Mispriced Equity: Regulated Rates for Auto Insurance in Massachusetts

By B. GLENN BLACKMON, JR. AND RICHARD ZECKHAUSER*

From the Santa Monica Freeway to the New Jersey Turnpike, drivers are unhappy about the cost of automobile insurance and are asking government to do something about it. California voters approved Proposition 103 in 1988; it requires that all rates be approved by the state insurance commissioner, attempts to reduce rates by 20 percent, and dramatically limits the criteria that can be used to rate drivers for premium purposes. New Jersey enacted an insurance reform law that seeks to charge insurers for a deficit-burdened state underwriting pool and prohibits the use of age, sex, and marital status in rating drivers for premiums. Other states enacting or considering significant rate rollbacks or reform since 1988 include Arizona, Florida, Michigan, Nevada, and Pennsylvania.

This article describes the current consequences of similar policies adopted in Massachusetts more than a decade ago. The experience suggests that recent moves by other states in the same direction will ultimately prove quite expensive as the proportion of high-cost drivers increases and as insurers lose the incentive to write policies and control costs. The trend away from insurance premiums based on expected cost also reduces incentive effects for drivers, since insurance premiums provide a link between tort judgments and consumer decisions.

I. Insurance Regulation in Massachusetts

The insurance commissioner in Massachusetts specifies a rating system for classifying drivers and sets a single schedule of rates that apply to any insurer in the state. The state eliminated sex-based rate differences for automobile insurance in 1977, when the state insurance commissioner concluded that "sex classifications in automobile insurance represent unfair discrimination. Rates containing a distinction based on gender are both unjust and violative of public policy" (James Stone, 1978, p. 179). At the same time, rate differences based on age were also eliminated and replaced with rating classes based on the number of years as a licensed driver. The state classification system allows rates to vary by territory (i.e., the place of residence of the driver), class (i.e., whether an inexperienced driver is the principal or an occasional driver of the car, whether any inexperienced driver has had driver training, and whether the car is used for business), and the age and type of car.

The state has "tempered" (limited the variation of) premiums across territories and classes. Across classes, the expected cost of insuring a driver varies by a factor of 4.4, but premiums vary by a factor of 3. Across territories, costs vary by 2.7 and premiums by 2. When class and territory are combined, the effect of tempering is even greater. The premium for drivers in the highest class-territory cell is 4.50 times the premium of the driver in the lowest cell, yet the cost of insuring the high-cell driver is 10.6 times the cost of insuring the low-cell driver (Automobile Insurers Bureau, 1990, exhibit 5).

In addition to the transfers among drivers, insurance regulators have also apparently tried to effect a transfer from insurers to drivers as a group. The insurance industry contends that overall rates are consistently below the level necessary to provide a profit. This claim would be expected from the industry as strategic behavior in the rate-setting process, and it would have little credibility if insurers were continuing to do

*John F. Kennedy School of Government, Harvard University, Cambridge, MA 02138. We thank the Bradley Foundation for research support, and John Pratt.

business in the state. Yet by 1989, eight insurance companies, writing 25 percent of automobile coverage in the state, had abandoned business in Massachusetts or were actively attempting to do so, despite high exit fees imposed by the insurance commissioner. These exit fees include both cash payments and prohibitions on writing other lines of insurance in the state.

While an insurance company is allowed no flexibility in the rates it charges, it can choose whether to insure a particular risk. Many companies choose not to insure many drivers. If an insurer declines to insure an exposure, that driver is ceded to a residual market pool, Commonwealth Auto Reinsurers (CAR). Being ceded to the pool has no effect on the driver's premium, and as a result the residual market pool pays claims well in excess of premiums. In 1988, 63 percent of drivers were insured by CAR, and the CAR deficit for private passenger automobile insurance was $519 million, or $239 per ceded risk (Commonwealth Automobile Reinsurers, 1988). This residual market deficit is financed by surcharging premiums for drivers in the voluntary market.

