TRANSPORTATION DEREGULATION AND SAFETY: SUMMARY REPORT ON A CONFERENCE

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1. INTRODUCTION

On June 23, 1987 the Transportation Center of Northwestern University convened a three-day conference on the implications for safety of two pieces of legislation, the Airline Deregulation Act of 1978 and the Motor Carrier Act of 1980. These Acts had the effect of reducing the control of the federal government, and of carrier rate associations on the conditions of competition in the two industries. In particular, the regulatory reforms embodied in the two Acts allowed: greater freedom of entry into the two industries; greater freedom of entry into, and of exit from, particular markets; and greater freedom of individual rate making. The Acts significantly increased the influence of market forces on the prices charged for air and truck service, and the profitability of individual firms. Increased rate competition between motor carriers had direct effects on the rates charged by railroads for the movement of high value goods, and indirect effects on all other tariffs.

The regulatory reform bills were passed because it was felt that increased competition would lead to more efficient operations and lower rates in the two industries, while not compromising safety, or seriously compromising quality of service. Some changes in quality of service were, in fact, hoped for in the airline industry. It was commonly believed that the suppression of price competition by the Civil Aeronautics Board (CAB) fostered adoption of service quality variables that were highly uneconomical, such as too early replacement of aircraft, and frequency of departures at major airports that were excessive in light of existing load factors. It was asserted that such quality competition drove up costs, which led to proposals to the CAB for relief in the form of fare increases. However, the positive effects of such increases, which were almost always granted, on the profitability of airline operations were soon worn away by another round of quality competition and increases in costs of operation.

It was expected that the discipline of increased price competition would also achieve cost economies by both airline and motor carriers because they would have to resist wage demands by unionized labor that exceeded increases in productivity. It was commonly believed that union wage demands were treated as a pass-through by firms. That is, they granted wage increases that exceeded productivity gains, and clearly also exceeded what comparable labor received in unregulated, competitive industries. The pass-through philosophy grew out of two beliefs: (1)

regulatory bodies would grant increases in rates that were designed to restore average profitability; and (2) that such rate increases would lead to actual increases in revenues and restore profitability for the representative firm because demand was growing over time and was relatively price inelastic. In the main these beliefs proved valid. Generally speaking, rate increases did temporarily improve profits, but at a significant increase in cost to users of airline and motor carrier services.

The framers of the motor carrier and airline bills hoped that a reduction in economic controls by government would increase price competition and bring benefits to users of the transport services produced by these industries. Clearly, that hope has been realized.

The rate benefits to users of airline service are very clear. Between 1977, when the CAB began to allow greater freedom of entry and increased price competition, and 1986, average revenue per passenger mile rose by only 30 percent, going from 8.3 to 10.8 cents. In real terms, deflating by the Consumer Price Index, the cost of airline travel to passengers fell by 23 percent. Passenger miles increased from 226 to 366 billion, and enplanements increased by 52 percent. Of course, the increase in passenger usage was the result of an 8.5-percent increase in per capita real income, as well as the reduction in the real cost of travel. It should be noted that in the nine years prior to the period of regulatory reform, average revenue per passenger mile increased by 17.7 percent in real terms (Air Transport Association, 1987). Some part of the decrease in real air fares that occurred during the years of increased price competition were due to declining fuel prices. It is difficult to determine how much consumers would have benefitted from such declines had they occurred in the regulatory era, but taking this into account, it has been estimated that deregulation brought about $16 billion annual benefits in current dollar terms (Morrison and Winston, 1986). This estimate of the magnitude of benefits has been questioned (Evans, 1987b), but that there have been significant benefits is beyond dispute.

There is clear evidence that open entry and a reduction in the power of motor carrier rate bureaus to control rates led to an increase in competition and to reductions in the real cost of trucking service to shippers. The number of trucking firms increased by some 19,000 in the years since passage of the Motor Carrier Act. Between 1977 and 1980, years in which the effects of increased entry and competition on rates were already evident, revenue per hundred weight for truck load (TL) or general freight traffic increased by 15.3 percent in real terms, whereas the increase was 6 percent between 1980 and 1984, the last year for which the authors were able to obtain this data. The figures for contract carriage are even more impressive. Between 1977 and 1980 real average revenue per ton mile fell by 1.33 percent per year, whereas in the period 1980 to 1984, it fell by 3.99 percent per year (U.S. Department of Transportation, various years). Data obtained from the East/Central Motor Carrier Freight Bureau for less-than-truck-load (LTL) freight shows that the revenue per hundred weight increased by 4.7 percent in the period from 1978 to 1980. In the years from 1980 to 1985, it was stable (Tye, 1987), again, in part due to declining fuel prices. Nevertheless, it has been estimated that regulatory reform has brought significant logistical benefits to shippers (Delaney, 1987; Evans, 1987a).

Statistics of the above kind understate the savings to shippers brought about by increased competition. In part they do so because they do not include data for the smallest class of common carriers, those that are completely specialized in TL carriage, that part of the motor carrier business where the increase in competition has been the greatest. In addition, our use of the published tariffs of a rate bureau understates what has happened to actual rates. Almost all trucking firms offer discounts from such tariffs which they publish as independent tariffs. The major trucking firms have established pricing strategy groups that evaluate the costs of providing service to

different customers and the prices necessary to attract and hold business. Discounts from published tariffs are offered when they are needed to hold onto or acquire business. The practice of discounting has been so widespread that the General Accounting Office (GAO) was asked by Congress to carry out an investigation to determine if it arose from predatory incentives, in which case it might be viewed as anti-competitive. While supporting the finding of widespread discounting, the GAO concluded that it was pro- rather than anti-competitive (GAO, 1987).

There is also evidence that deregulation has reduced the profitability of operations of the largest trucking firms. Data on operating ratios, the ratio of expenses to revenue, provided by the magazine, *Commercial Carrier Journal*, show that in the years between 1980 and 1985, the average operating ratio for the 20 largest trucking firms rose from 94.0 to 96.4. The squeeze on profits must have come from the revenue side because fuel prices fell over the period and labor cost increases were contained. These two-cost items comprise the major part of total costs. The large carriers lost a great deal of their TL freight to small firms, presumably because the small carriers had lower costs and rates. They also had to cut LTL rates selectively.

The figures on airline usage and the real cost of airline travel, and comparable figures for the motor carrier industry make it very clear that if the program of regulatory reform involved no disbenefits, it would have to be considered a tremendous success. However, regulatory reform has involved disbenefits, most clearly in the airline case, because of reductions in many of the quality aspects of service.

Taken alone, such disbenefits as increases in travel time and travel uncertainty, and lost or damaged baggage in airline travel would not have been enough to create the growing sense of public uneasiness, and the increasingly popular opinion that deregulation may have been permitted to go too far; that the nation might be better served if government imposed some limits on the range within which rates could be changed, on entry of new firms, and on the freedom of carriers to change the markets they serve. It is the fear that deregulation may bring, or already has brought, significant increases in the hazards of travel to airline passengers and to automobile users that is the source of the uneasiness.

The uneasiness was the genesis of the Northwestern University Conference, which brought together experts from government, industry, labor, and academia to examine the relationships between the economic, including the regulatory, environment in which airlines and motor carriers operate, and the degree of safety with which they function. The faculty at Northwestern University also wished to identify policies that would have favorable effects on safety, at least some of which could also be justified on economic grounds.

Safety, like other quality of life conditions such as improvements in air quality and health care, and reductions in crime and the incidence of fires, is an economic good. It can be increased, but many of the ways of doing so are very expensive. The resources required for such things as personnel training, expanded amounts and improved quality of infrastructure, and surveillance have alternative, possibly higher value, uses elsewhere in the economy. Fortunately, there are ways of increasing safety that do not require investment of significant amounts of additional resources.

The remainder of the Conference Summary is divided into two parts, each devoted to one of the modes. Each of the parts contains material drawn from papers prepared for the Conference, from the written comments of formal discussants, and from floor discussions that took place at the 15 sessions that comprised the Conference. The papers and discussions dealt with the main factors that many people believe link reductions in governmental economic controls to safety.

One set of links is seen by many critics of deregulation as resulting from financial pressure on firms. That is, increased competition reduces profit margins and forces firms to reduce: wages and the quality of the personnel hired; initial and career-long training of personnel; investment in maintenance; and the rate of replacement of old, less safe equipment by modern, safer equipment.

