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Using Market Incentives to Promote Auto Occupant Safety

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Should government coerce individuals into wearing seatbelts when they appear not to want to do so? Lawmakers in the 29 states that have enacted mandatory seatbelt laws apparently believe so. Moreover, federal regulations currently provide that automakers must install automatic seatbelts or airbags by September, 1989.[1] Opponents of these enactments have argued that "[p]ersons should be allowed to engage in any activity that does not harm others, even if it involves the risk of great harm to themselves, [and that a] person's refusal to wear a seatbelt does not harm others and should not be punished."[2] This Article argues that both perspectives are flawed. Rather than relying upon a complete mandatory scheme or complete laissez faire, government should use market incentives to reduce the excessively high costs of auto accidents,[3] while enabling consumers to make informed decisions about the nature of the protection they wish to use when riding in automobiles.

The rationale for such a policy is that economic efficiency will be enhanced if, on the one hand, seatbelts are worn by those individuals for whom the benefits of reduced injuries outweigh the costs of seatbelt use, and, on the other hand, seatbelts are not worn by those for whom the costs exceed the benefits.[4] Because the relative costs

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1. Occupant Crash Protection, 49 C.F.R. 571.208 S4.1.4 & S4.1.5 (1987). An automatic seatbelt system engages the seatbelt without any action taken by the passenger. These systems are either attached to the passenger door of the automobile or on a sliding track above the passenger shoulder, and the belts slide into position when the passenger enters the automobile.

2. Schwartz, The Seat Belt Defense and Mandatory Seat Belt Usage: Law, Ethics, and Economics, 24 Idaho L. Rev. 275, 289 (1988).

3. In 1986, auto accidents resulted in 47,900 fatalities and 1.8 million disabling injuries. National Safety Council, Accident Facts 45 (1987) [hereinafter Accident Facts]. At birth, males have a risk of one in fifty that they will die in a motor vehicle crash, and females have a risk of less than one in one hundred. National Highway Traffic Safety Administration, Fatal Accident Reporting System 11, 23 (1986) [hereinafter Fatal Accident Reporting System].

4. A governmental action promotes economic efficiency in the Kaldor-Hicks sense if the gains received by the winners are greater than the losses suffered by the losers. The

and benefits from seatbelt use differ widely among consumers, a mandatory seatbelt requirement will force some individuals to wear seatbelts even though the costs to them outweigh the potential benefits.[5] The laissez faire solution, although permitting the individualized determinations that can promote efficient outcomes, is not optimal because a number of factors generate a divergence between the estimated private and social benefits of seatbelt use. As a result, under laissez faire, many individuals fail to use seatbelts even though an accurate assessment of the costs and benefits would weigh in favor of seatbelt use. By more closely aligning the private and social benefits of seatbelt use, the market-based regulatory scheme proposed in this article should lead to more efficient allocation of resources as well as to reductions in deaths and injuries suffered by auto occupants under a laissez faire approach.

Section I of this article discusses the efficiency of laissez faire by examining the factors which contribute to the divergence between estimations of private and social benefits of seatbelt use, and concludes that individual choices made under a laissez faire regime are not optimal owing to these factors. Section II evaluates the possible bases for government intervention and provides a brief overview of the development of occupant restraint legislation at both the federal and state levels. It concludes that coercive measures—mandating seatbelt use or other occupant restraints—are also not optimal because they emphasize the benefits but not the attendant costs of these measures. Section III closely examines the costs and benefits of seatbelt use and develops a framework of analysis for a proposed market-based regulatory scheme. Section IV sets forth the details of the market-based scheme to encourage seatbelt use and examines the problems of implementation and the likely consequences of this approach to regulation.

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concept is susceptible to a number of normative criticisms when used as the sole criterion for policy assessment, but it is nonetheless an important tool for analysis. *See* Donohue, The Law and Economics of Tort Law: The Profound Revolution, 102 Harv. L. Rev. 1047 (1989) (reviewing W. Landes & R. Posner, The Economic Structure of Tort Law (1987), and S. Shavell, Economic Analyses of Accident Law (1987)); Donohue, Law and Economics: The Road Not Taken, 22 Law & Soc'y Rev. 903 (1988); Donohue & Ayres, Posner's Symphony No. 3: Thinking About the Unthinkable, 39 Stan. L. Rev. 791 (1987) (reviewing R. Posner, Economic Analysis of Law, (3d ed. 1986)).

5. For example, the National Research Council has estimated that requiring seatbelts to be installed in school buses would cost $40 million but would save only one life per year in transporting 25 million children to school. The Council therefore advised Congress not to mandate such a seatbelt requirement. Johnson, Study Rejects Requiring School Bus Seatbelts, N.Y. Times, May 9, 1989, at 1.

I. The Inefficiencies of Laissez Faire

Many states do not have regulations requiring car occupants to wear seatbelts or other types of protective restraints. Under such laissez-faire regimes, individual occupants are free to choose whether they wish to trade the comfort and time saved from not wearing a seatbelt for the enhanced safety from wearing a seatbelt. However, this freedom to choose does not necessarily result in the efficient use of seatbelts because individual choices are often not socially optimal. The failure to achieve optimal choice reflects the discrepancy between the perceived private benefit and actual social benefit of seatbelt use.[6] Since individuals generally have little problem making an accurate calculus of the costs of wearing a seatbelt, the problem is largely one of accurately evaluating the potential benefits of seatbelt use. The following discusses four reasons why an individual might not accurately evaluate such benefits under laissez faire.

A. Inadequate Information

Auto passengers may lack the information to adequately assess the benefits of wearing occupant restraints. As George Stigler has noted in the context of financial markets, "information costs are the costs of transportation from ignorance to omniscience, and seldom can a trader afford to take the entire trip."[7] The same is true in the "market" where decisions to wear or not to wear seatbelts are made. If consumers believe that the benefits of wearing seatbelts are less than the social value of such benefits, they may fail to wear belts even though it objectively would be in their interest to do so. Given the widely varying estimates of the benefits of seatbelt use,[8] it is hardly surprising that consumers would not have a very precise idea of the magnitude of these benefits.

If inadequate information is the problem, the government may be able to achieve the social optimum by providing accurate information on the probabilities and magnitude of harm from auto accidents and the ability of seatbelts to reduce that harm. Consumers could then weigh the expected benefits of wearing belts with the associated costs. Unfortunately, it is not easy to reach all consumers

6. The total benefit (private and social) of seatbelt use is conceived of as the value of total accident cost reductions attributable to the use of seatbelts.

7. G. Stigler, Imperfections in the Capital Market, in The Organization of Industry 113, 119 (1968).

8. *See infra* text accompanying notes 74-79 and Table 3.

even with such easily conveyed information. Thus, mere publication, even in a vastly simplified form, might not achieve the goal of adequately informing consumers.[9]

B. *The Problem of Moral Hazard*

Even if consumers recognize the true social costs and benefits of seatbelt use, they might not act optimally. Since consumers are reimbursed for much of the costs associated with auto injuries, the *private* benefit from wearing belts may well be substantially below the *social* benefit.[10] For example, private and governmental insurance plans pay a vast portion of the medical expenses resulting from auto accidents.[11] In addition, employers and the government will bear much of the burden from lost work output while accident victims are recovering from their injuries.[12] Moreover, employers pay a significant share of the costs of auto accidents, since 25% of all auto-related deaths and nearly half of the disabling injuries involve employees at work.[13] Thus, even with the proper information, consumers may have an incentive to underuse seatbelts since they will not reap all of the benefits from wearing seatbelts but will bear all of the attendant costs.[14]

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9. In addition, there is considerable variation in auto-related fatality rates within the United States. For example, Minnesota, New Jersey, and Massachusetts all had death rates (on a per 100 million vehicle mile basis) of 1.8 in 1986, while Arizona led the nation with a rate of 4.5. Accident Facts, *supra* note 3, at 70-71. Thus, the benefits of seatbelt use will vary significantly across states, increasing the complexity of fully informing all auto occupants.

10. Note that, unless insurers can monitor the seatbelt-wearing behavior of auto occupants, insured individuals will not take an adequate level of care, or, in other words, will not wear seatbelts at the optimal level. S. Shavell, Economic Analysis of Accident Law 258 (1987).

11. As New York Governor Mario Cuomo stated, in support of New York's mandatory seatbelt law, "whether it's through risk-pooling accident insurance or through tax support of some forms of health care, we're all paying the medical bills for those who injure themselves needlessly by failing to wear seatbelts." Highway Users Federation, Discussion Paper on Occupant Protection: How Thousands of Lives Can Be Saved, App. A (1985).

12. Many workers receive their full compensation during periods of illness or injury. In certain jobs, however, injured employees simply are not compensated during periods in which they cannot work. These injured workers will fully bear the burden of their lost income absent coverage by some governmental income maintenance scheme.

13. National Highway Traffic Safety Administration, The Economic Costs of Safety Belt Nonuse 1 (1986).

14. The divergence between private and social benefits from wearing seatbelts could be eliminated if insurance companies could distinguish those who wear belts from those who do not. The insurance company could then deny some portion of benefits to those who are not wearing belts in a crash. Unfortunately, because of the difficulty of ascertaining whether a seatbelt has been used, "insurance companies currently [do not] provide incentives in the form of premium reductions based solely on regular belt usage

Perhaps it is the realization that the public bears a large burden from seatbelt non-usage that can explain what would otherwise be some puzzling public opinion data. A national study conducted by Nordhaus Research Inc. in 1985 found that 68% of adults in the U.S. favored mandatory seatbelt laws and that 86% believed that a significant number of lives would be saved if all auto occupants wore belts. Nonetheless, national seatbelt usage rates in December 1985 were only 23%. These findings may reflect the public's realization that the failure to wear seatbelts is socially harmful but privately rational due to the existence of third party payments.

C. *Underestimating the Probability of an Accident*

There is evidence that at least some individuals systematically underestimate the probability of occurrence of low probability events.[15] These individuals may act on the assumption that, since the probability of having an accident on their next auto outing is very small, it can be treated as zero. For example, consider whether you are more likely to buckle your seatbelt if you know that the probability of having a fatal accident *on your next trip* is .00000025, or that the probability of having a fatal accident at some point *in a 50 year driving career* is one in a hundred. One experiment by Slovic, Fischoff, and Lichtenstein suggested that individuals were more likely to wear belts if they were apprised of the "one in a hundred risk," even though under typical assumptions these two probabilities are the same.[16] Moreover, in surveys, individuals vastly underestimate their probability of being involved in auto accidents.[17]

. . . . " National Highway Traffic Safety Administration, Assessment of Insurance Incentives for Safety Belt use, at x (1983). In the event of a fatality, it is more readily confirmed whether an individual was wearing a belt, which explains how General Motors can provide a $10,000 payment to any passenger in a new GM car who is killed while wearing a seatbelt in the first year of ownership. In some states, GM's insurance affiliate offers coverage for succeeding years as well. The cost of such coverage for the first additional year is $6.25, and $9.75 and $13.25 for the subsequent two years. General Motors Corporation Press Release, Update on GM $10,000 Life Belt User Insurance Program (Mar. 6, 1987).

15. Tversky & Kahneman, Availability: A Heuristic for Judging Frequency and Probability, 5 Cognitive Psychology 207 (1973).

16. *See* Arnould & Grabowski, Auto Safety Regulation: An Analysis of Market Failure, 12 Bell J. Econ. 27, 35. The two probabilities are the same under the assumption that the average individual takes 800 rides per year. Thus, over a 50 year driving career, one will take 50 * 800 = 40,000 rides. Therefore, the probability that one will not be in a fatal crash in 40,000 rides equals (1 − .00000025) raised to the 40,000 power, or .99. The probability that one *will* be in a fatal crash is then 1 − .99 = .01.

