

The Economics and Politics of Automobile Insurance Rate Classification

Scott E. Harrington
Helen I. Doeringhaus

ABSTRACT

This article examines the direct efficiency consequences of government-imposed restrictions on rate classification in the auto insurance market. It also analyzes the changes in insurance regulation that may accompany widespread restrictions on market classification and the sources and consequences of political pressure for and against restrictions. The direct efficiency effects of restrictions are somewhat ambiguous, but the indirect effects of restrictions will probably be to increase the cost of risk by distorting incentives for claim settlement and for legislative actions to control claim costs. Automobile insurance rate classification restrictions and the associated regulatory and political responses could seriously weaken the case for private sector provision of coverage.

The Risk Classification Debate

The pooling of losses in private insurance markets allows risk averse individuals and businesses to achieve valuable reductions in risk. Market-determined risk classification schemes and associated insurance prices affect the societal allocation of the cost of risk. Market classification also affects the magnitude of the cost of risk by influencing the types and amounts of risky activities that are undertaken and the level of precautions taken to reduce losses for any given level of risky activity. The cost of risk also depends on insurer claim settlement practices, including the incentives for insurers to pay contractually specified claims and to detect and control fraud, and on numerous laws and institutions that affect the frequency and severity of accidents and insured claims.

The efficacy of risk classification in private passenger automobile insurance markets has been debated for at least two decades. A number of states have significantly restricted certain types of information that can be used by insurers,

Scott E. Harrington is Professor of Insurance and Finance and Francis M. Hipp Distinguished Faculty Fellow in the College of Business Administration, University of South Carolina. Helen I. Doeringhaus is Assistant Professor of Insurance at the University of South Carolina. Thanks are due to Greg Niehaus and Travis Pritchett for helpful remarks on an earlier draft and to the referees for many constructive comments.

such as age, sex, marital status, and territory; and they have set limits on discretionary underwriting, established requirements that involuntary market insureds without accidents and convictions be charged rates similar or identical to voluntary market insureds, and adopted other constraints (see Mintel, 1983) that cause involuntary market rates to fall below the expected cost of providing coverage. Advocates of these limitations characterize certain types of market classification as unfair, arbitrary, or both (see Shayer, 1978, and Abraham, 1985, 1986; also see Federal Insurance Administration, 1974; Koston, 1979; Underwood, 1979; Austin, 1983; Wortham, 1986; and Butler, Butler, and Williams, 1988). For example, market classification in the automobile insurance industry is said to produce rates that are unaffordable to many buyers and to reflect characteristics that are not causally related to losses, that are not within the buyer's control, that provide little or no incentive for increased safety, or that are socially inadmissible.

In contrast, the actuarial community generally argues that pricing and classification should be cost-based; that is, the price charged to a buyer should reflect the estimated expected value of claim costs under the contract plus a loading to cover administrative costs and to provide compensation for bearing the risk. Much of this literature deals with technical aspects of pricing and classification to achieve predictive accuracy. The actuarial literature responds to criticisms of insurers' risk classification methods by stressing the importance of achieving the most homogeneous rate classes possible given imperfect and costly information on expected losses (e.g., Walters, 1981; also see Casualty Actuarial Society, 1988; Stanford Research Institute, 1976; and National Association of Insurance Commissioners Advisory Committee, 1979). Thus, each rating class should contain no clearly identifiable subsets of buyers with different expected losses. This literature also emphasizes that risk classification must consider the accuracy of information used and the cost of obtaining information. It is argued that affordability problems should not be addressed by regulatory restrictions on pricing and classification and that, given the costs of information, competitive pricing and risk selection produce the greatest possible degree of homogeneity.

Economic analysis of insurance classification generally focuses on the efficiency of market classification. (Theoretical contributions include Hoy, 1982; Crocker and Snow, 1986; Rea, 1987, 1992; Borenstein, 1989; and Bond and Crocker, 1990. A theoretical and empirical analysis is provided in Cummins et al., 1983; nontechnical discussions are presented in Abraham, 1985, 1986; Stanford Research Institute, 1976; Schmalz, 1980; Rottenberg, 1989; Harrington, 1991; and Harrington and Pritchett, 1990. Blackmon and Zeckhauser, 1991, and Schmalensee, 1984, offer additional insights.) Considerable attention is paid to the possible effects of classification on the levels of risky activity and precautions to reduce losses, the role of classification in mitigating adverse selection, and whether competitive classification with costly information is efficient.

The goal of this article is to identify and clarify key issues and questions that are essential for informed judgment concerning the potential benefits and

costs of restricting market classification in the auto insurance industry. We review the direct efficiency consequences of restrictions—the direct effects on the societal cost of risk—to promote wider understanding of efficiency implications for those who are unfamiliar with the (often technical) economic literature on these issues. Thus, we stress intuition and try to avoid unnecessary technical detail.

The article considers two subjects that have received less attention: the types and consequences of changes in regulation that might accompany widespread restrictions on classification, such as those needed to enforce restrictions and mitigate market dislocations, and the sources and consequences of political pressure for and against restrictions on market classification. The treatment of the latter subject relies heavily on the economic theory of regulation. Although the article deals only with auto insurance, the key arguments hold for all types of insurance.

The review of direct efficiency consequences indicates that restrictions on classification produce ambiguous effects. Although restrictions on classification based on low-cost information will likely be inefficient, the magnitude of the efficiency loss depends on the effects the restrictions have on insurance buyers' behavior. If classification restrictions for auto insurance have little effect on driving or purchase of coverage—and there is some evidence that this is true, at least for driving—the direct efficiency loss from classification restrictions likewise will be small. In addition, the theoretical literature stresses that too much classification will occur in a system of market classification based on costly information. These results suggest that direct efficiency losses from restrictions could be modest. Unfortunately, measuring these losses accurately would be very difficult.

Analysis of political pressure and of changes in regulation that might accompany restrictions in classification suggests that significant restrictions will increase the cost of risk by distorting incentives for claim settlement and for legislative actions to control claim costs. Thus, although measurement of the effects is again problematic, restrictions on classification can undermine incentives for controlling the cost of coverage. Finally, the overall analysis implies that restrictions on classification and the associated regulatory and political responses could seriously weaken the case for private sector provision of coverage. The long-term policy choice could be between private sector provision of coverage and market classification and public provision of coverage at rates significantly different from market classification rates.

Efficiency of Market Classification

Two important concepts of economic efficiency are Pareto efficiency and the Kaldor-Hicks criterion (sometimes called the wealth maximization criterion) of “potential” Pareto efficiency (Posner, 1983, chap. 4; Mishan, 1982). Pareto efficiency exists when no person can be made better off without making someone else worse off. Potential Pareto efficiency exists when no person could be made better off by an amount sufficient to fully compensate people

made worse off from a given action. Societal wealth is maximized when all potential Pareto improvements are realized. For example, if a given policy change would provide benefits valued at \$100 to one group and impose losses of \$90 on another group, the change would be efficient since it would increase total wealth by \$10. Because most regulatory policy issues involve choices that will make at least some parties worse off, Pareto efficiency has limited applicability. For example, the Pareto efficiency criterion, has limited applicability with risk classification; the use or prohibition of any particular rating variable in market classification is likely to make some buyers worse off than they would be otherwise (see Hoy, 1982, for an illustration).

It should be noted that the potential Pareto efficiency criterion has been criticized frequently for not requiring and generally not considering whether "winners" actually compensate "losers." It generally would be difficult to identify and accurately transfer resources from winners to compensate losers from a given action. In the context of insurance classification, the inherent problem of identifying beforehand individuals with high or low risk would make accurate compensation impossible.¹

In the context of auto insurance risk classification, application of the potential Pareto efficiency criterion is equivalent to minimizing the cost of risk, which is defined as the sum of the direct costs of accidents and dispute resolution, the cost of risk control, including activity foregone in response to risk (e.g., the cost of risk avoidance), and the cost of risk bearing and risk transfer. Unless otherwise noted, the term efficiency is used in this sense throughout the remainder of the article.² Inefficient outcomes are those that produce a greater cost of risk.