A second alleged set of links involves the adoption of unsafe procedures under the financial pressures induced by price competition. A commonly held view has it that price competition leads to the framing of truck schedules that force drivers to violate speed laws, and also to violate driving and rest regulations in more serious ways than would be the case in a less competitive environment. Similar allegations are made about increased competition and the airline industry. It is held by some that pilots are pressured into making flights even when certain equipment is faulty, when take-offs violate weather limits, and without sufficient and suitable rest.

A third alleged link involves new entrants. It was thought that new firms would have inexperienced managers, would tend to hire less well paid and lower quality staff, and use old equipment that they would not maintain.

The final pages of the discussions of each of the modal parts of this Summary Statement are devoted to policy recommendations. The Statement, including its policy recommendations, was circulated to all sponsors of the Conference and to a number of individuals who represented significantly different points of view on the issues. The reactions from both groups led to revisions in the Statement. Nevertheless, no claim is made that the Summary Statement represents a consensus view, or that most sponsors and attendees would support all of the policy recommendations. Those policy recommendations that are preceded by an asterisk represent the views of the writers of this summary and not necessarily the views of all Conference participants.

2. THE AIRLINE INDUSTRY

In the years when hearings were being held on the Airline Deregulation Bill, supporters of the legislation argued strongly that competition would bring fares down. Many of the individuals who supported passage accepted the idea that there would be some reduction in quality of service. In part they did so because an essential aspect of their argument for price competition was that airlines had engaged in excessive quality competition because it was the only form of competition open to them. Such competition, it was asserted, drove up costs of operation and fares without having lasting, favorable effects on industry profits. Supporters of the Bill did not accept the idea that economic deregulation would lead to a reduction in safety.

The experts who gave opposing testimony on the Bill emphasized quality of service, especially safety, and the impact that deregulation would have on the amount, as well as the quality, of service to small communities. The decline in the non-safety aspects of service quality has been extensively documented. Deregulation has brought significant reductions in the comfort of travel. The number and duration of delays and the number of incidents of lost baggage have increased. Overbooking has increased as has the density of passengers per flight. It would be hard to find experienced travelers who do not hold that the number and quality of the meals served has declined significantly.

The unfavorable effects on safety in the main corridors of travel were seen by critics of deregulation as developing from the financial pressure that increased price competition would put on firms to cut costs by skimping on safety investment, crew training, maintenance, replacement of

aircraft, etc. Small communities were seen as likely to suffer additional degradation of safety because they would be served by new, small companies that would fly small aircraft, staffed by less experienced pilots. Moreover, the operations of these small firms would frequently involve places that were far removed from Federal Aviation Administration (FAA) oversight. Questions were also raised about the new entrants that would enter the industry with deregulation. It was argued that their managements would be inexperienced and there would be no record by which consumers would be able to judge the safety of their operations.

Something not foreseen is that travelers whose trips do not originate in and/or terminate in major travel markets would tend to require more time to complete their trips than they did in the days of economic regulation. This is the case because of the hub travel system that has emerged as a result of deregulation and the search by airlines for operational systems that reduce costs. Hub operations offer cost efficiencies because they use small aircraft to gather passengers from light travel markets and deliver them to a major airport where they are then placed on large aircraft that are efficient for larger passenger loads and long distance travel. In the days before deregulation, large aircraft were frequently used to pick up or deliver a small number of passengers in secondary travel markets. The hub system achieves cost economies for the airlines but increases travel time and travel uncertainty for passengers whose trips do not originate and terminate at the major hub airports.

The experience of almost a decade of economic deregulation of airlines has settled many of the issues that were debated in the hearings. Competition has occurred and continues, despite the recent merger movement. Real fares have on average fallen, and are a great deal lower than they would have been had the old regulatory regime remained in force. There is even evidence that real fares fell in the years from 1979 to 1985 in small (non-hub) markets, these being the markets that are commonly served by a single airline (Scocozza, 1987).

Fare structures exhibit a great deal more price discrimination than they did in the past, which is a source of considerable annoyance to some travelers. However, the adjusting of rates to take account of the differing elasticities of demand of different travelers is entirely rational in industries that are characterized by the kind of competitive situation that exists in air transportation. Moreover, even the coach fares paid by business travelers, the group normally subject to price discrimination, are lower in real terms than they would have been under the old regulatory regime.

It seems unlikely that decreased quality, as measured by the non-safety quality variables, can figure as importantly as fares in decisions by individuals as to how much they will travel by air. If it did, passenger travel would not have increased as significantly in the years following deregulation as it has.

Would the increase in travel have taken place if deregulation had reduced travel safety, along with the other attributes of service quality? That is entirely possible because while consumers value safety, they frequently make choices that involve more risk than other choices they could make in order to achieve cost economies. Such savings allow them to increase consumption of other things. For example, people travel by auto, and do so at speeds that exceed legal limits, when they could travel much more safely by air, bus, or train. However, one does not have to make the argument that travel might have increased even more if safety had not declined, because the rate of accidents, fatal accidents, and fatalities fell during the period of economic deregulation.

Comparison of the period 1979-1987 with 1970-1978 shows that for large jet carriers, accidents fell by 36 percent, fatal accidents by 40 percent, and fatalities by 32 percent (National

Transportation Safety Board, various years). If the accident figures were expressed in relation to the number of flights, the percentage declines would be much greater. The improvements in safety have been shown to be statistically significant (Oster and Zorn; here and elsewhere parenthesized names refer to the source papers at the Conference).

Overall, people traveled more safely, though there are pockets of travel in which the trend of safety went the other way. Passengers whose trips originate and/or terminate in secondary travel markets do travel somewhat less safely than they would have in the regulated era. The accident rate for all commuter airlines is about three times as great as that of the large companies operating jet aircraft. The accident rate of even the top 20 commuter airlines is twice that of the large operators. The poorer safety record of the commuters is in substantial measure due to the fact that the crews they employ have considerably less experience than those of the jet operators, the lower altitude at which they fly, and the nature of airports into which they fly.

It should be borne in mind that commuter airlines account for less than 10 percent of all airline trips, and that most of that travel is handled by the largest 20 operators, whose safety record is a good deal closer to that of the jet operators. Another factor to be taken into account is that the substitution of commuter for jet service has reduced the number of intermediate take-offs and landings that travelers in secondary markets experience between origin and final destination, and it is in the take-offs and landings that most accidents occur. Research at the Conference, based on a survey of 60 secondary city pairs where commuter airlines had replaced jet carriers, indicated that the average number of intermediate stops had halved. Finally on this point, the availability of low-cost travel may also have increased the safety of travel to and from secondary markets for these changing modes by reducing the amount of auto travel on rural highways. Such travel is held to be considerably less safe than travel by commuter airlines (Oster and Zorn).

The improvement in the overall accident record is not due to deregulation. The declines are largely the result of a 40-year record of technical improvements in aircraft and air traffic control in the United States and in such overseas areas as the European Economic Community. Still, the record stands. The forecasts of some deregulation critics that price competition would cause an absolute decline in safety have proved incorrect (Rose). That is the case because, so far at least, the reasoning that underlies the safety degradation arguments has not in the main been borne out.

Critics of deregulation argued that with freedom of entry there would be a flood of new, jet airlines that would have inexperienced managements, and less experienced and lower quality flying and support personnel. It was hypothesized that the new entrants would exhibit higher accident rates than the established firms. Papers presented at the Conference indicate that the researchers have been unable to establish that new entrants have a statistically significant higher accident rate (Kanafani and Keeler). One difficulty in the research involved criteria for deciding which firms (for example, the ‘new’ Braniff Airlines) would be treated as new entrants, rather than spinoffs or expansions of previously operating airlines.

The critics of deregulation held that price competition would reduce profit margins and that firms under financial pressure would skimp on various aspects of safety investment, such as maintenance and training of crews. It was also believed that they would be unable to replace old aircraft with modern, safer aircraft. Statistical investigations prepared for the Conference offer some support for the financial pressure argument, but it is very slim. A decrease in profitability, due to increased costs or possible losses in patronage, lead to a small, statistically significant (at the five-percent level) increase in the accident rates of firms (Rose).

To argue that deregulation causes firms to reduce the care with which they carry out their operations is to ignore the fact that in the days of regulation there were firms that lost money. The CAB readily granted rate increases to compensate for cost increases and low profitability, but the adjustments were based on average performance for the industry. Except in the early years of the industry when subsidies were quite common, the CAB did not guarantee profitability for individual firms.