17. In one survey, individuals were asked to assess the probability of being involved in an automobile accident of any kind in the next year. The true probability was roughly 10 out of 100. A majority of the respondents selected odds of 1 out of 100 or greater. *Id.* at 34. The explanation of these results may be that individuals have a distorted view

However, that individuals seem to underassess the probability of auto accidents does not necessarily support the case for mandatory seatbelt laws. In fact, the experimental results may suggest that government should simply package the information into a form, such as the "one in a hundred" statistic, that consumers can understand better and thereby respond to more appropriately. Still, as noted above, the costs of conveying even simple information to consumers can be quite high.

D. *Cognitive Dissonance*

Even apart from the difficulty that individuals have in evaluating small probabilities, they may also tend to systematically understate the risk of certain harms. This is because certain individuals simply ignore, through the process of cognitive dissonance, the heightened risk of being involved in an auto accident without a seatbelt. The theory of cognitive dissonance has been examined in many contexts to explain the economically irrational behavior of individuals. As economist George Akerlof suggests:

> Cognitive dissonance theory would suggest that persons in dangerous jobs must decide between two conflicting cognitions. According to one cognition, ego is a smart person who would not choose to work in an unsafe place. If the worker continues to work in the dangerous job, he will try to reject the cognition that the job is dangerous.[18]

Similarly, individuals may pay a psychological price if they contemplate the possibility of being injured in an automobile accident.[19] A voluntary decision to buckle a seatbelt requires one to acknowledge the possibility of an accident, thereby imposing the psychological cost. As a result, consumers may rationally decide to ignore certain dangers if the psychological cost of considering them is too high. Conceivably, if car users buckle the seatbelt out of deference to coercive or incentive-based governmental regulation, they may avoid the psychological cost. In this case, the individual tells himself that he is taking the precaution not because danger is present but because the government has forced him to do so.

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of their own driving skills. One study found that 88% of Americans believe themselves to be safer drivers than the median driver. Svenson, Are We All Less Risky and More Skillful Than Fellow Drivers?, Acta Psychologica 143, 146 (1981).

18. Akerlof, The Economic Consequences of Cognitive Dissonance, 72 Am. Econ. Rev. 307, 309 (1982).

19. Unwillingness to consider unattractive events may explain why many individuals fail to draft wills.

II. The Inefficiencies of Mandatory Government Regulation

The rationale for government regulation has focused on only one side of the cost-benefit equation—i.e., the benefits resulting from seatbelt use. Very little attention has been given to the costs associated with requiring mandatory seatbelt use. In other words, both federal and state legislators in enacting occupant restraint laws have assumed that a decrease of fatality and other accident costs is in itself a sufficient justification for coercive regulation. This section examines the claim that seatbelts save lives, provides an overview of the development of federal and state occupant restraint legislation and regulation, and presents a critique of the rationale which underlies mandatory seatbelt laws and passive restraints.

A. The Rationale for Government Action: Seatbelts Save Lives

It is generally accepted that increased use of seatbelts by automobile occupants will save lives and reduce injuries. For example, in considering a challenge to the Reagan Administration's initial attempt to eliminate the mandatory passive restraint standard,[20] the Supreme Court stated: "We start with the accepted ground that if used, seatbelts unquestionably would save many thousands of lives and would prevent tens of thousands of crippling injuries."[21] A large and growing body of literature supports this proposition.[22]

1. The Peltzman Theory. Nonetheless, University of Chicago economist Sam Peltzman has expressed concern that governmental efforts to increase seatbelt use may generate some adverse consequences. In an interesting early paper, Peltzman cautioned that efforts to protect drivers may actually increase deaths and injuries.[23] Peltzman argued that, if safety regulation succeeded in decreasing

20. *See infra* text accompanying notes 41-44.

21. Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 52 (1983).

22. *See, e.g.*, Turnball, Dunne, Barrett, Langenberg & Orsay, Prospective Study of the Effect of Safety Belts on Morbidity and Health Care Costs in Motor Vehicle Accidents, 260 J.A.M.A. 3598 (1988); Chorba, Reinfurt & Hulka, Efficacy of Mandatory Seat Belt Use Legislation, 260 J.A.M.A. 3593 (1988); University of North Carolina Highway Safety Research Center, 1985-1986 Experience with Belt Laws in the United States (1987) [hereinafter UNC Highway Safety Research Center]; Accident Facts, *supra* note 3 (citing a study by the Insurance Institute for Highway Safety); Arnould & Grabowski, *supra* note 16; Lave & Weber, A Benefit-Cost Analysis of Auto Safety Features, 2 Applied Econ. 265 (1970).

23. Peltzman, The Effects of Automobile Safety Regulation, 83 J. Pol. Econ. 677 (1975) (cited with apparent approval in R. Posner, Economic Analysis of Law 351 n.2 (3d ed. 1986). *See also* Peltzman, The Regulation of Automobile Safety, in Auto Safety Regulation: The Cure or The Problem? 1 (H. Manne & R. Miller ed. 1976).

the risk of death from an accident, then drivers might alter their behavior by driving faster or more recklessly, since the "cost" of an accident had been reduced. As a result, total injuries from auto accidents would rise since (1) more frequent and perhaps more serious accidents would occur, and (2) unprotected pedestrians might suffer greater injuries. In Peltzman's terms: "The mandatory installation of safety devices does not by itself change the private demand for safety, but it may change some relevant prices the response to which may mitigate some of the technological promise of these devices."[24] However, as my former colleague Mark Steitz has noted in jest, if we follow Peltzman's logic, then the way to reduce injuries from auto accidents is to place a dagger in the steering column aimed at the driver's heart.

Figure 1 illustrates Peltzman's theory with a simple example that assumes that only two factors—vehicle speed and seatbelt use—influence the expected accident costs from driving an automobile.[25] In general, driving at higher speeds generates benefits—by saving time and perhaps by generating a feeling of exhilaration—at the cost of an increased number and severity of automobile accidents. Curve C_1 represents the increasing marginal expected accident losses resulting from driving at faster speeds without seatbelts.[26] Curve B represents the marginal benefits associated with driving at faster speeds.[27] The intersection of the two curves at E_1 defines the equilibrium when seatbelts are not worn: drivers will drive at, say, 55 mph and the dollar value of the expected accident losses is given by the sum of areas I and II.

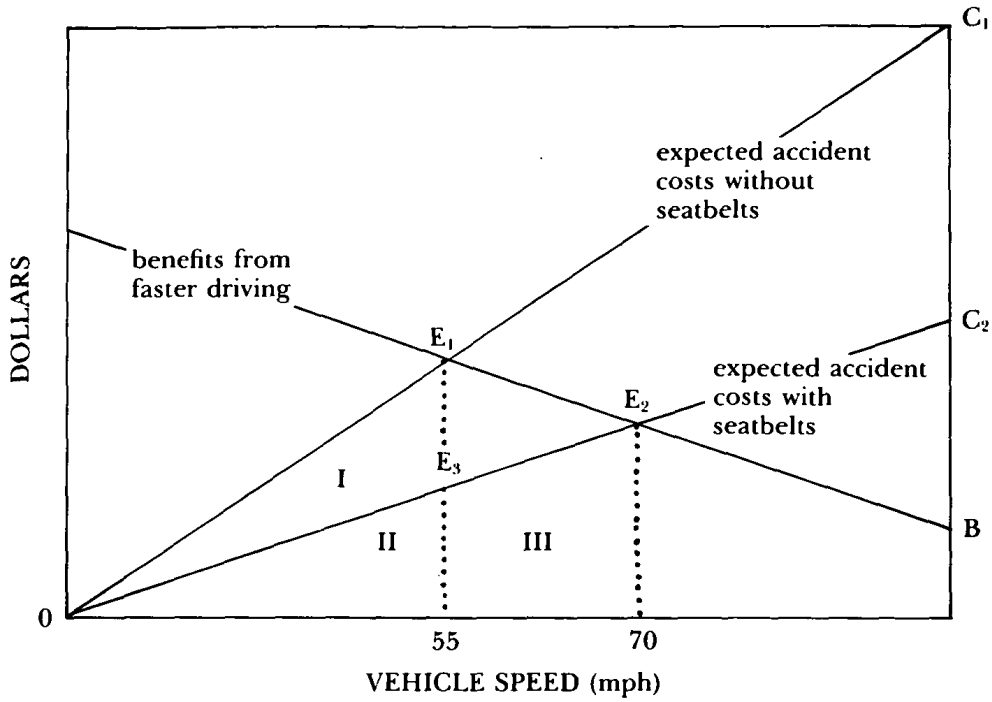
24. Peltzman, The Effects of Automobile Safety Regulation, *supra* note 23, at 680-81.

25. As noted above, Peltzman argued that anything that makes drivers feel safer may induce them not only to drive faster, but to drive more recklessly as well. Figure 1 restricts the analysis to the response of increased speed only to illustrate how enhanced driver safety may theoretically be offset by an accompanying increase in the dangers brought about by increased speed.

26. The expected accident losses from driving include all damage of any kind—whether to pedestrians, auto occupants, or property—that the driver will be responsible for paying or will personally suffer. C_2 lies below C_1 because the use of seatbelts will lower the expected damage to auto occupants, even though other types of damage would presumably remain unchanged. Thus, the distance between C_1 and C_2 at any given speed represents only the reduction in expected accident costs to auto occupants purely due to the use of seatbelts.

27. The marginal benefits of driving faster are depicted as declining, although the analysis would have proceeded similarly if I had instead assumed that the marginal benefits were constant. An example may justify the assumption of declining marginal benefits. If Bill drives 5 mph faster all week long he may be able to save enough time to allow him to watch his favorite TV sitcom. If Bill drives 10 mph faster he will then be able to also watch his second most favorite TV sitcom, which presumably gives him less pleasure than his favorite sitcom.

FIGURE I
EFFECT OF SEATBELT USE ON VEHICLE SPEED



As Peltzman's work implies, the enforced seatbelt use requirement lowers the expected accident cost curve, since, at any given speed at which an accident occurs, total damage will be reduced, on average, by the reduction in damage to the belted vehicle occupants. Thus, the expected loss curve shifts down from C_1 to C_2.[28] The resulting equilibrium is then given by E_2. As a result of the seatbelt requirement, drivers are willing to increase their vehicle speed to, perhaps, 70 mph, and the total expected accident loss will be represented by areas II and III. Thus, this simple illustration depicts Peltzman's prediction that, if drivers are protected by safety regulation, they may change their behavior and become more reckless—by driving faster, in this example. At the same time, the consequences for total accident costs are ambiguous: if area I is less than area III, then the safety regulation will actually have increased total accident losses.

2. *A critical view of the Peltzman Theory.* Peltzman's theory, however, founders on the empirical evidence. As Peltzman himself

28. Both curves have the same y-intercept of zero because there will be no accident losses if the automobile is not driven (i.e., is driven at speed zero).

reports, the advent of safety regulation did *not* lead to increased vehicle speeds.[29] In fact, since drivers are constrained by other regulation (e.g., speed limits), they may not be able to increase their speeds at all in response to changes in safety regulation, even if they are inclined to do so. Suppose, for example, that drivers want to respond to the mandatory seatbelt requirement by driving faster, but that they are prevented from doing so by the 55 mph speed limit. Mandating seatbelt use would then shift the expected accident loss curve from C_1 to C_2 and, because of the speed limit, would lead to equilibrium E_3.[30] In this case, the shift to wearing seatbelts unambiguously has caused total accident losses to decline, since the sum of areas I and II necessarily exceeds area II alone.

