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## The Economics of Auto Safety

There is great concern in this country over the high cost of auto insurance. The present "fault" concept with its inequity and inefficiency is pricing itself out of business. Proposals for reform are split between overhauling the "fault" principle and casting fault aside to allow recovery for involvement in an auto accident.

Since it is the high cost, and not the legal concepts, which troubles consumers, proponents on both sides have spent much time and money costing various plans and hybrids. No-fault seems to have the edge in the cost war. The recently published, massive Department of Transportation (DOT) study of auto insurance has recommended a no-fault system.<sup>1</sup> Critics of no-fault are quick to warn that many unaccounted-for contingencies may spoil the DOT cost figures. The chief uncertainty is the lack of knowledge regarding increases in both frequency and amount of claims.

Empirical data from Puerto Rico and Massachusetts, two early no-fault jurisdictions, show encouraging results. Many other states are adopting, or at least considering, modified no-fault plans. It would appear that eventually all states will have some form of no-fault.

While this is considered to be a victory for the consumer, it may be a Pyrrhic one. The tremendous influence of anti-no-fault pressure groups on state legislatures and the sheer complexity of no-fault plans may cause so-called new plans to retain many elements of the present fault system. This fact plus the dubious cost savings leaves the consumer little removed from his present plight.

Since cost saving is what the consumer really wants, the attack against the accident compensation problem should be focused on the causes of loss rather than on the compensation system. It is only by attacking the causes that any major savings can be realized. This paper will discuss how insurance premiums can be reduced by attacking some of the major causes of loss.

### *The High Price of Auto Accidents*

The American motorist spends 12 billion dollars annually on auto insurance premiums.<sup>2</sup> Slightly less than half of this is returned in the form of benefits to

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1. U.S. DEP'T OF TRANSPORTATION, *MOTOR VEHICLE CRASH LOSSES AND THEIR COMPENSATION IN THE UNITED STATES* 133 (1971) (Prepared by J. Volpe) [hereinafter cited as *CRASH LOSSES*].

2. *INSURANCE INFORMATION INSTITUTE, INSURANCE FACTS* 9 (1970).

3. *CRASH LOSSES* 51. Table 22 states that the ratio of total system expenses to total system benefits is 1.07.

accident victims.<sup>3</sup> Approximately 60 thousand people are killed,<sup>4</sup> four million injured<sup>5</sup> and 24 million cars damaged<sup>6</sup> on our nation's highways each year.

Compensable loss suffered by victims of auto mishaps are categorized as follows:<sup>7</sup>

	Millions of Dollars	Percent
Medical Payments	2,143	12
Lost Income	(4,239)	40
(if fatality)	1,227	
(if non-fatality)	3,012	
Other Loss	207	2
Property Damage	4,860	46
TOTAL	10,549	100

With these statistics in mind, consider the following facts.

First, the National Highway Traffic Safety Administration (NHTSA) states that if all cars today have air cushions (a type of passive restraint system) 24 thousand lives would be saved and 1.9 million injuries averted.<sup>8</sup> This represents a reduction in excess of 40 percent of present medical payments and lost income.

Second, if all drunk or drugged drivers were eliminated from the road, one-half of all fatalities and about one million injuries could be avoided.<sup>9</sup> If the effect of the air cushion is considered (by reducing these figures by one-half), getting rid of the drunk represents an additional 15 percent reduction in cost for medical payments and lost income.

Third, there are 24 million cars involved in accidents and 4.8 billion dollars are paid to repair them. This means an average of 200 dollars per car. A glance

4. While 56 thousand is the most commonly quoted figure, the figure of 60 thousand takes into account some of the people who die in the year following the accident who are not picked up on the next year's statistics. INSURANCE INFORMATION INSTITUTE, INSURANCE FACTS 49 (1970).

5. CRASH LOSSES 2. Injury figures vary from source to source because of the lack of definition of an "injured person."

6. *Id.* at 3.

7. *Id.* at 6. Compensable loss is not a measure of what auto insurance companies pay in benefits to victims. It is indicative of loss for which victims seek compensation. It includes loss for which victims are compensated by sources other than auto insurance. It is a figure which many new plans, including the DOT recommended plan, will be aiming to compensate.

8. U.S. DEP'T OF TRANSPORTATION, PROCEEDINGS OF NATIONAL HIGHWAY SAFETY BUREAU PRIORITIES SEMINAR Vol. IV at 37 (1969). The National Highway Safety Bureau is now included in the National Highway Traffic Safety Administration (NHTSA). The injury figure is an estimate based on NHTSA's projection of lives saved (24 thousand) and the present ratio of those killed to those injured in auto accidents.