Risk Classification with Perfect Information

Much of the controversy over risk classification arises because the variables used are imperfect indicators of risk so that risk classes are necessarily heterogeneous. The costs of obtaining classification information also play an important role in the policy debate. Before considering the effects of costly and imperfect information, it is useful to consider the case where insurance buyers and sellers have perfect information on expected claim costs. When both the buyer and insurer know the expected frequency and severity of claim costs under any given contract, competition would force each buyer's premium to equal the buyer's expected claim costs (suitably discounted to present value) plus the marginal nonclaim cost to insurers of providing coverage. If, for example, the "market" failed to charge different premiums to two groups of

¹ Another problem with the use of the potential Pareto efficiency criterion is the possibility of seemingly paradoxical results from its application. Under this criterion it is possible that winners could compensate losers in moving from outcome A to B or in moving from B to A (see Scitovsky, 1941).

² As an approximation, it also will be assumed that maximization of consumer surplus (using the ordinary demand curve) achieves this criterion.

consumers with different expected claim costs, an insurer that expanded sales to the group with lower expected claim costs and curtailed sales to the group with higher expected claim costs would earn substantial profits. Other insurers would suffer negative profits from the reduced number of consumers with lower expected claim costs in their portfolios. Competitive adjustments in the supply of coverage would ensure different premiums for the two groups.

For auto insurance, market prices equal to marginal expected costs of coverage also would have desirable implications for efficiency, because these prices provide consumers with incentives to reduce the cost of risk. Consumers would consider the expected accident costs when deciding on whether to drive, the type of vehicle and amount of insurance to buy, and the amount of care to exercise while driving. Restrictions on market classification would distort these incentives and increase the cost of risk.

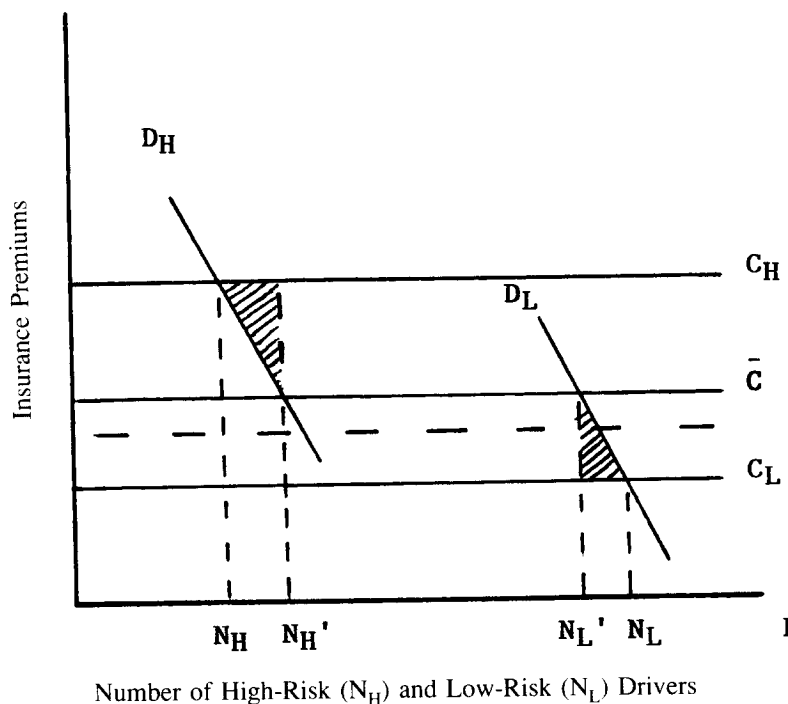
Effect on decisions to drive. Figure 1 illustrates the possible impact of restrictions on the decision to drive with perfect information on expected claim costs for the simple case in which all consumers are assumed either to purchase a vehicle and buy an identical amount of insurance coverage or to forego vehicle ownership.³ Two types of consumers are considered: low-risk and high-risk drivers for which the marginal expected cost of providing coverage is C_L and C_H , respectively. The demand for driving (or vehicle ownership) as a function of insurance prices for each group is given by D_L and D_H , respectively. With market pricing, low-risk drivers pay a premium equal to C_L , and the number of low-risk drivers is N_L . Similarly, high-risk drivers pay a premium of C_H , and the number of high-risk drivers is N_H .

If automobile insurance rate classification is restricted so that both types of consumers must pay the same premium to allow insurers to cover the average cost of coverage for the two groups, the number of low-risk drivers will decline to N_L' and the number of high-risk drivers will increase to N_H' . Because the proportion of high-risk drivers increases when classification is restricted, the average cost of coverage increases. In order for insurers to cover expected costs, the premium without classification will exceed the average premium with classification. Thus, the increased proportion of high-risk drivers that accompanies classification restrictions reduces the extent by which their premiums can decline and increases the premiums for low-risk drivers.

Too many high risks choose to drive if classification is restricted. The willingness of some high-risk drivers to pay for coverage (as given by the demand curve for high-risk people) is less than the marginal expected cost of providing coverage. The excess of cost over benefits for the high-risk group is illustrated in Figure 1 by the shaded area above the high-risk demand curve. The classification restriction results in too few low risks driving: some low

³ The possibility that consumers with different risk select different policies is considered below. An analogous illustration is provided in Rea (1992). This situation would describe the demand for minimum limits liability coverage assuming that insurance is compulsory and that driving without insurance is not an option. The effects of uninsured driving are discussed briefly below.

Figure 1
Decisions to Drive Under Perfect Information



Note: D_H and D_L = decisions to drive by high- and low-risk groups as functions of premiums charged. C_H and C_L = the long-term equilibrium cost of coverage. $\bar{C} = (N_H' C_H' + N_L' C_L') / (N_H' + N_L')$, the average cost of coverage without classification. The horizontal dashed line represents the average cost with classification.

risks forego driving even though they value it more than its marginal expected cost. The excess of benefits from driving over costs for this group is illustrated in Figure 1 by the shaded area under the low-risk demand curve.

The magnitude of the efficiency loss from the restriction depends on the effects of price changes on decisions to drive (i.e., on the price elasticity of demand for driving). If decisions to drive did not depend on price, the demand curves in Figure 1 would be vertical, and the restriction would only transfer income from N_L low-risk drivers to N_H high-risk drivers. Estimates of the elasticity of demand for vehicle ownership are generally small—ranging from 0 to 0.5, for example—which implies that the efficiency loss from restriction could be small (see Rea, 1992). In addition, this example assumes that it is possible to drive without insurance, ignoring the fact that some people impose costs on others by driving without liability or first-party medical expense and loss of income coverage, even if these coverages are required.

law.⁴ These people drive without adequate means (e.g., assets and insurance) to pay for their own losses or those that they cause others, because bankruptcy laws, Medicaid, or private charity may provide alternative sources of payment (e.g., Sinn, 1982; Keeton and Kwerel, 1984; and Shavell, 1986). Because compulsory insurance laws are imperfectly enforced, the effects of classification restrictions on peoples' decisions to drive might result in a decreased efficiency loss if some high risks are induced to buy coverage rather than drive uninsured and impose higher costs on others.⁵

Effects on amounts of coverage. In addition to affecting the decision to drive, classification restrictions also may affect the amount of auto insurance coverage chosen and the amount of caution exercised while driving (for further discussion, see Rottenberg, 1989, and Schmalz, 1980).⁶ To illustrate the possible effects on the amount of coverage purchased, assume that there is no effect on the decision to drive, the amount of driving, or the level of care exercised while driving. With perfect information, the effects of a classification restriction depend on whether low- and high-risk consumers pay the same rate per unit of coverage after the restriction is enacted.⁷

Case 1: Same rate per unit of coverage. If high- and low-risk consumers pay the same rate per unit of coverage following a restriction on classification, insurers will break even if the excess of expected costs over premiums for the high-risk group equals the excess of premiums over expected costs for the low-risk group. If rate changes do not affect the amount of coverage purchased by any member of either group, the restriction will result in a pure transfer of income between the two groups. There will be no efficiency loss since the gain to high-risk drivers will equal the loss to low-risk drivers.