As indicated, research prepared for the Conference indicates a small effect of profitability on the safety record of firms. That it is small should not be surprising because firms have incentives to avoid accidents. Airlines that experience serious accidents can lose business to their competitors and to other modes of travel for some period of time because of the reputation effect of accidents.

How serious the loss is depends on the past history of the firm, the availability of competitors, and the accident records of competitors. Firms with bad accident records probably find it difficult to hold onto their most valuable employees and also find it difficult to hire high quality workers. Material presented at the Conference also shows that airlines that have an accident suffer losses in wealth because the value of their stock market shares declines. The stock value decline after an accident was estimated at an average of $4.5 million, while the demand loss--which typically lasts under three months--is equivalent to one-sixtieth of a year's revenue. In dollar terms this is about $30 million for an airline the size of Continental Airlines (Borenstein and Zimmerman). Thus, even those firms that are financially pressed by competition have incentives to avoid accidents. Nevertheless, there may be situations in which firms that are on the verge of financial failure take risks, in order to stay in business, that endanger passengers.

The proponents and critics of deregulation are both interested in what the long-run safety situation will be. The difference between them is in the indicators that they believe should be used to make forecasts about the long run. Proponents use the actual record. Findings such as those on new entrants and financial pressure reported above support a forecast that deregulation will not reverse or slow the downward trend in accidents that the nation has been experiencing for 40 years as a result of technical improvements. Effectively they argue that the future will be like the past.

This forecast is rejected by a large number of thoughtful people, not all of whom have a vested interest in a return to economic regulation. The difference of opinion hinges on what has been called the safety margin or safety buffer, terms used by John Nance, author of the volume on airline safety entitled *Blind Trust*. The basic idea behind the safety buffer argument is that safety is a type of stock variable in which airlines and the public invested more freely in the past than they have since deregulation. Two types of elements enter into the stock of safety, those that are largely in the hands of individual airlines, and those that are primarily the responsibility of government. The former include such things as the hiring of highly qualified personnel, extensive programs of lifetime training of personnel, careful maintenance of aircraft, timely replacement of aircraft, etc. It is claimed that in the past airlines did more than they were required to do by the Federal Aviation Administration, and that a stock of safety was built up that provided substantial protection against increases in accident rates.

The line of reasoning continues that at the present time, many more firms tend to satisfy only minimum standards. Moreover, as the recent history of penalties imposed by the FAA shows, there are a number of large firms, firms that account for significant percentages of total travel, that failed to meet even minimum standards, though part of this is due to stepped-up and tougher enforcement by the FAA. These violations were able to occur because there are many

more firms for the FAA to oversee, and the resources the FAA has devoted to inspections have until recently been less than they were in the past (Kern). The latter, it is claimed by some, was the result of the FAA's greater interest in certificating new carriers than in overseeing maintenance and training standards of existing carriers. This has changed somewhat since 1984 because certification is now a lesser priority than surveillance. The position of the adherents of the safety stock hypothesis is still that the stock of safety built up in the days of regulation is being worn away.

The second type of element that enters into the safety stock argument has to do with the amount of infrastructure--including airport capacity, air traffic control (ATC), and collision avoidance systems -- that government provides in support of air transportation. Enplanements increased 52 percent since deregulation but there are no new major airports and the capacity of the ATC system is less than it was because of the reduced number of controllers following the dismissal of illegally striking controllers in 1981. The system is straining the limits of capacity, especially at major hub airports.

Those who believe that deregulation is wearing away the stock of safety also point to the hub and spoke system as a source of difficulty. With this system there is a great deal of congestion at peak hours of travel as passengers are brought in from many tributary airports to hub airports by commuter airlines as well as by connecting flights of the hubbing airline. The air space in the vicinity of these hubs is terribly crowded during those hours. The commuter pilots who perform the connecting function at peak hours are less experienced than crews of the major airlines, because their wages are low and turnover rates are high, and the supply of experienced new pilots from the military has decreased. General aviation aircraft add significantly to the amount of congestion and to the hazards of travel in the vicinity of certain hub airports.

Support for these ideas about air space congestion and safety comes from pilots. A recent survey conducted by the Air Line Pilots Association (ALPA), which represents 85 percent of all pilots who fly large jet aircraft, reveals that the primary concern pilots have is that growing airport congestion has increased the number of near midair collisions (O'Brien). Forty percent of the pilots who responded to the ALPA questionnaire indicated that their greatest safety concern was congestion and the inadequacies of the air traffic control system. They mentioned these factors over ten times as frequently as they mentioned weather factors, including windshear (Fingerhut, 1986).

Adherents of the safety stock-congestion theory hold that the record of accidents is insufficient to the task of predicting where the system is likely to go in the future in terms of safety. They argue that economists, for example, do not base their judgments on the future direction of the economy solely by what happens to the unemployment rate. Instead, a set of leading indicators is used to provide insights into direction of change (Lauber). They hold that the number of near midair collisions is one type of leading indicator, and that the number of such incidents has increased (Bailey and Kirstein).

The strength of the safety stock-congestion effect, assuming it exists, has not as yet been evaluated. Even if the frequency of near midair collisions (NMACs) is taken as an indicator of the erosion of safety stock, the theory cannot be tested at the present time. The system for reporting NMACs is imperfect and the data probably subject to considerable error. In part this is the case because the rules governing immunity for commercial pilots who report incidents in which they may be at fault tends to discourage reporting, i.e., pilots are guaranteed immunity, under a system run by NASA, only for the first `at fault' incident in any five-year period. In addition, air traffic controllers have no immunity. (*) The reporting of incidents should be made

mandatory, substantial penalties imposed for failing to report, and the rule extended to general aviation pilots.

While the safety stock-congestion hypothesis cannot be accepted at present, neither should it be rejected because the data required for testing it are unavailable. It should not be rejected because it has some logic on its side. Deregulation has been immensely successful in holding down real fares and in encouraging significant increases in the number of passengers and the number of flights. These increases, together with the adoption of the hub and spoke system, have greatly increased congestion at major hub airports. At the same time, the number of Full Performance Level air traffic controllers is below what it was seven years ago when most controllers were fired because of the illegal strike action. There are still fewer controllers today than there were at the time of the strike and the number of flights per day is some 28 percent above what it was then. Surely it is not surprising that some scholars of the airline industry view the following combination of factors as a recipe for potential disaster:

- a significantly greater number of aircraft in the air at major hub airports, especially during times when there are many connecting arrivals and departures;
- a smaller number of air traffic controllers, some of whom are still required to work a considerable number of overtime hours at major centers;
- the relatively low level of experience of commuter airline pilots because low wages and increased demand for pilots at major airlines cause commuter airlines to have high pilot turnover rates;
- a large number of private aircraft with relatively inexperienced pilots that attempt to land at major hubs or otherwise occupy air space in their vicinity;
- an alleged lower level of maintenance of an aging stock of aircraft; and
- too few field inspections of aircraft and airline operations due to an inadequate number of FAA inspectors.

Concerning the last point, the Air Florida (jet carrier) and the Bar Harbor, Henson, Simmons, and Air Illinois (commuter carriers) accidents might have been prevented had there been adequate surveillance of pilot training programs (Lauber).

If the adherents of the safety stock-congestion hypothesis are correct, and the number of accidents per commercial aviation flight does increase in the near future in a statistically significant way, the Congress as well as the U.S. Department of Transportation (DOT), will have to bear a heavy measure of blame because they adopted a set of contradictory policies. That is, they adopted a program of economic deregulation because it promised to bring benefits to travelers. The program was a success, fares were held down and the amount of travel increased substantially. On the other hand, government, which has much of the responsibility for the character, quality, and capacity of the system's staffing and infrastructure, failed to increase the capacity of the system, to adopt programs that would use the existing capacity more efficiently, and take other needed actions to ensure safety. Indeed, when we take the number of air traffic controllers into account, the effective maximum capacity of the system is probably smaller than it was in the past.

The claim is also made that the Aviation Trust Fund, money collected from the taxes government imposes on airline travel, has over five billion dollars of unexpended funds in it. DOT has been accused of failing to request the money to finance improvements and expansions in facilities and equipment because it has wished to cooperate with other branches of the Administration in an effort to make federal budget deficits appear smaller than they really are.