Of course, it is possible that the Peltzman effect would increase the desire of drivers both to speed and to drive recklessly, and that differences in the ability of the police to enforce the laws prohibiting such behavior would lead to no increase in speeding but significant increases in reckless driving. Yet, even granting the perhaps questionable premise that it is easier to enforce prohibitions on speeding than those on reckless driving,[31] the evidence suggests that the safety benefits of seatbelts dwarf any offsetting tendency to drive less carefully.[32] Thus, when properly construed in light of the empirical evidence, Peltzman's work does not undermine the view that seatbelts save lives.[33]

29. After examining the effect of increased safety regulation on vehicle speed, Peltzman concludes, "[W]e must reject the hypothesis of a regulation-induced increase in vehicle speed." Peltzman, The Effects of Automobile Safety Regulation, *supra* note 23, at 703.

30. Drivers would like to increase their vehicle speed past 55 mph (because at that level the benefits of increased speed, given by curve B, exceed the costs, given by curve C_2), but they are prohibited from so doing. Thus, they will drive at 55 mph and suffer accidents costs of area II.

31. Remember that both these prohibitions are subject to direct regulation by law enforcement officials, as well as to indirect regulation through the tort system of unreasonable behavior that leads to injury.

32. *See* Crandall & Graham, Automobile Safety Regulation and Offsetting Behavior: Some New Empirical Estimates, 74 Am. Econ. Rev. 328, 330 (1984) ("[T]he intrinsic engineering effects of safety devices appear to swamp the behavior responses. That result differs substantially from Peltzman's original empirical result.").

33. Peltzman also suggests that his prediction of increased risk-taking is supported by the post-1965 increase in the propensity of young people to drive and the growth in drunk driving, but the leap from these findings to the conclusion that they are caused by auto safety regulation is quite heroic. Even Peltzman concedes that the "annual growth of alcohol consumption has roughly doubled since 1965, so it risks exaggeration to attribute all of the reported increases in drunk driving to legal changes." Peltzman, The Effects of Automobile Safety Regulation, *supra* note 23, at 705. As Richard Nelson has stated:

> If one did not go into the study with Peltzman's particular blinders, and saw the data that Peltzman has uncovered, the analyst might have asked, in a quite open-

Figure 1 can also be used to show that, while seatbelts may save lives, their enforced use can generate inefficiencies.[34] For example, the move from laissez faire to a mandatory seatbelt requirement will impose the cost of installing and using seatbelts while generating an increase in social welfare given by the area $0E_1E_2$ without a speed limit and $0E_1E_3$ with a speed limit. If we assume that both these areas are greater than the cost and use of seatbelts, then the seatbelt regulation is efficient. Even in this case, however, the use of the speed limit imposes the deadweight loss $E_3E_1E_2$. This establishes the general point that regulations (or combinations of regulations) that save lives are not necessarily efficient: total accident losses are reduced by imposing mandatory seatbelt laws and speed limits, but social welfare would be unambiguously greater without the speed limit.

B. Developments in Auto Safety Regulations

Recognizing that occupant restraint devices save lives, legislators and government regulators sought to increase their use through various laws and regulations. The thirty year trend toward greater use of seatbelts began fitfully in 1956 when Ford Motor Company, the first manufacturer to offer seatbelts to consumers, quickly terminated the option, allegedly because of unsatisfactory purchase rates.[35] Five years later, New York State passed legislation mandating the installation of seatbelts in automobiles sold in New York. The federal government subsequently followed New York's lead by

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> minded way: Why the rise in teenage driving and drunk driving (which seems plausibly connected with rising pedestrian fatalities and property damage)? In searching for the factors behind these developments, the researcher might have looked at a number of variables, but I doubt seriously whether he would have put very much weight on the possibility that the main reason was the new auto safety legislation. Without the legislation, would the incidence of young driving and drunk driving have been significantly less? Would it be an effective attack on rising pedestrian deaths and property damage to actually ban seat belts and related auto safety devices?

Nelson, Comments on Peltzman's Paper on Automobile Safety Regulation, in Auto Safety Regulation: The Cure or The Problem? 63, 65 (H. Manne & R. Miller ed. 1976). *See also id.* at 89-96 for an illuminating exchange between Peltzman and Nelson.

34. *See infra* text accompanying notes 67-71 for a general discussion of the inefficiencies of mandatory seatbelt laws.

35. Lee Iacocca has stated that the primary reason for the removal of seatbelts was the images of injury and fatality generated by their presence. According to Iacocca, automobile industry executives were concerned about the negative effects these images would have on their ability to market their products. L. Iacocca, Iacocca 296 (1984). This phenomenon can provide a justification for mandatory seatbelt *installation*, since a manufacturer's act of voluntarily offering seatbelts would make its cars appear more dangerous. *See* T. Schelling, Micromotives and Macrobehavior, 213, 223-24 (1978) (arguing that all hockey players would like to wear helmets but they refuse to do so absent coercion for fear of being viewed as cowardly).

passing the National Traffic and Motor Vehicle Safety Act of 1966, which created the National Highway Traffic Safety Administration (NHTSA).[36] In 1967, NHTSA issued Federal Motor Vehicle Safety Standard (FMVSS) 208, which required the installation of seatbelts in all automobiles.[37] Nevertheless, while federal actions guaranteed those driving in new cars the availability of seatbelts, more than 85% of the population declined to wear them.[38] Consequently, federal regulators began to think in terms of "passive restraints," such as airbags or automatic seatbelts that would automatically protect vehicle occupants.

1. The interlock system. In 1972, FMVSS 208 was amended to require full passive protection for all front seat occupants on new cars beginning in August of 1975. For the period between August 1973 and August 1975, manufacturers were ordered to supply either passive restraints or lap and shoulder belts coupled with an "ignition interlock" that would prevent the car from being started until front seat passengers had buckled their seatbelts. Confronted with this choice, the automakers chose the ill-fated interlock option. Consumer response to the interlock system was extraordinarily negative, and Congress quickly reacted to the public outcry by eliminating this requirement.[39]

For those regulators seeking to maximize seatbelt use, the interlock system was the perfect solution: car occupants had to fasten their belts just to start their cars. The interlock system clearly increased belt use in new cars and reduced the enforcement costs that would attend any mandatory seatbelt usage law. However, it also created numerous inefficiencies: (1) the system could be disconnected, which meant that the expense of the system was completely wasted; (2) since the system was triggered by sensors that perceive weight on the front seat, it required car owners to buckle up even when there was no benefit from doing so, such as when starting the car to perform an engine repair or when transporting a bag of groceries on the passenger seat; and (3) it gave no consideration to the

36. 15 U.S.C. §§ 1381-1431 (1982).

37. Federal Motor Vehicle Safety Standard 208, 49 CFR § 571.208 (1987).

38. Seatbelt use by drivers did not reach 15% until late in 1984. National Highway Traffic Safety Administration, The Estimation of Economic Savings From Increased Safety Belt Use 2 (1985) [hereinafter Estimation of Economic Savings].

39. The interlock system was eliminated by the Motor Vehicle and School Bus Safety Amendments of 1974, 15 U.S.C. § 1410b(b) (1982). The Amendments prohibited any motor vehicle safety standard that required either an interlock system or a continuous buzzer indicating that the seatbelts were not in use.

interests of those for whom the costs of seatbelt use clearly outweighed the benefits.

2. *The battle over passive restraints.* The chaotic development of federal safety regulation continued when the Ford Administration delayed the August 1975 deadline for mandatory passive restraint systems for one year, and then suspended it entirely in December 1976.[40] A few months later, the Carter Administration reintroduced a plan that would have required front-seat passive protection over a three-year period beginning in model year 1982.[41] Yet, another switch in administrations again altered the fate of the mandatory passive restraint standard. In the wake of intense lobbying efforts by the insurance industry in support of mandatory passive restraints and by the auto manufacturers in opposition, the Reagan Administration responded by ordering a one year delay of, and eventually rescinding, the Carter plan.[42]

However, the auto industry's success in the executive branch was soon reversed by the insurance industry's success before the judiciary. The Supreme Court in *Motor Vehicle Manufacturer's Association v. State Farm Mutual Automobile Insurance Co.* held that NHTSA's rescission of the passive restraint standard was defective in that the agency "failed to supply the requisiter reasoned analysis' " for its decision.[43] Justice Rehnquist noted in his concurring opinion: "since the airbag and continuous spool automatic seatbelt were explicitly approved in the Standard the agency was rescinding, the agency should explain why it declined to leave those requirements intact. In this case, the agency gave no explanation at all."[44]

In response to the Supreme Court's direction to consider the issue further, NHTSA developed a new approach to protect front seat passengers. This new scheme was based on two findings: (1) of all the available options, the strict enforcement by states of mandatory seatbelt usage laws would most quickly and inexpensively provide the greatest safety benefits; and (2) the next best option was to require automakers to provide passive restraints, such as automatic seatbelts or airbags.[45] To implement these findings, NHTSA announced an amended FMVSS 208 requiring the gradual phase-in of automatic restraints, culminating in the installation of automatic restraints in all new cars beginning with model year 1990 (September

40. Motor Vehicle Mfrs. Ass'n, 463 U.S. 29, 36-37 (1983).
41. Modified Standard 208, 49 C.F.R. § 571.208 (1978).
42. *See* 463 U.S. 29, 38.
43. 463 U.S. 29, 57 (1983).
44. *Id.* at 57-8.
45. Occupant Crash Protection, 49 Fed. Reg. 28962 (1984).

1, 1989), unless prior to that time the state mandatory belt usage laws that have been enacted cover at least two-thirds of the U.S. population.[46]

C. *State Mandatory Seatbelt Laws*

1. Responding to NHTSA's encouragement. A few months after this rule was promulgated, New York became the first state to accept NHTSA's invitation to enact a mandatory seatbelt law. At present, a total of 29 states and the District of Columbia have mandatory seatbelt laws.[47] In order to identify factors influencing the decision to enact a seatbelt law, I estimated a logit model using the following explanatory variables:[48] per capita income of the state, education level, population density, and region dummies. My working hypothesis was that the greater the percentage of residents for whom the *social* (not necessarily private) benefits of seatbelt use exceeded its costs, the greater the likelihood that the state would adopt a mandatory seatbelt law. Somewhat surprisingly, the only two variables that were consistently statistically significant were per capita income and the Northeast dummy.[49]

The first major finding that emerged from the statistical evidence was that states with higher per capita income were more likely to enact mandatory seatbelt laws.[50] While the predicted sign on this variable was unclear *a priori*—because the higher one's income, the higher are both the costs and benefits of using seatbelts—the empirical evidence may suggest that the benefits of wearing seatbelts rise more quickly than the costs as income increases. Alternatively, since income and education levels are highly correlated, it is possible that higher education levels contribute to the enactment of state seatbelt

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46. *Id.*

47. UNC Highway Safety Research Center, *supra* note 22, at 1. Two states—Massachusetts and Nebraska—adopted mandatory seatbelt laws and then rescinded them through voter referenda in 1986. *Id.*

48. A logit model is a standard econometric tool for analyzing binary choice decisions. *See* R. Pindyck & D. Rubinfeld, Econometric Models and Economic Forecasts 274-80 (2d ed. 1981).

49. The most parsimonious model explaining whether or not a state had a mandatory seatbelt law (yes=1, no=0 will therefore include only these two variables. The results of this logit regression were as follows:

$$\log(p/1-p) = \underset{(2.4)}{-5.9} + \underset{(2.5)}{[.00049 * \text{Income}]} + \underset{(2.7)}{[-2.8 * \text{NE}]},$$

where p represents the probability of enacting a seatbelt law, Income represents the particular state's per capita income, and NE identifies Northeastern states. The numbers in parentheses are t-statistics, and all the coefficients are significant at the .05 level.

