The Costs and Benefits Associated with the Americans with Disabilities Act

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Introduction

This report provides preliminary estimates of costs and economic benefits associated with adoption of the "Americans with Disabilities Act of 1989" (ADA). All estimates presented here must be viewed with caution and a certain degree of skepticism. This is for three reasons. First, the estimates were developed in the absence of knowledge of the final operational meanings to be given to certain terms and provisions of the act. For example, Section 402(4)(A) specifies that the term "discriminated against" includes "a failure to remove architectural and communication barriers . . . where such removal is readily achievable." The meaning of this section is clearly highly dependent on the final definition given to the term "readily achievable." Second, the knowledge base from which several of the estimates were developed is limited. For example, our experience with making intercity buses accessible to the disabled is minimal. Third, cultural and technological reactions to the provisions of the bill cannot be predicted with any certainty. For example, we cannot reliably predict the total usage levels (and therefore costs) of telephone relay services because we do not know how relay services, when uniformly available, will be integrated into the lives of hearing impaired people.

With these caveats, it is nonetheless possible to make reasonable ball-park estimates of overall costs. To enable the reader to evaluate these estimates, the report attempts throughout to provide a sense of the quality and quantity of data upon which individual estimates are based.

The report focuses on the four primary areas where ADA is likely to have the largest cost impact:

1. Public transportation, primarily:
   - Urban bus transportation,
   - Intercity bus transportation, and
   - Rail transportation;
2. Telephone relay systems;
3. Architectural modifications in public accommodations; and
4. Employment.

Table 1 presents our summary of cost estimates by area. As can be seen, for most areas we have developed high, medium and low cost estimates. The basis and meaning of these estimates is presented below. Wide variations between the high and low cost estimates does not necessarily indicate a correspondingly high level of uncertainty. For example, the difference between the high estimate of $217 million[1] for intercity buses and the low estimate of $17 million is primarily a function of a policy choice, namely whether some, all, or no new intercity buses will be required to have accessible restrooms. In other cases, such as the difference between the high and low estimates for rail systems, the disparity is due primarily to the varying costs of alternate technological solutions to the problem of accessibility. Finally, for some areas, such as employment, the differences between the high and low estimates are primarily a function of our inability to project costs on the basis of available data. Therefore, readers are urged to remember that each cost estimate can only be understood in terms of the specific assumptions on which it was based.

1. Given several extreme assumptions, the cost estimates can go as high as $559 million.

Table 1: ADA Cost Estimate Summary

Cost Element	High Cost Estimate (Millions)	Medium Estimate (Millions)	Low Cost Estimate (Millions)
Employment	102	51	26
Public Transportation			
Urban Buses	21	21	21
Intercity Buses	217	57	17
Rail Transportation	25	19	16
Telephone Relay Systems	128	36	0
Architectural Barrier Removal	270	135	27
TOTAL COST	763	319	107

Economic benefits of two types were also estimated:

1. Increased employment income of disabled Americans, and
2. Decreased expenditures for welfare and insurance benefits.

Table 2 presents our summary of the economic benefits of ADA. No estimates of non-economic benefits -- the social benefits of increased integration of the disabled into the American mainstream, and noneconomic benefits to individual disabled Americans -- were made in this report.

Table 2: ADA Economic Benefit Estimate Summary

Economic Benefit	High Estimate (Millions)	Medium Estimate (Millions)	Low Estimate (Millions)
Decreased Welfare and Insurance	2,400	1,200	600
Increased Employment Earnings	18,700	9,350	4,675
TOTAL ECONOMIC BENEFITS	21,100	10,550	5,275

The table shows benefits that exceed potential costs by an order of magnitude. Even assuming the highest cost estimates and the lowest benefit estimates, ADA is projected to have a benefit to cost ratio of 7 to 1. This is particularly surprising given the consistently conservative assumptions used in estimating benefits. We estimated no employment income gains for those disabled Americans who are currently employed but experiencing discrimination in salary or position. Of the 6 million nonworking disabled adults who wish to be employed, we estimated that the bill would positively affect the employment status of only .4 to 1.7 million; and among those affected, we subtracted lost welfare and insurance benefits when calculating income gains from employment. When calculating benefits from reduced welfare and insurance payments, we assumed that the large majority of those employed as a result of ADA would retain full benefits. Also, the welfare and insurance benefit savings estimates included only cash payments and excluded medical benefit savings. Less conservative assumptions would have produced much larger estimates of the economic benefits.

Public Transportation

Intercity buses

Because the experience level with accessible intercity buses is very low, very little direct evidence exists on which to base estimates of ADA costs. Moreover, the associated technology is in a period of rapid change. Costs of making intercity buses accessible have five major components: 1) capital costs of lifts, accessible restrooms, and other equipment, vehicle modifications and associated installation costs; 2) maintenance costs; 3) loss of seats and associated revenue, 4) loss of package space and associated revenue; and 5) training costs. All these costs vary depending on the standards for accessibility, the technology employed, and the volume of demand for equipment.

Lifts

Capital costs for intercity buses are usually amortized over a 10-year period rather than the 12-year standard for urban buses. The shorter period is consistent with the much higher average mileage driven by intercity buses. The 10-year amortization period is consistent with Greyhound's fleet turnover practices, and corresponds to the ratio of the total number of intercity buses in service to new buses introduced to service each year (20,000 to 2,000).[2]

Given a 10-year amortization schedule, it is reasonable to estimate the annual costs as 10 percent of capital costs. The major capital expenditure associated with accessibility is the purchase and installation of lifts.

There are currently two major manufacturers of intercity bus lifts in the United States. The first is MCI, which offers a fully automatic elevator-type lift. The MCI lift is an elevator installed in the side of the bus. The lift takes approximately one-third of the under-the-bus cargo space, and two seat spaces. In a new bus, the MCI lift costs approximately $35,000 including installation. The primary customers for MCI lifts have been the Golden Gate Transit District in California, Massachusetts Bay Transit Authority, and Greyhound. Greyhound of Dallas has experienced an average of $3,000 per year in maintenance costs. Massachusetts reports an annual maintenance cost of $1,000.

2. The ratio of new to total buses in service is a reasonable measure of bus lifespan because of the relatively flat growth curve of the intercity bus industry.

The second major type of intercity bus lift is the Hubmatic, which is manufactured in Germany by AMF. The Hubmatic Lift is an external lift. It requires no cargo space nor seat space for use. The Hubmatic is not fully automatic and requires the driver to assist at the side of the bus. The Hubmatic costs approximately $10,000 including installation in a new bus. The primary American customers for Hubmatics have been Denver Public Transit, Santa Barbara Public Transit, Palm Springs and Greeley, Colorado Public Transit. Denver, which uses 17 of the Hubmatics, reports an average annual maintenance cost of $15. Santa Barbara, which has used 20 of the Hubmatics over three years, reports *no* maintenance costs.[3] In Germany, Hubmatic lifts have successfully been used for many years on Setra intercity buses and German Red Cross intercity buses.

