant, the relatively low value of the coefficient (0.043) compared to that for medical charges (0.520) suggests that the total compensation provides only for wage replacement. General damages may be unaffected by lost work time unless disability

is also claimed. Other important determinants of the bodily injury compensation are the at-fault driver's degree of fault, involvement of an attorney, and presence of a fracture injury. The number of weeks on disability also influences the magnitude of the bodily injury settlement, as does the fact that a serious injury was visible at the accident scene.

The most influential predictor of total compensation is the (claimed) medical charges.[12] The medical charge variable is highly significant and possesses a coefficient substantially different from zero. This means that higher claimed medical charges lead to higher pain and suffering settlements, although at less than a dollar-for-dollar rate.

Two other conclusions can be drawn from the model. The involvement of a plaintiff's lawyer adds about 50 percent to the otherwise determined value of the case.[13] In cases where the claim was judged by the bodily injury coder to involve medical treatment buildup, the total settlement was about 22 percent *lower* than would otherwise be expected, which we interpret as the outcome of an aggressive negotiation process that occurs when buildup is suspected. On a practical basis, the reduced total case value for built up claims emanating from the lottery model provides evidence that claims adjusters are aware of the lottery element of built up claims.

Finally, we observe that the coordination of benefits between personal injury protection and health insurance is meant to produce savings for the auto insurance system as a whole. However, with respect to those claimants who receive BI awards, these coordination of benefits savings are illusory, because the money saved by a reduced PIP payment will be paid out as part of the BI settlement since there is no collateral source offset to BI for health insurance payments. Indeed, inclusion of a variable to indicate the availability of private health insurance in the model of total compensation produced no changes in the model parameters. We can conclude that the PIP savings attributable to coordination of benefits were recouped within the BI settlement, so that total compensation was unaffected.

In effect, for these claimants, a portion of their medical reimbursement has been shifted from a system in which they are compensated once (through PIP) to a system in which they can potentially "double-dip." Unless the health insurer enforces its subrogation rights, the total paid by all insurance coverage will increase. One obvious way to achieve real savings for the entire system would be a collateral source offset similar to the current PIP payment offset.

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[12] Interestingly, the $2,000 monetary threshold is satisfied by $2,000 in medical charges (bills) rather than by medical payments. This means that medical charges denied payment by the personal injury protection insurer may still be used to qualify for a bodily injury tort claim.

[13] Because the total compensation model is modeled on a log scale, resulting coefficients need to be exponentiated for interpretation here and elsewhere. For example, the coefficient for lawyer involvement is 0.40, which implies a total compensation effect of EXP (0.40) = 1.49 or about 50 percent.

The Effect of Special Claims Handling

The specific policies and procedures that govern the claims handling process vary considerably across insurers. In particular, the criteria for identifying suspicious claims and strategies for response depend on the resources available, company philosophy, whether a separate special investigation unit exists, and many other factors (see Insurance Research Council, 1992, for a discussion of special investigation units). In general, however, we can differentiate two central activities. There is routine claim settlement, which is invoked for the vast majority of claims. And there is the closer scrutiny reserved for difficult and suspicious claims.

To understand the relationship between fraud and claims handling requires some knowledge of the insurer's situation. In all U.S. jurisdictions, filing a fraudulent claim is illegal in theory and the insurer is entitled to deny the claim. Various criminal penalties may also be specified. However, as a practical matter, it is rare for a claim to be denied. First, the insurer must have sufficient grounds to justify the denial and possible subsequent expense of defending that decision in litigation. Second, most states have fair claim settlement laws that call for multiple damage awards if bad faith is found.

Because the consequences of an error in dealing with a suspicious claim can be costly, the insurer may first attempt to gain additional information. An array of investigative techniques are available. Some of these techniques are employed directly by front-line adjusters, but many insurers have established special investigation units to handle the more complex investigations.

One purpose of claim investigation is to support a lower estimate of the special or general damages, leading to a decreased negotiated settlement. Another purpose might be to help justify a denial of the claim. In either case, the function of the evidence developed is to bolster the legal position of the insurer should presentation before a court or in arbitration ever be necessary. However, especially in the case of suspected fraud, the insurer may hope that the claim will either be dropped or reduced voluntarily in the face of rigorous investigation.

It seems plausible that reliable information about suspicion of fraud would help improve decisions about individual claims. However, given the constraints under which insurers must operate, it is not clear whether substantial reductions in settlement values would result. To explore this issue, we examined claims handling techniques and the recommendations of the adjusters and investigators for our supplementary study sample.