50. Nebraska and Massachusetts were treated as not having mandatory seatbelt laws.

laws.[51] The second major finding was that states in the Northeast were considerably less likely to have seatbelt laws than one would have expected given their relatively high per capita income levels.[52] While this finding is somewhat surprising,[53] a possible explanation is that many of the northeastern states have quite low death rates per vehicle mile, which may result in a lesser perceived need for seatbelt legislation.[54]

The effects of the two significant variables are quantified and presented in Table 1, which shows the probability that a state will adopt a mandatory seatbelt usage law for different levels of per capita income and region. Note that the probability that a non-northeastern state will adopt a mandatory seatbelt law is almost 90% if its per capita income is one standard deviation above the mean level for all states, but only 45% if its income is one standard deviation below the mean. Conversely, northeastern states with these same income levels have sharply lower probabilities of adopting seatbelt laws.[55]

2. *Thwarting NHTSA's instructions.* While NHTSA has been surprisingly successful in achieving its goal of encouraging states to adopt mandatory seatbelt laws, it has been less successful in its efforts to dictate what these laws should provide beyond the general requirement that front seat occupants have their seatbelts fastened when their vehicle is in forward motion.[56] NHTSA declared that

51. More educated citizens might be able to perceive more accurately that the social benefits of seatbelt use outweigh its costs and therefore not only choose to use seatbelts themselves, but support mandatory seatbelt laws to prevent others from generating the external costs of not wearing belts.

52. Connecticut, New York, and New Jersey were the three northeastern states that have seatbelt laws. Maine, Vermont, New Hampshire, Massachusetts, Pennsylvania, and Rhode Island do not have such laws.

53. Could it be the product of "Yankee individualism," which at times exalts freedom over life itself? For example, the famous slogan adorning New Hampshire license plates—"Live Free or Die"—would seem to embody a sentiment inconsistent with mandatory seatbelt laws.

54. *See* Accident Facts, *supra* note 3, at 70.

55. Since Massachusetts is an affluent northeastern state that first had a mandatory law and then rescinded it, I also decided to eliminate it from the analysis to see if the results presented above were sensitive to its inclusion as a state without a mandatory law. The logit results were quite similar to those presented above.

56. It is interesting to speculate why so many states responded to NHTSA's effort to encourage the adoption of mandatory seatbelt laws by offering the incentives of avoiding a mandatory passive restraint standard. During the Carter Administration, NHTSA offered to provide federal grant funds to states that passed mandatory seatbelt laws and only Puerto Rico enacted such a law at that time. *See* Arnould & Grabowski, *supra* note 16, at 28. In other words, the states did not respond to NHTSA's appeals when they would have received cash payments for doing so, but did respond when the sanction for refusing to adopt such laws fell most directly on the automakers, who would then be forced to comply with the mandatory passive restraint standard. This may suggest that

TABLE 1
Probability of Adopting a Mandatory Seatbelt Usage Law

Per Capita Income	Northeast	Non-Northeast
$11,619	.05	.45
$13,956	.13	.72
$16,293	.33	.89

Note: The mean per capita income level for all states was $13,956, and the other two income figures are one standard deviation above and below this mean.

state mandatory seatbelt laws would only be counted towards its two-thirds requirement if they met certain standards.[57] One of these standards was that the fine for violating the mandatory belt law must be at least $25, which is above the level currently specified in about half the states.[58] A second requirement of meeting the two-thirds rule was that the law must provide that non-use of a seatbelt will reduce the damages awarded to injured plaintiffs in civil lawsuits. Very few states have adopted such provisions.[59]

Moreover, some states that adopted mandatory usage laws also desired the adoption of the federal mandatory passive restraint standard. As a result, there emerged an interesting strategic response to NHTSA's plan to rescind the federal requirement of automatic restraints if enough states enacted mandatory belt laws: a number of states specified that their seatbelt laws would become void if NHTSA uses them in calculating whether or not to rescind the FMVSS 208 automatic restraint requirement.[60]

major auto manufacturers have greater influence on state legislatures than the federal government does. Apparently, when General Motors was considering where to locate its massive Saturn manufacturing plant, it courted states such as Illinois and Tennessee that did not have mandatory usage laws and indicated that passage of such laws would be factors in favor of a decision to locate in that state. Both states quickly adopted such laws during the courtship, and the Saturn plant ended up in Spring Hill, Tennessee. N.Y. Times, Dec. 17, 1987, at D4.

57. 49 C.F.R. § 571.208 S4.1.5.2(c)(2) (1987).

58. Minnesota is the only state with a mandatory seatbelt law that does not levy a fine but only warns violators. Violators of the seatbelt laws in other states face fines ranging from $5 in Idaho to a maximum of $50 in New York, California, and New Mexico.

59. For example, the Louisiana statute provides that non-use of a seatbelt is admissible in a civil lawsuit, but limits the maximum reduction in damages to 2%. Other states have adopted this basic approach, although they vary on the permissible percentage reduction in damages: Michigan (5%), Missouri (1%), and Nebraska (5%). New Jersey and New York permit the evidence of non-use in civil actions but do not specify a maximum percentage reduction in damage awards. National Safety Council, Mandatory Safety Belt Use Laws By State in the United States 2-3 (1987). However, a number of the mandatory seatbelt usage laws specifically prohibit the use of evidence of a violation of the seatbelt statute to mitigate damages. *See generally* Schwartz, *supra* note 2 (advocating that noncompliance should be a basis for mitigating damages).

60. California, North Carolina, Missouri, Maryland, and the District of Columbia have adopted such provisions. It is possible that the combined efforts of NHTSA and

Thus, even though almost three-quarters of the nation's population is now covered by state seatbelt laws,[61] the mandatory airbag/passive restraint standard scheduled to go into effect on September 1, 1989 will not be obviated by the passage of state seatbelt laws. Nonetheless, NHTSA's innovative effort to increase seatbelt use beyond the previous level of 15% has been successful: national usage rates rose to 23% in December 1985 and to 34% by June 1986.[62] Table 2 presents the usage rates before and after the listed states adopted mandatory seatbelt laws. The latest average usage rate observed in those states with current seatbelt laws is 48%.[63]

D. A Final Wrinkle on the Passive Restraint Standard

Meanwhile, the tortuous path of federal safety regulation continues. In 1987, NHTSA again amended FMVSS 208 to allow auto manufacturers to wait until 1993 to install airbags or other automatic restraints to protect all front seat occupants if they put airbags on the driver's side by 1989.[64] Although this new extension weakens the automatic protection to be afforded to the front seat passenger, it does encourage the introduction of airbags to protect drivers, who are involved in almost three-fourths of all front seat fatalities.[65]

E. The Problems with Mandatory Seatbelt Laws and Passive Restraints

As the above discussion shows, tension between the mandatory requirement and purely laissez faire interests contributed to abrupt reversals and repeated delays in various regulatory decisions. But one thing is clear: because of information costs, the moral hazard problems arising from third party reimbursements, difficulties in evaluating low probability risks, and cognitive dissonance, a laissez

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the automakers were enough to put mandatory seatbelt laws on the legislative agenda in many states, but were not sufficient to ensure that the seatbelt laws ultimately enacted would further the automakers' goal of avoiding a mandatory passive restraint standard.

61. General Motors Corporation Press Release, *supra* note 14.

62. Accident Facts, *supra* note 3, at 53. The usage rate equals the percentage of passenger car occupants that wear seatbelts. Somewhat surprisingly, the number of traffic deaths per 100 million vehicle miles remained at 2.57 for both 1985 and 1986, despite the increased seatbelt use. Perhaps this increase did not occur in the group that would benefit most—young male drivers. *Id.* at 45. Nonetheless, this fatality rate is the lowest to date, and is roughly half the rate experienced twenty years earlier. *See id.* at 64.

63. UNC Highway Safety Research Center, *supra* note 22, at 2.

64. 49 C.F.R. § 571.208 S4.1.3.4 (1987).

65. *Id.* Without the extension, every new car would have had to be equipped with some form of automatic protection for all front seat occupants by September 1989. With the new rule, the automakers can meet the standard with automatic belts (or airbags) for all front seat occupants, or with just airbags for the driver from 1989 until 1993, at which time full passive protection will again be mandated.

TABLE 2
Belt Usage By State

	Pre-Law %	Latest Belt Use %
California	18	47
Connecticut	25	56
Colorado	18	—
D.C.	—	55
Florida	22	60
Hawaii	33	64
Idaho	16	27
Illinois	16	47
Indiana	20	52
Iowa	18	63
Kansas	10	44
Louisiana	12	35
Maryland	30	66
Massachusetts	20	25 (repealed)
Michigan	20	47
Minnesota	20	32
Missouri	10	40
Montana	33	—
Nebraska	11	29 (repealed)
Nevada	21	—
New Jersey	18	41
New Mexico	12	50
New York	16	48
North Carolina	25	65
Ohio	16	41
Oklahoma	16	35
Oregon	35	—
Tennessee	—	28
Texas	15	60
Utah	18	22
Virginia	32	—
Washington	—	51

Source: UNC Highway Safety Research Center, *supra* note 22, at 2.

faire approach tends to result in the underuse of seatbelts. Government regulators have responded to the heavy costs imposed by such underuse by resorting to mandatory seatbelt laws or passive restraint regulations. Indeed, economists Robert Cooter and Thomas Ulen would seem to endorse this approach:

> The public policy response to the presence of some risks that cannot be accurately estimated cannot simply be to provide more information about those risks or about the benefits of using the expected utility

> model. Instead, public policy must in these instances be directed at identifying the optimal level of precaution and directly requiring decision makers to take it.[66]

But while the requirements of mandatory seatbelt laws or passive restraint regulation may be welfare-enhancing vis-a-vis the laissez faire situation, they are not optimal since they coerce consumers to use seatbelts even when the full benefits of wearing belts are outweighed by the costs.[67]

Thus, under a mandatory seatbelt law an individual willing to pay $200 to avoid wearing a seatbelt is under the same legal compulsion as someone who would only pay $20. If the expected benefits from decreased accident losses are valued at, for example, $85, then society will benefit if only the second individual wears a belt. Conceivably, this result could be reached by establishing the level of enforcement of a mandatory law at precisely the level that makes the expected fine equal to $85.[68] But this is not the most effective method of simplifying the cost-benefit calculus for the auto occupant, since the evaluation of the probability of apprehension will be at least as difficult as the evaluation of the probability of getting into an accident.[69]

The mandatory passive restraint standards impose similar burdens on consumers. Those who already use lap and shoulder belts

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66. R. Cooter & T. Ulen, Law and Economics 416 (1988).

67. Under laissez faire we almost certainly have significant underuse of seatbelts, while under mandatory laws some individuals will use seatbelts even though the social benefits of doing so are outweighed by the costs. To the extent that the class of individuals who tend to ignore mandatory seatbelt laws is primarily composed of those for whom it would be inefficient to use belts, then the inefficiencies of the mandatory law are mitigated. At the same time, the existence of the mandatory law will impose enforcement costs that are absent in the laissez faire case.

68. For example, if the average annual benefit of belt use is $85, the amount of the fine could be set at $85 times the reciprocal of the annual probability of apprehension. Thus, if the level of enforcement is such that a non-complying individual will on average have an annual probability of being caught of 25%, then the fine should be set at $340.

69. The approach of using a mandatory scheme with the expectation that individuals will disobey the law if their compliance costs exceed the expected fine presents other problems. First, this scheme imposes risk burdens on presumably risk-averse individuals. Those who comply with the law can avoid the risk of incurring the fine, but since this scheme is predicated upon encouraging the efficient level of noncompliance it necessarily must impose risk upon the noncompliers—unless a private insurance market can insure noncompliers against the risk of apprehension and fine. Since risk costs are true social costs, this scheme may be a more costly mechanism for obtaining optimal seatbelt use than an *ex ante* payment scheme. Second, the mandatory scheme with optimal noncompliance might be viewed as undermining the authority of the law—which in general may not be advisable. Not only will some individuals feel apprehension about violating the law—which again imposes a cost with no corresponding benefit—but others will be encouraged in the belief that laws are to be obeyed only when their personal cost/benefit assessment tips in favor of compliance. In general, it will be socially costly if this attitude becomes widespread, because it is efficient that most laws be obeyed.

may be particularly disadvantaged. If the car they purchase is equipped with airbags, they will have to pay for a safety item that may not generate a comparable level of enhanced safety.[70] If the car is not equipped with airbags, it must have automatic belts, which to some are less desirable than manual belts.[71] Therefore, the standard may impose excessive burdens on the roughly 15% who would normally use seatbelts, as well as upon those who object to passive belts.

