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of Transportation  
**Federal Transit  
Administration**

## Implementation Experience with Deep Discount Fares

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Volpe National Transportation Systems Center  
Cambridge, MA 02142-1093

Final Report  
September 1994

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Service Assistance Division  
Washington, DC 20590

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## PREFACE

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This report reviews the experiences of transit agencies across the country with Deep Discount fares, a new public transit pricing strategy, between 1988 and 1993. It updates the 1988 FTA report, *Deep Discount Fares: Building Transit Productivity with Innovative Pricing*, in preparation for a full evaluation of the Deep Discount practice to be completed by FTA in 1994.

METRIC/ENGLISH CONVERSION FACTORS

ENGLISH TO METRIC

LENGTH (APPROXIMATE)

- 1 inch (in) = 2.5 centimeters (cm)
- 1 foot (ft) = 30 centimeters (cm)
- 1 yard (yd) = 0.9 meter (m)
- 1 mile (mi) = 1.6 kilometers (km)

AREA (APPROXIMATE)

- 1 square inch (sq in, in<sup>2</sup>) = 6.5 square centimeters (cm<sup>2</sup>)
- 1 square foot (sq ft, ft<sup>2</sup>) = 0.09 square meter (m<sup>2</sup>)
- 1 square yard (sq yd, yd<sup>2</sup>) = 0.8 square meter (m<sup>2</sup>)
- 1 square mile (sq mi, mi<sup>2</sup>) = 2.6 square kilometers (km<sup>2</sup>)
- 1 acre = 0.4 hectares (he) = 4,000 square meters (m<sup>2</sup>)

MASS - WEIGHT (APPROXIMATE)

- 1 ounce (oz) = 28 grams (gr)
- 1 pound (lb) = .45 kilogram (kg)
- 1 short ton = 2,000 pounds (lb) = 0.9 tonne (t)

VOLUME (APPROXIMATE)

- 1 teaspoon (tsp) = 5 milliliters (ml)
- 1 tablespoon (tbsp) = 15 milliliters (ml)
- 1 fluid ounce (fl oz) = 30 milliliters (ml)
- 1 cup (c) = 0.24 liter (l)
- 1 pint (pt) = 0.47 liter (l)
- 1 quart (qt) = 0.96 liter (l)
- 1 gallon (gal) = 3.8 liters (l)
- 1 cubic foot (cu ft, ft<sup>3</sup>) = 0.03 cubic meter (m<sup>3</sup>)
- 1 cubic yard (cu yd, yd<sup>3</sup>) = 0.76 cubic meter (m<sup>3</sup>)

TEMPERATURE (EXACT)

$$[(x-32)(5/9)] \text{ } ^\circ\text{F} = y \text{ } ^\circ\text{C}$$

METRIC TO ENGLISH

LENGTH (APPROXIMATE)

- 1 millimeter (mm) = 0.04 inch (in)
- 1 centimeter (cm) = 0.4 inch (in)
- 1 meter (m) = 3.3 feet (ft)
- 1 meter (m) = 1.1 yards (yd)
- 1 kilometer (km) = 0.6 mile (mi)

AREA (APPROXIMATE)

- 1 square centimeter (cm<sup>2</sup>) = 0.16 square inch (sq in, in<sup>2</sup>)
- 1 square meter (m<sup>2</sup>) = 1.2 square yards (sq yd, yd<sup>2</sup>)
- 1 square kilometer (km<sup>2</sup>) = 0.4 square mile (sq mi, mi<sup>2</sup>)
- 1 hectare (he) = 10,000 square meters (m<sup>2</sup>) = 2.5 acres

MASS - WEIGHT (APPROXIMATE)

- 1 gram (gr) = 0.036 ounce (oz)
- 1 kilogram (kg) = 2.2 pounds (lb)
- 1 tonne (t) = 1,000 kilograms (kg) = 1.1 short tons

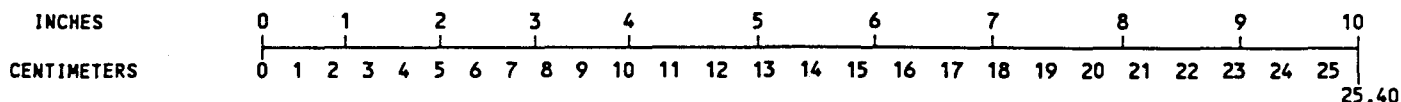
VOLUME (APPROXIMATE)