The issue of the Aviation Trust Fund is one about which there has been considerable debate, and about which most members of the airline industry feel very strongly. At the Conference, the Air Transport Association went so far as to propose that the FAA's functions be turned over to a new quasi-independent group like the Federal Reserve System, and that such an agency be completely and freely funded by money collected in ticket taxes (Bolger).

The DOT has recently responded to claims that it has failed to spend the money in the Trust Fund by asserting that aviation funding has increased by $3 billion since 1982, but that a complicated provision in the authorizing legislation has forced much of the cost of the program to be financed from general tax revenues rather than the Trust Fund. DOT also asserts that Congress failed to appropriate over $1 billion that it requested for modernizing and increasing the capacity of the National Airspace System. The basic difficulty between Congress and DOT is DOT's belief that 85 percent of FAA's current operating expenses should be paid out of the Fund, with the remaining 15 percent paid by the military. However, in legislation passed by the Congress, DOT was only allowed to fund 70 percent of FAA's current operating expenses from the Trust Fund. Moreover, Congress imposed a penalty, the complication referred to above, that the proportion of current expenses coming from the Trust Fund would be further reduced if DOT failed to expend authorized amounts from the Fund on research and development and improvements in the air traffic control system. This is, in fact, what has happened and it explains why there is unexpended money in the Trust Fund (DOT, 1987).

From the point of view of airline passengers and the public at large, it makes little difference who is right and who is wrong in the conflict between Congress and DOT. The simple fact is that the federal government has not mounted a major campaign to significantly relieve congestion at major hub airports and in the air space in their vicinity. It has failed to bring the amount and quality of airport and ATC system capacity up to the levels required by growth in numbers of commercial and general aviation flights. It has also failed to press for practices, such as congestion pricing, and rational landing fees, both of which are discussed at length below. By failing to do these things, the government has added to the probability of accidents, and made the safety stock-congestion argument a good deal more compelling than it would otherwise be.

3. THE AIRLINE INDUSTRY--POLICY RECOMMENDATIONS

3.1 Private Aircraft in Congested Hub Airports and Surrounding Areas

A significant factor in airport congestion, in near midair collisions, and in actual accidents are the number of private aircraft that land at hub airports or occupy air space in their vicinity during peak hour travel periods. One of the reasons why such aircraft add significantly to the risk of accidents is that the pilots of many of the private aircraft are not sufficiently well trained. Another difficulty is that many small aircraft lack "Mode C" transponders, devices that permit height as well as latitude and longitude to be recorded on radar. Without such information controllers cannot determine whether a dangerously close situation is developing. Arguably, aircraft that are not equipped with such transponders should have been banned from highly congested hub airports several years ago. The FAA has recently issued such an order, but it is not clear at this time whether the rule is sufficiently extensive. (*) The present, as well as some other, writers hold that "Mode C" transponders should be required on any aircraft that operates within 50 miles of a major hub airport.

3.2 Landing Fees, Congestion Fees, and the Efficient Utilization of Airport and Air Traffic Control Capacity

Air space in the vicinity of congested hub airports and the physical facilities of such airports are scarce economic resources. These resources should be used efficiently so that the amount of public money that is needed to expand capacity is less than it would otherwise have to be. These resources are not currently being used efficiently, as evidenced by very significant peak hour overcrowding that exists. Airlines claim that they set their schedules in response to the temporal pattern of consumer demand for travel, and that individually they can do little to change the pattern of demand. An individual airline that charged more for prime than off-peak travel, and in doing so changed more than its competitors, would lose a great deal of business. It has been claimed that some headway on the congestion problem has been made as a result of recent voluntary scheduling agreements, but such an approach should be avoided because it tends to lead to collusion on other matters.

The problem of congestion is exacerbated by the practice of airlines publishing arrival times that do not reflect the delays experienced. The point-to-point time of a flight from New York to Chicago may be listed as being of the same duration whether the flight is at 8 am or 11 am. As a result, the inexperienced traveler may choose to travel at a peak time, whereas another time might have been selected if the expected delay had been known at the time the flight was booked. At the Conference it was recommended that information on delays be made available to consumers as a way of encouraging airlines to publish more realistic schedules (Bailey and Kirstein). Information on delays is now available to ticket purchasers. However, such information is not a panacea. Many of the nation's urban highways are extremely congested, filled with commuters of long experience who know the average peak hour delays to be expected.

Two types of solutions to the peak load problem and the inefficiencies and safety hazards it entails are possible. The first is a nonmarket solution, one that has been suggested by some members of Congress. This solution would have the FAA determine the maximum number of landings and departures that could safely take place at each of the major hub airports in some time interval, say per 30-minute period. Then, under this approach, firms that serve a given airport would be granted anti-trust immunity and allowed to make agreements as to the allocation of peak hour landing rights.

The above solution to the congestion problem is unacceptable. In effect it resurrects the functions of the CAB by putting bureaucrats back into the position of determining how much competition and entry there should be, an arrangement it was the intent of the Airline Deregulation Act to end. Also, the solution would create monopoly conditions by in effect allowing existing firms to form legal cartels. New firms could be precluded from prime time markets and existing firms could be encouraged to collude on prime time landing rights, and perhaps fares as well.

(*) What is needed is a pricing system that allocates airport capacity and the air space in the vicinity of congested hub airports in an efficient way. The economic model that underlies such a system of prices has been known for many years. It was first recommended as a cure for congested bridge travel in the early 1800s, and has been broadly and successfully applied around the world to such things as the pricing of telephone service and electric power. It has also been used with modern day success in the pricing of facilities such as bridges and tunnels. In the case of airport landings, the essential idea behind such pricing is that the delays associated with increases in the number of scheduled landings per period would have a money value attached to them that would reflect the money cost of associated landing delays to airlines and to passengers.

These costs would then be incorporated into a set of landing fees that would differ by time of day, day of week, season, etc. (Stiglitz and Arnott).

Under a congestion pricing system, a substantial part of the high fees that airlines would pay for landings at peak times would be passed on to passengers in the form of differentially high ticket prices. Such prices would cause some passengers to be willing to travel at less congested times. They would thereby increase the profitability to airlines of providing off-peak service. The peak would be spread out, less capacity would be required at those times, and existing capacity would be used more efficiently. The fees collected would also provide funds that would be under control of local authorities. These funds could be used to make investments in facilities and equipment that would increase airport capacity. Congestion fees would, of course, be imposed on private as well as commercial aircraft that land at peak times.

(*) The issue of landing fees for private aircraft entails another aspect of rationality in the pricing of facilities that should be addressed. At the present time, landing fees are based on the weight of aircraft. The fees are much too low to begin with, and basing them on weight means that most private aircraft pay almost nothing to land, even at the most congested times. Landing fees should reflect the amount of airport capacity that aircraft use in a landing. Such usage is practically the same for all aircraft. The amount of time that a runway is tied up, and the amount of controller time required to assist a small aircraft to land is certainly not less than that required to land a large, commercial plane. In fact, since private aircraft frequently have pilots who are less experienced than those in commercial aviation and travel at slower speeds, they can require more airport capacity than commercial craft. Some very small differential between private and commercial aircraft based on weight might be justified because heavier aircraft do more damage to runways and other concrete surfaces than small aircraft, though it is unlikely that either type of aircraft account for as much damage to surfaces as weather and the passage of time.

A set of rational prices, one that takes congestion and utilization of airport capacity into account, would do more than increase the efficiency with which airport capacity is utilized and reduce the amount of investment in additional airport capacity needed to handle traffic safely. It would reduce the number of near-midair collisions and runway incursions and the probability of accidents.

Up to now this policy recommendation has dealt with congestion at major hub airports. It has ignored the fact that there is also congestion in the air corridors in the vicinity of hubs that has nothing to do with hub take-offs and landings. This second type of congestion, which is also serious and an important source of near midair collisions, is caused by the presence of private aircraft that are in transit in the vicinity of hub airports, or taking off or landing at private airports located nearby. (*) The application of a significant air space user fee, one that might be administered through the private airports involved in the flights, would cause many private pilots to schedule their landings at less congested times and to detour around the congested areas. The safety and efficiency with which air space is utilized by commercial and general aviation would thereby be increased.

Pricing techniques can increase the efficiency with which existing airport capacity is utilized. However, even with such pricing it is likely that the amount of capacity will have to be increased. Demand has risen rapidly in the last decade, and continues to grow. Aside from Denver, no other new major airport is in the advanced stages of planning anywhere in the nation. In part, this is due to the severe environmental constraints on the expansion of airport capacity.