In any event, the development of occupant restraint regulation reflects the thinking of regulators that, because increased use of seatbelts will save lives and prevent injuries, governmental action is sufficiently justified. Indeed, the language of the National Traffic and Motor Vehicle Safety Act of 1966 seems to reflect this view.[72] But the generation of such benefits is a necessary but not sufficient basis for governmental regulation. For example, a ban on driving by those under age 25—or indeed a ban on all driving—would certainly reduce deaths and injuries on the highways; this does not mean, nor would many seriously argue, that the benefits from such prohibitions would exceed the costs they would impose.

III. Toward a Cost-Benefit Analysis of Seatbelt Use

The above discussion has demonstrated that neither laissez faire nor coercive government regulation will generate the socially optimal level of seatbelt use. To assess whether an intermediate market-oriented governmental policy could more constructively promote the use of occupant restraints and at the same time enhance economic efficiency, I examine in detail the benefits and costs of seatbelt use. This evaluation will provide the framework for the discussion of the proposed market-based scheme.

70. Arnould and Grabowski present cost/benefit calculations for airbags, and they conclude that the benefits outweigh the costs of airbags only under certain assumptions. Arnould & Grabowski, *supra* note 16, at 42-43.

71. Some automatic belts, such as those found in Volkswagen, only have a shoulder harness without the lap component. In general, automatic belts are less effective than the three-point lap and shoulder belts. Furthermore, automatic belts can be more cumbersome than manual belts. *See id.* at 37.

72. The Act states that "Congress hereby declares that the purpose of this chapter is to reduce traffic accidents and deaths and injuries to persons resulting from traffic accidents." 15 U.S.C. § 1381 (1982). This declaration seems to suggest that *any* regulation that reduces auto deaths or injuries would probably be a justified intervention by the government.

A. Computing the Benefits of Seatbelt Use

Conceptually, the benefits from increased seatbelt use are defined by the expected reduction in total social costs resulting from the wearing of seatbelts. Total social costs are the costs to the car occupant (whether reimbursed by third parties or otherwise) from accidents in which seatbelts are not used. These costs conceptually represent, in the case of death, the loss of human life; and in the case of non-fatal injuries, medical and hospitalization expenses, lost earnings, the costs of processing insurance claims, and pain and suffering. These cost estimates can be derived either from a "willingness to pay" approach developed by Thaler and Rosen[73] or from a direct estimate used by the NHTSA.

The "willingness to pay" approach estimates the benefits of seatbelts as the expected damage reduction resulting from their use. Thus, if every car crash caused exactly $1,000 in damage to an unbelted auto occupant and seatbelts were 30% effective in reducing personal injury, then the benefit of wearing a seatbelt for an occupant who suffered a crash would be 30% of $1,000, or $300. Moreover, if the probability of being in such an accident in a given year were, say, 10%, then the annual expected benefits of seatbelt use would be 10% of $300, or $30. Since crashes of different severities occur, we must compute the damage reduction afforded by seatbelt use and the probability of being in such an accident for six different severity categories using the following formula:

73. To circumvent the difficult problem of quantifying the value of a human life, Thaler and Rosen have presented evidence from the labor market to determine the amount a person would be willing to pay to reduce the probability of his own death by a small amount. Thaler and Rosen used the fact that two otherwise identical jobs will have different rates of pay if one of them carries a slightly higher risk of death. Thus, if the risk of death on job A is 2/10,000 and the risk of death on job B is 1/10,000, workers might demand an additional yearly wage of $100 to work on the more dangerous job A. The valuation of life implicit in this demand is $100 * 10,000 = $1 million. Thaler & Rosen, The Value of Saving a Life: Evidence from the Labor Market, in Household Production and Consumption Studies 265 (N. Terleckyj ed. 1975). They also estimate the life-saving value of seatbelts, inflated to 1988 dollars, to be $50.80, which does not include the value of seatbelts in reducing the severity of nonfatal injuries. Arnould and Grabowski have then applied the Thaler and Rosen findings to the estimated reduction in probability of being killed or injured afforded by seatbelts to measure the benefits of seatbelts in terms of the willingness to pay for such safety improvements. Arnould & Grabowski, *supra* note 16, 30-33.

$$TB = \sum_{1-n} D_n * E_n * P_n,$$

where TB = total benefits of seatbelt use, calculated as the expected reduction in injury costs from all accidents;

D_n = estimated value of human life or injury cost for injury severity category n;

E_n = effectiveness of seatbelts in reducing injuries for injury severity category n;

P_n = probability of being involved in an accident causing damage approximated by injury severity category n.

Table 3.A sets forth the different sets of estimates for the three variables needed to derive the value of benefits from seatbelt use under the "willingness to pay" approach. In the first column, two sets of estimates of the *probability* of incurring an injury of a given severity are presented: one used by Arnould and Grabowski in their 1981 cost/benefit analysis of seatbelts based on NHTSA estimates of 1975 data, and one that I developed using 1986 data.[74] My estimates of the probability of each class of injury are uniformly higher than those presented by Arnould and Grabowski, and thus should yield higher estimated benefits of seatbelts. The second column shows two sets of estimates of the *effectiveness* of seatbelts in preventing or reducing damage: one furnished by the NHTSA, and the other used by Arnould and Grabowski, which is uniformly more optimistic than the more recent NHTSA projections presented. In general, I prefer the NHTSA effectiveness figures because they are both more recent and more conservative than the Arnould and Grabowski estimates. In the third column, Arnould and Grabowski present two sets of estimates of the *cost of each category of injury*, and I also present another set of estimates compiled somewhat differently by NHTSA. The NHTSA estimates do not explicitly include pain

74. I devised the 1986 probabilities of injury in the following manner. First, I computed the number of injuries in each severity class for 1986, which are presented in Table 4 of the Appendix. Second, I estimated the annual number of total auto occupants in the Appendix. *See infra* note 119. Finally, I divided these two numbers to obtain the probability that any auto occupant would experience an injury of a given severity during the course of the year. Ideally, one would like to estimate the probability of injury of an unprotected occupant. Since the number of actual injuries occurring in 1986 is used in deriving this probability, however, the "1986" probability estimates are biased downward because a sizable proportion of auto occupants wore seatbelts in 1986.

TABLE 3

A. ASSUMPTIONS USED IN CALCULATING BENEFITS OF SEATBELTS

Injury Severity	Column 1 Probability of an Injury: AG	Column 1 Probability of an Injury: 1986	Column 2 Effectiveness of Seatbelts: AG	Column 2 Effectiveness of Seatbelts: NHTSA	Column 3 1988 $ Cost of Each Injury: AG-Low	Column 3 1988 $ Cost of Each Injury: AG-High	Column 3 1988 $ Cost of Each Injury: NHTSA
Minor	.01	.0145	.30	.10	651	6513	2144
AIS 2	.0015	.00179	.57	.50	6513	65130	4881
AIS 3	.00025	.00065	.59	.50	32565	162825	12157
AIS 4	.00006	.00009	.60	.50	434200	434200	60456
AIS 5	.00001	.00005	.60	.50	651300	651300	283779
Fatal	.00013	.00017	.60	.45	651300	651300	374965

B. ESTIMATED BENEFITS OF SEATBELTS UNDER VARYING ASSUMPTIONS

Assumptions Concerning: Probability	Effectiveness	Injury Cost	Estimated Benefit From Using Seatbelts	Average
AG	AG	AG Low-High	$83-$170	
AG	NHTSA	AG Low-High	$64-$130	$83-$168
1986	NHTSA	AG Low-High	$103-$206	
1986	NHTSA	NHTSA	$50	
Alternative NHTSA approach	NHTSA	NHTSA	$59	

Note: The estimated benefits in the second to right column of B are obtained using the "willingness to pay" methodology in all but the last row, which uses an alternative NHTSA approach. To obtain the estimated benefits under the former approach is the sum of the product of the *probability* of injury, the *effectiveness* of seatbelts, and the *injury cost* for each of the six injury severity categories. The "1986" estimated probabilities were computed from the projected number of accidents of each severity in 1986. The NHTSA estimates of the effectiveness of seatbelts are more recent than those used by Arnould and Grabowski (AG), and the NHTSA estimates of cost per injury are downward biased since they omit pain and suffering damage.

The Abbreviated Injury Scale (AIS), which grades injuries from least to most serious, is discussed in the Appendix. *See infra* note 114. All monetary figures are expressed in 1988 dollars.

and suffering costs and are therefore substantially lower than the Arnould and Grabowski estimates.

The first three rows of Table 3.B provide estimates of the benefits of seatbelts under different combinations of these assumptions.[75] The first row replicates Arnould and Grabowski's estimates of the yearly benefits from wearing seatbelts, which ranged from $83 to $170, depending upon whether one employs their "high" or "low" set of estimated costs of each injury class. The second row makes one change to the first row estimate by using newer, lower NHTSA

75. While I rely principally on this "willingness to pay" approach in providing estimates of the benefits of seatbelts, I also provide in the fourth row of Table 3.B an estimate using NHTSA's injury cost figures presented in the right-hand side of column 3. In addition, all the Table 3 estimates of the value of seatbelts are biased upwards to the extent there is any validity to the Peltzman critique, although I assume that this effect is quite modest empirically. *See supra* note 32 and accompanying text.

estimates of the effectiveness of seatbelts, thereby reducing the Arnould and Grabowski estimates to a range of $64 to $130. The third row again makes one change from the second row estimates by replacing Arnould and Grabowski's estimates of the probability of different injuries with my estimated probability figures, which are based on 1986 data and are presented in the right-hand side of column 1 of Table 3.A. The result was a range of benefits from $103 to $206. If one averages these two revised sets of estimates in the second and third row (which differ only in terms of the estimated probabilities of injury) one obtains an estimate of the value of seatbelts ranging from $83 to $168, which is remarkably close to the Arnould and Grabowski estimates in the first row.

The wide range between the "low" and "high" estimates is caused by the large differences in the pain and suffering costs associated with Arnould and Grabowski's three least serious injury categories. Column 3 of Table 3.A shows that their "high" estimates of the cost of minor and moderate injuries are 10 times higher than their low estimates. To get a sense of whether the true average benefits of seatbelts are closer to the $83 figure or to the $168 figure, I sought other information about the costs of each type of injury. Recent NHTSA cost estimates were available, although they were not devised for the "willingness to pay" methodology and are therefore not directly comparable, since they do not include any adjustment for pain and suffering and therefore understate the true social costs.[76] When I substituted these NHTSA cost figures for the Arnould and Grabowski range of figures, keeping the other two variables in the third row constant, the resulting lower-bound estimate of the benefits of seatbelt use was $50 per year, which is presented in the fourth row of Table 3.B.

While NHTSA did not develop these cost figures for use in a "willingness to pay" approach to estimating the value of seatbelts, they were designed for use in an alternative NHTSA methodology for estimating the value of seatbelts. This method, which is employed by NHTSA in its own cost-benefit analyses, requires one to estimate the total costs associated with deaths and injuries resulting from motor vehicle accidents for a given year and then to assess how much of the cost would have been avoided if everyone had worn seatbelts.[77] In addition to the difference in methodology from the

76. These figures are presented in the last column under column 3 of Table 3.A *See* text at note 78 for a discussion of the NHTSA cost figures.