⁴ Blackmon and Zeckhauser (1991) estimate sizable efficiency losses from price restrictions due to their effects on driving decisions, but they are unable to control for the possibility that, for some people, price restrictions may affect the decision to insure but not the decision to drive.

⁵ Whether this is a likely scenario depends on several factors, including the extent to which restrictions would cause some low risk persons to drive without coverage. The major efficiency argument for compulsory coverage is that it will cause some persons who value driving less than the expected costs of driving to forego driving (e.g., Keeton and Kwerel, 1984). Shavell (1986) emphasizes that this possible gain must be compared to the possible loss that arises if compulsory liability with imperfect experience rating encourages previously uninsured drivers to drive less safely.

⁶ With regard to possible changes in coverage, Rea (1992) concludes that "the efficiency cost of eliminating a rating variable may be very small when the quantity of insurance is fixed and demand is inelastic, but the cost could be considerably larger when the quantity of insurance purchased can be varied." Dahlby (1983) provides evidence that unisex rating in Canada significantly reduced the amount of collision coverage purchased by young females (also see Dahlby, 1992).

⁷ With perfect information, restrictions on the use of information in classification produce an environment that is analogous to one of asymmetric information in which insurers are unable to observe a consumer's expected loss but consumers know their own expected loss. Rothschild and Stiglitz (1976) and Pauly (1974) provide the seminal contributions that consider insurance market equilibria under asymmetric information with and without consumer sorting (i.e., signaling) through changes in amounts of coverage, respectively.

However, rate reductions probably will induce some members of the affected group to increase their amount of coverage (and induce more people to buy coverage). These increases in amounts of insurance purchased and in numbers of new buyers will be inefficient, because the value to buyers of the extra coverage purchased will be less than its marginal expected cost. Otherwise, they would have purchased the extra coverage prior to the restriction and the rate reduction. Similarly, some members of the group whose rates increased probably will purchase less coverage. This result would be inefficient in that the marginal expected cost of foregone coverage will be less than the buyer's willingness to pay. Otherwise, these people would have purchased less coverage prior to the restriction and their rate increase.⁸

Because restricting classification increases the amount of total coverage purchased by high-risk drivers, the pooled rate per unit of coverage needed for insurers to break even will exceed that which would be required if the amount of coverage purchased did not change (i.e., if the demand for coverage were completely inelastic). The greater the effects of price changes on the amount of coverage purchased, the greater the pooled rate necessary for insurers to break even. A static analysis that incorrectly ignored that relatively more coverage would be purchased by high-risk drivers would overstate the degree to which the premium rate would decline for high-risk groups.

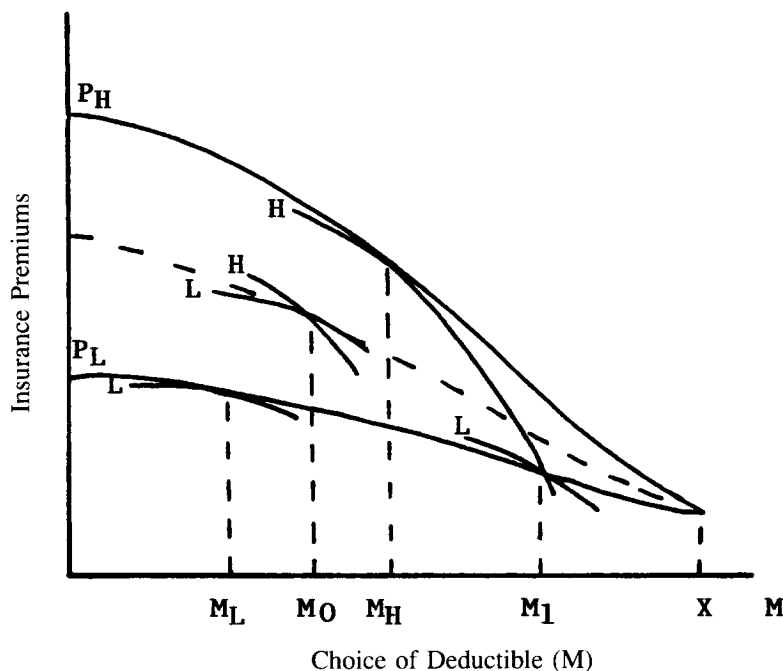
Case 2: Consumer sorting. If consumers with different expected claim costs separate into groups with different levels of premiums and coverage despite a restriction on classification, it is possible in principle that low-risk consumers could be made worse off by the restriction without making high-risk consumers better off (e.g., Rothschild and Stiglitz, 1976; Cummins et al., 1983; also see Dionne and Doherty, 1992). The intuition for this is that, at any given amount of coverage, low-risk consumers may value additional coverage less than high-risk consumers. If so, insurers may be able to offer policies with lower coverage that attract only low-risk consumers. The prices of these policies need to cover only the expected costs for low-risk consumers. High-risk consumers purchase separate policies with greater amounts of coverage at prices that reflect the expected costs for high-risk consumers. Thus, basing rates on the amount of coverage purchased rather than directly on the risk of loss would produce separate price-coverage classes for high- and low-risk consumers.

The possibility of two groups of consumers with different probabilities of loss but identical severity distributions is illustrated in Figure 2. The figure

⁸ If the use of a certain variable was to be restricted for more than one type of insurance, the effects on a given person's welfare might be offsetting so that the overall impact of the restriction on the distribution of income could be low. Whether this would be the case for restrictions on variables such as sex has been subject to some debate (see, for example, Carney and Hardigree, 1990). The efficiency effects of such a restriction would be additive rather than offsetting. The total reduction in aggregate wealth would be the sum of the reductions for each coverage. For example, let group 1 gain \$100 in line of coverage A and lose \$110 in line B, and let group 2 lose \$110 in line A and gain \$100 in line B. Restricting classification in both lines rather than A or B alone reduces the loss to group 2 or group 1 from \$110 to \$10, but it increases the net loss across the two groups from \$10 to \$20.

assumes that consumers are risk averse with identical utility of wealth functions, that consumers have identical wealth if no loss occurs, and that break-even insurance premiums equal expected claim costs with a proportionate loading factor. Moral hazard is ignored.

Figure 2
Premiums and Deductibles for High- and Low-Risk Consumers
with Identical Severity Distributions



Note: P_H and P_L = long-term equilibrium premium schedules for high- and low-risk groups, respectively. The dashed curve is the long-term equilibrium premium schedule without classification if both groups choose the same deductible.

Break-even premiums for insurers as a function of the level of the deductible for the high and low loss probability groups are shown by the curves P_H and P_L , respectively. The premium schedules decline as the amount of deductible (M) increases because the insurer expects a lower cost of claims. The premium schedule for the high-risk group (P_H) lies above that for the low-risk group (P_L) for all deductibles (M) less than the maximum value subject to loss (X), because the probability of loss is greater for high risks. Indifference curves are shown for both high-risk and low-risk consumers (H and L , respectively). Consumers are equally well off (i.e., have equal expected utility) for all premium and deductible combinations along a given indifference curve. Thus, the curves slope downward: A higher deductible requires a lower premium in order for the consumer to be equally well off. Consumer welfare increases as

the deductible declines (coverage increases) or as premiums decline (lower price), other things being equal.

Without restricted classification, low probability consumers choose deductible M_L . At this deductible, the slope of the indifference curve for the low loss probability group is tangent to the group's break-even premium schedule. Low loss probability drivers cannot do better than M_L with its corresponding premium if insurers are to break even. Similarly, high loss probability drivers choose M_H .⁹

If classification is restricted, one possible outcome is for the two groups to purchase identical deductibles, such as M_0 , and pay the same premium that allows insurers to break even on this "pooled" policy. However, theoretically, such a policy may not be offered in equilibrium. For identical utility functions, high-risk consumers who purchase this policy value marginal changes in coverage more than low-risk consumers, which is illustrated by the greater absolute slope of the high-risk consumer's indifference curve at the pooled policy with deductible M_0 . As deductibles increase, high-risk consumers require a greater premium reduction than low-risk consumers to maintain the same expected utility. As a result, the pooled policy would be vulnerable to the introduction of a policy with a higher deductible that would attract low-risk consumers and produce profits for an insurer. For example, in Figure 2, a contract with a deductible-premium combination that fell between the high-risk and low-risk indifference curves but below the dashed line would attract only low-risk consumers and would produce positive profits.