II. Subsidies in Massachusetts Auto Insurance Rates

The subsidies contained in Massachusetts auto insurance rates are large and multidimensional. Subsidies flow from drivers in rural areas to those in urban areas, from women to men, from the middle-aged to the young and the elderly, from experienced drivers to inexperienced drivers, and from drivers in the voluntary market to those in the high-risk, involuntary market.

How large is the subsidy? A minimum value would be the size of the residual market deficit ($519 million), but the true value is surely larger since some ceded drivers are actually paying more than their cost. About $191 million results from the tempering of rates across class/territory cells. The remainder, at least $328 million, can be attributed to the state rating system that requires insurers to charge a single premium to a heterogeneous group of drivers. A cell that, on average, is charged premiums in excess of cost will nonetheless contain some drivers whose costs exceed the premium. Many of these drivers can be readily identified by an insurer and are ceded to the residual pool. For example, the average experienced driver 25 or older pays a subsidy of about $60 per year, yet 60 percent of these drivers are ceded to the residual market. Recognizing this, we divide drivers into three groups in Table 1: those in a cell that receives a subsidy through tempering (s); those in a subsidy-paying cell but who receive a subsidy from ceding (c); and those neither tempered nor ceded (n). The first two groups receive a subsidy, and the third group pays a subsidy. We assume that all drivers in a subsidy-receiving cell are ceded and that the proportion of ceded drivers is constant across subsidy-paying cells.

TABLE 1—AVERAGE SUBSIDY AND PRICE OF THOSE PAYING AND RECEIVING SUBSIDIES

	Average Cost	Insured Vehicles (000)	Average Premium	Subsidy
s	$1,312	820	$1,079	$233
c	$928	1,251	$665	$262
n	$323	1,216	$750	($427)

Source: Authors' calculations from data in Automobile Insurers Bureau (1990).
Note: s = subsidized cell; c = ceded to residual market; n = not ceded or subsidized.

These subsidies generate allocative inefficiency: those who pay the subsidies restrict their consumption of automobile insurance, by not driving or by driving without insurance. Those receiving the subsidies increase their consumption. A deadweight loss results as some consumers are deterred from driving even though they would pay the cost and others drive when they would not if prices reflected costs. To assess the deadweight loss from the subsidies, we first estimated a simple demand function for insurance using data from Massachusetts towns in 1988. The demand for insured vehicles per household was estimated as a log-linear

(constant-elasticity) function of income, price, and household density.[1]

Using this demand function, we calculated deadweight loss from the subsidies at $217 million annually, or 42 percent of the total subsidy. (This 42 percent figure seems high until we recognize that if the cross-subsidy scheme must break even, the losses of both those undercharged and overcharged must be counted.)[2] The deadweight loss is substantial, but it alone does not tell us whether the policy of subsidies is good or bad. There are at least two possible rationales for subsidies—risk spreading and egalitarianism.

Subsidies as a risk-spreading mechanism. The state's rationale for subsidizing high-cost drivers at the expense of low-cost drivers (as explained by the commissioner) in essence is to spread the risk that one may be a bad driver (Stone). If drivers were risk averse and did not yet know whether they are high- or low-cost drivers, they could increase their expected utility by agreeing to pay more than cost if they are low-cost and less than cost otherwise. How risk averse would Massachusetts drivers have to be for the observed pattern of tempering to be superior to cost-based prices? To answer this question, we first computed the gain from driving, g, as the per capita consumers' surplus up to the $5,000 available at the bottom of the demand curve. We then posited household utility, U, as a function of money income, y, plus the gain g derived from operating an insured vehicle. For each cell of individuals, i, let $x_i = y_i + g_i$. We express utility as a constant proportional risk-aversion function, $U_i = u(x_i) = x_i^b$, where b is a risk-aversion parameter to be estimated. We measure the effect of the subsidies by their effect on the expected utility of a randomly chosen individual, one who knows only the proportions of individuals who will be subsidized and by how much but not his particular group. The relevant individuals are those who would own a car under either the subsidized rates or cost-based rates. (There would be 1.993 million drivers in group n if rates were based on cost.)