3.3 Reporting of Near Midair Collisions

To the present writers it seems indisputable that the number and trend of near midair collisions is one of the pieces of information that should enter into a judgment of how safe conditions are near a major airport, and how safe they may be in the future. That being the case, authorities need reliable information on the number of such incidents. (*) Reporting of near midair collisions should be made mandatory for general aviation as well as commercial pilots, and fines imposed for failure to report.

3.4 The Ticket Tax Fund and Government Investment in Safety

Economists view safety as a desirable attribute of service. They recognize that its production requires the use of scarce economic resources, and that at any given time it may not be socially optimal to increase the level of safety (Panzar and Savage). However, airline passengers have what amounts to a contract with government that it spends the money in the Aviation Trust Fund in the ways that offer the greatest promise of increasing the safety and operating efficiency of airline operations.

In all fairness it must be mentioned that the agency is now attempting to improve safety by hiring additional inspectors and increasing the number of field inspections. It has begun to identify carriers who are more likely to violate the rules governing the Minimum Equipment List, and has imposed substantial fines for violations of air safety regulations (Kern).

DOT is also currently involved in other programs that offer substantial promise of improving safety. One of these is the National Airspace System (NAS) Plan which, when implemented, will upgrade the air traffic control system in a major way. It is unfortunate that DOT did not begin the program even sooner. As has been pointed out by the GAO, introduction of the program could have been begun almost a decade ago as opposed to the 1981 publication of the first version of the NAS Plan. It is also unfortunate that the current implementation program is behind schedule, with the year 2001 as the completion date, assuming something that is unlikely, no further delays (McLure). To the extent that the schedule for NAS Plan implementation and the delays are due to insufficient funds rather than technical difficulties, the money in the Aviation Trust Fund should be used to hasten completion of the Plan.

The agency is currently also carrying out tests of a collision avoidance system that is capable of recommending needed "climb or dive" evasive action if the intruding aircraft is equipped with a "Mode C" transponder. This is another example of a technology that might have been introduced years ago.

Another, still more advanced, collision avoidance program would be capable of choosing the best evasive action as between left-right and up-down. The FAA indicates that this system is at least several years away from certification. Again, to the extent that delays in advancing this system toward certification are due to inadequate funding rather than technological unknowns, increased expenditure of money from the Aviation Trust Fund might well be justified as something that would advance safety in an effective manner. DOT has expressed the opinion that technical problems, rather than insufficient funding, are the source of the delays in certifying this particular system.

3.5 The Number of Air Traffic Controllers

There are fewer Full Performance Level air traffic controllers today than there were in 1981 and the number of flights is 28 percent greater than immediately prior to deregulation. The inadequate number of fully qualified controllers leads to a great deal of overtime work for such controllers at the most congested airports. Overtime work, strain, and tiredness lead to errors in judgment and accidents.

The number of controllers has to be increased. (*) If that cannot be accomplished quickly enough by training new personnel, then it is worthwhile considering rehiring carefully selected, fired controllers. Among those who were fired, there are undoubtedly some who would be willing to return with loss of seniority, who are in the appropriate age group, and who could be retrained in much less time than is required to train inexperienced people.

4. THE MOTOR CARRIER INDUSTRY

The motor carrier industry was brought under the control of the Interstate Commerce Commission (ICC) in 1935. Thereafter, entry into, but not exit from, the industry was severely limited. Rate competition between individual carriers was severely limited. ICC certificated general freight carriers could legally discuss and make agreements on rates, which were then presented to the ICC for approval. The main objective of the 1935 Motor Carrier Act was to achieve rate stability. It was a commonly held view in the 1930s that one way to cure the Great Depression was to control price cutting. The Motor Carrier Act and such legislation as the National Recovery Act mistakenly focused on price declines as a cause of the depression rather than recognizing it as a symptom.

The 1935 legislation achieved the objective of bringing about what was viewed as a more orderly industry. With rate competition between certificated carriers largely eliminated, the emphasis turned to competition in quality of service. Without a doubt, the certificated segment of the industry competed vigorously in service. The profitability and growth of individual firms depended on the skills of management in containing costs and offering innovative and high quality service. Despite the ease with which the ICC granted Tariff Bureau requests for rate increases when costs increased, there were firms that failed to earn a reasonable return. In part this was the case because the rate increases the ICC granted were based on average performance.

Those firms whose costs were too high or who produced low quality service had low returns. If their certificates granted them operating rights in valuable areas, their certificates were purchased by other carriers. The ICC readily approved mergers in the motor carrier industry. It was by such mergers and acquisitions that the companies with the greatest managerial skills grew to great size. Within such companies the emphasis on quality of service was even greater than in the industry as a whole. Cost containment, quality control, and marketing of service were the keys to success in the regulated era. The development of pricing strategies and competition in rates along with competition in service had to wait for passage of the Motor Carrier Act of 1980.

The hearings that preceded passage of the 1980 Act were similar to those of the Airline Act in that some of the same kinds of forecasts were made about the effects of deregulation. It was claimed that freedom of individual carriers to quote rates, and the discounting that would take place with the loss of power by Tariff Bureaus (the rate setting truck operators' cartel) would lead to chaos in rates; and reductions in profitability would reduce service quality. It was claimed that

there had been a good deal of cross subsidization of service under regulation. Competition would reduce profitability and eliminate such subsidization, with the result that there would be a loss of service to small communities and to firms with small shipments.

The rates now paid by small to medium size shippers that are located in small communities are probably higher on average than those paid by comparable shippers whose establishments are located in the main corridors of trade and transport. However, in the deregulated environment they have service and, in most instances, there is more competition for their business than there was in the past so that service quality is better than in the past. Given the advantages that small communities have in land and labor costs, the transport situation of today is more favorable to their growth and development than it was under regulation when they had favorable tariffs but experienced great difficulty in securing service at those tariffs.

Those who opposed competition also offered opinions on safety that were similar to those that had been voiced in the airline hearings. It was claimed that severe price competition would greatly increase speed violations by trucker. Increased speeds would increase the rate and severity of highway accidents. It was also claimed that there would be more instances of drivers beginning trips with too little rest, and staying behind the wheel for excessively long periods of time. It was believed that such behavior would also increase accident rates. Price competition and the cutting of profit margins would also force firms to reduce the amount spent on vehicle maintenance, and force them to hold onto old vehicles much longer than they had in the past. These conditions were also supposed to lead to increases in accidents and reductions in quality of service.

No one can doubt that overall deregulation has benefitted shippers by providing them with the lower rates that were promised by the legislation. In part, the lower rates are the result of what has happened to wages. Between 1970 and 1980, real wages increased by one-half of one percent per year. Between 1980 and 1985, real wages fell by three percent per year (U.S. Department of Labor, various years), at the same as the negative impacts on costs of restrictive work rules were somewhat mitigated.

Statistics that were presented in the introductory portion of this Summary Statement indicated real rates are now more favorable to shippers. This being the case, if there are societal disbenefits that are the result of economic deregulation they must be in the areas of service quality and safety. Let us first take up the issue of quality of service, including accidents that involve loss and damage to freight but do not involve fatalities.

There is a near absence of complaints among shippers that the quality of service they receive has fallen since deregulation. One can read as widely as one wishes in the professional and business magazines that deal with logistics and physical distribution, traffic management, and materials handling, and fail to find evidence of the kind of consumer unrest that characterizes airline passenger travel. Price competition in the motor carrier industry has meant that shippers have a continuum of choices in rates and quality of service. If they wish they can have service quality as high, or higher than, any they had in the regulated environment and pay a high price for it, or they can choose to pay less and have lower quality service.

In recent years many U.S. manufacturing firms have adopted a type of logistical strategy known as Just In Time (JIT) production. It is characterized by an emphasis on the reduction of inventory carrying costs by, among other things, the use of very dependable trucking service that is closely integrated with a manufacturer's production schedule. Such close integration of transportation and production cannot be achieved without trucking service that meets tight delivery schedules and has very low loss and damage rates.