Under these conditions, an equilibrium where insurers break even could involve the low loss probability consumers purchasing deductible M_L for a premium on P_L and the high loss probability consumers purchasing deductible M_H for a premium on P_H . Since high loss probability consumers are indifferent between M_L with premium on P_L and M_H with premium on P_H , M_L is the minimum deductible that low loss probability consumers can obtain without attracting high loss probability consumers to the policy. If this were the case, the restriction on classification would harm the low-risk group, because they prefer more complete coverage at their break-even premium schedule, and the restriction would not benefit high-risk consumers. Whether an equilibrium with high- and low-risk consumers purchasing separate contracts exists and alternative concepts of equilibrium that are consistent with a pooled policy have received extensive theoretical discussion (see Dionne and Doherty, 1992, for a review).

The key question raised by models of consumer sorting concerning the effects of restrictions on classification is whether many low-risk consumers may be able to distinguish themselves from many high-risk consumers by reducing their amount of coverage because they value coverage less than high-risk consumers. Unless prohibited by additional regulation, this behavior will

⁹ M_H need not exceed M_L under these assumptions. The implications for restrictions on classification do not require this relation.

reduce the potential gains to people who otherwise would benefit from restrictions on classification. Constraints on sorting might limit its relevance to the policy debate, despite its prominence in theoretical work. Minimum limits for liability coverage constrain the ability of low-risk drivers to reduce coverage. Moreover, in the case of unisex rating, even if market sorting would otherwise occur, would regulators permit the market to separate into price-coverage combinations primarily populated by either men or women? It also is politically unlikely that restrictions on territorial rating classifications would primarily cause coverage reductions in lower risk territories without producing lower rates in higher cost urban areas. Instead, prohibitions on territorial rating probably will mandate rate reductions in urban areas and require the auto insurance industry to supply coverage (see below). Rates in other areas must increase for insurers to cover their total costs.

Imperfect Information and Costly Classification

Insurers must estimate expected claim costs. Risk assessments before policies are issued and during and after a period of coverage are costly. While profit maximization and competition provide insurers with incentives for accurate classification, the cost of obtaining relevant and accurate information (such as a driver's use of alcohol or attention to traffic conditions) will frequently be prohibitive. Costly information underlies problems of moral hazard and adverse selection. Without a complete sorting of consumers into homogeneous groups with different levels of coverage, as discussed above, costly information will encourage heterogeneity in market-determined rate classes and thus cross-subsidies among buyers in any given class. Obviously, the net benefits of market classification will be much lower with imperfect and costly information.

It is sometimes argued that market classification involves the use of arbitrary or superfluous information (e.g., Federal Insurance Administration, 1974, and Michigan Insurance Bureau, 1977). This argument is difficult to reconcile with rational behavior by insurers. The use of information that has no predictive power will not be rewarded over time and it could easily produce negative profits.¹⁰ Another criticism of classification is that the market fails to use low-cost information that helps predict claim costs (e.g., Butler, Butler, and Williams, 1988). But this criticism, too, is inconsistent with profit seeking in a competitive environment. Insurers have incentives to use low-cost information

¹⁰ Even if the superfluous information were costless, its use would produce rates below costs for some buyers with the result that the insurer would earn negative profits. For example, if expected claim costs were unrelated to eye color, an insurer that mistakenly believed otherwise and reduced premiums for some colors and increased premiums for others would lose money. Such a classification method would attract buyers whose actual expected costs would exceed its premium rate and lose buyers for which its premium rate exceeded those charged by other insurers. Evidence also suggests that market classification does not lead to significant rationing and, thus, large involuntary markets (see, for example, Grabowski, Viscusi, and Evans, 1989, and Harrington, 1991). The impact of classification restrictions on availability is discussed below.

that helps predict claim costs even if the increases in predictive accuracy are modest.

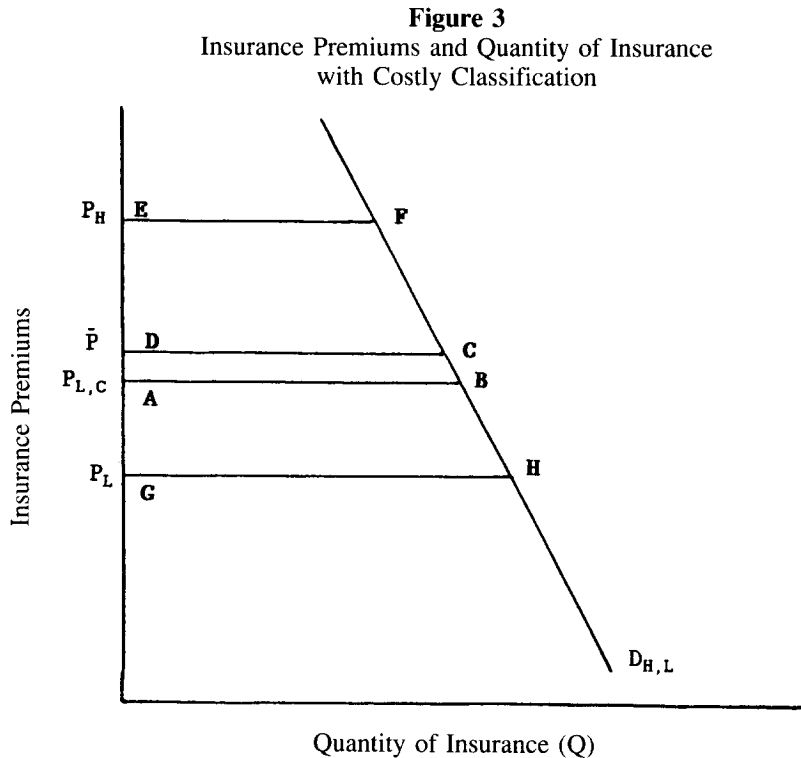
In fact, in a competitive insurance market there may be some risk classifications for which the social benefits are less than the cost of obtaining information. The theoretical work of Spence (1973) on costly screening in labor markets showed that workers may be willing to invest in a costly activity (education) in order to "signal" a higher level of productivity to employers and thus receive a higher wage. In Spence's model, individuals who pay the costs of screening are made better off, but the net social benefit across all individuals is not necessarily positive.

Similarly, theoretical analysis of costly classification in a competitive insurance market suggests that lower risk insureds essentially will pay to be classified as long as the resulting premium (that includes classification costs) is lower than it would be without classification (see Crocker and Snow, 1986; Borenstein, 1989; Rea, 1992). Costly classification would benefit low risks and disadvantage high risks. The social benefits would not necessarily be positive. Intuitively, the market will classify as long as premiums can be reduced for low-risk groups, even if only by a small amount; the resulting costs to high risks are not considered.

The possibility of excessive classification is illustrated in Figure 3 for the simple case of equal numbers of high- and low-risk (probability of loss) consumers, constant loss severity, identical downward sloping demand for coverage for each consumer as a function of the premium rate per unit of coverage, and no administrative costs apart from the costs of classification.¹¹ P_H and P_L denote the expected claim cost per unit of coverage for high- and low-risk consumers, respectively. $\bar{P}$ represents the pooled premium rate for high and low risks without classification and equals the average expected claim costs per unit of coverage for the two groups.