9. Allstate Insurance Company, *The Drunk Driver May Kill You*, at 2 (pamphlet distributed by Allstate Insurance Companies, Northbrook, Ill.).

at the repair costs of late model cars after impact at speeds of five m.p.h.<sup>10</sup> easily shows the high percentage of cars damaged in low speed collisions. NHTSA estimates that three-fourths of all claims for property damage are below the 200 dollar figure.<sup>11</sup> On the other hand, Allstate Insurance Company and Senator Phillip Hart credit five m.p.h. collisions with only 20 percent of the property damage bill.<sup>12</sup> In either case, automobiles with built-in body protection devices which enable them to withstand low speed collisions without damage can significantly reduce property damage claims and costs.

These three areas could mean a savings to the consumer of one-half of his auto insurance premium.<sup>13</sup> Extended research in these areas coupled with empirical data gained as a result of experience could yield even higher savings in future years.

Why have these three areas been selected from among all the factors which influence auto accidents?

First, they are "high pay-off" areas in terms of saving insurance dollars. This means simply that they have a low ratio of cost of deployment to money saved. An example of a "low pay-off" area would be the safety redesign of every road in the country. This would lessen the number of accidents and accompanying financial loss but the cost of redesign and reconstruction would be prohibitive.

Second, insurance business interests may become concerned here, at least with the auto body protection devices and the anti-alcohol measures.<sup>14</sup> Additionally, if no-fault, in a relatively pure sense,<sup>15</sup> is adopted, insurance companies

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10. C. WIXOM, PROCEEDINGS OF THE INSURANCE INSTITUTE FOR HIGHWAY SAFETY 1970 SYMPOSIUM 263 (1970) [hereinafter cited as 1970 SYMPOSIUM].

11. DEP'T OF TRANSPORTATION, THIRD ANNUAL REPORT OF THE DEPARTMENT OF TRANSPORTATION ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT, H.R. Doc. No. 398, 91st Cong., 2d Sess. 16 (1970) [hereinafter cited as TRAFFIC SAFETY-3RD ANNUAL REPORT].

12. The Allstate Insurance Company advertises that it will cut collision insurance rates 20 per cent for any car the manufacturer certifies through independent tests can withstand a 5 mph crash into a test barrier, front and rear, without damage. N.Y. Times, July 7, 1971, at 23 (advertisement). Senator Hart's statement appears in the Congressional Record. 117 CONG. REC. 1936 (daily ed. Feb. 25, 1971).

13. This estimate assumes that: (1) payments by insurance companies for loss will be cut in half by successful deployment of the airbag, anti-alcohol devices, and protective bumpers; (2) there is a ratio of approximately one to one between benefits paid and insurance company costs; and (3) this one to one ratio will continue if benefit payments are reduced to one-half of what they are now. CRASH LOSSES 51.

14. Evidence of the growing interest can be seen in the Allstate Insurance Company's advertising campaign. Additionally, the Insurance Institute for Highway Safety, the safety arm of the insurance industry, is devoting a great deal of time to these specific problems. See 1970 SYMPOSIUM.

15. A total no-fault plan, *i.e.*, one in which all elements are first party, provides that a motorist suffering loss would be compensated by his own insurance company. The prime emphasis of insurance companies under the present fault system is the selectivity of persons rather than the protection of the persons.

would shift research emphasis to defensive safety efforts such as the air cushion. The reason for the shift would be that their liability would then be triggered by client involvement rather than client causation.

Third, these categories have been selected for their practicality. Prototypes have already been designed and are in the testing stages. Two of these three areas have DOT safety standards which will require at least some positive results within the next two or three years.<sup>16</sup>

Some other areas of proposed safety improvement such as the more comprehensive driver training programs and better state vehicle inspections have recently come under fire for their impracticality. While it is believed that these programs can help reduce the frequency of auto accidents, it is not known exactly how they relate to safer driving and hence there is some skepticism as to how they may be improved.<sup>17</sup>

There is no question that the three areas, restraint, anti-alcohol measures, and auto body protection will produce favorable results. The drawbacks to their success center around what could be called lack of proper public education and concern.