AMF and their American importer, Bus Manufacturers, report that they can presently supply 30 lifts per month. With advance notification the number can be increased to 100 lifts per month in three months, with large increases in production readily available in relatively short periods.

The prices of $10,000 for the Hubmatic and $35,000 for the MCI lift are based on installation in new buses. Installation in existing buses can substantially increase costs because of the potential need for door changes in the case of the Hubmatic and structural changes in the case of the MCI lift. Denver Public Transit currently is having a used Eagle Bus modified to employ a Hubmatic at the cost of $20,000. Engineers involved in the project estimate that modifications of a large number of buses could be accomplished at a 30 to 40 percent savings.

Accessible Restrooms

A key feature of intercity buses is that most have restrooms. Section 303 of ADA does not define accessibility and use to include or exclude restrooms. Officials of Transit Canada report that to date, restroom accessibility has not been an issue with the various disabled groups involved in their planned demonstration of accessible intercity bus service

3. Santa Barbara is not using the Hubmatics on intercity bus lines and Denver only employs the Hubmatic on a short intercity run between Denver and Boulder. Therefore it is legitimate to question whether the maintenance experience in these areas would generalize to long-distance intercity bus lines. Intercity buses are structurally designed to have a certain flexibility. The resulting minor structural body twists could affect lift performance. Engineers from United States Bus Manufacturers, which imports the Hubmatic, state that because the Hubmatic is bolted on rather than structurally integrated into the bus the wear and tear of long-distance bus runs will not adversely affect the Hubmatic.

in Ottawa. In the demonstration, wheelchair users will use accessible restrooms at bus stations.

If accessibility is defined to include accessible restrooms on all or some intercity buses, costs would increase. We were unable to locate any company with direct experience with the installation of accessible restrooms on intercity buses. Greyhound estimates the cost to be $1,000. Engineers with MCI and Transit Canada found this estimate to be plausible although potentially low.

Maintenance costs are not expected to be any higher for accessible than for inaccessible restrooms.

Seat Loss

The loss of passenger seats through reserving space for wheelchair users, lifts and accessible restrooms potentially constitutes the largest component of accessibility costs. The MCI lift requires the removal of two seats, the Hubmatic none. Wheelchair-reserved space requires either removing one or more seats, or using removable seats or flip seats on tracks. Accessible restrooms require both removing seats to make room for the restroom plus possibly removing seats to make the aisle to the restroom accessible.

The Transit Canada demonstration, which uses MCI lifts and flip seats on tracks, and does not include accessible restrooms, will have a two-seat-per-bus seat loss. If the demonstration had chosen Hubmatics no seat loss would occur.

At the other extreme, Greyhound estimates that use of the MCI lift, 2 reserved spaces for wheelchairs, and an accessible restroom would require removal of 8 to 14 seats depending on aisle accessibility requirements.

Table 3 summarizes expected seat loss under various levels of accessibility and design options.

Table 3: Seat Loss by Bus Configuration

Configuration	Seat Loss
MCI lift, 2 Wheelchair spaces, accessible restroom	8
MCI lift, 2 Wheelchair spaces (seats on tracks) accessible restroom	6
MCI lift, 2 wheelchair spaces (seats on tracks) nonaccessible restroom	2
Hubmatic lift, 2 Wheelchair spaces, accessible restroom	6
Hubmatic lift, 2 Wheelchair spaces (seats on tracks), accessible restroom	4
Hubmatic lift, 2 wheelchair spaces (seats on tracks) nonaccessible restroom	0

A possible alternative to seat loss is a larger bus. MCI, in conjunction with Transit Canada, is developing a prototype 45 foot bus. This bus will be 5 feet longer than the standard MCI bus and will include both an exterior lift similar to the Hubmatic and an accessible restroom. Because of the added length, the bus would experience no seat loss due to accessibility.[4] At this time no definite cost estimates are available for the larger

4. If the 45 foot prototype were not accessible, however, it could increase the number of seats by 8; in this sense a seat loss does occur.

bus. However, officials involved the prototype believe that the larger bus, together with the accessible features, will add approximately 10 percent or $25,000 to the cost.

A number of obstacles must be overcome before a longer bus could be adopted as a general solution to the problem of cost-effective accessibility in intercity buses. The 45 foot bus is only a prototype. MCI reports that the prototype could not be ready for manufacture before 1991. The bus size might limit its use in urban situations and on certain routes. Further, there are legal complications. In many States 45 foot buses are not currently legal on highways. Finally, there are questions of energy efficiency. The aerodynamics of the MCI bus are such that the 5 foot extension is unlikely to result in a large increase in drag, so that highway mileage should not be significantly affected. However, the weight increase may cause a noticeable deterioration in city mileage.

Data for estimating the costs of seat loss is limited. More than eighty percent of all intercity buses are not full. In fact, intercity buses average only 53 percent full per trip.[5] In such cases seat loss entails no revenue loss. Therefore, the costs of seat loss should not be defined in terms of the average revenue per seat, but as either the revenue lost by the necessity of turning away paying customers because of seat loss, or the cost of using additional buses because of seat loss.

In estimating the potential costs of seat loss Greyhound took the latter course. Greyhound maintains a policy of carrying all riders who wish to take a scheduled trip. If more riders request service than there are seats on the bus, Greyhound brings an additional bus into service. Given this policy, Greyhound estimates that for every seat lost, the average cost of bring additional buses into service will be $2,400 annually.[6]

It is highly unlikely that the annual estimate of $2,400 per seat lost for Greyhound applies to the industry as a whole. The industry averages annual income of approximately $2,000 per seat, per bus. [7] Given a maximum of 75 percent rate of full buses, and 52.6 percent full average load this translates a maximum of $961 in annual costs per seat loss.