77. The alternative NHTSA methodology does not employ the formula used by the "willingness to pay" approach, although its assumptions and result are presented in

"willingness to pay" approach, the NHTSA injury cost figures, unlike the Arnould and Grabowski estimates that specifically include pain and suffering costs, only include readily quantifiable items such as lost earnings, medical expenditures, and the insurance administration cost associated with processing claims.[78] While Thaler and Rosen have argued that this direct estimate of costs does not yield "the conceptually appropriate measure,"[79] it may be useful to present estimates of the value of seatbelts using this alternative method since the validity of the methodology itself is not in question. Since, once again, pain and suffering costs have not been included in the NHTSA injury cost figures, the resulting estimate of $59, which appears in the fifth row of Table 3.B, is similarly a lower-bound estimate.

While the matter is certainly not beyond dispute, the $50 estimate obtained from the "willingness to pay" approach using the NHTSA lower-bound injury cost figures and the $59 estimate obtained from the alternative NHTSA methodology both suggest that the true average benefits of seatbelt use are probably closer to $83 than to $168. Moreover, since an assessment of the benefits of a government program should probably lean toward the conservative side, I will assume for the remainder of this article that the average benefit from wearing seatbelts is roughly $85 per year.

B. Computing the Costs of Seatbelt Use

Given that the yearly benefits from wearing seatbelts seem fairly sizable, it is somewhat puzzling that only 15% of the public chooses to use this safety equipment in the absence of government compulsion. Two possibilities may explain this phenomenon.[80] First, as mentioned before, individuals undervalue the benefits of wearing seatbelts.[81] Second, as the following analysis shows, the costs of wearing seatbelts exceed the benefits for certain individuals.

Table B.3 in similar format. A full discussion of the manner in which this alternative calculation was made is presented in the Appendix.

78. *See* Estimation of Economic Savings, *supra* note 38, at 1. *See also* Accident Facts, *supra* note 3, at 4.

79. Thaler and Rosen state that "the value of a life is the amount members of society are willing to pay to save one." Thaler and Rosen, *supra* note 73, at 265. This figure can be quite different from the present discounted value of the future lost earnings of a deceased individual, as a comparison of the NHTSA and Arnould and Grabowski estimates of the cost of a fatality in Table 3.A reveals.

80. I assume that there is no problem with individuals overestimating the costs of seatbelt use.

81. *See supra* text accompanying notes 6-19.

Conceivably, the decision not to wear seatbelts can be made by rational, utility-maximizing individuals who are well-informed of the consequences of their decision and who fully consider all relevant costs and benefits therefrom. In this case, government action to increase seatbelt use would be welfare-reducing, because the individual decisions to avoid seatbelts in the absence of government intervention would produce socially optimal results.

Is it possible, however, that the costs of wearing seatbelts are greater than $85? There are three types of costs associated with the use of seatbelts: (1) the time it takes to fasten them; (2) the need to *remember* to fasten a seatbelt; and (3) the discomfort associated with wearing the belt. These costs are assessed below.[82]

1. Fastening time. Assume that the total time expended in fastening and unbuckling a seatbelt is 5 seconds. Since the average individual takes 800 car trips per year, the time involved in using a seatbelt over the year is about 4000 seconds, or 1.11 hours.[83] Based on the average hourly earnings of U.S. citizens,[84] the value of this lost time is about $10 per year.[85]

2. Remembering to buckle up. Warning buzzers have been mandated by federal law to reduce the cost of remembering to buckle up.[86] At some point, however, the value of these buzzers is reduced because the sound becomes part of the background noise and fails to impinge on the consciousness of the passengers. Since it appears that most auto passengers are either habitual wearers of seatbelts or habitual nonwearers, this cost is probably best evaluated as the cost of forming the habit of wearing belts. If one assumed that two

82. Note that this analysis focuses on the choice of the auto occupant to wear seatbelts given the fact that all cars are equipped with belts by federal regulation. Therefore, this cost/benefit analysis does not need to consider the one-time cost of installing the seatbelts. From a social perspective, however, a complete cost/benefit analysis would consider these costs in order to evaluate whether the decision to install seatbelts is cost effective.

83. The figure of 800 trips per year is from a U.S. Department of Transportation study, cited in Arnould & Grabowski, *supra* note 16, at 35 n.11.

84. The average hourly wage of private non-agricultural workers in December 1987 was $9.10. Economic Report of the President 298 (Table B-44) (1988).

85. This is probably an upper bound estimate of the time cost of using seatbelts for passengers (as opposed to drivers), since the 5 seconds required to fasten a belt will probably not be productively spent if the passenger does not bother to fasten his or her belt and merely waits for the driver to buckle up. In other words, the opportunity cost of a passenger in an automobile is probably less than the person's hourly wage.

86. The cost of remembering to use a precaution is something that is often overlooked, particularly in negligence law. *See* Grady, Why Are People Negligent? Technology, Nondurable Precautions and the Medical Malpractice Explosion, 82 Nw. U. L. Rev. 293, 295 (1988).

hours of concentration would be needed to form the habit, then the cost would be about twice the cost of fastening and unbuckling estimated above, or a one-time expense of $20.[87] Since this cost would be amortized over an entire driving career of perhaps 50 years, the annual expense might be estimated to be $.80 in the first year.[88]

3. The discomfort from wearing belts. The evidence that best approximates the cost of discomfort is from a study of the use of active and passive belts in Volkswagen Rabbits. The compliance rate of drivers in VW Rabbits equipped with passive belts was found to be about 78%, while a similar group of drivers of VW Rabbits equipped with active belts had a compliance rate of only 33%.[89] In other words, when the cost of remembering to fasten a seatbelt and taking the time to do so were reduced to zero, seatbelt usage increased dramatically. Almost half (45%) of the Rabbit drivers were not willing to wear belts if they had to pay these two costs, but were willing to wear seatbelts when they were eliminated.

From this evidence, Arnould and Grabowski concluded that "[t]he striking difference in usage . . . rates between VW manual and automatic belt systems suggests that discomfort costs are not the key reasons for the observed nonutilization of manual belt systems."[90] While this statement seems correct at first glance, it will not withstand closer scrutiny as soon as the dollar value of discomfort costs is derived below. For the 45% of the drivers who would not wear manual belts but who did wear automatic belts, the following two conditions hold:

(1) $f + r + d > b$ [Don't wear manual belts], and
(2) $d < b + f$ [Wear automatic belts],

where f = cost of buckling and unbuckling;
r = the cost of remembering to use seatbelts;
d = discomfort cost; and
b = the benefits from using seatbelts.

The first condition simply notes that the individuals found the costs of using the manual belts to be greater than the benefits. The second condition notes that the decision to wear the automatic belt

87. I readily concede the arbitrary nature of this assumption and invite readers to substitute other plausible values.

88. If driving careers are 50 years, then the expected duration for a person chosen at random might be 25 years. The first-year expense using straight-line depreciation would then be 20/25 = $.80.

89. Arnould & Grabowski, *supra* note 16, at 35.

90. *Id.* at 36.

imposes discomfort cost *d*, while a contrary decision requires one to incur the unfastening costs *f*,[91] and to forego the benefits *b*. Since these individuals have opted to wear the belt, it must be true that the discomfort costs are not as great as the sum of the costs of forgone benefits and disengaging the automatic belt system; hence $d < b + f$.

If we assume that the drivers were aware of the values of *f*, *r*, and *b* that were estimated above, then expressions (1) and (2) imply that:

(3) $\$95 > d > \$74.20$.

In other words, for this group, and presumably for the remaining 22% who chose not to use either the manual or the automatic belts, the discomfort costs are the most significant of the costs associated with wearing seatbelts.[92] This evidence may provide tentative support for the view that a significant number of individuals will actually find the total costs of using seatbelts greater than the estimated average benefit of $85 per year as the opportunity costs of fastening and remembering begin to increase with their increase in income.

IV. A New Regulatory Scheme

Although mandatory seatbelt laws and passive restraint standards are inefficient, there may still be an important role for the government to play in harnessing the market to promote optimal automotive safety.

A. The Proposal

The proposed alternative mode of regulation seeks to align the social and private benefits from wearing seatbelts and ensures that individual consumer choices are socially optimal. The government can achieve this goal by determining the "price" of not wearing a seatbelt, which is the expected annual accident loss reduction that seatbelts provide. Consumers are then free to purchase the right not to wear seatbelts if they are willing to pay this price (P). Those consumers who find that wearing seatbelts is more onerous than paying the government-determined price will pay P and thereby be relieved of the duty to wear a belt. Those who find that the cost of

91. Unfastening a VW automatic belt is almost the identical operation in reverse as fastening a manual seatbelt. Therefore, I estimate these operating costs to be the same (as represented by the variable *f*) in both cases.

92. It must be stressed that the conclusion that the discomfort costs are from $74.20 to $95 per year depends critically on the assumption that the *perceived* benefits of wearing seatbelts are $85, and that the estimates of costs *f* and *r* are accurate. For example, if the perceived benefits of wearing seatbelts were only $30, *ceteris paribus*, then the imputed discomfort costs would be less than $40 per year for the 45% swing group.

wearing a belt is less than P will prefer to wear the belt, thereby providing social benefits of reduced accident costs that have an expected value of P.

The precise value of P will depend not only on the expected annual benefit of seatbelt use, which is taken to be $85, but also will depend on the reason for the consumers' inaccurate assessment of these benefits. If consumers are simply disregarding the benefits from wearing seatbelts—because of cognitive dissonance or the mistaken equation of small risks with no risk—then P should be set equal to $85 to ensure that individuals will not shun seatbelts unless the benefits from so doing exceed $85. If, on the other hand, the reason for the inefficient underuse of seatbelts is that the government reimburses victims for, say, 60% of their losses, then the price could be set at 60% of $85 = $51, which would ensure that the full benefits—i.e., including the reduction of external costs ignored by the individual consumer—of seatbelt usage would be evaluated when consumers decided whether or not to wear belts.

In essence, this scheme would make the decision not to wear seatbelts the equivalent of the decision to purchase any other market good. If consumers wish to purchase a commodity, they are free to do so as long as they are willing or able to pay the listed price. When the price of the good reflects the social cost of its production, then the consumer's willingness to pay this price implies that he or she values the good by an amount greater than its social cost. In other words, by forcing consumers to express their preferences in the market, we ensure that the benefits from consumption of a good are greater than the cost of production.

The same analysis applies with the "good" of not wearing seatbelts. One can think of the social costs incurred from not wearing seatbelts as the cost of production of this good. Therefore, society will benefit only if those who purchase this good receive greater benefits from its consumption than it imposes. A market-based scheme that requires a consumer to purchase this "good" for the full cost of its production ensures that only welfare-enhancing purchases take place.

B. Advantages of the Scheme

The advantages of this approach are that it both eliminates coercion and inefficiency inherent in a mandatory seatbelt law and avoids the problems of divergence between private and social benefits that are associated with the laissez faire approach. Under the

proposed scheme, consumers will be less likely to undervalue the benefits of seatbelt use for the following reasons. First, the price feature of the market-based scheme will alleviate the problem of inadequate information by providing a summary estimate of the benefits, packaged in an easily understandable concept of market price.[93] Second, since accident probabilities will have already been incorporated in arriving at the socially optimal price, the scheme will aid consumers in making informed risk estimates that fully reflect the benefits of seatbelt use.[94] Third, the scheme will overcome the moral hazard problem resulting from private and social insurance schemes by requiring people to compensate society for the external costs they impose on others by not wearing seatbelts.[95] Finally, it might also reduce the costs of cognitive dissonance vis-a-vis a mandatory seatbelt law, since those who would suffer these costs could pay the price P and never have to think about wearing a seatbelt for the remainder of the year, or they might avoid the costs by thinking of wearing the belts as a way to save money rather than as a safety measure.[96] At the same time, the market-based scheme would presumably impose less of the psychological costs that a coercive mandatory scheme would generate among those who oppose seatbelt use: the extent of the cost would presumably be limited to the price P, because any individual who resented the coercion by an amount more than P would simply pay that amount and then avoid the requirement of wearing seatbelts.