It should come as no surprise to anyone who has studied transportation, that where economic and technical conditions favor the existence of many carriers a type of competitive situation emerges in which a wide range of service qualities and charges are offered, and shippers are pleased with what the industry has to offer. After all, there are important, long standing examples of such unregulated situations in U.S. transportation. They include the movement of almost all of the goods that are carried on the nation's inland waterways; the movement of agricultural goods by motor carriers that, at the insistence of shippers of agricultural goods, were exempt from the limits on competition imposed by the 1935 Motor Carrier Act; and freight transport in the Commercial Zones of cities. The latter, which were originally regarded as the areas from which rail terminals located inside cities derived their freight have been areas of free competition from the days when goods moved to rail terminals by horse and wagon.

At various times there have been efforts to bring each of the above transport sectors under economic regulation. However, such moves originated with, and were in the main supported by carriers from other modes of transport or other branches of the same industry that were in competition with a less regulated sector. Such efforts did not receive significant support from the shippers who were served by the free market sectors. Lack of shipper support for expanded regulation would not have been the case if price competition tended to denigrate service quality.

Data on accidents that involve loss and damage to freight lend support to the position that motor carrier firms can compete vigorously in price and still offer high quality service. As was pointed out at the Conference, if correction is made for changes in the value of goods, the adjusted index of accidents per truck mile fell from 100 in 1978 to 69 in 1985--a 30-percent reduction. The nature of the adjustment requires some comment.

For many years, carriers were supposed to report all accidents involving $2,000 or more in property damage. Over time, the value of goods shipped and the cost of the repairs increased because of increases in prices. When prices go up, one should expect the number of reported accidents involving the fixed $2,000 limit to increase even if the total number of accidents and mileage remained constant. Recently DOT carried out an investigation that involved use of a Gross National Product based deflator. It recomputed the published data on accidents using a $2,000 real value instead of a $2,000 nominal value. The 30-percent reduction in accidents per mile reported above is the result of that adjustment (Schweitzer).

Such a reduction in the accident rate must be interpreted cautiously because accident data that do not involve fatalities are probably flawed (Jovanis). They are based on reports that the interstate carriers themselves submit. Carriers have an incentive to make operations appear as safe as possible to shippers. They probably under report accidents, especially those that involve relatively minor dollar amounts of damage. In addition, intrastate carriers are not required to report their nonfatal accidents to federal authorities.

In the opinion of the writers of this Summary Statement, these flaws should not be taken to mean that the decline in the adjusted value property damage accident rate reported above is fictitious. If we look at the rate of fatal accidents, the reporting of which is not subject to the flaws that contribute to the property damage accident statistics, we find that this has fallen. It is difficult to believe that truck related fatal accident rates could fall but property damage rates fail to do so. While it is true that the rate of survival in highway accidents has increased--due in part to increased seat belt use--the aggregate levels of fatal and nonfatal accidents track each other closely over time.

The number of automobile fatalities in which trucks are involved has caused a great deal of concern. The public and some members of the media believe that automobile users of highways

are considerably less safe than they were in the regulated environment when, because of restricted entry, there were many fewer truck-miles than there are today. It should be added that there are also many more cars on the road today than there were in 1980, and that lower fuel prices have led to an increase in average miles traveled per auto per year.

In point of fact, the index of auto fatalities in truck related accidents per mile of automobile usage fell by 21 percent from 1978 to 1985, based on data from the Federal Highway Administration and the National Safety Council. Per mile traveled, automobile users of the highways are safer with regard to accidents with trucks than they were in the more regulated environment. If fatalities are expressed in relation to truck rather than auto miles, the decline in the fatality rate is less pronounced, falling from .064 fatal accidents per million truck miles in 1978 to .054 in the period 1983-1985, a 15-percent decline (Schweitzer). The present writers believe that a more accurate picture of the risk of truck related automobile fatalities is conveyed by the statistic in which truck related automobile fatalities are in the numerator, and auto, rather than truck, mileage is in the denominator. It is auto mileage that determines amount of auto occupant exposure to situations that produce accidents. The statistic in which truck mileage is in the denominator is more appropriate for trucking firms that wish to insure themselves against claims that arise from fatal accidents, or for companies that insure them.

There is also at least one way in which regulatory reform has contributed substantively to safety. In the current environment, certificated carriers are free to choose the highways by which they travel in picking up and delivering freight. They are no longer required to follow a set of rules, which today look absolutely insane, involving what were known as gateway cities, and which influenced routings. In response to this aspect of truck regulatory reform, carriers shifted mileage to the interstate highway system, which has significantly lower accident rates than any other part of the highway network. The number of deaths from truck-auto head-on collisions would probably be greater today if trucks had not reduced their usage of undivided highways in rural areas. In this regard, the motor carrier industry differs from airlines. In airlines, as we noted earlier, the decline in accident rates in the years since passage of the act is more the result of long run improvements in the quality of safety inputs and safety technology than economic reform.

The participants in the Conference generally agreed that economic deregulation has not led to an increase in the fatality rate. Neither has it increased the rate of industrial injuries and illnesses of trucking industry employees (Viscusi). It has not done so despite the fact that some of the links between economic deregulation and safety measures, such as vehicle maintenance, and compliance with federal regulations on driver qualifications and hours of driving, were found to exist by the researchers who prepared papers for the Conference (Chow, Corsi, and Fanara). However, while statistically significant, some of the linkage factors were found to have quite small effects. They explain only a small part of the total number of accidents.

One of the papers presented at the Conference examined the safety record, and the record of safety violations of new entrants into the motor carrier industry; they were found to have higher accident rates. However, the researchers could not find a statistically significant tie between the higher accident rates of new entrants and the kinds of safety violations that could be expected to cause accidents. There was evidence of a learning curve concerning safety. New entrants were found to have higher than average accident rates, but the rates fell rapidly as years in business increased. Thus, the accident record of a sample of new firms revealed that in 1985, the firms that had been established in that year had an accident record of .246 accidents per million vehicle miles while the firms that had been established in 1980-1981 had a 1985 accident rate of .167 (Corsi and Fanara).

It is difficult to foresee a detectable, long-run negative impact on safety from findings on the safety record of new entrants. Deregulation more than doubled the number of firms in the industry, but that effect is in the past. In each year in the future the number of new firms will be smaller than the number that entered in the first years of deregulation. The impact on the national safety record of the higher than average accident rate that new entrants tend to have in the first few years of their operations is unlikely to be detectable, because they will comprise a very small percentage of the total number of firms in the industry.

Another of the links between economic regulation and safety is the increased economic pressure that price competition puts on firms and which, some believe, can cause them to operate less safely in a variety of ways. Evidence presented at the Conference suggested that carriers close to bankruptcy spent relatively less on safety related items (Chow). However, we cannot be certain from this evidence that these firms have an inferior accident experience. More recent evidence (Bruning, 1987) does show a negative relationship between profitability and accident rates. A ten-percent improvement in a firm's return on investment leads to a three-percent decline in its accident rates. While this result is statistically significant, the work does suffer from some statistical deficiencies. Other researchers at the Conference reported on the results of a study in which drivers were interviewed and asked to compare current safety conditions with those prior to 1980. Drivers did tend to agree that economic pressures led them to adopt less safe practices (Capelle and Beilock; see also Baker). It is difficult to assess the accuracy of the findings because drivers were being asked to recall experiences over a six-year period. The results of such a survey have to be highly impressionistic and probably biased, because recent events tend to be recalled more vividly than past events. Besides, deregulation has had a negative impact on drivers' wages and they should not be expected to be too pleased with it. Finally, on this point, an earlier 1970 survey reported that economic pressures had similar impacts on safety practices even then (Fellmuth, 1970).

Findings were reported at the Conference which suggest that the quality of drivers the industry has recently been attracting has been falling (Papai). In part the decline is due to the fact that in the new competitive environment wage rates have failed to keep pace with their growth elsewhere in the economy. This situation may help explain the higher-than-average accident rates of new entrants into the industry. New, small firms tend to hire nonunion drivers. They pay lower than average wage rates and end up with drivers of lower than average quality. However, a second and equally important effect on driver quality comes from the fact that with deregulation there was a tremendous short-run increase in demand for drivers, and a short-run supply function that may have actually declined. However, the problem is one of the short rather than the long run. Over time, the low quality drivers that have been hired will tend to be fired. In addition, wages will be bid up to the point where the relatively small number of new drivers that are needed each year will be of higher quality.