5. "Annual Fact Book: 1985-86," Metro Magazine.
6. We were not provided with the data to examine and verify these estimates.
7. Robert R. Nathan Associates, "Federal Subsidies for Passenger Transportation, 1960-1988: Winners, Losers, and Implications for the Future," 1989, Appendix C; Metro Magazine "Annual Fact Book 1985-86"

Training Costs

An often overlooked component of intercity bus accessibility is the cost of training drivers. If the driver training requirements resembled those the DOT has established for airlines, intercity bus companies would be required to provide one day of training per year for all drivers. Generalization from DOT airline requirements, however, may overstate the need. The DOT airline requirements include a variety of training areas unique to air travel such as emergency water landings. Therefore, our training cost estimates were based on the current practices of companies now using intercity accessible buses. Golden Gate, which uses 21 intercity buses with MCI lifts, spends 1 to 3 hours total per driver on training on lift and accessibility issues. Santa Barbara, which uses the Hubmatic, spends an average of 1 hour per driver in training. The Seattle Metro accessibility training program is instructive because it goes beyond simple lift operation to include sensitivity to the diversity of disabling conditions; as part of the training the bus operators themselves also use the lifts while in wheelchairs. The Seattle accessibility training program occupies 4 hours out of a total 80-hour operator training package. If we assume three hours' average training time, three drivers per bus, driver turnover or retraining every 5 years, and 40 dollars per hour of training cost,[8] we obtain an estimate of training costs of $72 per year per accessible bus.

Package Space Loss

The MCI lift, because it is an elevator built in the side of the bus, requires substantial storage space. This storage space, in turn, reduces the amount of available package space. On two-axle buses the loss is about 30 percent, and on three-axle buses the loss is 38 percent.[9] If we assume a full load on all buses and a one-third reduction in total package space because of the MCI lift, Greyhound's cost associated with lost package space would average $9,000 per bus per year. Because package space is seldom full and packages travel on a "stand-by" basis, actual losses are likely to be much lower.

8. The 40 dollar per hour estimate includes operator salary, training and material costs, overhead and indirect costs.
9. Greyhound officials point out that the percentage loss is greater when measured not as percent of total luggage space but as percent of space remaining for packages after passenger luggage is loaded.

Total Costs

In the United States there are approximately 20,000 intercity buses in service. Of these, about 40 percent, or 8,000 fixed schedule buses and therefore subject to ADA fixed schedule requirements. The remaining 12,000 are largely in charter service.[10]

Table 4 presents the total costs of ADA, after full implementation, based on level of accessibility and technology employed for fixed-route intercity buses.

The costs of accessibility for nonfixed schedule intercity buses closely resembles the costs for fixed schedule with two exceptions. First, no package spaces costs should be assumed.[11] Second, a low cost option exists whereby charter and tour service buses could share lifts.

ADA requires that new buses be "readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs." The costs of lifts on intercity buses depend heavily on the interpretation given to this clause. If "accessible and usable" includes buses equipped with the capacity to quickly install a lift, the costs could be substantially reduced for charter service buses and other bus services where it is possible to reserve lift service in advance. Stewart-Stevenson engineers, who installed the Denver lifts, report that the Hubmatic can be installed in a prepared bus in 30 minutes. The lift weighs 220 pounds and installation requires only torching down seven bolts. Preparation of a new bus requires advance installation of the lift motor, pump, and brackets at a total parts and labor cost of approximately $700 to $900.[12] Because the MCI lift is built into the structure of the bus it cannot be shared across buses.

Thus equipped, multiple buses could share the use of one or more lifts. For costing this policy option we assumed an average of five buses would share each lift.

Table 5 summarizes the costs of ADA for nonfixed-route intercity buses under various configuration.

10. There is no clear line between fixed-route and charter service buses. For example, many charter buses regularly run identical lines between gambling centers and major cities. The costs of making these buses accessible to disabled users depend both on the standards used for accessibility and the technologies employed.
11. Indirect costs of luggage space losses may, however, occur for long-haul charters where passenger are carrying significant amounts of music, sports, or other equipment or personal possessions.
12. Costs could be substantially reduced with volume orders.

Table 4: Intercity, Fixed-Route Bus Accessibility Costs

Lift Type	Sliding Seats	Accessible Restroom	Share Lift	Lift Costs	Maintenance Costs	Package Service Costs	Restroom Costs	Seat Loss Costs (Low)	Seat Loss Costs (High)	Training Costs	High Estimate Total Annual Costs Per Bus	Low Estimate Total Annual Costs Per Bus
MCI	Yes	Yes	No	3,500	1,500	9,000	100	5,770	14,400	72	28,572	19,942
MCI	Yes	No	No	3,500	1,500	9,000	100	1,920	4,800	72	18,972	16,092
MCI	No	Yes	No	3,500	1,500	9,000	100	7,690	19,200	72	33,372	21,862
MCI	No	No	No	3,500	1,500	9,000	100	3,850	9,600	72	23,772	18,022
Hubmatic	Yes	Yes	No	1,000	100	0	100	3,850	9,600	72	10,872	5,122
Hubmatic	Yes	No	No	1,000	100	0	100	0	0	72	1,272	1,272
Hubmatic	No	Yes	No	1,000	100	0	100	5,770	14,400	72	15,672	7,042
Hubmatic	No	No	No	1,000	100	0	100	1,920	4,800	72	6,072	3,192

Table 5: Intercity, Non-Fixed Route Bus Accessibility Costs

										High Estimate	Low Estimate
Lift Type	Sliding Seats	Accessible Restroom	Share Lift	Lift Costs	Maintenance Costs	Restroom Costs	Seat Loss Costs (Low)	Seat Loss Costs (High)	Training Costs	Total Annual Costs Per Bus	Total Annual Costs Per Bus
MCI	Yes	Yes	No	3,500	1,500	100	5,770	14,400	72	19,572	10,942
MCI	Yes	No	No	3,500	1,500	100	1,920	4,800	72	9,972	7,092
MCI	No	Yes	No	3,500	1,500	100	7,690	19,200	72	24,372	12,862
MCI	No	No	No	3,500	1,500	100	3,850	9,600	72	14,772	9,022
Hubmatic	Yes	Yes	No	1,000	100	100	3,850	9,600	72	10,872	5,122
Hubmatic	Yes	No	No	1,000	100	100	0	0	72	1,272	1,272
Hubmatic	No	Yes	No	1,000	100	100	5,770	14,400	72	15,672	7,042
Hubmatic	No	No	No	1,000	100	100	1,920	4,800	72	6,072	3,192
Hubmatic	Yes	Yes	Yes	290	100	100	3,850	9,600	72	10,162	4,412
Hubmatic	Yes	No	Yes	290	100	100	0	0	72	562	562
Hubmatic	No	Yes	Yes	290	100	100	5,770	14,400	72	14,962	6,332
Hubmatic	No	No	Yes	290	100	100	1,920	4,800	72	5,362	2,482

Combining Tables 4 and 5 we obtain total annual costs of accessibility on intercity buses. As can be seen there exists great variation in total costs; ranging from a high of $559 million to a low of $17 million. It is unlikely either extreme will actually result. The high estimate would require that the intercity bus industry consistently chose the most high-priced technical alternative, that all seats on all buses be full all the time, that all package space be full on all buses, and that most stringent possible interpretation of the regulations apply to all buses.