Effective Techniques

Specialized claim investigation techniques have long been available for use when justified by the circumstances surrounding the claim and by the cost of the technique (Brainard, 1965, Rosenbloom, 1968). Our study of 1989 claims included data on the presence or absence of the following standard techniques:

Central Index Bureau—an inquiry to the Central Index Bureau for a history of prior liability claims and subsequent follow-up by the adjuster for prior claims related to the current claim.

Site Investigation—a visit by an investigator to the site of the alleged accident to assess physical evidence and to seek witnesses.

Activity Check—an investigation that may include surveillance of current and accident day activities of the claimant and related parties.

Independent Medical Examination—an independent medical examination that may be ordered to assess injuries and treatment.

Examination Under Oath—a sworn statement taken under penalties of perjury to establish the facts of the case.

Special Investigation—any investigation beyond routine claim handling, including, but not limited to, those performed by special investigation units.

Alternative Dispute Resolution—the use of any of several alternative dispute resolution techniques, including arbitration and mediation.

Medical Audits—the review of claimed medical charges by medically-trained professionals.

Wage Verification—the review of claimed wage loss by verifying various documents relating to the claimant's earnings.

Although the application of each technique will add to the information base for adjusting the claim, the direct effect on the claim settlement value has not been measured previously. The effect of the specialized claims handling techniques on settlements is measured by adding each as a variable to the Tobit model discussed above. The marginal results of adding the techniques one at a time are presented in Table 8. The results suggest that some techniques reduce the total compensation and others do not. Unfortunately, the small size of our supplementary sample with claims handling data (176 claims) and the rarity of some of the claims handling methods (as little as 3 in 176) do not permit reliable one-variable marginal effect analysis.

Grouping similarly effective methods produces the conclusion that the combined effect of independent medical exams with positive findings (failure to confirm the alleged injury or treatment), examinations under oath, special investigations, medical audits, and wage verifications is to reduce the total settlement amount by 18 percent. Little or no significant claim amount effect is shown by using the Central Index Bureau data on prior claims, site investigations, or activity checks.[14] The attempt to obtain an independent medical examination is also effective but cannot be shown as such by this analysis.[15] Specialized claims handling techniques clearly have a dampening effect on

[14] This result should not be interpreted as indicating that these techniques have no value. Indeed, each of the three modes of investigation could lead to claim denials and criminal prosecution.

[15] Specifically, the claimed medical charges and the attempted independent medical examination are collinear with respect to the total compensation variable. Other statistical tests show that attempted independent medical examinations result in lower *claimed* medical charges while the other claim handling variables do not.

Table 8
Tobit Regression Effects for Claims Handling Techniques

Technique	*Marginal Coefficient*	*Effect P-Value*	*Interactive Coefficient*	*Effect P-Value*
Central Index Bureau (11)	0.02	0.85	0.06	0.41
Site Investigation (32)	0.06	0.46	(45 Claims)	
Activity Check (3)	0.12	0.59		
Independent Medical Examination				
Attempt (32)	0	0.96		
Positive (9)	-0.13	0.36	-0.20	0.002
Examination Under Oath			(70 Claims)	
Attempt (8)	-0.18	0.17		
Taken (5)	-0.22	0.17		
Special Investigation				
Special Investigation Unit (6)	-0.22	0.16		
All (8)	-0.17	0.21		
Alternative Dispute Resolution (4)	-0.11	0.56		
Medical Audit (5)	-0.19	0.27		
Wage Verification (47)	-0.10	0.20		

Source: Automobile Insurers Bureau of Massachusetts.
Note: Tobit regression model is applied to 176 claims of the regression with claims handling data shown in Table 7. Marginal coefficients are single variable additions to those in Table 7 used to explain the dependent variable of log (BI payment + PIP payment). All dependent variables here are (0, 1) dummy variables (1 = technique applied, 0 = technique absent). Number of claims where technique was applied are shown in parentheses. Interactive coefficients are generated by (0, 1) dummy variables (1 = at least one of the techniques was applied, 0 = none of the techniques were applied). P-value is the probability that the estimated coefficient could have arisen by chance. The independent medical examination attempt variable is collinear with the claimed medical charge variable and thus not susceptible to this Tobit analysis.

claim amounts. The question remains whether more aggressive use of the effective techniques would produce even lower payments.