- 1 milliliters (ml) = 0.03 fluid ounce (fl oz)
- 1 liter (l) = 2.1 pints (pt)
- 1 liter (l) = 1.06 quarts (qt)
- 1 liter (l) = 0.26 gallon (gal)
- 1 cubic meter (m<sup>3</sup>) = 36 cubic feet (cu ft, ft<sup>3</sup>)
- 1 cubic meter (m<sup>3</sup>) = 1.3 cubic yards (cu yd, yd<sup>3</sup>)

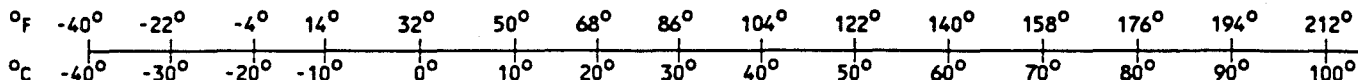
TEMPERATURE (EXACT)

$$[(9/5) y + 32] \text{ } ^\circ\text{C} = x \text{ } ^\circ\text{F}$$

QUICK INCH-CENTIMETER LENGTH CONVERSION



QUICK FAHRENHEIT-CELSIUS TEMPERATURE CONVERSION



For more exact and or other conversion factors, see NBS Miscellaneous Publication 286, Units of Weights and Measures. Price \$2.50. SD Catalog No. C13 10286.

## TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1. SUMMARY .....	1
2. INTRODUCTION .....	3
3. MARKET RESEARCH BACKGROUND AND IMPACTS BY MARKET SEGMENT	7
3.1 Market Factors Justifying Deep Discounting .....	9
3.2 Deep Discount Impacts on Key Market Segments .....	15
4. LOCAL EXPERIENCE WITH DEEP DISCOUNTING .....	19
4.1 Allentown .....	21
4.2 Chicago .....	25
4.3 Dayton .....	26
4.4 Denver .....	27
4.5 Grand Rapids .....	29
4.6 Lafayette .....	31
4.7 Louisville .....	33
4.8 Madison .....	34
4.9 Milwaukee .....	37
4.10 Minneapolis - St. Paul .....	40
4.11 Norfolk .....	43
4.12 Oakland .....	44
4.13 Philadelphia .....	44
4.14 Richmond .....	46
4.15 St. Louis .....	47
4.16 Tucson .....	48
4.17 Wilmington .....	50
5. TECHNICAL ANALYSIS OF DEEP DISCOUNT FARES .....	53
5.1 Market Segment Elasticities .....	53
5.2 Market Penetration and Shift Rates .....	56
5.3 Inducement .....	57
5.4 Sample Output .....	57
6. MARKETING GUIDANCE .....	59

**TABLE OF CONTENTS (continued)**

<u>Section</u>	<u>Page</u>
7. RECOMMENDATIONS .....	63
7.1 Compatibility with Complex Fares .....	63
7.2 Single vs. Peak and Off-Peak Tickets .....	63
7.3 Level of Discounts .....	64
7.4 Response from Commuters vs. Other Users .....	64
7.5 Potential Optimal Approach .....	64
7.6 Impacts on Pass Sales and Revenues .....	65
7.7 Marketing and Market Research Requirements .....	67
8. CONCLUSION .....	69
LIST OF ACRONYMS .....	71
REFERENCES .....	73
APPENDIX A .....	A-1



## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
3-1 Sample Scratch-Off On Board Survey Card . . . . .	8
3-2 Trip Frequency Distributions . . . . .	10
3-3 Rider Duration Data . . . . .	12
3-4 Riding Dynamism . . . . .	13
3-5 Use of Various Fare Types . . . . .	14
4-1 Ridership Percent Change from 1986 through 1992 in US Cities . . . . .	20
4-2 LANTA Annual Ridership, 1987 through 1993 . . . . .	23
4-3 LANTA Annual Revenue, 1988 through 1992 . . . . .	24
4-4 Denver Annual Revenue and Ridership, 1988 through 1991 . . . . .	28
4-5 GRATA Annual Revenue and Ridership, Federal FY 1988 through 1992 . . . . .	30
4-6 GLPTC Annual Revenue and Ridership, 1988 through 1990 . . . . .	32
4-7 Madison Metro Annual Ridership, 1988 through 1993 . . . . .	35
4-8 Madison Metro Annual Fare Revenue, 1988 through 1993 . . . . .	36
4-9 MCTS Annual Revenue and Ridership, 1987 through 1992 . . . . .	39
4-10 Twin Cities Annual Revenue and Ridership, 1989 through 1993 . . . . .	42
4-11 AC Transit Annual Revenue and Ridership, FY 1988 through 1992 . . . . .	45
4-12 St. Louis Annual Transit Ridership, 1987 through 1993 . . . . .	49
4-13 Wilmington DART Ridership and Revenue, FY 1988 through 1992 . . . . .	51
5-1 Change in Revenue and Riding for Various Fare Structure . . . . .	58

**LIST OF TABLES**

<u>Table</u>		<u>Page</u>
3-1	Common Reaction of Key Market Segments to Deep Discount Fares . . . . .	15
5-1	Elasticities Used to Project Impacts of Deep Discount Fares for the Transit Authority of River City . . . . .	55

## 1. SUMMARY

This report reviews local experience with Deep Discount fares, a new public transit pricing strategy, between 1988 and 1993. Based on new market research findings, Deep Discounting has shown that it is possible to raise transit ridership and revenues simultaneously with a combination of higher cash fares and deeply discounted tickets or tokens. Deep Discounting is both a fare structure and a marketing program, but it remains an innovative and experimental technique that does not always yield the intended results. Nevertheless, it has gained rapid acceptance in the transit industry, having been applied in more than 20 large, medium and small cities since 1987.

An overview of the Deep Discount concept is first provided, along with reasons for increased interest in this area and a summary of major findings to date. Deep Discounting involves selling tickets or tokens in bulk at prices 25 percent or more below the cash fare. The discounts are usually achieved by raising cash fares and leaving bulk ticket prices unchanged, or reducing them slightly. It has been seen that Deep Discounting can increase revenue by as much as 20 percent while basically maintaining ridership, or even increasing it. That higher revenue *and* ridership can result from fare changes underscores the appeal of Deep Discounting; it can stem the downward spiral in ridership that typically results from conventional fare increases. Deep Discounting recognizes that fares, market research, marketing and promotion are powerful management tools that contemporary and consumer sensitive transit systems should not neglect. Deep Discounting is also called market-based or consumer-based pricing.

The report also reviews the market research basis of the Deep Discount concept. It emerged from new market research methods and results, which found among other surprises that most transit users ride infrequently. Low frequency users are also the best opportunity to increase riding. Offering substantial discounts, Deep Discounting separates riders into the fare sensitive and fare insensitive segments. It gives savings to riders who want them and draws added revenue from those who willingly forego savings. It promotes prepayment, riding increases and greater commitment. Deep Discounting extends prepayment to lower frequency riders who, under conventional fare plans, usually pay cash for each ride taken. This emphasis on low frequency users contrasts with the industry's usual emphasis on monthly passes and daily commuting.

Experience in many of the cities implementing Deep Discounting is clouded by influences of the economic recession that began in 1990. The impact of economic change easily overwhelms the influence of fare and marketing changes. Yet, in some cases, such as Denver, Madison, Oakland, Louisville and Lafayette, very positive results are evident. In all the cities that have used Deep Discounting, even where definitively positive results were not achieved, use of Deep Discounting has continued and in many cases been further emphasized through subsequent fare changes. The Deep Discount concept is almost universally well-regarded by local transit managers, policy makers, riders and the media. Deep Discounting's consumer-based market segmentation strategy has been used as an alternative to the operations-based pricing that is more common in transit. That is, in some cities Deep Discounting replaced use

of peak/off-peak fares, allowed the number of fare zones to be reduced, or otherwise simplified the existing fare structure.