While the low cost estimate does not depend on as many implausible conditions to converge, it does highly depend on a limited definition of accessibility that both excludes restroom accessibility and which allows the definition of accessibility to include shared lifts. If we were to combine the low cost technological alternatives with a definition of accessibility that includes accessible restrooms on all intercity buses, the total costs rise to $57 million.

Based on prior regulatory experience, we judge that the affected industry is likely to use available, cost-effective technologies to meet regulatory requirements. On this basis we find estimates based on use of the MCI lift unrealistic. Therefore, we estimate the likely plausible range of annual costs to be between $17 and $217 million based on use of the Hubmatic or similar lift.

Table 6: Total Intercity Accessibility Costs

Lift Type	Sliding Seats	Accessible Restroom	Share Lift *	High Estimate Total Annual Costs (Thousands)	Low Estimate Total Annual Costs (Thousands)
MCI	Yes	Yes	No	463,440	290,840
MCI	Yes	No	No	271,440	213,840
MCI	No	Yes	No	559,440	329,240
MCI	No	No	No	367,440	252,440
Hubmatic	Yes	Yes	No	217,440	102,440
Hubmatic	Yes	No	No	25,440	25,440
Hubmatic	No	Yes	No	313,440	140,840
Hubmatic	No	No	No	121,440	63,840
Hubmatic	Yes	Yes	Yes	208,920	93,920
Hubmatic	Yes	No	Yes	16,920	16,920
Hubmatic	No	Yes	Yes	304,920	132,320
Hubmatic	No	No	Yes	112,920	55,320

** Only nonfixed route buses are assumed to share lifts*

Urban Buses

ADA would require that all new buses brought into service be accessible. The cost of this accessibility includes the costs of lifts, maintenance, lost seats, and driver training.

Lift Cost

Lifts for urban buses cost an average of approximately $10,000 and are amortized over a 12-year period for an annual cost of $830. The cost of lifts for 1,470 new buses that would not otherwise be lift-equipped is, therefore, $12.2 million per year. This estimate may be high, because it does not take into account future trends in the percentage of buses that are lift equipped and attributes to ADA all costs of future advances in bus accessibility.

Maintenance Costs

Perhaps the best measure of lift maintenance costs comes from Seattle Metro. Seattle's system is nearly fully accessible, with 773 lifts ranging in age from 1 to 10 years. The Seattle Metro keeps detailed service and cost records, and has a reputation for full lift maintenance. During the last year Seattle spent an average of $588 per lift on maintenance.

Urban bus lifts have historically experienced severe maintenance problems in many locations. However, lift design improvements and advances in maintenance practices have proved effective in reducing the associated costs. The current generation of lifts has only one-quarter as many moving parts as the lifts of ten years ago. Seattle Metro reports that lifts purchased 10 years ago cost an average of $1,149 per year to maintain as opposed to $155 for the latest generation of lifts.[13] Therefore, current average lift maintenance costs are likely to greatly overestimate the maintenance costs of new lifts mandated by ADA. We conservatively estimate the average cost of lift maintenance, over the usable life of the lift, to be two times the average cost based on recent experience with the current generation, or $310 per lift per year.

13. Not all reduction in maintenance costs can be attributed to improved design; part of the savings in cost must be associated with lift age. Although they are unable to provide detailed data, Seattle maintenance managers have the impression that most savings come from improved design.

Seat Loss

Seat loss due to wheelchair accessibility is a much lesser problem with urban buses than with intercity buses. This is for three reasons:

1. Flip-up seats can eliminate any seat loss from reserving spaces for wheelchair users. In contrast, simple flip-up seats are not viewed as a commercially viable arrangement for long-haul intercity buses.
2. Flip-up seats can actually increase ridership on urban buses by providing additional standing space for rush-hour commuters.
3. Urban buses do not require accessible restrooms with associated seat loss.

Because of these factors, we assume no costs relating to seat loss from increased urban bus accessibility.

Training Costs

In an earlier section on intercity buses we provided data from several public transit districts indicating that training costs associated with bus accessibility average $72 per year per accessible bus. This estimate may significantly overstate the added costs of ADA, since many urban bus systems which are now only partially accessible train all drivers on accessibility issues. In such systems, the ADA would result in no new training costs. As a rough adjustment for this effect, we assumed full training costs for all bus systems on which one-third or less of current buses are accessible (approximately three-quarters of all systems); one-half training costs for all systems that have more than one-third but less than two-thirds of buses accessible (approximately one-eighth of all systems); and zero training costs for systems that are currently more than two-thirds accessible (the remaining one-eighth of the systems). This approximation results in average training costs of $59 per year per bus.

Total Urban Bus Costs

There are approximately 50,000 urban public transit buses in active service in the United States. Of these one-third are accessible to the handicapped.[14]

The percentage of buses that are accessible rises each year. Each year approximately 3,500 new buses are brought into active service.[15] Of those brought into service in 1988, 58 percent were accessible.[16] ADA, which requires that all new urban buses purchased be accessible, would increase this percentage by 42 points to 100 percent. This translates to 1,470 new buses per year. The total number of buses affected by the act would increase over the standard 12 year life-span of urban buses from 1,470 in the first year of implementation to a high of approximately 17,600 in the twelfth year after implementation. At that point, the overwhelming majority of urban buses would be accessible. Table 7 summarizes the ADA direct costs associated with urban bus accessibility over this 12-year span.

As the table shows, the projected costs of purchases of lift-equipped buses run from a first year low of approximately $1.8 million to $21 million after 12 years. This estimate is likely to be high for three reasons. First, the estimate attributes the costs of all further progress in bus accessibility to ADA. Over the last decade, an increasing percentage of new buses has been accessible; this has been a steady trend, which is likely to continue even in the absence of ADA. Second, the costs shown reflect no off-setting savings and income. No income is shown for the increase in the fares from disabled passengers.[17] Further, substantial off-setting savings are possible under ADA for those bus systems that choose to switch from paratransit systems to accessible buses. We currently have no data on which

14. "1988 Transit Passenger Vehicle Fleet Inventory," American Public Transit Association, 1988.
15. The actual number varies considerably from year to year. The 3,500 estimate is based on the ten year average from 1978 to 1987, from the "1988 Transit Passenger Vehicle Fleet Inventory," American Public Transit Association, 1988.
16. Based on preliminary counts for buses built in 1988. The data was provided by APTA research division. The 58 percent number is an estimate based on 80 percent of purchases. Final numbers should be available in several months.
17. Available data suggests that this income may be negligible. However, most of the available data is from bus systems that are only partially accessible. In such systems, ridership of disabled people may be artificially low because of limited routes or schedules. Data from systems that are more fully accessible suggest that increased ridership may be an important source of revenue. Denver and Seattle have experienced an average of 180 to 270 annual uses of lifts per bus. At an average of $.25 fare per use (since disabled riders commonly receive discounts), lifts in generally accessible systems can be expected to generate increased revenue of $45 to $68 per year. Thus, given an average $.25 fare the increased revenue is likely to roughly equal driver training costs.

to base estimates either of the number of systems which would make this choice nor of the resulting savings.