A Supplementary Coding

Each of the 387 claims underlying the Tobit regression analysis was coded independently by two adjusters. One coding was based on the PIP file and one on the BI file. Because only 62 of these 387 claims were deemed by at least one of the two coders to involve fraud, we enriched those 62 claims by adding 65 claims chosen randomly from the remaining 325 to construct a stratified sample of 127 claims. Each of those 127 PIP and BI claims was coded by a third adjuster and by an experienced investigator from the Insurance Fraud Bureau (IFB). Thus, four independent views were obtained for each of the 127 bodily injury claims.

The adjusters and the IFB investigator recorded a fraud assessment, opinions about the utility of various investigative techniques, and a judgment regarding the best approach to handling the claim. The adjusters were also asked several questions about the cost versus benefit of additional investigation in terms of claim settlement. We constructed a "fraud vote" variable equal to the number of coders who, when asked for a clear-cut determination of fraud or no fraud,

chose the fraud option. This provided a division of the sample claims by the strength of the suspicion of fraud. Since not one claim was deemed fraudulent by all four coders, the values of the fraud vote variable were 0-3.[16] We turn first to the comparison of actual versus recommended claims handling approaches.

Actual Versus Recommended Claims Handling

The actual and recommended approaches to handling claims, as perceived by the claims adjusters, are presented in Table 9. Clearly, resistance to the claimant's demand increases with the level of suspicion. For claims with a fraud vote of zero or one, the adjusters tended to agree with the relatively passive actions taken. However, for more suspicious claims, our coders targeted a much higher percentage of these claims for possible denial or special investigation.[17]

For each investigative method most commonly employed by adjusters, we asked the coder to indicate whether the technique was potentially useful, ignoring additional expenses entailed, for handling the bodily injury liability claim. The results are presented in Table 10. In general, the usefulness increased with the level of suspicion. A check of the Central Index Bureau for previous claims, an independent medical examination, recorded statements of the claimant and insured, and wage loss verification were often considered useful. However, when the cost of these techniques was taken into account, the implication was quite different.

The coders were asked to speculate about the cost-to-benefit ratio if the additional useful investigation were conducted. The results in Table 11 imply that the additional expense usually could not be justified on a claim-by-claim basis. Indeed, most of the benefit would be concentrated in those very suspicious claims that might ultimately be withdrawn or successfully denied. For claims characterized by little or no suspicion, including possible buildup, our coders were skeptical about the ability of enhanced investigation to reduce claim settlements.

Translating into population terms, we estimate that the additional cost of investigation would exceed the benefit for 44.2 percent of all claims, would equal the benefit for 31.8 percent, and would be less than the resulting benefit for only 15.2 percent of claims. For another 8.8 percent, the coders were too uncertain to speculate. This means that additional investigation will not lead generally to lower net claim settlement costs. The fact that additional investigation may not lead to lower (net) settlement costs for specific claims does not preclude the use of carefully selective investigations designed to increase denials and criminal prosecutions for their future deterrent value.

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[16] The fact that not one claim of the 127 was judged to involve fraud, as opposed to buildup, by all four coders speaks to the difficulty in definitively identifying fraud cases from claim file type information.

[17] See Insurance Research Council (1992) for more information on how insurers are organized to cope with suspicious claims.

Table 9
Actual and Recommended Claims Handling Action

	Fraud Vote							
	0 (52)		*1 (36)*		*2 (26)*		*3 (13)*	
Action	*Actual*	*Recommended*	*Actual*	*Recommended*	*Actual*	*Recommended*	*Actual*	*Recommended*
Normal	76.9	71.2	52.8	47.2	61.5	30.8	53.7	7.7
Compromise	17.3	23.1	33.3	33.3	19.2	34.6	30.8	30.8
Investigate					7.7	26.9	7.7	46.2
Deny		1.9		5.6	7.7	3.9	0.0	7.7
Other	5.8	3.9	13.9	13.9	3.9	3.9	7.7	7.7
All	100	100	100	100	100	100	100	100

Source: Automobile Insurers Bureau of Massachusetts.
Note: This table shows percentage distributions of a stratified random sample of 127 PIP and BI claims for 1989 accidents according to claims handling action coded by experienced adjusters. Fraud vote = number of four independent coders designating the claim as apparently fraudulent. The distribution of 127 claims by fraud vote value is shown in parentheses.