### *Packaging*

It is a commonly known fact that seat belts save lives and reduce the seriousness of injury. The seat belt is an example of "packaging," one of two injury prevention theories. The other theory is energy management. Simply stated, energy management means letting the vehicle take the brunt of the collision without passing the force of the impact on to the passengers. The overall goal of controlling energy is to reduce as much as possible the force which propels the passengers into the second collision.<sup>18</sup> This concept will not be discussed in depth because there is a paucity of data relating collision speed to injury, death, and resulting financial loss.<sup>19</sup> Several safety research teams are looking into auto structural changes and their effect on energy control.<sup>20</sup> The concept will briefly appear in the section on auto body protection.

In the theory of packaging the ideal is to totally envelope the passenger and

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16. The third area, anti-alcohol measures, has a DOT standard also, but it is not in the same category as those for restraints and auto body protection. See note 24 *infra*.

17. For a discussion of the effectiveness of many current safety programs see 1970 SYMPOSIUM 183.

18. The "second collision" is an auto safety term of art for the collision between person and vehicle which causes the actual injury.

19. An explanation of the reasons for the lack of this data is in TRAFFIC SAFETY-3RD ANNUAL REPORT 32.

20. Cornell Aeronautical Laboratory under contract with the Department of Transportation has done the major portion of the research in this field.

thus buffer his second collision. Attempts at packaging, such as the seat belt, have been immensely successful.<sup>21</sup>

The major problem with seat belts is that they are not used. Approximately 25 percent of the motorists who have the lap belt use it and only four percent use the shoulder harness. These percentages are not atypical of the American motorists' attitudes toward safety in general. Another problem with the belts is that if a collision occurs at high speeds, the effect of restraint by the seat belts is to allow the entire force of the collision to be transmitted to that portion of the body which is covered by the belt.

Some other packaging ideas include the slide-in belt, total interior padding and the air cushion.

The air cushioning concept represents as near a perfect example of packaging as could be designed. In addition to its passivity<sup>22</sup> the air cushion allows the subject passenger to experience forces far greater than he could withstand with a seat belt. The reason for this is that the force is spread over a much larger area of the body thus reducing the pressure on any one portion of the body. It operates in the following manner.<sup>23</sup>

When a vehicular crash occurs, a sensing device triggers a release mechanism which permits gas stored under pressure to fill the cushions in a matter of milliseconds. These inflate to cushion the occupants as they are thrown forward by the impact.

The sensor may be either mechanical or electronic and can sense crashes from one or all directions. Sensors now in production are capable of discriminating between the level of force at which the cushion should deploy and those below which it should not. This level may be set for any speed. Current designs trigger deployment when the force is sensed at speeds ranging from 12 to 15 m.p.h. When the sensor detects crash forces over the triggering level, it sends an electrical shock to a detonator.

There are two types of inflation systems. In stored gas systems, the detonator breaks a seal which releases compressed gas, generally air or nitrogen. In gas generator systems, the detonator sets off a small explosive charge which generates gas to inflate the bags. The bags, usually folded nylon, are filled with gas 40 to 60 milliseconds after the start of the crash. As the occupant pitches into

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21. *TRAFFIC SAFETY-3RD ANNUAL REPORT* 13. Seat belts, although infrequently used, save between 2.5 and 3 thousand lives per year.

22. "Passivity" means that no action is required by the passengers such as the "buckling up" with seat belts and harnesses.

23. Information on the operation of the airbag may be found in a fact sheet prepared by the Center for Auto Safety.

the inflated cushion, the cushion absorbs his forward motion. Pores built into the ends of the cushion vent the compressed gas.

Despite its potential as the ultimate motion safety device, there are some serious side effects which must be hurdled before the air cushion will be popularly accepted.

First, there is widespread fear that the device will cause accidents and injury. This fear is best exemplified by picturing someone driving at 50 or 60 m.p.h. on a busy highway when suddenly the device activates. With the loud noise and shock of the activation, can the driver safely control the car?

Second, presuming the answer to this question is yes, how do you convince the motoring public? The device has logged some 4 million miles under varied conditions without a single misfire. Continuing research can eliminate control problems and muffle any noise associated with activation. But the fact remains that despite its potential the air cushion simply has no backers. In fact, DOT has now pushed back the safety standards requiring air cushions until 1975.

The air cushion should have backers soon. The advent of no-fault is going to mean one thing to insurance companies—their clients, his passengers, and his automobiles must be protected. It will soon become apparent that if any profit is to be made, it will be made by increasing this protection in order to reduce claims. Insurance companies will start pouring money into research and development to perfect such protective devices as the air cushion.