The benefits of costless classification to the lower rated group will be at least as large as the losses to the higher rated group. The increase in consumer surplus for each low-risk consumer with costless classification (the area CDGH) exceeds the reduction in consumer surplus for each high-risk consumer (the area CDEF). With costly classification, the market will subdivide consumers into high- and low-risk groups as long as the premium that can be charged to the low-risk group to cover expected claim costs per unit of coverage and the cost of classification is lower than the average expected claim costs per unit of coverage for the two groups. The benefit to a low-risk buyer net of classification costs (represented by the area ABCD) need not exceed the loss to a

¹¹ Given that demand is identical for each group, consumer sorting into high and low risk groups with different premium rates and coverage amounts is not possible. Crocker and Snow (1986) consider consumer sorting; Rea (1992) does not. Borenstein (1989) considers both cases. The models with two risk classes employed in the literature assume that low risks pay all of the cost of classification. If high risks can be identified through a costly procedure, they will have the incentive to declare that they are high risk and avoid paying the cost of identification. The more realistic case of costly classification for a continuum of risk types has not been considered.



Note: $D_{H,L}$ = individual demand for coverage for high- and low-risk buyers. P_H and P_L = expected claim cost (per unit of coverage) for high- and low-risk buyers, respectively. $\bar{P}$ = the average expected claim cost for high- and low-risk buyers. $P_{L,C}$ = the premium rate for low-risk buyers, including classification costs.

high-risk buyer (the area CDEF). The net social benefit is not necessarily positive: compare areas ABCD and CDEF.

Similarly, to illustrate the possibility of socially excessive classification for the case in which all people either buy a fixed amount of coverage or give up driving, assume that the expected loss for low-risk drivers is \$100, that the expected loss for high-risk drivers is \$300, and that without classification there will be equal numbers of drivers in each group so that the average expected loss is \$200. If low-risk drivers can be identified at a cost of \$95 per driver, the market will separate into a low-risk class with a premium of \$195 and a high-risk group with a premium of \$300. Apart from the cost of classification, any decrease in the number of high-risk drivers and increase in the number of low-risk drivers from these premium changes would be efficient. Nevertheless, the welfare gain to the low risks, given the cost of classification, will probably be much smaller than the welfare loss to the high risks.

These theoretical results support the criticism in the policy debate (see Federal Insurance Administration, 1974) that competition in insurance markets leads to excessive classification. However, an important implication of the

theory is that rate classification using low-cost information is likely to be efficient. To a great extent, the policy debate has focused on the use of variables in market classification that generally can be observed at relatively low cost (e.g., age, sex, and place of residence).¹² Thus, the theory suggests that banning these types of classification will lead to some efficiency loss.

It is also relevant that there are significant impediments to otherwise efficient forms of market classification. As discussed by Abraham (1985) and Rea (1992), the ability of competitors to copy innovations in classification that identify drivers who, on average, have lower expected claim costs is likely to reduce the amount of investment by insurers in the development of new classification methods.¹³ Similarly, expenditures to obtain certain types of relevant information about a driver (such as alcohol and drug use) could be discouraged by privacy considerations (National Association of Insurance Commissioners Advisory Committee, 1979). Thus, whether the market engages in "too much classification" is ambiguous.

Indirect Costs of Restrictions

The preceding discussion suggests that, while restrictions on classification using low-cost variables such as age, sex, and territory will be inefficient, the efficiency loss will be small if the price changes have little effect on decisions to drive and buy coverage or if restrictions reduce the number of people who drive without liability or first-party medical insurance. However, to be effective and avoid potentially severe market dislocations, significant restrictions on rate classification will require additional regulatory constraints on insurer behavior. These constraints may increase substantially the efficiency loss from restrictions on rate classification.

Market Dislocations, Involuntary Market Pooling, and Increased Claim Costs

State mandated involuntary market mechanisms require the auto insurance industry to provide coverage to drivers that insurers are unwilling to insure voluntarily. People for which rates are perceived as inadequate by insurers are assured of obtaining coverage. These state regulations also spread any shortfall of premiums relative to expected losses in the involuntary pool broadly among insurers and ultimately among other policyholders in the same line and state. Comprehensive restrictions on classification may force rates for many drivers

¹² Ex ante verification of information supplied by the insured may not be necessary if information after an accident can be verified at sufficiently low cost to discourage false statements that would void coverage according to the common law doctrine of misrepresentation.

¹³ Classification systems involve cooperation among insurers, at least in terms of developing and using systems for reporting data on claim costs for different classes. Industry cooperation raises the possibility of collusive behavior in setting up any "standard" classification system. However, many insurers modify standard systems or develop their own systems in auto insurance, despite the costs of doing so. It also is not clear how insurers could profit from colluding on rate classification in the presence of rate competition for any given class.

below competitive market levels. Large involuntary markets will result, which in turn will discourage the use of assigned risk plans, as opposed to alternative mechanisms such as reinsurance facilities or joint underwriting associations.¹⁴ Empirical evidence supports this conjecture: States with the largest involuntary markets (Massachusetts, New Jersey, New Hampshire, North Carolina, and South Carolina) generally have significant limits on rate classification.¹⁵ They also have used reinsurance facilities or joint underwriting associations—as opposed to assigned risk plans.¹⁶

To illustrate the relationship between involuntary market design and restrictions on classification, consider the probable consequences if a state with an assigned risk plan were to prohibit territorial rating in a way that initially mandated reduced premium rates in urban areas and increased premium rates in nonurban areas.¹⁷ Following such a change, insurers would know that rates were below expected costs in urban areas and above expected costs in nonurban areas. Without mandated offers (and renewal) of coverage, insurers would be unwilling to write coverage in urban areas. A large proportion of urban drivers would end up in the assigned risk plan at a state regulated rate that would be lower than expected claim costs.

This result would be politically unstable for several reasons. First, the concentration of the urban market in the assigned risk plan would be inconsistent with the prohibition of the use of place of residence as a rating variable. Second, compared to a consensual relationship, some insurers would have less incentive to provide quality coverage to assigned risks than to voluntary insureds. In practice, it might be very difficult, costly, or both to control quality reductions through regulatory monitoring or litigation. Third, administrative problems would arise if insurers were assigned large numbers of customers without marketing outlets or claims facilities near their homes. Insurers also might find it costly or difficult to monitor claims for these assignments (Lee, 1977).

Mandated offers of coverage would reduce the size of the assigned risk plan. However, with mandated offers of coverage, insurers might reduce the number

¹⁴ An assigned risk plan is an involuntary market mechanism in which people can apply to the plan for coverage and have coverage assigned to an insurer in the state at a regulated rate. Assignments are made in proportion to an insurer's share of the voluntary market in the state. Joint underwriting associations use a number of servicing insurers to administer coverage for involuntary market insureds for a fee, with the net financial results spread across all insurers in the state in proportion to their voluntary market volume in the line and state. States with reinsurance facilities require each insurer to accept all applicants at a regulated rate. Insurers are allowed to pool financial results for unwanted applicants with other insurers.

¹⁵ Generally, these states heavily regulate overall rate levels. Restrictions on overall rate levels under prior approval rate regulation also will increase the number of persons insured in the involuntary market (see Ippolito, 1979, and Grabowski, Viscusi, and Evans, 1989).

¹⁶ The New Jersey joint underwriting association, which accumulated a \$3 billion deficit in the 1980s, is being replaced by an assigned risk plan.

¹⁷ Similar arguments would apply to restrictions on other variables, although the magnitude of the effects could be smaller. For further discussion of the effects of classification restrictions on the size of the involuntary market, see Mintel (1983) and U.S. General Accounting Office (1986).

of marketing outlets in urban areas over time so that it would be necessary for the state to mandate sales outlets (such as "designated" agents) or use some other means to ensure supply of coverage. In addition, mandated offers would disadvantage insurers with relatively greater market shares in urban areas. Without additional restrictions, the market might segment over time into distinct groups of insurers specializing in either urban or nonurban areas.¹⁸

The adoption of either a reinsurance facility or joint underwriting association that allows insurers to share losses on underpriced business is likely to mitigate these problems, but it could create a moral hazard problem and thus increase claim costs over time.¹⁹ Under either mechanism, the insurer that settles an involuntary market claim shares loss payments with all other insurers in the state. This risk sharing will reduce the insurer's incentive to engage in efficient claim settlement practices, such as investigation of fraud. With a reinsurance facility, an insurer that spends more money for investigation of claims for reinsured business will bear the full cost but share any reduction in claim costs with other insurers. Similarly, payment schedules for joint underwriting association servicing carriers or for "designated carriers" in states with reinsurance facilities that involve fixed amounts per claim or remuneration as a percent of premiums or losses paid will not by themselves provide the same incentives for claim cost control as exist when insurers bear the full cost of both claim settlement and claim payment.