The report documents experience in each of the cities studied, including trends in ridership and revenue. As available, key findings from before and after on board and telephone surveys and other assessments are summarized. The report also offers an overview of the technical analysis that has been used to project potential impacts in many of the cities that have implemented Deep Discounting. In the marketing area, the report provides guidance and describes some of the most successful promotional techniques that have been used. Intensive marketing and promotion, with particular focus on infrequent riders, are critical to Deep Discounting's success.

The report also provides cross-cutting findings on the market segments that appear to have responded best (and those that have responded less well) to Deep Discounting. Generally, the commuter market segments, both regular and occasional transit commuters, are very responsive to Deep Discount incentives, but occasional off-peak users have been found to be less responsive to Deep Discounting. Off-peak ridership may fall, or grow less relative to commuter use, as a result of Deep Discounting. Based on these and related findings, pitfalls to avoid and other recommendations to assist Deep Discount implementation are detailed. A potentially optimal approach for Deep Discount fare structures is also suggested. A prominent pitfall is that the use of passes (monthly and especially weekly passes) tends to increase when a Deep Discount plan is introduced. More pass use can offset the revenue gain from Deep Discounting. The basis of this problem and actions that can minimize it are presented.

Most, but not all, Deep Discounting experiences have been positive. Although the pitfalls of Deep Discounting are not yet fully understood, the transit industry has found the Deep Discount idea an appealing alternative to conventional fare plans. Five to ten new cities have been adopting it every year, perhaps due in part to the increased consumer sensitivity of the 1990's. To increase the beneficial impacts of existing and future Deep Discount applications, it is suggested that more formal evaluations of Deep Discounting be advanced.

## 2. INTRODUCTION

This report compiles experience with Deep Discount pricing, reflecting information available through mid-1993. This project was undertaken in late 1993 to summarize what has been learned about this new and innovative approach to public transit pricing.

A caveat must immediately be made. The report offers more information in some areas than in others, and in many cases is limited by the availability of sound local evaluation data. Nevertheless, Deep Discounting has rapidly gained acceptance throughout the transit industry. It appeals to transit managers because it offers revenue and ridership benefits without unacceptable complexity, as is associated with the distance-based and peak/off-peak fare plans that have long been advocated for the transit industry. The aim of this report is to support this interest and help frame new research efforts by assembling and presenting all of the readily available information on Deep Discounting.

Deep Discounting emerged in the mid-1980's as a way to increase transit revenues with minimal ridership loss. In some cases, simultaneous increases in revenue and ridership have been achieved. Due to advances in on board survey techniques, market research has revealed a large share of *infrequent riders*. Deep Discounting naturally segments the market by offering a choice: either prepay fares by buying, for example, a sharply discounted ten-ride ticket, or pay considerably higher cash fares on a single ride basis. By their choices, riders are naturally segmented (self-selected) as fare sensitive or fare insensitive. This allows discounts to be used more cost-effectively in building ridership among fare sensitive users, while added revenue is drawn from riders who persist in paying cash fares but tend not to reduce their usage due to their demonstrated insensitivity to the potential savings. Deep Discounting eases sensitivity to higher cash fares.

Thus, Deep Discounting builds ridership and revenue by focusing primarily on infrequent riders. It also has positive impacts on middle frequency riders and is generally compatible with the use of monthly and weekly passes, the fare instruments serving high frequency users. Until now, passes have been the industry's primary fare prepayment strategy. Deep Discounting offers a way to extend prepayment to lower frequency market segments, which, to the surprise of some, have been found to be larger than the regular or frequent user market segment. Deep Discounting also acknowledges that pricing is a key marketing tool and that fare policy should reflect a marketing strategy.

The Deep Discount plan is now seen as a strategy that can be used by most transit agencies. In 1992, three quarters of all North American transit systems offered prepaid passes and about 40 percent used some form of multi-ride instrument (e.g., tickets or tokens). Passes have long been used and are popular with riders for savings and convenience reasons, and popular with transit systems for operational reasons, but passes are also increasingly associated with revenue losses due to intensive use and abuses such as pass sharing. Recent research has shown passes to draw few new riders, and to have generally negative net revenue impacts. In recent years, discounted tickets have become more popular as their role in allowing higher cash fares, drawing new riders, and effectively segmenting the market has become better understood.