C. *Certain Imperfections of the Scheme*

Of course, the scheme cannot theoretically achieve the perfectly efficient outcome. The price P is computed based on the average individual. For those who have rock hard skulls or who drive far less than average, P will doubtless overstate the expected annual accident losses that they will incur if they don't buckle up. Conversely,

93. *See supra* text accompanying notes 7-9. Consumers are relatively skilled at determining whether it is worth paying a certain price to receive a certain benefit, for indeed this is precisely the judgment they make every day in determining whether to buy a new pair of shoes or an air conditioner or any of thousands of other commodities. The fact that they have to put down hard cash before they can walk off with any of these goods assures that they will focus on the cost-benefit analysis very directly, and that the cost component will be exactly specified and known to the consumer at the time of purchase.

94. *See supra* text accompanying notes 15-17.

95. *See supra* text accompanying notes 10-14.

96. *See supra* text accompanying notes 18-19. The level of cognitive dissonance, however, would still be greater than under a laissez faire situation, since everyone would presumably have to consider the costs of not wearing seatbelts when initially electing whether to pay the seatbelt price P.

the more fragile among us, cab drivers, and young men will find that P understates the benefit in terms of reduced annual accident expense if they were to always wear their belts. To sum up: the unregulated market is inefficient since consumers are unable to assess accurately the private benefits of seatbelt use and they have no incentive to evaluate any external benefits; mandatory seatbelt laws and passive restraint standards are inefficient in that they deprive consumers of the ability to buy the right not to wear a belt by paying the appropriate price; and the proposed price-based scheme of regulation may cause inefficiency to the extent that the price is inaccurately set.[97]

D. Administering the Market-Based Regulatory Scheme

If the market-based scheme is to be welfare-enhancing, its administrative costs must not be large relative to the net benefits it creates from aligning the social and private cost/benefit calculations. While an ideal market-based scheme would confront every person with an individual choice of buckling up or paying the actual social cost of failing to do so, this is not administratively feasible. Two possible approaches exist. First, the system could operate by levying potential charges on each vehicle registration. If the registrant agrees always to wear a seatbelt when driving in the car, then he or she can avoid the charge. If the registrant wishes to avoid wearing seatbelts, he or she must pay the fee.[98] The state could then issue different colored license plates to the two groups of car owners, or use some

97. Note that, even if the government sets the correct price P on average, the degree of inefficiency will then depend upon the variance within the population of consumers. Thus, if A drives a great deal and B drives very little, A may be willing to pay $200 to avoid the burden of wearing a belt, but B may not be willing to make this payment. The result would be that the frequent driver does not wear a belt, while the infrequent driver does. If expected accident losses vary directly with mileage, then this result is inefficient. While the government would ideally like to set the price of not wearing a seatbelt on a per mile basis, this is not a realistic option in practice owing to the difficulty of monitoring miles driven.

98. Presumably, all occupants of a car that has been registered so as to be exempt from the seatbelt requirement would be free to shun seatbelts, and those in non-exempt cars would be required to wear belts. This means that, in setting the price P, the state should consider the expected benefits that seatbelt use would provide to all the occupants of the car, not just the driver. Moreover, if some cars are demonstrably safer than average, the state could provide lower values of P to owners of such cars.

An example that is reflective of the problems that exist when the election to be subject to the seatbelt requirement is made on a per vehicle rather than on an individual basis will be helpful. If the state determines that on average there are two occupants in each car, then it will set the price at 2 * $85 = $170. Consider the case in which the driver would suffer costs of $100 by wearing seatbelts, but the passenger would only suffer costs of $50. The efficient solution would clearly be to have the passenger buckle up and to allow the driver to shun seatbelts. The likely result, however, is that they will

other mechanism to readily identify which vehicles were subject to the seatbelt requirement.[99]

The enforcement problems of this market-based scheme would be roughly equivalent to those found under "primary enforcement" of the mandatory seatbelt usage law.[100] In one respect, enforcement of the market scheme is more difficult in that the police would have to observe the license plate of a car before they would know whether its occupants were required to wear belts. On the other hand, enforcement would be made easier since the police would only have to monitor those automobiles registered to individuals who did not pay the added fee.[101] Both of these factors are probably small in magnitude and largely offsetting; therefore, the primary enforcement costs of the regulatory scheme would probably be indistinguishable from the primary enforcement costs of a mandatory seatbelt usage law.

A second approach would be to issue passes to individuals that would indicate whether they were subject to the mandatory seatbelt requirement or had paid the seatbelt fee and therefore were free not to wear their belts. By tailoring the regulatory scheme to individuals rather than to motor vehicle registrations, this second option could address the fact that the benefits of seatbelt use vary considerably depending on the readily observable factors of age and sex. For example, since young males are in a disproportionately large

both wear seatbelts, because collectively it is only worth $150 to escape the seatbelt requirement and they would have to pay $170 to do so.

99. In a program to stop car thefts in New York, owners who register their cars with the police have bright yellow decals placed in their back windows that authorize the police to stop the car if it is being driven between the hours of 1:00 and 5:00 in the morning. Apparently, the program has drastically reduced thefts of cars registered in the program (although whether it merely increases the theft rate of uncovered cars is not clear). N.Y. Times, September 18, 1988, at 42. Another possibility might be to have the license plate begin with a certain number if the registrant had paid the fee to avoid the seatbelt requirement.

100. Primary enforcement occurs when police officers are encouraged to stop drivers for violations of the state seatbelt laws, even if they are otherwise driving in an acceptable fashion.

101. Any such scheme will inevitably generate some difficulties. Consider the case of two neighbors: individual A who pays the fee and therefore is free to not use his seatbelt, and individual B who does not pay, and is therefore subject to a mandatory seatbelt usage requirement. If A takes a ride in B's car, A might feel that he should not have to wear a seatbelt. Enforcement considerations, however, would probably require that anyone driving in a car that has not been registered to avoid the seatbelt requirement must wear seatbelts. While the proposed market-based scheme does not eliminate all of the inefficient coercion inherent in the mandatory laws, it does reduce this coercion: unlike the situation under a mandatory seatbelt law, A will still be free to avoid wearing his seatbelt in his own car and in any other car whose owner has paid the requisite fee. This particular problem is eliminated by having an individual-based regulatory scheme, such as that discussed next.

number of accidents, the state could decide that they should face a higher price for the right not to wear belts. These individual discriminations would probably not be feasible if the scheme were based on registration, however, since young males could have their cars registered in another's name if they wished to lessen their seatbelt fee.

While the individualized scheme would yield more precise pricing of the right not to wear seatbelts, it would pose greater enforcement problems than the scheme based on registration since a police officer would not know whether an individual who was not wearing a seatbelt was under a legal duty to do so until he or she inspected the individual's license or authorization card. Still, many states choose to enforce their mandatory seatbelt laws only if they stop a car on some independent ground.[102] For states using such "secondary enforcement," the individualized market-based scheme would seem to generate no additional costs.

Note that an alternative method of achieving the same goal of encouraging the optimal rate of seatbelt usage would be to pay auto occupants to wear their belts. Because of the Coasean nature of the problem (assuming transaction costs are low), society can reach the efficient level of seatbelt usage regardless of whether the government or the public possesses the "right" not to wear seatbelts.[103] It is sensible, though, to grant the entitlement to the government as this regulatory scheme envisions, since the opportunities for abuse

102. The District of Columbia and the following states rely purely on secondary enforcement of their mandatory seatbelt usage laws: California, Idaho, Illinois, Indiana, Kansas, Louisiana, Maryland, Michigan, Missouri, New Jersey, Ohio, Oklahoma, Tennessee, Utah, Virginia, and Washington. National Safety Council, Mandatory Seatbelt Use Laws by State in the U.S. 1-4 (1987).

103. Coase, The Problem of Social Cost, 3 J. L. & Econ. 1 (1960). Under the proposed market-based scheme in which the state owns the entitlement, individuals can purchase the right not to wear seatbelts as long as they pay a pre-determined price. In other words, the proposed scheme protects the government's entitlement with a liability rule. The advantage of a liability rule is that generally the transaction costs are lower than with property rules; the disadvantage is that, since the price is determined with respect to the average individual, it will not reflect idiosyncratic traits that determine the expected costs and benefits of seatbelt use. If auto occupants possessed the entitlement not to wear seatbelts, however, and could be deprived of this right only with their agreement at an agreed-upon price—i.e., if their entitlement was protected by a property right—the problem of the inaccurately set price disappears but the transaction costs would be prohibitively high. *See* Calabresi & Melamed, Property Rules, Liability Rules and Inalienability: One View of the Cathedral, 85 Harv. L. Rev. 1089 (1972). Note that, while both a mandatory seatbelt law and the proposed regulatory scheme would confront individuals with a requirement to wear seatbelts, the proposed regime enables individuals to purchase the entitlement not to wear seatbelts *ex ante*. To the extent that the mandatory law is enforced by fines, the government's entitlement appears to be protected by a liability rule; if the mandatory law is enforced by license revocation, it is a rule of inalienability.

appear to be greater if the government is providing cash payments to individuals to encourage them not to drive without wearing their seatbelts.[104]

E. Possible Responses to the Market-Based Scheme

It is important to consider how consumers would likely respond to this regulatory scheme. In general, one might expect that consumers would prefer it to a mandatory seatbelt law, because it, in effect, gives every consumer the choice of whether he or she wants to be subject to a mandatory seatbelt law. Those who do not want to pay to avoid this burden are in the same position as they would be with the current mandatory laws. Moreover, those who do wish to pay to avoid having to fasten their belts would thus escape an onerous burden while voluntarily paying the costs that their behavior imposes on society. Since the first group is no worse off, and the second group is better off, the substitution of a market scheme for a mandatory usage law would constitute a Pareto improvement.

What would happen to usage rates under a market scheme? Some of the states that have shunned the mandatory laws as undue abridgments of freedom might be willing to adopt the market-based regulatory scheme. If so, their seatbelt usage rates would undoubtedly rise. Would usage rates fall if a state with a mandatory law shifted to the price-based scheme? My estimate is that no more than 10-15% of the registrants under this regulation would choose to pay the price and thus be able to avoid the seatbelt requirement.[105] This would leave the remaining 85-90% subject to a mandatory seatbelt

104. First, if government owns the entitlement, those who don't use seatbelts will have to show that they paid the seatbelt fee; if individuals own the entitlement, non-users will have to show that they never received a government check. It would seem that the former can be more readily established than the latter. Second, the opportunity to receive cash payments from the government will invite some abuse. Some individuals will apply under multiple names to secure multiple payments intended to persuade them to use seatbelts. In addition, some individuals who never plan to be auto passengers will request payment from the government to encourage their use of seatbelts. No social purpose is achieved by such wealth transfers. In general, I suspect the amount of money that would change hands would be lower, which is more desirable, under a scheme in which non-users had to pay a fee to the government to avoid the seatbelt requirement, than under one in which seatbelt users received payments from the government.