For any given set of prices, the expected utility $E(U)$ is equal to the utility of an individual in each group, weighted by the proportion of individuals (potential drivers) in that group. Each of the three groups in Table 1 is divided into finer units based on class and territory, yielding a total 1,092 cells. Thus

$$E(U) = \sum_{i=1}^{1,092} \left[d_i * (30{,}000 + g_i)^b \right],$$

where d_i is the proportion of individuals in cell i and all drivers are assumed to have household income of $30,000. We find the highest value for b at which $E(U)$ under the current subsidy regime is equal to $E(U)$ under a regime in which each group was charged a price equal to its expected cost. For the subsidized outcome to offer at least as high an expected utility, b must be less than or equal to -7.2. At this level of risk aversion, an individual's marginal utility of

[1]Our illustrative estimation applies ordinary least squares to data from 294 towns. Our right-hand side variables were median household income in 1979 (the latest year of town-level data), average price of a standard package of insurance coverage, and households per square mile as the density measure. The demand for vehicles should decrease with population density because substitute transportation becomes more readily available. Thus, we expect the coefficients on income to be greater than zero, and on price and density to be less than zero. Our estimated coefficients, with standard errors in parentheses, were income .477 (.044), price −.569 (.119), and density −.044 (.011). Our R^2 was .593. All coefficients are significantly different from zero at the 99 percent confidence level (see our 1990 paper). We did not have a sufficiently rich data set to control for exogenous variables that could influence the driving decision. In contrast to a traditional market, supply conditions were favorable for our estimation efforts, since all prices were set by regulators, and the supply curve for each cell was horizontal (any driver had to be accommodated at the established rates).

[2]Our measure of deadweight loss does not include the inefficiency from pricing at average cost instead of marginal cost. Using data on insurance costs, we estimate that marginal cost exceeds average cost by 40–60 percent in urban areas of Massachusetts. The additional deadweight loss is $81 million (see our 1990 paper).

income drops by an implausible factor of 295 as his income increases from $15,000 to $30,000.

Subsidies as an income transfer mechanism. A second rationale for subsidies would be to transfer income from consumers with high income to those with low income, again as a way of raising the expected utility of a randomly selected consumer (i.e., egalitarianism in the spirit of an optimal income tax trading off incentive losses against risk-spreading gains). Tempering a commodity price, such as an auto insurance premium, can accomplish this purpose only if high-cost consumers tend to have low incomes. The relationship between subsidies and income is decidedly mixed in the case of automobile insurance. The subsidy of Boston and other cities tends to flow from high-income towns to low-income towns. Yet women subsidize men even though women's income is much lower. In many cases the group paying or receiving a subsidy is simply too diverse for us to estimate its income.

Measuring only variations across towns, we estimate that the average household income of group s, those in a cell receiving a tempering subsidy, is $26,500, measured in 1988 dollars. Since the drivers in group c and group n are in the same cells, their average income is the same, $30,418. Given these assumptions about income, an egalitarian motive justifies the subsidies if $b < -2.7$. At this level of risk aversion/egalitarianism, the marginal utility of income at $15,000 is 13 times that at $30,000. (For this utility function, taking account of variability in incomes within cells would increase the relative attractiveness of the subsidy scheme.)

We have not attempted to measure the egalitarian sentiment of Massachusetts citizens, but a look at the state's social programs and tax system suggests that it is not nearly this strong. Moreover, this redistributional bucket is extraordinarily leaky; other instruments, such as taxes and transfers, could effect the transfer with significantly smaller losses.

"Price equity" as a goal. Neither risk aversion nor egalitarianism, if their implicit tradeoff rates are examined, yields a satisfactory justification for the subsidies in Massachusetts auto insurance rates. We believe that the subsidies may be better explained (though not justified) by a desire for price equity, the idea that differences in price for goods that are nominally similar is in itself a bad thing. Price equity is a sensible goal, and a natural accompaniment of competitive markets, when the cost of the product does not depend on who consumes it. Variation in prices across a market is usually welfare reducing, but not for insurance. The expected cost of insurance varies in predictable fashion for large subsets of consumers, though not for any particular consumer.