Table 7: Urban Bus Accessibility Costs by Year

Year from Implementatior	Number of Buses Affected	Lift Capital & Installation Costs	Lift Maintenanc Costs	Training Costs	Total Costs
1	1,470	$1,225,980	$455,700	$85,260	$1,766,940
2	2,940	$2,451,960	$911,400	$170,520	$3,533,880
3	4,410	$3,677,940	$1,367,100	$255,780	$5,300,820
4	5,880	$4,903,920	$1,822,800	$341,040	$7,067,760
5	7,350	$6,129,900	$2,278,500	$426,300	$8,834,700
6	8,820	$7,355,880	$2,734,200	$511,560	$10,601,640
7	10,290	$8,581,860	$3,189,900	$596,820	$12,368,580
8	11,760	$9,807,840	$3,645,600	$682,080	$14,135,520
9	13,230	$11,033,820	$4,101,300	$767,340	$15,902,460
10	14,700	$12,259,800	$4,557,000	$852,600	$17,669,400
11	16,170	$13,485,780	$5,012,700	$937,860	$19,436,340
12	17,640	$14,711,760	$5,468,400	$1,023,120	$21,203,280

Year from Implementation	Number of Businesses Affected	Lot Capital $ Rehabilitation Costs	$ Maintenance Costs	Training	Urban Goods
1	1,470	$1,229,380	$765,760	$68,580	$1,170,420
2	2,940	$2,458,760	$911,440	$137,160	$2,340,840
3	4,410	$3,688,140	$1,057,120	$205,740	$3,511,260
4	5,880	$4,917,520	$1,202,800	$274,320	$4,681,680
5	7,350	$6,146,900	$1,348,480	$342,900	$5,852,100
6	8,820	$7,376,280	$1,494,160	$411,480	$7,022,520
7	10,290	$8,605,660	$1,639,840	$480,060	$8,192,940
8	11,760	$9,835,040	$1,785,520	$548,640	$9,363,360
9	13,230	$11,064,420	$1,931,200	$617,220	$10,533,780
10	14,700	$12,293,800	$2,076,880	$685,800	$11,704,200
11	16,170	$13,523,180	$2,222,560	$754,380	$12,874,620
12	17,640	$14,752,560	$2,368,240	$822,960	$14,045,040

Rail Systems

This section presents the estimated costs of bringing rail transportation systems into compliance with the proposed provisions of full accessibility as would be required in ADA. The following data and analysis was provided by Robert Reuter of Access Systems, Baltimore, Maryland.

Several factors were taken into consideration in making these estimates:

1. Many new transit systems are being proposed and constructed. Fortunately, most are being built to full accessibility standards and therefore would not be affected by this bill; also, since most of these newer systems do not have full engineering in place, it would be difficult to judge the level of modifications needed. Therefore only systems that are in service and actually carrying passengers are included in this analysis.

2. The Architectural Barriers Act has been in effect for several years. Many modifications that would be covered by this law are either in place or in the planning stages. Since these modifications would be carried out with or without ADA, their cost is not classed as a cost of ADA.

3. This analysis assumes the use of the least costly method with a proven track record to provide accessibility. For reasons of their own, many systems have chosen a more expensive method of supplying access. This upgrading is optional and cannot be considered a cost of the Americans With Disabilities Act.

4. Most railroad car entrances do not meet the clearance standards established by ANSI and the Federal Government. However, AMTRAK and several other operators have found that most disabled persons and most wheelchair users are able to negotiate the existing clearances. Therefore, this analysis will assume these tighter clearances are acceptable, and that no car modifications are necessary if the car meets the size standards used by AMTRAK. This is a major cost savings.

5. Many operating systems throughout the country have significantly improved accessibility over the past ten years. Their experiences are included in these cost figures. Many systems are fully in compliance today and many others will be in compliance within the time periods required in ADA.

6. Some cities have done little or nothing to improve access to rail facilities in the past ten years and consequently have higher compliance costs than other cities. These cities saved money in the past by not making access improvements, while other cities expended monies in voluntary compliance.

   Thus, compliance costs should be viewed as related to past expenditures.

7. There is some confusion concerning the use of tiedowns in rail vehicles. However, Federal crash testing indicates that only Chicago Subway cars in full emergency exceed the limits of adhesion for a wheelchair with the regular wheel locks applied, and concludes that only Chicago subway cars would need tiedowns for wheelchairs. AMTRAK's experience without tiedowns bears this out. Therefore tiedowns have been considered only in Chicago.

8. The definition of "key station" has varied from city to city and from time to time. The following definition of a key station was used to generate these cost estimates.

   A station was assumed to be a key station if:

   a. It was a terminal station for a route or line,

   b. It was a transfer station between two or more lines,

   c. It was more than 1 km. (6/10th mile) from the next nearest accessible station via alternative accessible transit,

   d. It generated more than 5% of the ridership of that line, or

   e. It served a major disabled traffic generator.

   Since the key station concept is exclusively a method to cut costs, it was assumed that only the lowest cost alternatives would be implemented by a transit operation using the key station concept.

9. We have amortized costs according to the following standards: Equipment is amortized over a 12-year period, new construction and renovations are amortized over a 25-year period, and operating costs are fully expended in the year they occur.

As the attached table shows, the estimated annual costs of ADA associated with rail systems range from a high of $25 million to a low of $16 million, given the use of cost-effective technologies and key stations. We used four alternative approaches to estimate the costs:

1. High cost technology, no key stations;
2. High cost technology, key stations;
3. Low cost technology, no key stations;
4. Low cost technology, key stations.

Table 8 summarizes the results. In the appendix to the report we present all four alternatives in extended detail.

Table 8: Rail Systems
Accessibility Cost Summary

Cost Option	Key Stations	Annual Cost (Thousands)
High	Yes	19,463
High	No	25,261
Low	Yes	15,768
Low	No	19,183

Relay Services

Title V of the act requires the nationwide provision of telecommunication relay services.

Adoption of Title V would guarantee relay service in all States and territories and would assure inter-state services as well as intra-state services.