Table 10
Usefulness of Investigative Techniques Without Regard for Expense

	Fraud Vote			
Technique	*0 (52)*	*1 (36)*	*2 (26)*	*3 (13)*
Central Index Bureau	88.5	100.0	100.0	92.3
Medical Audit	3.9	8.3	26.9	30.8
Independent Medical Examination	50.0	75.0	80.8	92.3
Activity Check	11.5	19.4	57.7	69.2
Site Investigation	19.2	30.6	23.1	53.9
Claimant Recorded Statement	38.5	50.0	53.9	92.3
Claimant Sworn Statement	3.9	11.1	23.1	46.2
Insured Recorded Statement	42.3	66.7	69.2	92.3
Insured Sworn Statement	1.9	8.3	11.5	46.2
Witness Recorded Statement	21.5	16.7	11.5	23.1
Witness Sworn Statement	0	2.8	3.9	0
Wage Loss Verification	44.2	50.0	42.3	46.2

Source: Automobile Insurers Bureau of Massachusetts.
Note: This table shows the percentage of a stratified random sample of 127 PIP and BI claims for 1989 accidents deemed useful for the indicated claims handling technique to be taken. Fraud vote = number of four independent coders designating the claim as apparently fraudulent. The distribution of 127 claims by fraud vote value is shown in parentheses.

Table 11
Cost Versus Benefit of Additional Investigation

	Fraud Vote			
Net Cost After Investigation	*0 (52)*	*1 (36)*	*2 (26)*	*3 (13)*
Probably Lower (19)	13.7	5.6	26.9	23.1
Probably Same (39)	32.7	30.6	34.6	15.4
Uncertain (14)	9.6	11.1	7.7	23.1
Probably Higher (55)	44.2	52.8	30.8	38.5
	100	100	100	100

Source: Automobile Insurers Bureau of Massachusetts.
Note: This table shows percentage distribution of results of a stratified random sample of 127 PIP and BI claims for 1989 accidents after the useful techniques of Table 10 were expected to be applied. Fraud vote = number of four independent coders designating the claim as apparently fraudulent. The distribution of 127 claims by fraud vote value is shown in parentheses.

Conclusion

This article has explored the traditional model for claims filing behavior under a system of no-fault compensation compared to the emerging view of the operation of a personal injury lottery. Under the lottery view, minor or fabricated claims are pursued, sometimes with the assistance of a lottery "manager," with inflated medical bills to exceed the monetary tort threshold and to increase payments for pain and suffering. Operational flow models were given

for the traditional and lottery models along with hypotheses to be tested with a sample of Massachusetts bodily injury and personal injury claims.

Our results suggest that the lottery model predominates for soft-tissue strain and sprain injury claims, while the traditional model predominates in non-strain/sprain claims. There is evidence that minor accidents and minor injuries are being seen as opportunities to participate in the personal injury insurance lottery for profit.

Responses by insurance adjusters to lottery-type claims were measured via a Tobit regression model for combined BI and PIP payments. We conclude that adjusters reduce the otherwise determined bodily injury payments in cases of suspected buildup by about 22 percent. The effectiveness of specialized claims handling techniques was explored, with preliminary findings showing an additional average reduction of about 18 percent in claim size when one of the effective techniques is used. A compilation of the judgments of the independent adjuster coders suggests that the current level of investigation is driven by a reasonable if not formal cost/benefit analysis on a claim-by-claim basis. However, we found evidence that the adjusters see limited potential for compromising claims *further* in a cost effective manner using the main techniques now available to adjusters. Thus, the major benefits of more aggressive, but more costly, investigations might result from claim denials and the deterrent effects of increased criminal prosecutions.

Overall, the results suggest certain claims handling strategies. First, better ways must be developed to identify claims that are likely to benefit from increased scrutiny. The wide disparity in perceptions of fraud by observers will likely make this screening process difficult but not impossible. Additional claim savings are possible *if* the fraudulent claims can be identified early. Second, Massachusetts and other states now have insurance fraud bureaus, an additional resource that was not available when our data was collected. Without the support of an insurance fraud bureau, insurers had little incentive to expend resources beyond the value of the claim without hope of criminal prosecution for fraud (fraudulent rings are the exception). With an insurance fraud bureau, strategies that extend beyond the single claim become practical and deter future fraudulent claims. Third, much can be accomplished by reducing or eliminating the effect of lottery managers. Either prosecution in the cases of outright fraud or system redesign (verbal threshold) is needed to deter those who manipulate the system for personal gain.

For future research, additional theoretical work to model and parametrize the claim process is needed. Dionne and St-Michel (1991), Bond and Crocker (1993), and Cummins and Tennyson (1994) have provided a good start down that path. There is also a need to develop claim screening techniques, as mentioned above, and to organize controlled objective experiments in the evaluation of claims handling techniques.

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