As a result of these incentive issues, regulators will need to monitor claim settlement practices to help mitigate the moral hazard associated with reinsurance facilities and joint underwriting associations. Monitoring is costly and imperfect, and its scope and effectiveness depend on the incentives for regulators to engage in efficient monitoring. Monitoring is unlikely to prevent higher claim costs under either mechanism. Anecdotal evidence on the performance of the original reinsurance facility and the subsequent modified joint underwriting association in Massachusetts supports this conclusion (see U.S. General Accounting Office, 1986; also see Blackmon and Zeckhauser,

¹⁸ Experience with limits on territorial rating in Michigan suggests these results. In 1981, Michigan restricted territorial rating, eliminated sex-based rating, constrained other underwriting criteria that could be used by insurers, and formed a joint underwriting association. Insurers must accept all applicants that meet their underwriting criteria, but they cannot pool the experience of any unwanted applicants with other insurers. The Michigan joint underwriting association has remained relatively small, but the 1981 restrictions on territorial rating produced significant market dislocations and were substantially relaxed in 1986. Although it appears that the constraints on allowable underwriting criteria were intended to limit subjective underwriting, they help to enforce unisex rating. In particular, they constrain insurer ability to avoid selling coverage to young males if unisex rating produces inadequate rates (see U.S. General Accounting Office, 1986, and Harrington, 1991).

¹⁹ The economic theory of insurance and other risk-sharing mechanisms has emphasized the trade-off between risk sharing and incentives for loss prevention and control (e.g., Shavell, 1979). In this literature, the term moral hazard refers to the impact of risk sharing on incentives whenever precautions cannot be observed.

1991). The former auto insurance joint underwriting association in New Jersey has produced substantial controversy and litigation in this regard.

Other Forms and Effects of Increased Regulatory Control

Experience rating. Restrictions on the use of particular rating variables affect the weight given to the remaining classification variables. Proponents of restrictions on classification commonly advocate that greater weight be given to an individual's driving record than is the case with market classification (e.g., Federal Insurance Administration, 1974; Michigan Insurance Bureau, 1977; Consumer Federation of America et al., 1989). Driving records have been given greater weight in some states and others are likely to follow. For example, in 1989, South Carolina imposed very large surcharges on people with chargeable accidents and traffic violations to help finance losses in its reinsurance facility. This change appeared to reflect public pressure for lower rates for "good" drivers and higher rates for "bad" drivers. Similarly, California's Proposition 103 contains provisions designed to increase the extent to which auto insurance rates reflect an individual's driving record (as well as mileage driven and years of driving experience).

The general public probably views driving history as a more equitable basis for rate classification than characteristics such as age, sex, or territory. Although statistical analysis indicates that information on driving records increases the predictive accuracy of risk classification, additional information substantially improves accuracy (see Woll, 1991). The limited explanatory power of individual driving experience reflects the random nature of losses: individual experience is not highly credible. Surcharges for accidents or traffic violations in excess of those that arise under market classification (i.e., those that are based on all information that can be obtained at relatively low cost) will distort the normal incentives provided by experience rating. In particular, they might lead to an inefficiently high level of deterrence, and drivers could be exposed to excessive risk. Large penalties also might discourage the reporting of accidents and violations (or increase the frequency of hit-and-run accidents).

Regulation of statewide rate changes. Early work that proposed widespread restrictions on classification argued that prior approval of overall rate levels was undesirable (see Federal Insurance Administration, 1974). In practice, restrictions generally have been accompanied by prior approval regulation of an insurer's statewide rate changes (or even state-made rates), perhaps because regulators may wish to influence the allocation across consumers of higher premiums needed to offset premium reductions from restrictions, as opposed to allowing the market to determine the incidence of premium increases. High statewide average claim costs and thus premiums also may create pressure both for classification restrictions to lower rates for drivers who face the highest premiums and for limiting statewide rate changes for all drivers (see Baumol, 1991, and Cummins and Tennyson, 1992).

The attendant politicization of the rate approval process may cause rate increases to lag behind increases in claim costs, at least temporarily (see Pauly, Kleindorfer, and Kunreuther, 1986; Harrington, 1987; and Grabowski, Viscusi, and Evans, 1989). Limitations on rate increases for both the voluntary and involuntary market will lead to a larger involuntary market and thus exacerbate any moral hazard problem associated with pooling of costs in reinsurance facilities or joint underwriting associations. Hence, if high claim costs and thus competitive premium rates create pressure for limits on classification and tight regulation of overall rate changes, regulatory responses could lead to even higher claim costs. Basic economic theory also implies that increased government control of rates might reduce incentives for insurers to provide quality coverage, increase incentives for insurer exit, and reduce diversity in coverage and service.

Long-term viability of private sector supply. Given the likelihood of increasing regulatory control following restrictions on auto insurance rate classification, it is important to recognize that private sector provision of auto insurance at competitively determined prices has three main functions. First, competitive pricing and risk selection provide some incentive for consumers to minimize the cost of risk. Although the magnitude may be modest, there will be some effect, however small, on decisions to drive, to buy coverage, and to exercise care while driving. Second, insurer responsibility for claim settlement and payment provides incentives for insurers to settle claims efficiently. Third, competition keeps rates in line with costs and produces desirable diversity in service and coverage. Constraints on risk classification undermine the first two functions; substantial regulatory control of statewide rate changes undermines the third. A point could be reached in which the remaining value of private sector provision by numerous insurers will be small enough to raise serious questions about the advantages of direct government provision. An implication is that the long-term policy choice could be between private sector provision with market classification and government provision with regulatory classification.

Political Pressure and the Public Interest

Do high claim costs and correspondingly high market premium rates for certain groups increase political pressure for restrictions on rate classification? If so, would restrictions on classification serve the public interest? The traditional view of economic regulation is that the public interest is served by promoting efficiency (e.g., Breyer, 1982). If pursuit of the public interest was more broadly construed to include both equity and efficiency, public spirited policymakers presumably would weigh the direct and indirect efficiency losses from restrictions on classification against the potential gains from improved fairness. Conceivably, the overall goal might be the adoption of restrictions that would be approved by the median voter in a well-informed electorate. If wealth transfers to low-income insurance consumers were desirable to make coverage more affordable, careful consideration would be given to whether restrictions

on classification would be the most efficient method for assisting low-income people—as opposed to an explicit program of taxes and subsidies. The government's goal would be to reduce the costs of transfers and to fairly allocate benefits and burdens among society.

Interest Group Pressure

The economic theory of regulation presents a different view of the political and regulatory process (see Stigler, 1971; Peltzmann, 1976; and Becker, 1983). Rather than collectively serving the public interest, policymakers either maximize political support or minimize opposition. The theory emphasizes the relative costs to different interest groups of exerting political pressure and that many people who do not belong to organized groups will not become well informed about the details or consequences of regulation. According to this literature, regulation is primarily redistributive rather than efficiency oriented, but efficiency losses from regulation tend to limit the extent of redistribution (see especially Becker, 1983).

The most important implication of the theory is that a group's ability to obtain benefits (or avoid costs) from regulation depends on its ability to exert more political pressure than other groups. Comparative advantage in exerting pressure depends on factors such as the cost of organizing group members and the cost of lobbying. The best way for an organized group to obtain a subsidy is to exert significant pressure while keeping other groups from becoming aware of or concerned about the costs of implicit taxes needed to finance subsidies. The costs of becoming informed and of organizing to exert pressure effectively suggest that subsidies will accrue to small, highly organized groups, and the costs will be spread broadly among the population. The theory generally has emphasized economic rather than ideological influences, but a strong commitment to a common ideology or standard of fairness could be expected to increase a group's production of pressure.²⁰ As noted, the theory predicts that efficiency losses will limit the extent of redistribution through regulation. Distortions in behavior reduce the marginal benefit of subsidies and increase the marginal cost of implicit taxes necessary to finance subsidies. As a result, cross-subsidies are predicted to be less likely when marginal efficiency losses are high.