We estimated the costs of a national relay system based on the experiences of the California relay system. We assume that the costs of a national relay system reflect the costs of the California system adjusted for inter-state communications. We also assume that 12 percent of traffic is inter-state at standard 800 line rates. Using this methodology we estimate the costs of a national system at $165 million per year.

AT&T has estimated the costs of a national system based on California experience at $200 million per year. Because much of the data on which AT&T based their estimate is proprietary, we were unable to account for the $35 million difference.

Both estimates may be high, at least in the short run. Initial usage rates for new relay systems in New York and Alabama were much lower than expected based on the California experience. AT&T representatives speculate that the lower usage rate is a function of the fact that free TDD's are provided to the hearing impaired in California but not in New York or Alabama. California thus has an unusually high potential user base for relay services. Nonetheless, the differential is likely to be reduced over time as TDD prices continue to drop and the availability of relay services promotes TDD purchases; therefore, the California experience may be more indicative of long-term costs than initial costs.[18]

The cost of ADA as it relates to relay services is not the total cost of a national relay system, but the difference in costs between the current or planned systems and the systems mandated by ADA. The ADA requirements come at a time of rapid expansion of relay services. As of May, 1989, relay services existed in 7 States accounting for 24 per-

18. California has only three years of experience with relay systems. Demand has grown in each of these years, though at a decreasing rate. At this time we have no way to realistically estimate long-term demand for relay services. This is particularly true for inter-state services, for which experience is partially nonexistent.

cent of the population; relay services were approved and under development in 13 States accounting for another 25 percent of the population; and relay services were under active consideration in 7 States accounting for an additional 25 percent of the population.[19] It is important to keep in mind that most of the current or planned systems provide only intra-state services, whereas ADA mandates both intra- and inter-state relay services.

If we estimate the cost of ADA-required relay services as an increase in the intra-state services currently provided or under development plus the costs of inter-state services[20] we obtain costs of $105 million to $128 million, depending on whether total costs of a national relay system are estimated at $165 million or $200 million.

These cost estimates are likely to be high. The estimates allocate to ADA the costs of all further developments in relay services. As noted above, even without ADA the use of relay services is likely to grow rapidly. At the current rate of growth the large majority of states could be expected to have developed relay services within five years. If we assume that even without ADA, intra-state relay services would grow to cover the large majority of American citizens, then the costs of ADA consists only the inter-state portion of costs. Using the same procedures described above, we estimate these costs to be between $30 and $36 million annually.

Even this cost may be too high. In an environment of rapidly expanding but fragmented state-based relay systems, ADA may actually **reduce** total relay costs. This is because a national relay system can be expected to benefit from substantial economies of scale not achievable by the state relay systems, which are often small and fragmented.[21]

Given all these considerations we obtain a high cost estimate of $128 million, a medium estimate of $30 million, and a low estimate of $0. The high estimate assumes no further growth in relay systems and therefore is not plausible. The medium estimate assumes no economies of scale over fragmented state systems and therefore also is likely to be too high. Therefore, of the three estimates, the most likely actual figure is the surprising estimate of no costs. It is entirely plausible that federal intervention into the area of relay

19. "Telephone Relay Service Update; State-By-State," Telecommunications for the Deaf, Inc., May 1989, and testimony of Gerald Hine of AT&T before the Subcommittee on the Handicapped, May 10, 1989.
20. We estimate the costs of inter-state services as the costs of basic relay services plus 800-line costs for 12 percent of total traffic.
21. Savings from economies of scale are, of course, completely dependent on the final form a national relay system takes. AT&T and FCC officials working on relay systems confirmed the existence of economies of scale. However, none of those interviewed could produce detailed estimates.

services will act to coordinate and rationalize ongoing efforts so as to result in overall savings.

Accessibility of Public Accommodations

ADA bans discrimination against the disabled in public accommodations. Under ADA, public accommodations means privately operated establishments that are used by the general public as customers, clients, or visitors; or that are potential places of employment; and whose operations affect commerce. Discrimination is defined to include "a failure to remove architectural and communication barriers that are structural in existing facilities . . . where such removal is readily achievable." Where an entity can show that removal of a barrier is not readily achievable, discrimination is defined to include "a failure to make such goods, services, facilities, privileges, advantages, and accommodations available through alternative methods if such methods are readily achievable."

ADA requires that new facilities be readily accessible to and usable by individuals with disabilities, except where an entity can demonstrate that is structurally impracticable to do so. For renovations and alterations, ADA requires alterations be made in such a manner that, to the maximum extent feasible, the altered portion of the facility, the path of travel to the altered area, and the bathrooms, telephones, and drinking fountains serving the remodeled area are readily accessible to and usable by individuals with disabilities.

Accessibility standards under ADA will be consistent with the Architectural Barriers Act of 1968 and will be set by the Architectural and Transportation Barriers Compliance Board.

This set of architectural barrier provisions extends and unifies existing State codes. Four-fifths of all States currently have accessibility requirements that apply to some privately owned buildings used by the public for commerce, employment, housing or other purposes.

Because ADA is an extension of existing standards, to estimate the impact of ADA we abstracted State code summaries provided by the Architectural and Transportation Barriers Compliance Board.[22] New construction that is currently fully covered by state accessibility standards was not counted in estimating the costs of ADA. All new construction that is completely unaffected by state accessibility standards, however, was included in our cost estimates. For the middle ground, where existing state standards provide partial or

22. Data was taken from ATBCB State Codes and Standards File. Most state data had been updated as of September 1988.

limited coverage, a percentage of new construction was included in estimating the costs of ADA.[23]

The costs associated with architectural accessibility vary considerably with the specifics of each construction project. For new construction, accessibility does not necessarily entail more than very trivial costs. This is because accessibility standards specify minimum standards of how a building is to be built, not what is to be built.[24] For example, except in rare and extreme conditions, it is generally possible to design new buildings so that entrance does not require the use of stairs. With proper design and site grading this can be done without any additional costs for ramps or any other special design features.

Various studies have been conducted on the costs of accessibility in new construction. These studies have generally estimated costs as between .1 and 1 percent of total construction costs exclusive of land costs.[25] For this study we use the range of .1 to 1 percent, with .5 percent as the most plausible value.[26]

The costs of making existing inaccessible buildings accessible is much harder to estimate because the range of design options in an existing structure is much more limited. Discussions with various experts in accessible design uncovered no reliable method for estimating overall costs; all those interviewed indicated that costs are specific to each project. As an alternative approach we interviewed state officials responsible for administering similar architectural requirements. Officials from California's State Architect's Office, who assisted in the study, could find no data on which an estimate could be based. The problem is further complicated by the fact that ADA limits accessibility requirements in existing structures to those that are readily achievable.