Even a well-informed consumer, however, would find it difficult to judge the absolute or relative cost of his coverage and would probably underestimate variation in cost across insureds. With little idea about cost, consumers judge their rate relative to others —both rates charged other consumers and the rates they paid in the past. If consumers assess the fairness of rates on a relative scale, a politically responsive regulator would set rates on the same basis.

The recent insurance reforms in California and New Jersey significantly temper rates, promoting the notion that significant variation in rates across consumers is unfair. The demand for price equity is reflected in prices for electricity and natural gas (typically the same for rural and urban customers of the same company despite cost differentials), tuitions for college students (invariant across fields with disparate costs of facilities and faculty), and the invariant cost of sending a letter.

III. Regulation and the Residual Market

A heavily subsidized market has important and negative effects on the incentives of insurers. These effects are most apparent in the operation of the residual or involuntary market, which was intended to be a last-resort insurance source for high-risk drivers. It now insures more than two-thirds of Massachusetts drivers, its size the inevitable consequence of that state's strategy

of limiting absolute rates and tempering relative rates.

Every state provides some mechanism to insure drivers who cannot obtain insurance at standard rates. The most common mechanism, used in about 40 states, is the assigned-risk plan: drivers who cannot obtain insurance are assigned to an insurer, who is responsible for all expenses and losses of that policy. Massachusetts uses a reinsurance mechanism. Drivers are not assigned to a specific insurer; rather their losses are allocated among insurers. Massachusetts is unique in requiring that residual and voluntary market drivers in the same rating category pay the same rate. Tempering and heterogeneous classifications both increase the ceding of risks, and Massachusetts now has more drivers in the involuntary market (70 percent of all drivers in 1989) than any other state (Timothy Gailey, 1989, p. 5). Since 1977, when the state adopted its policy of tempering rates and prohibiting sex- and age-based rates, the total number of insured drivers has increased by 35 percent. However, the number of drivers voluntarily covered by insurance companies has decreased by 35 percent.

The high proportion of drivers in the residual pool undermines the incentive of insurers to minimize cost; for instance, by limiting fraudulent claims and excessive payments for repairs. Most claims are paid from the residual pool, where all insurers share the loss. Thus an individual insurer will bear all of the cost and almost none of the benefit from greater efforts to control the cost of these claims.

IV. The Implication for Torts

The systematic mispricing of automobile insurance in Massachusetts, and the trend toward the Massachusetts method in other states, undermines the rationale for preserving some element of a tort liability system. When insurance is priced at cost, the premium reflects the tort claims that can be expected if the consumer engages in the insured activity, and the consumer will make an efficient decision about whether to operate a motor vehicle, though his incentive to drive safely will be insufficient.

V. Conclusion

Massachusetts suffers from significant deadweight efficiency losses, hence high prices, because regulated rates for auto insurance deviate substantially from cost. Taking an expected utility approach, for reasonable parameter values neither risk-spreading nor egalitarian concerns justify this cross-subsidy scheme.

REFERENCES

Blackmon, B. Glenn, Jr. and Zeckhauser, Richard J., "Mispriced Equity: Automobile Insurance Pricing in Massachusetts," mimeo., John F. Kennedy School of Government, Harvard University, 1990.

Gailey, Timothy H., *CAR Reform: Shaping the Residual Market for the 1990's,* Boston: Massachusetts Division of Insurance, 1989.

Stone, James M., "Excerpt from the Opinion, Findings and Decision on 1978 Automobile Insurance Rates," in *Automobile Insurance Risk Classification: Equity and Accuracy*, Boston: Massachusetts Division of Insurance, 1978.

Automobile Insurers Bureau of Massachusetts, *Subsidies in the 1990 Rates*, Actuarial Notice 90-1, Boston: 1990.

Commonwealth Automobile Reinsurers, *Members Participation Report, 1988*, Boston: CAR, 1988.