With just 40 percent of transit systems having multi-ride tickets and fewer using discounting and marketing practices consistent with Deep Discount concepts, the opportunity for expanded use of Deep Discounting is considerable. Some cities offer only nominal discounts on tickets (which have been found to be ineffective in motivating ticket purchases by infrequent riders), and many have made limited or no use of target marketing techniques. More effective design and pricing of monthly pass plans are extensions of Deep Discount practices. In fact, because the Deep Discount plan also tends to increase pass use, its implementation can necessitate changes in pass instruments. This lesson of recent Deep Discount experience is discussed below.

Further background information on the conceptual basis of Deep Discounting appears below, and more information is available in *Deep Discount Fares: Building Transit Ridership with Innovative Pricing*, prepared by Richard Oram for the Federal Transit Administration (FTA) Office of Policy in 1988 (1).<sup>1</sup> This report also reviewed early Deep Discount experiments in Allentown, Pennsylvania, Lafayette, Indiana, and Milwaukee, Wisconsin, and was widely distributed by the FTA.

Since the late 1980's, the Deep Discount plan has been used by more than 15 other agencies. Many factors have influenced the level of success achieved. The 1990's recession has also clouded the data, and in many cases it is too soon to draw firm conclusions. Tentatively, however, it seems that *when it is successful, Deep Discounting can build revenue in the range of ten to 15 percent, with ridership remaining generally stable*. Data supporting this appear below, notably from experience in Oakland, Madison, Lafayette, Denver, Louisville, and Chicago (in initial months).

If it is true that ten percent revenue growth can be achieved, the overall magnitude of the opportunity Deep Discounting offers is impressive. To the industry on a national basis, ten percent more revenue would mean about \$600 million annually. Of course, not all agencies will be ready or able to adopt new fare plans, and some already have. But if even half of the bus systems and no rail systems used pricing strategies with these results, it could yield more than \$180 million in added operating revenue annually.<sup>2</sup>

To a local agency, a ten percent increase in revenue is what the typical fare change provides, but conventional fare increases almost invariably lose riders. Assuming an agency recovers 50 percent of its costs from fare revenue, a ten percent revenue increase would cover a five percent cost increase, which might mean forestalling any subsidy increases for one or two years, or avoiding service reduction. In the longer term, strategies that build revenues while not reducing riders avoid the downward spiral that fare increases typically stimulate, i.e., the tendency for one fare increase to lead to another. Many of the agencies that implemented Deep Discounting did so hoping to avoid ridership losses or to preserve long sought riding gains, when an increase in operating revenues was imperative.

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<sup>1</sup> A number in parentheses indicates the number of the information source quoted or referred to in the text, as cited in the "List of References" at the end of this report.

<sup>2</sup> This estimate uses 1990-91 American Public Transit Association revenue data.

It is also worth noting the potential productivity impacts of Deep Discounting. For a mid-sized bus system, if revenue goes up 14 percent and ridership grows by three percent, for example, cost recovery from fares could rise from a presumed 50 percent to 57 percent, an increase of 14 percent. The subsidy per passenger would fall even more, 14.4 percent in this example.

Federal funding changes also suggest the use of fare strategies like Deep Discounting will continue to grow. In Fiscal Year 1994, federal transit funding provided an overall 21 percent increase in transit support, the largest increase in over a decade. Yet the increased funding is concentrated in capital assistance categories. For example, Section 9 Urbanized Area formula funds grew 43 percent to \$2.2 billion, but Operating Assistance remained at the 1993 level of \$802 million. For Federal Fiscal Year 1995, a 25 percent reduction in Operating Assistance to the \$600 million level has been proposed.

New capital funding suggests expanded service, but without more operating assistance, fare levels or local subsidies must rise. In fact, if fares cover half of operating costs and service expands 20 percent, fares and/or operating subsidies must grow by 40 percent. This assumes new service draws as much revenue as existing service, which is unlikely. In sum, new federal funding policies are another reason to use improved fare plans.