Ronald Mace, in his testimony on ADA, provided an example list of potential modifications that can be readily accomplished:

- install a permanent or portable ramp over an entrance step,
- install offset hinges to widen a doorway,

23. Percentage estimates were based objectively on the percent of construction costs covered by state codes and subjectively on the level of coverage relative to ADA.
24. The two possible exceptions are the requirements for grab bars and for accessible parking spaces, although for parking spaces the primary change is in width of space.
25. See, for example: Schroeder, S, & E. Steinfeld, The Estimated Cost of Accessible Buildings, 1979, p. 141; ATBCB, "ATBCB Minimum Guidelines and Requirements for Accessible Design: Cost Information", 1981; ATBCB, "About Barriers", 1982, p. 5; U.S. Commission on Civil Rights, Accommodating the Spectrum of Individual Abilities, 1983, p. 81.
26. The .5 percent value was used in the estimate of section 504 costs.

- reduce the pressure of a door closer or install a power door operator,
- relocate a vending machine to clear an accessible path,
- eliminate a turnstile or provide an accessible path around it,
- replace worn carpeting with low pile, high fiber density carpeting,
- install appropriate handrails at stairs,
- create a designated handicapped parking space,
- replace broken or worn hardware with accessible hardware,
- install a grab bar at an existing toilet,
- lower the paper towel dispenser in a toilet room,
- remove toilet partitions in single partition toilet rooms to increase maneuvering space,
- remove lavatory aprons and insulate pipes to improve use by wheelchair users,
- install a full length mirror in bathroom,
- install a raised toilet seat,
- select adjustable furnishings to accommodate a broader range of users,
- arrange furniture to maintain accessible routes,
- lease or purchase accessible easy-use equipment modes from vendors, rather than inaccessible models with the same features,
- locate work supplies with universal reach heights,
- mount power strips to bring electric outlets within easy reach,
- make closet rods adjustable for use at multiple heights,
- install a paper cup dispenser at an existing inaccessible water cooler,
- locate a planter under a protruding object for easy detection by blind patrons,
- use large, high-contrast type for facility signs,
- install raised tactile labels on existing elevator panels,
- install an accessible remote switch to activate power operated items, and
- install a Telecommunications Device for the Deaf (TDD) for use by hearing impaired people.[27]

27. Ronald Mace, Testimony before the Subcommittee on the Handicapped, Hearing on the Americans with Disabilities Act of 1989, May 10, 1989.

Review of the list reveals that many items have no costs, and that almost all items on the list can be achieved within the .1 to 1 percent of total construction cost estimate for new facilities. Therefore, we estimate the cost of removal of architectural barriers, as required in ADA, as costing between .1 to 1 percent of the costs of renovation.

Based on unpublished Census data on new construction for 1988, we estimate that ADA will cover approximately 80 billion dollars per year in new construction [28]

This estimate includes all major renovations. Of this 80 billion per year in new construction approximately 66 percent is covered by existing State accessibility standards substantially similar to those in ADA. Therefore, ADA can be expected to affect approximately 27 billion in construction costs per year. Finally, if we estimate that accessibility costs between one-tenth of one percent and one percent of construction costs with the most reasonable estimate one-half of one-percent, then ADA architectural accessibility costs will range between $27 million and $270 million dollars per year with the most likely value $135 million.

28. New construction covered was defined as private nonresidential buildings excluding religious buildings, hospitals (because they are almost uniformly accessible today) and 50 percent of industrial construction (50 percent was chosen as an estimate to adjust for equipment related costs not covered by ADA). New construction includes new buildings and structures, additions, alterations, conversions, expansions, rebuilding reconstruction, renovations, rehabilitations, and major replacements.

Employment

Section 202 of ADA provides that:

> "No employer, employment agency, labor organization, or joint labor-management committee shall discriminate against any qualified individual with a disability because of such individual's disability in regard to job application procedures, the hiring or discharge of employees, employee compensation, advancement, job training, and other terms, conditions and privileges of employment."

The section further provides that the term "discrimination" includes:

> ". . . the failure by an employer, employment agency, labor organization, or joint labor-management committee to make reasonable accommodations to the known physical or mental limitations of qualified individuals with a disability who is an applicant or employee unless such entity can demonstrate that the accommodation would impose an undue hardship on the operation of its business."

In this section we briefly review the expected impact of these provisions and the costs associated with the reasonable accommodation requirement.

Experiences from the Rehabilitation Act of 1973 show that requiring nondiscrimination in employment by federal contractors can substantially increase employment of the disabled. A survey of federal contractors found that firms that depend heavily on the federal government for contracts were more likely to hire and accommodate disabled workers.[29]

Because of the broader scope of ADA, the effect of ADA on employment of the disabled may be greater than that of the Rehabilitation Act for covered organizations. In particular, ADA not only provides for nondiscrimination in employment but also for accessible public transportation. The Harris Survey of Disabled Americans found that 28 per-

29. "A Study of Accommodations Provided to Handicapped Employees by Federal Contractors," Berkeley Planning Associates (BPA), 1982, page 68.

cent of nonworking disabled persons reported that a lack of accessible or affordable transportation was an important reason why they were not working.[30]

A study of the impact of implementing regulations for section 504 of the Rehabilitation Act of 1973 found that approximately 4 million disabled Americans were potentially affected by employment nondiscrimination laws.[31] Statistical analysis of a variety of survey data led to the conclusion that for these 4 million disabled Americans, income was an average of 18 percent lower than it would have been in the absence of employment discrimination.[32] Updating data from this analysis, we obtain an estimate that approximately 4.5 million disabled Americans are potentially impacted by nondiscrimination employment laws.[33]

Of these 4.5 million, approximately 20 percent are currently covered under section 504 and another 35 percent are covered under section 503. This leaves 2 million not currently covered by existing nondiscrimination law. Taking into account the fact that ADA excludes businesses with fewer than 15 employees, approximately 1.7 million disabled people can be expected to be affected by the law.

The Section 504 regulatory impact study estimated costs of employment nondiscrimination by multiplying three numbers: 1) the number of disabled Americans affected by the

30. "ICD Survey of Disabled Americans," Louis Harris and Associates, 1986, page 72.

31. "Discrimination Against Handicapped Persons; The Costs, Benefits and Economic Impact of Implementing Section 504 of the Rehabilitation Act of 1973," Dave M. O'Neill, 1977.

32. The analysis took into account severity of impairment, occupational status, age, education level, employment status, and sex, in estimating the impact of discrimination on earnings. Those unable to work because of their disabilities and those over 65 or under 18 were excluded from the analysis. Ibid., Appendix A.