Organized interest groups exert pressure for and against restrictions on market classification in auto insurance. Insurer trade associations oppose most restrictions on classification. Consumer advocate groups such as Public Citizen, the National Insurance Consumer Organization, and the Consumer Federation of America favor restrictions. Pressure for classification restrictions also comes from other, less obvious interest groups that benefit directly from high claim costs—trial attorneys, for example. Market premium rates convey information to policymakers as well as policyholders. Without restrictions on rates, high

²⁰ A related issue, the importance of the political ideology of policymakers, has been debated (compare Peltzmann, 1984, and Kalt and Zupan, 1984).

claim costs and premiums for certain regions and groups of buyers would motivate regulators and legislators to consider modifying institutions to control claim costs in ways that could benefit policyholders. Options include promoting competition in auto repair parts, increasing sanctions against fraud and auto theft, and limiting tort liability. Restrictions on rate classification generally reduce variation in premium rates among consumers. Spreading premium burdens more broadly in this manner probably reduces public pressure for legislative action to reduce claim costs, especially if premium increases for lower risk consumers can be delayed by regulation (see below).

Pressure from Unorganized Interests

To be sure, most people affected by rate classification restrictions do not belong to organized interest groups. Although the theory has focused on organized groups, Becker (1983) has emphasized that the relative costs of group organization are more important than absolute costs. If high costs make organized pressure very difficult or infeasible for different groups of consumers, the theory nevertheless suggests that consumers who would value subsidies the most (or perhaps who would complain most vigorously if confronted with market-determined prices) are the ones who would be favored by regulation (cf. Wenders, 1986).

Past concern with the "auto insurance affordability problem" indicates that high premiums generate significant public pressure for limits on rates. Apart from the role of organized groups, does the theory predict restrictions that shift wealth from high- to low-income consumers or, holding income constant, from low- to high-risk consumers? Just as milk consumers have little incentive to become informed about or effectively oppose subsidies to the dairy industry, people whose auto insurance premiums represent only a small proportion of total income might have little incentive to become informed about regulatory policies that benefit other consumers at their expense. As a result, regulators may be able to cut rates significantly for some consumers who would otherwise face high premiums, either in absolute terms or relative to income, without generating significant opposition. Rate cuts for high-risk or low-income consumers of auto liability or medical expense insurance also may meet less opposition as long as the cuts reduce the number of uninsured drivers. The cost of these rate cuts to other parties will be at least partially offset by a reduction in the expected costs of uninsured driving that they would otherwise bear.

In summary, the economic theory of regulation postulates that classification restrictions are more likely to be implemented if (1) they are supported by organized interest groups; (2) premium increases needed to finance premium reductions can be delayed, spread broadly among the insured population, or both; (3) parties whose rates increase are ignorant of the effects of restrictions; and (4) the adverse effects on behavior and associated efficiency losses are small. Strong commitments to standards of fairness by government and the public also make the adoption of certain restrictions more likely.

This discussion also suggests that supporters of restrictions on market classification will argue that the insurance market is not competitive, that restrictions will not require rates to go up for any group and that efficiency losses will be inconsequential. Advocates of restrictions will first attempt to delay and then allow only a gradual phase-in of rate increases necessitated by restrictions. They also will attempt to spread ultimate rate increases broadly among the driving population, support administrative rather than more visible statutory intervention, and emphasize the greater fairness of the proposed restrictions relative to market classification.

Accurate prediction of the scope and pattern of restrictions across states is impeded by ignorance of efficiency consequences, consumer information, and preferences for fairness. Nevertheless, statutory restrictions on territorial rating are not likely to occur unless suburban and rural drivers mistakenly believe that rate reductions for urban drivers will not require their own premiums to increase significantly if private insurers are to continue to provide coverage in the state. Otherwise, these suburban and rural drivers might strongly oppose rate classification restrictions. In addition, the total efficiency loss from restrictions on territorial rating will be large compared to many other restrictions because of the large number of people that could experience significant price changes. Restrictions on classification based on sex and age may be more probable than restrictions on territorial rating, because the price effects could be smaller and because of widespread concern about the unfairness of sex and age rating.

The experience with California's Proposition 103, which includes a provision intended to restrict the use of age, sex, and territory as auto insurance rating variables, provides some insight into the politics of restrictions on territorial rating. The initial regulatory order to limit the use of territorial rating, which is currently being litigated, imposed strict constraints on rate increases in lower rated territories. In addition, the promise of a 20 percent rate rollback from levels that existed one year prior to the November 1988 election may have led some consumers to believe that no one's rates would increase as a result of restrictions on classification. Even so, the proposition received only a small majority of votes statewide and received a majority of votes in only a handful of urban counties with the highest premiums and claim costs (Zycher, 1990). This voting pattern may reflect the expectations of voters in higher cost regions that they would receive relatively large refunds from the 20 percent rollback. However, it may also indicate that some voters in lower cost regions believed that the proposition would eventually cause their auto insurance rates to increase in order to subsidize higher cost regions such as Los Angeles.

Conclusions

Accurate estimation of the efficiency costs from restricting classification, while worthy of more research, is likely to be problematic. Arguments for restricting classification often assume that policymakers can improve fairness by restricting classification without significantly increasing the cost of risk.

Analysis suggests, however, that classification restrictions could significantly increase the cost of risk even if their effects on decisions to drive, to buy coverage, and to exercise care were modest because of the potentially significant indirect costs associated with large involuntary markets, increasing regulation, and reduced political pressure for cost control. If so, accommodating fairness concerns or other sources of pressure for restrictions could be very costly.

The economic theory of regulation suggests that restrictions on automobile insurance rate classification are unlikely to be adopted if efficiency losses are large. However, if classification restrictions hamper the adoption of laws designed to reduce claim costs, then organized groups with a stake in maintaining high costs will pressure state legislatures to adopt the restrictions. Because restrictions on classification and accompanying regulation undermine the principal functions of private sector insurance provision, the success of these and other efforts to restrict market classification ultimately could lead to direct governmental provision of coverage.

References

- Abraham, Kenneth S., 1985, Efficiency and Fairness in Insurance Risk Classification, *Virginia Law Review*, 71: 403-451.
- Abraham, Kenneth S., 1986, *Distributing Risk: Insurance, Legal Theory, and Public Policy* (New Haven, Conn.: Yale University Press).
- Austin, Regina, 1983, The Insurance Classification Controversy, *University of Pennsylvania Law Review*, 131: 517-583.
- Baumol, William J., 1991, Technological Imperatives, Productivity and Insurance Costs, *Geneva Papers on Risk and Insurance*, 16: 154-165.
- Becker, Gary, 1983, A Theory of Competition Among Pressure Groups for Political Influence, *Quarterly Journal of Economics*, 98: 371-400.
- Blackmon, B. Glenn and Richard J. Zeckhauser, 1991, Mispriced Equity: Regulated Rates for Auto Insurance in Massachusetts, *American Economic Review Papers and Proceedings*, 91: 65-69.
- Bond, Eric W. and Keith J. Crocker, 1990, Smoking, Skydiving, and Knitting: The Endogenous Categorization of Risks in Insurance Markets with Asymmetric Information, *Journal of Political Economy*, 99: 177-200.
- Borenstein, Severin, 1989, The Economics of Costly Risk Sorting in Competitive Insurance Markets, *International Review of Law and Economics*, 9: 25-39.
- Breyer, Stephen G., 1982, *Regulation and Its Reform* (Cambridge, Mass.: Harvard University Press).
- Butler, Patrick, Twiss Butler, and Laurie L. Williams, 1988, Sex-Divided Mileage, Accident, and Insurance Cost Data Show That Auto Insurers Overcharge Most Women, *Journal of Insurance Regulation*, 6: 243-84, 372-420.
- Carney, Robert J. and Donald W. Hardigree, 1990, The Economic Impact of Gender-Neutral Insurance Rating on Women, *Journal of Insurance Issues*, 13: 1-23.
- Casualty Actuarial Society Board of Directors, 1988, *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*, New York, promulgated May.
- Consumer Federation of America, Consumers Union, National Insurance Consumer Organization, and Public Interest, 1989, *Reducing Auto Insurance Rates: A Comprehensive Program*, Washington, D.C.
- Crocker, Keith J. and Arthur Snow, 1986, The Efficiency Effects of Categorical Discrimination in the Insurance Industry, *Journal of Political Economy*, 94: 321-344.
- Cummins, J. David, Barry D. Smith, R. Neil Vance, and Jack L. VanDerhei, 1983, *Risk Classification in Life Insurance* (Boston: Kluwer Academic Publishers).
- Cummins, J. David and Sharon Tennyson, 1992, Controlling Automobile Insurance Costs, *Journal of Economic Perspectives*, 6: 95-115.