Regulatory reform and increased price competition in the motor carrier industry was seen by one researcher as a source of increased diversion of freight from rail to truck. Since trucking has a higher fatality rate than rail transport, such a shift was seen as a possible source of future declines in overall transport safety (Boyer). Still, the record stands at this date. The fatality rate in the system as a whole has fallen during the years since passage of the Motor Carrier Act.

The essential conclusion regarding the motor carrier industry that was reached at the Conference was that no objective evidence had been found to support a position that economic deregulation had caused a degradation of highway safety or the quality of freight delivery services. Since it also seemed clear that real transport rates had fallen, there was no basis for a return to

economic regulation. Conference participants were strongly in support of the view that where safety difficulties were identified, they should be addressed by safety measures, not economic regulation.

This conclusion is supported by the findings of leading groups that study accidents in which trucks are involved. Thus, in a recent publication, the University of Michigan Transportation Research Institute (UMTRI, 1987) reported that accidents are strongly conditioned by the nature of the road on which travel takes place, and on driving conditions. The study points out that rural non-interstate roads account for 54 percent of all truck fatalities but only 37 percent of the travel. Fatalities on these roads are in the main the result of head-on collisions. Authors of the UMTRI Report state that the incidence of such collisions at dawn comprise a severe problem. As expected, on divided highways, rear-end collisions are more frequent than head-on collisions. They also tend to be concentrated in the evening hours and at dawn when driver perceptions are poorest. These are not matters that are related to economic regulation.

The UMTRI report also raises questions about one of the supposed links between economic regulation and safety. Namely, that increased price competition and financial pressure on firms might lead them to establish schedules that would force drivers to violate the rest and hours of driving regulations. Such violations would lead to increased driver fatigue and accidents. The UMTRI report notes that more than 50 percent of all accidents that occur at dawn involve head-on collisions. However, it was found that in the dawn hours, drivers who had been driving for longer than three-and-one-half hours comprised a smaller percentage than is the case for any other time period. The UMTRI report concludes that there is no simple link between fatigue and accidents.

5. THE MOTOR CARRIER INDUSTRY--POLICY RECOMMENDATIONS

5.1 Fatality Rates, High-Risk Zones, and Highway Improvements

State police organizations and local police are generally aware of the stretches of roads in their areas that have a high incidence of serious accidents, both death and physical injury. Money should be provided by a program that might be funded by states and the federal government to identify the nation's most hazardous zones and the time periods in which most of the accidents in those zones occur. Amounts of travel, as well as numbers of accidents, would be taken into account in identifying the nation's riskiest stretches of highway. Program funds should be used to investigate these zones, and to make recommendations as to measures that would be most efficient and economical in reducing their accident rates.

In some cases the most effective measure in a cost-benefit sense might be increased police surveillance during certain travel periods. In other cases the recommendation might be to improve the physical characteristics of some stretch of highway. The cost of such improvements might have to be funded by states as well as the federal government. (*) In still other cases the appropriate measure might be very high peak hour tolls that would significantly reduce congestion in a hazardous zone, such as the Washington, D.C. Beltway, at certain times of the day.

5.2 A Central Computer Accident File Open to Shippers and Other Recognized Groups Such as the American Automobile Association

A program of providing consumers of airline service with information about delays in travel was recently introduced as a way of encouraging airlines to meet their announced schedules or to alter them in realistic ways. Information made available to consumers makes firms respond with quality improvements. The basic idea involved in that program should be carried over to the highway area.

A central computer file should be created in which data are stored on the fatal and property damage accident rates, and possibly the record of safety violations of motor carriers. (*) This file should be open to shippers, shipper groups, and other highway user organizations. The availability of such information would significantly increase the marketplace incentives that trucking firms have to oversee and manage the safety aspects of their operations more carefully. The Commercial Vehicle Safety Alliance is already starting to computerize firm level accident and violation data to assist enforcement personnel.

Truck related fatal accidents attract almost no media attention outside of the local area in which they occur because individual accidents involve very few deaths or injuries. As a result, there is little nationwide public awareness of truck accidents. The kind of file that is envisaged in the present proposal would increase such awareness by a group that is very important to carriers, shippers of freight. Before selecting a carrier, many shippers would use the central file to investigate its accident and safety violation record, perhaps because they might avoid carriers that could pose legal problems for them. Awareness of carriers' accident and safety records by shippers would increase the dollar incentives that trucking firms have to oversee, and manage the safety of their operations more effectively. In evaluating this proposal, the costs of such a program should also be taken into account.

5.3 Improved Data on Property Damage Accidents

The kind of program described above, and the amount of marketplace incentive for increased safety of trucking operations that it provides, depends on the extent and accuracy of the data included in the computer file. At the present time, only interstate carriers are required to file reports on accidents that involve property damage, and they probably under report accidents. The reporting requirement for damage-only accidents was held constant at $2,000 in damages for many years. Ultimately with inflation, this tended to trivialize the activity and contribute to under reporting.

The minimum limit on dollar value of damages for accident reporting purposes has been raised to $4,400. It should periodically be increased as the price level increases. In addition, the federal government should provide funds and other incentives for the states to gather comparable property damage accident statistics for intrastate carriers that would also be included in the federal data file.

5.4 Speed Limit Monitoring

(*) Everyone who studies accidents knows that the rate of serious injuries and deaths increases as the speed of vehicles increases. The American Trucking Associations opposed the recent increase in the speeds on rural interstate highways because it believed that the result would be an

increase in fatalities. Preliminary investigations have revealed that the accident rate has already increased measurably. The effects of the increased speed limits should be carefully evaluated after they have been in effect for a suitable period of time, say a year, in part to determine whether truck drivers violate the new higher speed limits and, if so, what kinds of drivers tend to be the most frequent violators, and whether they have higher-than-average accident rates.

5.5 Commercial Zone Operations and Safety Regulations

Current safety regulations governing vehicle maintenance, driver licensing, and work hours regulations do not apply to firms that operate strictly within the Commercial Zones of cities. Some knowledgeable people believe that these zones have become dumping grounds for bad drivers and poorly maintained equipment. This type of claim is much like those that were advanced against regulatory reform in the motor carrier industry. Whether or not the claim is valid, there are other reasons for changing the current situation. The open entry, competitive environment in which the motor carrier industry functions has eliminated the need for the Commercial Zones. They were created and left free of entry restrictions and rate controls so that service to rail terminals would be efficient and low cost. There is no longer any reason for them to exist. (*) They should be eliminated. The carriers that have been operating within them should be granted ICC certificates. If nothing else, such a change would eliminate any unfair cost advantage that Commercial Zone trucking firms now have in competing with ICC certificated firms for business inside the Zones.

5.6 Monitoring of New Entrants and Financially Stressed Carriers

Research that was prepared for the Conference found that new entrants into the motor carrier industry did tend to have a somewhat higher accident rate than firms with more years of experience. It was pointed out that the rate fell quickly. Nevertheless, it might be worthwhile to maintain accurate accident records on new firms, and to determine whether their accident rates are significantly higher than those of other firms over a long enough period of time to make it worthwhile to subject them to special inspections concerning safety violations, vehicle maintenance, etc. (*) A program of special monitoring of new firms should be adopted only if it can be proven to be in the social interest in a cost-benefit sense, because the imposition of special burdens on new firms can act as a barrier to entry and as a way of restricting competition.

Research reported at the Conference also showed that firms on the verge of bankruptcy reduced their expenditure on safety related areas of operations. It might be worthwhile following the accident rates of financially troubled firms to determine whether they are higher than average.

5.7 The Program of Road Inspections

With virtually unanimous agreement that accidents depend on the nature of the road, on the quality of the driver, and on driving conditions, rather than presence or absence of economic controls, it followed quite naturally that participants in the Conference would look to safety measures for improvements in safety conditions. Most participants welcomed the increase in safety oversight by states and the federal government. The Motor Carrier Safety Assistance Program, which received increased funding in 1986, is an example of such oversight. It provides funds for an almost tenfold increase in road safety inspections. Conference participants also strongly

supported the objectives of the Commercial Motor Vehicle Safety Act of 1986 which in a few years will lead to a situation in which truck drivers will only be able to hold a single license. It will then be much more possible to identify and weed out drivers who have high accident rates, or who are found to be involved in drug and alcohol abuse. Progress is also being made in achieving uniformity in state vehicle inspection systems through the Commercial Vehicle Safety Alliance (Daust and Cobb).