33. The Harris Survey of the Disabled found that an estimated 6 million unemployed disabled adults wished to be employed. We used the much lower impact analysis estimate over the Harris Survey estimate because the impact analysis included functional capacity as well as wish to work in estimating impact.

provisions, 2) the percent requiring reasonable accommodations related to employment, and 3) the average cost of reasonable accommodations. The study estimated that half the disabled employees affected would require reasonable accommodations and that such accommodations would cost an average of $100.[34]

Subsequent research has supported these estimates. An HHS evaluation of employment-related remedies under Section 504 of the Rehabilitation Act found that the large majority of remedies had no direct cost.[35] The study abstracted all letters of finding from 3 HHS regions for a 6-year period. Of 139 employment-related remedies, 82 (59%) involved changes in hiring and personnel practices. Only 22 (16%) involved issues of reasonable accommodation. Of these, the most common accommodations involved no direct costs; examples are modification of work schedules and elimination of lifting requirements on the job.[36] Only 10 percent of the remedies involved reasonable accommodations with direct costs. The study did not produce data on the magnitude of those costs.

A Louis Harris national survey of the disabled found that among those employed, accommodations were provided in only 35 percent of the cases.[37] When accommodations are required they are generally very low cost. A 1982 Department of Labor study of the

34. Ibid., page 14.

35. "Evaluation of Section 504 of the Rehabilitation Act of 1973; Evaluation Criteria Report," Daniel Finnegan, Disability Rights Education and Defense Fund, 1985.

36. Modification of work schedules, elimination of lifting requirements, and similar reasonable accommodations, while entailing no direct costs, may result in indirect costs to employers by shifting workloads to nondisabled employees. Surprisingly, the available data suggests that the general effect of accommodations is in the opposite direction. In a telephone survey of firms making reasonable accommodations, 29% of the firms reported that other nondisabled workers were benefiting from accommodations as opposed to only 19% that reported other workers were suffering some inconvenience as the consequence of accommodations. (See "A Study of Accommodations Provided to Handicapped Employees by Federal Contractors," Berkeley Planning Associates, 1982, page 33.) The Wall Street Journal on November 22, 1983 provided examples of how accommodations for the handicapped worked to the service of all employees: "Widened doorways at Western Electric allow easier moves of heavy equipment. Scientific Atlantic likes its enlarged elevators for similar reasons . . . When Tektronic altered an assembly line supervisor's tasks to aid a mentally retarded man, all 12 workers' output rose and errors fell."

37. ""The ICD Survey of Disabled Americans: Bringing Disabled Americans into the Mainstream," Louis Harris and Associates, 1986, page 74.

accommodations provided to handicapped employees by federal contractors found very low costs associated with providing accommodations:

> A striking finding of this study was that accommodations rarely involved much expense. Thus no cost was involved for 51% of the accommodations reported, and an additional 30% of all workers received packages of accommodations for which the total cost was between $1 and $500. The fear that accommodation is expensive is not supported by the data. Only 8% of accommodated workers received packages of accommodations with a total cost exceeding even the low figure of $2,000 . . . Firms predominantly report that benefits exceeded the costs of the accommodations made.[38]

Past experience with equal opportunity employment legislation relating to sex and race shows that legislation does not directly eliminate the problem. If 100 percent of the 1.7 million disabled Americans potentially affected by Title II of ADA are actually affect, and if 30 percent of these require reasonable accommodations, at an average cost of $200,[39] we obtain an estimate of the total cost of the provision of $102 million.

This estimate is likely to be too high because it assumes the complete elimination of employment discrimination against the disabled. If we make the more pessimistic, but more plausible, alternative estimates of 50 or 25 percent effectiveness, we obtain cost estimates of $51 and $26 million.

Even these estimates may be unduly high, however, because the preponderance of evidence shows that the cost of accommodation of disabled employees is generally exceeded by the direct and indirect benefits. A 1980 American Management Associations survey of top human resources executives in major firms asked respondents to compare handicapped and non-handicapped workers by indicators including productivity, attendance, safety, and motivation. The results showed that the performance of handicapped workers on all scores was above average.[40]

38. "A Study of Accommodations Provided to Handicapped Employees by Federal Contractors," Berkeley Planning Associates, 1982, page 28.
39. We used $200 as the average cost per affected disabled person rather than the $100 used in the 504 impact study, both to account for inflation and in recognition of findings from subsequent research.
40. American Management Associations, "Hiring the Handicapped," 1980. The most methodologically sound study of productivity of handicapped employees was conducted in 1948 by the Bureau of Labor Statistics (BLS). The BLS study compared matched samples of 11,000 handicapped workers and 18,000 non-handicapped workers. The samples were matched on sex, age, experience, shift, and job. Ten different types of impairment were examined. The study found that, overall, handicapped employees had slightly higher rates of work performance (1.0 percent). See "The Performance of Physically Impaired Workers in Manufacturing Industries," Bureau of Labor Statistics Bulletin No. 923, 1948.

Economic Benefits of ADA

The economic benefits of ADA are likely to greatly exceed total costs. Economic benefits can reasonably be expected in two areas: reduced welfare and insurance costs, and increased productivity and employment income.

Reduced Welfare and Insurance Costs

The Harris Survey of Disabled Americans found that 38 percent of disabled persons in the labor force are receiving government benefits or insurance payments, compared to 62 percent of disabled persons not in the labor force. Thus, increased employment of the disabled could be expected to remove 24 percent of those affected from the benefit rolls. If 1.7 million disabled Americans at an average benefit level of $6,000 per annum are affected, the benefit savings will total $2.4 billion per year. As we noted in the prior section, this estimate is likely to be too optimistic because it assumes the complete elimination of job discrimination against the disabled. If we make the more pessimistic, but more plausible, assumptions of 50 or 25 percent effectiveness we obtain savings estimates of $1.2 billion and $600 million.

These estimates are likely to be low because they do not include the savings from reduced benefit levels among those who become employed and continue to receive benefits.

Increased Productivity and Employment Income

The other major source of economic savings arising from the employment provisions is the increased earnings of the affected disabled Americans. The Harris Survey of Disabled Americans found a difference of $11,000 in the median annual income of employed and nonemployed disabled Americans.[41] Using the same range of estimates used above for the effectiveness of ADA in eliminating employment discrimination, we obtain estimated increases in income for disabled Americans of $18.7 billion, $9.4 billion, and $4.7 billion.[42]

41. Louis Harris and Associates, op. cit., page 54

42. It is important to note that this represents increased income *after* income reduction due to lost welfare and insurance benefits. Measures of total increased productivity would be greater because they would include total wage income.