- Dahlby, Bev, 1983, Adverse Selection and Statistical Discrimination: An Analysis of Canadian Automobile Insurance, *Journal of Public Economics*, 20: 121-131.
- Dahlby, Bev, 1992, Testing for Asymmetric Information in Canadian Automobile Insurance, in: Georges Dionne, ed., *Contributions to Insurance Economics* (Boston: Kluwer Academic Publishers).
- Dionne, Georges and Neil Doherty, 1992, Adverse Selection in Insurance Markets: A Selected Survey, in: Georges Dionne, ed., *Contributions to Insurance Economics* (Boston: Kluwer Academic Publishers).
- Federal Insurance Administration, 1974, *Report of the Federal Insurance Administration to the Secretary, Department of Housing and Urban Development, on Full Insurance Availability* (Washington D.C.: U.S. Government Printing Office).
- Grabowski, Henry, W. Kip Viscusi, and William N. Evans, 1989, Price and Availability Tradeoffs of Automobile Insurance Regulation, *Journal of Risk and Insurance*, 56: 275-299.
- Harrington, Scott, 1987, A Note on the Impact of Auto Insurance Rate Regulation, *Review of Economics and Statistics*, 69: 166-170.
- Harrington, Scott, 1991, Auto Insurance in Michigan: Regulation, No-Fault, and Affordability, *Journal of Insurance Regulation*, 10: 144-183.
- Harrington, Scott and S. Travis Pritchett, 1990, Automobile Insurance Reform in South Carolina, *Journal of Insurance Regulation*, 8: 422-445.
- Hoy, Michael, 1982, Categorizing Risks in the Insurance Industry, *Quarterly Journal of Economics*, 96: 321-336.
- Ippolito, Richard A., 1979, The Effects of Price Regulation in the Automobile Insurance Industry, *Journal of Law and Economics*, 22: 55-89.
- Kalt, Joseph P. and Mark A. Zupan, 1984, The Apparent Ideological Behavior of Legislators: Testing for Principal-Agent Slack in Political Institutions, *Journal of Law and Economics*, 33: 103-131.
- Keeton, William and Evan Kwerel, 1984, Externalities in Automobile Insurance and the Underinsured Driver Problem, *Journal of Law and Economics*, 17: 149-181.
- Koston, Gary M., 1979, An Appraisal of Sex Discrimination in Setting Automobile Insurance Rates, *Pacific Law Journal*, 10: 201-223.
- Lee, J. Findlay, 1977, *Servicing the Automobile Insurance Shared Market* (New York: Automobile Insurance Plans Service Office).
- Michigan Insurance Bureau, 1977, *Essential Insurance in Michigan: An Avoidable Crisis* (Lansing: MIB).
- Mintel, Judith, 1983, The Effects of the Pricing of Private Passenger Automobile Insurance Sold through Residual Market Mechanisms on Competition and Market Structure, *Journal of Insurance Regulation*, 1: 289-307.
- Mishan, Edward J., 1982, *What Political Economy Is All About* (New York: Cambridge University Press).
- National Association of Insurance Commissioners Advisory Committee, 1979, *Private Passenger Automobile Insurance Risk Classification: A Report of the Advisory Committee* (Kansas City, Mo.: NAIC).

- Pauly, Mark V., 1974, Overinsurance and Public Provision of Insurance: The Roles of Moral Hazard and Adverse Selection, *Quarterly Journal of Economics*, 88:44-62.
- Pauly, Mark, Paul Kleindorfer, and Howard Kunreuther, 1986, Regulation and Quality Competition in the U.S. Insurance Industry, in: J. Finsinger and M. Pauly, eds., *The Economics of Insurance Regulation* (London: Macmillan).
- Peltzman, Samuel, 1976, Toward a More General Theory of Regulation, *Journal of Law and Economics*, 19: 211-240.
- Posner, Richard A., 1983, *The Economics of Justice* (Cambridge, Mass.: Harvard University Press).
- Rea, Samuel A., Jr., 1987, The Market Response to the Elimination of Sex-Based Annuities, *Southern Economic Journal*, 54: 55-63.
- Rea, Samuel A., Jr., 1992, Insurance Classifications and Social Welfare, in: Georges Dionne, ed., *Contributions to Insurance Economics* (Boston: Kluwer Academic Publishers).
- Rothschild, Michael and Joseph Stiglitz, 1976, Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information, *Quarterly Journal of Economics*, 90: 629-649.
- Rottenberg, Simon, 1989, *The Cost of Regulated Pricing: A Critical Analysis of Auto Insurance Premium Rate-Setting in Massachusetts* (Boston: Pioneer Institute for Public Policy Research).
- Schmalensee, Richard, 1984, Imperfect Information and the Equitability of Competitive Prices, *Quarterly Journal of Economics*, 98: 441-460.
- Schmalz, Richard A., 1980, Problems of Insurance Availability—"Redlining," *CPCU Journal*, 33: 149-157; 34: 25-36.
- Scitovsky, Tibor, 1941, A Note on Welfare Propositions in Economics, *Review of Economic Studies*, 9: 77-88.
- Shavell, Steven, 1979, On Moral Hazard and Insurance, *Quarterly Journal of Economics*, 93: 541-562.
- Shavell, Steven, 1986, The Judgment Proof Problem, *International Review of Law and Economics*, 6: 45-58.
- Shayer, Natalie, 1978, Driver Classification in Automobile Insurance, *Automobile Insurance Risk Classification: Equity and Accuracy* (Boston: Division of Insurance).
- Sinn, Hans-Werner, 1982, Kinked Utility and the Demand for Human Wealth and Liability Insurance, *European Economic Review*, 17: 149-162.
- Spence, Michael, 1973, Job Market Signaling, *Quarterly Journal of Economics*, 87: 355-374.
- Stanford Research Institute International, 1976, *The Role of Risk Classifications in Property and Casualty Insurance: A Study of the Risk Assessment Process*, SRI Project 4253-4 (Menlo Park, Cal.: SRI).
- Stigler, George, 1971, The Theory of Economic Regulation, *Bell Journal of Economics and Management Science*, 2: 3-21.
- Underwood, 1979, Law and the Crystal Ball: Predicting Behavior with Statistical Inference and Individualized Judgment, *Yale Law Journal*, 88: 1408.

- U.S. General Accounting Office, 1986, *Automobile Insurance: State Regulation Affects Cost and Availability* (Washington, D.C.: U.S. Government Printing Office).
- Walters, Michael, 1981, Risk Classification Standards, *Proceedings of the Casualty Actuarial Society*, 68: 3-18.
- Wenders, John T., 1986, Economic Efficiency and Income Distribution in the Electric Utility Industry, *Southern Economic Journal*, 52: 1056-1067.
- Woll, Richard, 1991, Auto Insurance and Territorial Rates, Allstate Insurance Company, Menlo Park, California.
- Wortham, Leah, 1986, Insurance Classification: Too Important To Be Left to the Actuaries, *University of Michigan Journal of Law Reform*, 19: 349-423.
- Zycher, Benjamin, 1990, Automobile Insurance Regulation, Direct Democracy, and the Interests of Consumers, *Regulation: Cato Review of Business and Government*, 13: 67-77.