The balance of this report presents the following. Section 3 offers more on the market research basis of Deep Discounting and summarizes apparent impacts of the strategy on key segments of the transit market. Section 4, the core of the report, presents city-by-city findings on the use of Deep Discounting and offers data and other evidence as available. Section 5 discusses the technical analysis of Deep Discount fare options, based on modeling exercises performed to date. Section 6 offers marketing guidance, since a high level of marketing and promotion is critical to achieving success with the Deep Discount strategy. Section 7 identifies findings that emerged in compiling this review, noting pitfalls to avoid and offering general implementation guidance for Deep Discounting. Section 8 concludes with a brief summary of Deep Discounting's significance. A "List of References" and a list of "Transit Agency Contacts" appear at the end of the report.





### **3. MARKET RESEARCH BACKGROUND AND IMPACTS BY MARKET SEGMENT**

The Deep Discount fare strategy is a major departure from longstanding transit pricing practice, supported by a number of new insights gained from innovations in on board survey data collection and analysis methods. These studies were first done in the mid-1980's and have since been repeated and confirmed at nearly twenty transit agencies. Before this work was popularized, only the Southeastern Pennsylvania Transportation Authority (SEPTA) is known to have had a fare strategy resembling Deep Discounting, and the establishment of SEPTA's fare policy was not driven by market research findings.

A new way to administer on board surveys was one advance that assisted this work. "Scratch-off on board survey cards" have now been used many times, and are preferred to the standard approach of distributing pencils and cards for many reasons. (See Louisville sample scratch-off card in Figure 3-1.) Drivers hand out these cards, making paid survey administrators unnecessary. Riders like to complete scratch-off cards, which makes response rates high, typically exceeding 60 percent. High response reduces distortions (e.g., self-selection bias) inherent in on board surveys; standard methods rarely yield response rates above 30 percent. High response rates also allow small sample sizes; typically just 2500 cards are used, even in a city as big as Minneapolis. In addition, there are image and safety benefits, i.e., no pencils to fall on floors.

The scratch-off approach is also low cost. As surveyors are avoided, a survey (or follow-up) may cost as little as \$12,000, including printing, data processing, analysis, etc. This low cost has allowed many cities interested in Deep Discounting to do surveys and perhaps repeat them to gain before and after data. As shown below, these studies have produced valuable insights. The role of sound market data in guiding success with Deep Discounting cannot be overstated.

The discussion below first summarizes the research findings that stimulated use of Deep Discounting, and then presents the apparent impacts of Deep Discounting on key market segments. These cross-cutting findings arose from a number of on board surveys preceding and following the use of the Deep Discounting plan.

**PLEASE MARK (SCRATCH OFF) ONLY ONE ANSWER TO THE FOLLOWING QUESTIONS:**

1. How did you pay your fare when boarding the bus? (If you used a transfer, mark the way you paid your fare on the first bus.)	<b>CASH:</b>	peak 60c	off-peak 35c	school 25c	senior free	other				
2. How many <i>one-way</i> trips do you take in a typical week? (Going to work and back is two trips.)	<b>TICKETS:</b>	peak 50c	off-peak 35c	school 25c	senior/disabled 25c					
3. How long have you been riding TARC buses?		less than 1	1	2	3	4	5	6	7	8
4. Has the number of trips you take per week changed in the past six months?		9	10	11	12	13	14	15	16+	
5. What days of the week do you ride?		3 months or less	3 to 6 months	6 months to 1 year	1 to 2 years	over 2 years				
6. What times of the day do you ride?		yes, increased	yes, decreased	no, stayed the same	I'm a new rider					
7. Rate TARC's service and performance:		Mondays to Fridays <i>only</i>	Saturdays and Sundays <i>only</i>	weekdays <i>and</i> weekends						
8. What is your best source of information about TARC?		rush hours <i>only</i>	non-rush hours <i>only</i>	rush hours <i>and</i> non-rush hours						
9. Would you buy a pass good only on Mon. - Fri. that costs \$20 per month?		excellent	good	average	fair	poor				
10. If you could save 30% of your fare with a 10-ride ticket, would you buy it?		drivers	friends	schedule	phone	newspaper				
11. If your employer gave you a \$20 monthly fare discount, would you ride more?		yes, probably	no, I also ride on weekends	no, I don't ride often enough	no, I can't pay \$20 at once					
12. What is your age?		yes, I'd buy it	maybe some-times	no, I ride free	no, I ride too little	I'm not interested				
13. Where do you live?		I'd ride somewhat more	I'd ride much more	I already ride daily.	discounts won't make me ride more					
14. In what category is your total household income?		15 or less	16-20	21-34	35-50	51-64	65 or more			
		City of Louisville	Jefferson County	Southern Indiana	other state or county					
		\$15,000 or less	\$15,001 to \$25,000	\$25,001 to \$35,000	\$35,001 to \$50,000	over \$50,000				