Driver incentive measures will probably come on two levels. It would be wise to acquaint drivers with the operation of the air cushion. Test rigs, developed to enable drivers to experience a crash simulation, will help reduce the fear associated with the air cushion. People will then be able to make a rational decision about auto control and use of the device. The other level is, of course, a premium reduction. With a device like the air cushion it should be a sizeable reduction.

#### *Anti-Alcohol Measures*

Unlike the standards for packaging devices and auto body protection, the NHTSA standard dealing with driving and drinking is of minute significance when compared with the enormity of the problem.<sup>24</sup> It is not that NHTSA is

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24. U.S. Dep't of Transportation, Highway Safety Program Standard 8: Alcohol in Relation to Highway Safety. This pamphlet concerns itself primarily with establishing a national standard for drunkenness (0.1 percent blood alcohol level), a national implied consent criteria for those arrested for driving while intoxicated, and standardized testing for any adult killed or injured in an auto accident. This after-the-fact standard is, or closely approximates, the law in many states today. There is no appreciable difference between states with a law like this and those without it as far as traffic deaths are concerned.

unconcerned. Douglas Toms, the Administrator of NHTSA, lists the Agency's three goals:<sup>25</sup> crash survivability, getting the drunk off the road, and the development of a prototype safety vehicle. What is missing from the NHTSA anti-alcohol stand is an effective solution to the problem.

Most other remedial proposals are in the area of better enforcement, both through the passage of more comprehensive legislation and the imposition of stiffer penalties in states which now have the legislation. With a poor history of success in this field some very progressive measures are needed to cope with the drunk driver, the most prevalent cause of death and serious injury on our highways.

Enforcement measures are inefficient for several reasons. A policeman must find the alleged drunk, observe that the driver is, in fact, driving unusually or breaking the law and then test the individual. This process is made even more difficult when the most common facts about drunk driving-related injuries are revealed. These injuries occur primarily during the hours of darkness and often on rural roads and highways. This means there is a scarcity of observers to begin with and then darkness often obscures the observation.

Even if the enforcement procedures were more effective the criminal processing of the drunk driver has been very favorable to him. What is more, legislators show a great reluctance to change this situation. If the American public is outraged by the drunken driver and his path of carnage, it must look for results to other measures than currently proposed better enforcement.

Since the chief problem of enforcement is the necessity of outside observation of the appearance of drunkenness before testing, an improved system calls for driver self-testing. This testing must be mandatory and test those functions which are hazed by excess drinking. Since the drunk kills or maims because he cannot handle the functions which a driver should handle, it is only fitting that this test of a driver's ability should precede the most elemental of functions, that of starting the car.

One such "testing" device is the General Motors "phystester," developed by Delco Electronics. The "phystester" is designed to function in the following manner.<sup>26</sup> When the driver turns on the ignition key in his car, a random number with a fixed number of digits is displayed for a few seconds on a miniature scoreboard. Then the number turns off and the keys on a keyboard below the scoreboard light up. The keyboard is similar to that on a pushbutton telephone. The driver then has a short time in which to punch into the keyboard

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25. See 1970 SYMPOSIUM 171-73.

26. Information on the "phystester" was furnished by the Delco Electronics Division of the General Motors Corporation, Milwaukee, Wisconsin 53201.

the exact number he has just seen displayed on the scoreboard. If he does this successfully, the car will start. If he fails the test, the driver has two more chances to start the car. A different number is displayed for each try. If he fails twice more, the vehicle is inhibited from starting for an extended period of time.

The Delco Electronics engineers and researchers believe this simple test, which takes a few seconds to perform, can quickly check four human faculties that are degraded early by excessive amounts of alcohol: visual acuity, short-term memory, coordinated motor response, and judgment.

Not only does the device prevent one who is drunk or drugged from starting a car but it also retards someone who is in an abnormal emotional state or in a hurry from starting a car. Statistics can show that these people, in a hurry or otherwise distracted from the highly technical job of driving, cause more accidents than people in normal emotional states. The device then has a two-fold purpose: getting the drunk off the road and getting the normal driver into a serious mood for driving.

Opponents of the device point out several basic faults both in principle and in operation. Who will buy a car with the device if it is optional? Probably no one. Therefore, the device must be mandatory or at least some incentive to buy the device must be presented. What about people with low manual dexterity who can't pass the test drunk or sober? While there is some question as to whether these people ought to be driving, they will have to be considered an exceptional case.