105. This number might be higher if (1) the number of airbags installed in cars were to increase in the years ahead, which seems likely; and (2) the regulators granted cars with airbags an exemption from the seatbelt requirement. Such an exemption could be readily achieved under the market-based scheme by simply treating owners of cars equipped with airbags as having paid the price established by the state. However, regulators may not wish to grant such an exemption if airbags are not a good substitute for seatbelts. In fact, airbags only work in frontal crashes, and their advocates always stress that they should be used in conjunction with seatbelts.

requirement. It is conceivable that usage rates among this group would even rise above the levels seen in states with mandatory seatbelt laws because (1) the states would have a greater monetary incentive to enforce the law to collect the fees from those who promised to wear their belts but then reneged;[106] (2) the additional information on the benefits of seatbelt usage might encourage some additional voluntary compliance; and (3) some members of the public might feel a sense of obligation to uphold their promise to wear belts.[107]

If the numbers of registrants who find wearing belts to be burdensome, and who therefore decide to pay the fee, is substantially higher than I have speculated, however, seatbelt use could decline. While I think this result is unlikely, it is acceptable since those who pay the fee have already compensated society for the expected accident costs that they will impose, and their choice demonstrates that the private burden of wearing seatbelts is greater than the expected social benefits.

V. Conclusion

Owing to a variety of factors, for the last twenty years there have been considerable improvements in highway safety.[108] The death rate per 100 million motor vehicle miles has steadily declined from over 5 in 1966 to the current level of 2.57 in both 1985 and 1986.[109] Moreover, while the other major industrial nations have similarly experienced declines in their traffic fatality rate, the 2.57 U.S. rate compares favorably with the 1984 death rates in France (6.4), Italy

106. If 12.5% of the 158.6 million licensed drivers were to pay a fee of $85 to avoid the seatbelt requirement, the revenues generated would be $1.69 billion. Many state governments would be quite enthusiastic about tapping their share of this revenue. The anticipated greater enforcement efforts under the market-based scheme would generate additional costs for the state, however, and would breed some resentment from the public.

Note that those who failed to pay the fee and refuse to wear seatbelts would have to be sanctioned by prohibitive measures such as an exorbitant fine or license revocation; otherwise, they would have no incentive to comply until they were apprehended.

107. These effects might spur greater consumer interest in choosing passive belt systems to take advantage of the reduced cost of belt usage discussed above.

108. In addition to the effects of automobile safety equipment, death rates per vehicle mile driven will be influenced by the age composition of the driving public, improvements in automobiles and highways, the size of automobiles, consumption of alcohol and drugs, etc.

109. Accident Facts, *supra* note 3, at 45.

(5.0), Germany (4.9), Japan (4.7), and England (3.4).[110] Further improvements in this safety record can be obtained most efficiently if governments can harness market incentives to encourage seatbelt use by those for whom the expected benefits exceed the expected costs. The proposed market-based regulatory scheme informs consumers of the expected benefits of wearing seatbelts as reflected in the pricing and enables consumers more easily to assess whether the costs of wearing belts exceed these benefits. A mandatory rule prevents individuals from weighing the costs and benefits of their actions, while under laissez faire there is a substantial likelihood that individuals will underassess the benefits from seatbelt use. The market-based scheme fixes the benefit level to make the cost-benefit comparison easier and more rational.[111] As a result, more rational, informed, and socially optimal judgments on seatbelt use will be made, and states will generate significant revenues.

Another advantage of the market-based scheme is that it might well serve an important didactic function. At present, most individuals think in terms of dichotomous choices about various forms of risky behavior: either the conduct should be prohibited because it is "bad" or permitted because citizens should be "free" to do what they want. The tremendous publicity that the law would generate, and the price that consumers are forced to focus on, would inform the public that risky behavior imposes costs not only on the individuals who engage in it, but on society as well. It would be a valuable lesson if individuals realized that they should be required to pay for the harm they inflict on the public, as the price of being allowed to engage in certain dangerous activities. However, the use of this regulatory scheme cannot easily be extended to all risky activities, nor should it. The considerations that favor regulation are (1) the private behavior imposes large external costs on society; (2) the variation in the social cost among different consumers is not excessively

110. *Id.* at 55. The large number of miles travelled on the limited access interstate highway system in the United States undoubtedly contributes to the lower highway fatality rates based on vehicle miles in this country. In 1986, the fatality rate per 100 million vehicles miles travelled on interstate highways was 1.1. Fatal Accident Reporting System, *supra* note 3, at viii.

111. As a result, consumers have complete flexibility in evaluating the costs of seatbelt use, but not in evaluating its benefits. Nonetheless, the market-based scheme should not undermine the incentives that individuals currently have to fasten their seatbelts when accident risks are increased as a result of external factors such as inclement weather and poor road conditions. McCarthy, Seat Belt Usage Rates: A Test of Peltzman's Hypothesis, 18 Accident Analysis & Prevention, 425, 433 (1986).

large; and (3) there are simple means of enforcement of the tax.[112] A relatively small number of activities will generate social costs on the order of $9 billion, which is the rough calculation of the social loss resulting from the refusal to wear seatbelts (see Table 4 of the Appendix). Less damaging activities would attract less regulatory attention. Those who are willing to pay the full social costs imposed by their behavior should be allowed to engage in risky behavior.[113] This is an important lesson for rational governmental regulation and for a responsible citizenry.

112. This lesson has many different applications for regulation. For example, the estimated $22 billion health care cost of cigarette smoking, combined with the $43 billion cost of reductions in the labor force due to smoker's fatal illnesses, would justify a per pack tax of $2.24 according to a 1985 study of the Congressional Office of Technology Assessment. Passell, Who Should Pay the Cost of Smoking, N.Y. Times, June 22, 1988, at D2.

113. For those activities that are quite socially harmful, the tax scheme will not always be feasible. Thus, the regulatory plan might work for seatbelts and cigarettes, but not for overeating. Alcohol consumption would be an intermediate case, since the attendant social costs are high, but perhaps only for those who use alcohol to excess. Tailoring a tax on excess consumption is far more difficult than simply levying a uniform tax. *See* Pogue & Sgontz, Taxing to Control Social Costs: The Case of Alcohol, 79 Am. Econ. Rev. 235 (1989). Finally, while the external costs of gun ownership are probably quite high, and the administrative burden of a tax on guns are reasonably low, this regulatory plan might not be well designed for guns because of the large variance among consumers in the degree of external damage they impose.

Appendix
NHTSA's Alternative Methodology For Estimating the Benefits of Seatbelts

NHTSA cost-benefit analyses are not based on the "willingness to pay" approach, but rather upon an alternative methodology that tries to estimate the total costs associated with deaths and injuries from car accidents for a given year and then to determine how much of these costs could be avoided by seatbelt use. The NHTSA figures do not include estimates for pain and suffering costs, but include only readily quantifiable figures, such as lost earnings, medical expenditures, and the cost of processing insurance claims.

Table 4 provides estimates for the sum of such costs in 1986 (expressed in 1988 dollars). Dollar costs are assigned to each type of injury, from least serious to fatal, and these costs are then multiplied by the number of injuries in each category.[114] For example, the average social cost of each of the 39,600 occupant fatalities was estimated to be $374,965, or a total of $14.9 billion. Proceeding similarly for the remaining categories of accidents generates the total cost of $30.3 billion in injuries resulting from motor vehicle accidents.[115]

The estimated $30.3 billion cost of accidents occurred during a period in which seatbelt usage across the nation was roughly 34%.[116] The last column of Table 4 presents rough projections of the total cost of injuries on the assumption that usage rates were to rise to 100%. While the average amount of damage in each category of accident severity would fall if everyone wore seatbelts, the

114. This analysis employs the Abbreviated Injury Scale (AIS), which was created by the American Association for Automotive Medicine in 1971 to measure the degree of injury severity. The six AIS categories are: AIS 1—minor injury, AIS 2—moderate injury, AIS 3—severe injury, but not generally life-threatening, AIS 4—serious, life threatening injury, AIS 5—critical injury, with likely permanent disability, and AIS 6—fatal injury.

115. In developing the estimates in Table 4, I rely upon the following information from the U.S. Department of Transportation. The total number of nonfatal injuries was derived by multiplying the number of fatalities by 99. This ratio was developed from the Department of Transportation's National Accident Sampling System, which indicated that for the years 1982 and 1983 for the nation as a whole there were 99 police-reported occupant injuries for every fatality. Estimation of Economic Savings, *supra* note 38, at 5. The proportion of nonfatal accidents falling into each of the severity categories was then multiplied by the total number of nonfatal injuries. The total number of accidents—fatal plus nonfatal—was then multiplied by the average cost of such injuries for 1984, expressed in 1988 dollars.

116. The 34% figure is for June 1986. Accident Facts, *supra* note 3, at 53.

TABLE 4
Costs of Automobile Accident Injuries and Deaths 1986

Injury Level	Number (1000s)	—At 34% Seatbelt Usage Rate— $ Cost Per Injury	Total Cost ($billions)	—At 100% Usage Rate— Projected Cost ($billions)
AIS 1	3324.5	2,144	7.13	6.64
AIS 2	411.6	4,881	2.01	1.21
AIS 3	149.0	12,157	1.81	1.09
AIS 4	19.6	60,455	1.19	.71
AIS 5	11.8	283,779	3.34	2.01
AIS 6	39.6	374,965	14.85	9.64
Total	3960.0		30.32	21.31

Cost Reduction From Increasing Seatbelt Use to 100%: $9.01 billion Annual Savings Per Additional Seatbelt User: $59.39
Note: All monetary figures are expressed in 1988 dollars.

damage reduction would not be uniform. Specifically, the Department of Transportation estimates that wearing seatbelts would prevent 45% of the costs in the most severe category (fatalities), 10% of the costs in the least severe category, and 50% of all other costs.[117] Using this information, I project the total injury losses that would occur if everyone always wore seatbelts to be roughly $21.3 billion.[118] Therefore, increasing seatbelt use from the 34% level of 1986 to 100% would have saved $9 billion. Put differently, a very

117. Estimation of Economic Savings, *supra* note 38, at 7. The figures supplied in the text are the latest and the most conservative that I have found. Three other studies have generated somewhat more optimistic assessments about the effectiveness of seatbelts. The National Accident Sampling System surveyed approximately 3,000 accidents for the years 1979 and 1980, and found that seatbelts were 64% effective in reducing injuries and 60% effective in preventing fatalities. The National Crash Severity Study, based upon the results of 25,000 automobile accidents involved in tow-away accidents, concluded that seatbelts were 50% effective in reducing injuries and 49% effective in preventing fatalities. Arnould and Grabowski used earlier NHTSA estimates, reproduced in Table 3.A, which indicate that seatbelts reduce minor injuries by 30% and other injuries and fatalities by 57-60%. Arnould & Grabowski, *supra* note 16, at 32.

118. For example, for the least serious injuries, the total costs were $7.13 billion with a 34% seatbelt usage rate. Since belts are 10% effective in reducing accident costs in this category, we can solve for the per accident cost x if no one were wearing seatbelts by setting up the following algebraic equation: $(.34)*(.9x) + (.66)*(x) = 2144$. Once we have the value of x, then .9x equals the cost per accident with 100% seatbelt use. Multiplying this figure by the total number of accidents (the second column of Table 4) yields the projected cost of $6.64 billion for the least serious injuries when everyone wears seatbelts.

rough estimate of the average expected annual saving in social costs from wearing seatbelts would be around $60 per occupant.[119]

119. If seatbelt use rose from 34% to 100%, then the total increase in licensed drivers wearing seatbelts would be 66% of the 158.6 million drivers in 1988, or 104.7 million. To obtain an estimate of the total number of occupants (= drivers + passengers), I note that 69% of the fatalities in 1986 were drivers. Fatal Accident Reporting System, *supra* note 3, at Table 1. Therefore, the estimated number of auto occupants is given by 158.6/.69 = 229.9, and the total increase in the number of auto occupants wearing seatbelts (assuming the same seatbelt usage rate for both drivers and passengers) will be 66% of 229.9 million, or 151.7 million. If the total increase in auto occupants wearing seatbelts is 151.7 million, then the savings per additional belted occupant is $9.01 billion/151.7 million = $59.39.