Road inspections have been shown to reduce accidents, but it is not clear that a simple increase in police surveillance would not accomplish as much, and at lower private and public cost. The nation is already embarked on a greatly increased program of road inspections. That program should be carefully evaluated in cost-benefit terms before further increases in it are made. In this regard an important, general principle on the evaluation of safety programs was expressed at the Conference, namely, evaluation of programs should be carried out by agencies other than the ones that are responsible for them (Hauer).

6. CONCLUDING REMARKS

Regulatory reform in the motor carrier industry has brought increased price competition. Shippers of freight and consumers of the products carried by motor carriers have benefitted from truck rates and commodity prices that are lower than they would otherwise be. Both service quality and rates are now variables. Those shippers who require premium service and are willing to pay for it can obtain service equal to or better than anything that was available under regulation. However, there is now a continuum of quality and rates. Shippers can pick that combination of rates and services that best meets their needs, a situation that has led to major savings in logistical costs for firms.

Overall, there is no evidence that regulatory reform has had a negative impact on safety. However, there may be areas where increased truck-auto congestion has increased the fatality rate, and where increased surveillance, highway improvements, expansions, and appropriate pricing could be economically justified to cope with the problem.

Regulatory reform in the airline industry has also brought increased competition and price benefits to most airline travelers. Service quality has fallen. However, it seems indisputable that the declines in service have not been so great that travelers are worse off than they would be under the higher rates that would exist today were the system still under the economic control of the CAB.

There is no evidence that a reduction in economic regulation has caused an increase in airline fatality rates. Rather, the long-term downward movement of accident rates has continued during the years of economic deregulation. However, the success of deregulation in holding down rates has brought such an increase in airline travel that the system is currently straining at capacity, particularly at the major hub airports where congestion during peak travel hours, from private as well as commercial aviation, is a serious problem. It poses a potential threat to the safety of airline passengers, and may lead to increased fatalities in the future.

An important lesson learned from the United States' experience is that changes in the environment of economic regulation that achieve their economic goals also require that there be a careful and timely reevaluation of the role of government in overseeing safety and providing infrastructure.

REFERENCES

Air Transport Association of America (1987). *Air Transport 1987: The Annual Report of the U.S. Scheduled Airline Industry*, Washington, DC.

Bruning, E. (1987). "The Relationship between Profitability and Safety Performance," Allied Social Sciences Associations Annual Meeting, Chicago, Illinois, December 1987.

Commercial Carrier Journal (1980, 1985) for December 1980 and December 1985.

Delaney, R. V. (1987). *The Disunited States: A Country in Search of an Efficient Transportation Policy*, CATO Institute Policy Analysis Paper No. 84, Washington, DC.

Evans, M. K. (1987a). *Macroeconomic Implications of Trucking Deregulation*, Coalition for Sound General Freight Trucking, Washington, DC.

Evans, M. K. (1987b) "Has Deregulation Helped or Harmed the Transportation Sector?" Allied Social Sciences Associations Annual Meeting, Chicago, Illinois, December 1987.

Federal Highway Administration (various years) *Accidents to Motor Carriers of Property*, U.S. Government Printing Office, Washington, DC.

Fellmeth, R. (1970). *The Interstate Commerce Omission--The Public Interest and the ICC*. Grossman Publishers, New York, New York.

Fingerhut, V. (1986). "The Pilots View of Air Safety," *Air Line Pilot*, Vol. 55(10), pp. 17-22.

General Accounting Office (1987). *Trucking Regulation: Price Competition and Market Structure in the Trucking Industry*, report number GAO/RCED-87-16, U.S. Government Printing Office, Washington, DC.

Morrison, S. and Winston, C. (1986). *The Economic Effects of Airline Deregulation*. Brookings Institution, Washington, DC.

National Safety Council (various years). *Accident Facts*. Chicago, Illinois.

National Transportation Safety Board (various years). *Annual Report*. U.S. Government Printing Office, Washington, DC.

Scocozza, M. V. (1987) Testimony before the Subcommittee on the Rural Economy and Family Farm of the Senate Committee on Small Business, October 28, 1987. U.S. Congress, U.S. Government Printing Office, Washington, DC.

Tye, W. B. (1987). *Encouraging Cooperation Among Competitors: The Case of Motor Carrier Deregulation and Collective Ratemaking*. Quorum Books, New York, New York.

U.S. Department of Labor (various years, monthly). *Employment and Earnings*. U.S. Government Printing Office, Washington, DC.

U.S. Department of Transportation (various years). *National Transportation Statistics*. U.S. Government Printing Office, Washington, DC.

U.S. Department of Transportation (1987). "The Aviation Trust Fund Surplus--Why It's There," press release dated August 26, 1987.

University of Michigan Transportation Research Institute (1987). "Large Truck Survey Program," Proceedings of the *National Truck Safety Symposium*, Motor Vehicle Manufacturers Association, Washington, DC.

The following references appear in the *Proceedings* of Northwestern University Transportation Center's *Transportation Deregulation and Safety Conference*.

Bailey, E. E. (Dean, Carnegie Mellon University) and Kirstein, D. M. (Beckman & Kirstein) "Truth in Scheduling."

Baker, F. (President, Transportation Research and Marketing) "Safety Implications of Structural Changes Occurring in the U.S. Motor Carrier Industry."

Bolger, W. F. (President, Air Transport Association of America) "Deregulation: Past or Prologue? (Whither the Infrastructure?)."

Borenstein, S. and Zimmerman, M. B. (University of Michigan) "Market Incentives for Safe Commercial Airline Operation."

Boyer, K. D. (Michigan State University) "The Safety Effects of Mode Shifting Following Deregulation."

Capelle, Jr. R. B. (Director of Research and Statistics, Regular Common Carrier Conference) and Beilock, R. (University of Florida) "Deteriorating Safety Conditions and the Results of Reduced Economic Regulation of the Motor Carrier Industry: The General Freight/LTL Trucking Industry Perspective."

Chow, G. (University of British Columbia) "Deregulation, Financial Condition and Safety in the General Freight Trucking Industry."

Corsi, T. M. (University of Maryland) and Fanara, Jr. P. (Howard University) "Effect of New Entrants on Safety."

Daust, J. E. (President, Commercial Vehicle Safety Alliance) and Cobb, D. L. (Michigan State Police) “The Relationship Between Economic Deregulation of the Motor Carrier Industry and its Effects on Safety.”

Hauer, E. (University of Toronto) “The Reign of Ignorance in Road Safety: A Case for Separating Evaluation from Implementation.”

Jovanis, P. P. (Northwestern University) “A Perspective on Motor Carrier Safety Issues in the 1980s.”

Kanafani, A. and Keeler, T. E. (University of California-Berkeley) “New Entrants and Safety: Some Statistical Evidence of Airline Deregulation.”

Kern, J. S. (Deputy Associate Administrator for Aviation Standards, Federal Aviation Administration) “Effect of Deregulation on the Federal Aviation Administration's Inspection and Surveillance Efforts.”

Lauber, J. K. (Board Member, National Transportation Safety Board) “Assessing the Impact of Deregulation: The Benchmarks of Airline Safety.”

McLure, H. R. (Senior Associate Director, Transportation Issues and Planning, General Accounting Office) “The Need for Additional Surveillance in the Airline Industry.”

Nance, J. J. (Author, Attorney, former airline pilot) “Economic Deregulation's Unintended but Inevitable Impact on Airline Safety.”

O'Brien, J. E. (Director, Engineering and Air Safety, Air Line Pilots' Association) “Deregulation and Safety: An Airline Pilot's View.”

Oster, Jr. C. V. and Zorn, C. K. (Indiana University) “Airline Deregulation: Is It Still Safe to Fly?”

Panzar, J. C. and Savage, I. (Northwestern University) “Regulation, Deregulation and Safety: An Economic Analysis.”

Papai, R. F. (Director of Safety, Ruan Transportation) “Deregulation and Safety: A Truck Load Carrier's View.”

Rose, N. L. (Massachusetts Institute of Technology) “Financial Influences on Airline Safety.”

Schweitzer, R. P. (Legislative Counsel, Private Truck Council of America) “The Myth of Economic Deregulation and Safety in the U. S. Motor Carrier Industry.”

Stiglitz, J. E. (Princeton University) and Arnott, R. J. (Queens University) “Safety, User Fees and Public Infrastructure.”

Viscusi, W. K. (Northwestern University) “The Effect of Transportation Deregulation on Worker Safety.”