As far as the operation goes, the most frequent question concerns emergencies. The only sensible solution to the emergency situation is that the device contains a bypass. The bypass does two things. First, it causes lights to flash at the four corners of the vehicle signalling an emergency. It has the double effect of attracting police for aid if there is in fact an emergency and attracting police for testing purposes if someone is bypassing the test to drive while intoxicated. The activation of the bypass is an implied consent to police testing or immediate surrender of one's license. Second, activation of the bypass would make an indelible mark on the speedometer which must be satisfactorily explained to a magistrate within 24 hours or license will be lost.

Other operational objections go to how foolproof the device would be: a non-driver could start the car; a permanent bypass could be rigged. These are valid objections, and unless a solution can be found the whole concept will be undermined. Some suggestions border on science fiction<sup>27</sup> and others are purely legal

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27. As an example of this science fiction consider the following: When a car is purchased the thumb prints of the owner and principal drivers are recorded in the memory of the anti-alcohol device. The memory recognizes and records every starter whether registered or not. The memory is erased every time the car is turned off. If a non-registered person is driving (or has started the car

deterrents such as stiff penalties. The probable result is that if and when solutions are found, they will not be revealed to the public to become an aid to potential lawbreakers.

For deployment incentive, we once again turn to the insurance companies. They are well aware of how much is presently lost because of the drunk driver. Under no-fault those losses will increase unless specifically provided against.<sup>28</sup>

Backing of devices like the "phystester" should also have national priority. It is surprising that Douglas Toms, the country's leading advocate of the controversial air cushion, would not adopt this as the best solution so far to his second priority—the drunk driver.

### *Auto Body Protection*

Auto body protection is the most advanced of the three areas. Some of the 1972 models are equipped with protective bumpers. By September 1972, according to the National Highway Traffic Administration Standard 215, all cars must have bumpers which can withstand collisions of five m.p.h. front and two and one-half m.p.h. rear without any damage to the automobile. By September 1973, the rear collision criteria is raised to four m.p.h.

The reason that the speed figures of the Safety Standard are so low is that they have been amended downward several times. Detroit has made numerous pleas that higher speed requirements are economically unreasonable mainly because of the lead time associated with retooling. NHTSA has yielded to these pleas, both in the area of speed and in the area of bumper material.

The standard as it was originally conceived could have had a two-fold effect. First, it would reduce the incredibly high cost of repairing the fragile modern auto.<sup>29</sup> Second, if the shock absorbing requirement had not been dropped, high speed impact velocities would be lessened. That is, if a front bumper could absorb 10 m.p.h. before the body of the vehicle was contacted, this would mean a 70 m.p.h. crash would effectively be a 60 m.p.h. crash from the frame of

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for a registered person) a special light in the exterior rear of the car is lit. This light is noticeable in the day as well as at night. It is a notice to police which they may or may not investigate. In addition to recording who has started the car, the device should cut down on auto thefts. A combination (in addition to a key) which would be punched into the keyboard of the device, could also be required to start the auto.

28. Some proposed no-fault plans provide for the exclusion from payment of persons injured while driving intoxicated. Other plans will hold such a person strictly liable. Compensating the drunk, which was rarely done under the fault system, will be a considerable problem because of the first party nature of no-fault. Even if the plans provide an exclusion for the drunk, the burden of proving drunkenness after a collision will be a very stiff burden to meet.

29. See 1970 SYMPOSIUM 263.

reference of the passengers of the automobile. This is an example of the concept of energy management referred to in the section on restraints.

The auto industry will probably use resilient materials to fulfill the protective requirement. This goes against the concept of energy management and will have the effect of creating "bumper cars" which transmit all of the collision shock to the occupants.

Despite the weakness of Standard 215, a great deal of money will be saved by the addition of protective bumpers. Members of the insurance industry have seen the wisdom of backing such a standard. This will be the first testing ground for the safety incentive program and, if it is successful, there is no reason why it will not be expanded to cover other safety areas.

#### *Conclusion*

This paper is not a treatise on auto insurance nor is it an exhaustive study of auto safety. It is simply a suggestion that auto safety measures can have a tremendous influence on the cost of auto insurance.

Likewise, much of the money going to study ways to determine better and less expensive compensation systems could be more fruitfully spent. Two million dollars was expended on the DOT Insurance Study. Had this money gone into research to develop the air cushion, it could be saving lives today. The air cushion, if properly developed, *will* save millions of dollars. It is hard to find a statement as positive as that anywhere in the DOT Insurance Study.

The approach taken to the overall problem, *i.e.*, overhauling the compensation system, is an extremely pessimistic one. How the pieces are picked up is not a very fit topic for discussion when many of the pieces don't have to be there in the first place.

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