**Please return this card to your driver now, or drop it in the mail within 3 days. Thanks!**

**No 2289**

**Figure 3-1. Sample Scratch-off On Board Survey Card<sup>3</sup>**

<sup>3</sup> This card was used in the Transit Authority of River City Study, (Louisville, 1993, Reference 6).

### 3.1 MARKET FACTORS JUSTIFYING DEEP DISCOUNTING

As presented in the 1988 report (1), the findings that first prompted use of Deep Discounting concern rider trip frequency, riding duration, turnover and stability factors, and data correlations with the use of cash vs. prepaid fares.

Understanding the trip frequency findings requires explanation of a factor that severely distorts interpretations of on board survey data. This is the *frequency bias* factor. Simply put, on board survey data gained from transit riders on any one day are dramatically distorted by the higher probability that high frequency riders will be over-represented in the sample. If the intent is to gain a view of all transit riders, one must acknowledge that a sample of those boarding on any single day will over-represent high frequency users at the expense of low frequency riders. Thus, a daily rider has a 100 percent chance of being surveyed, but a once-a-week rider has just a 20 percent chance, and an occasional rider has a very low chance, e.g., 1/30 or three percent for a once-a-month user.

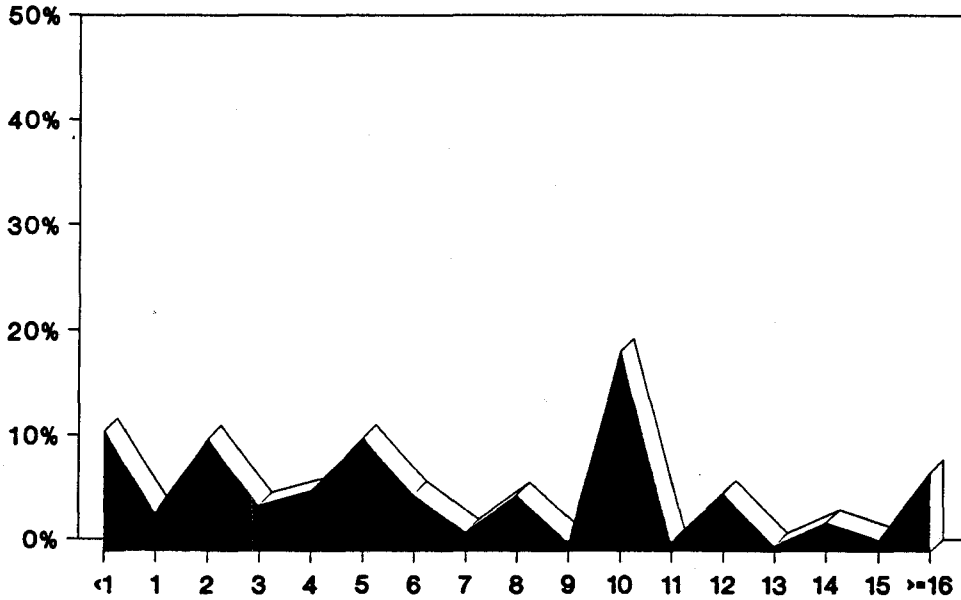
This does not mean that data used without regard to frequency bias are wrong, but it does mean that data with no frequency bias correction represent the trips taken on the survey day, as opposed to the people who made them. Using a statistical correction for frequency bias, one can project both the share of the total market (the people) and each ridership segment's share of the total trips. With this information, one can see that there are far more people who ride transit occasionally, but that they make up a smaller share of total trips than do the smaller number of intensive riders. In essence, some people ride a lot, but far more people ride a little.

Figure 3-2 shows these findings from a survey in Dayton. The top graph is the frequency data provided by survey respondents. The lower graph adjusts the data base to reflect each rider's reported frequency, and then presents the adjusted results. This enables one to project the entire market of all users, despite the fact that most riders were not in the sample.

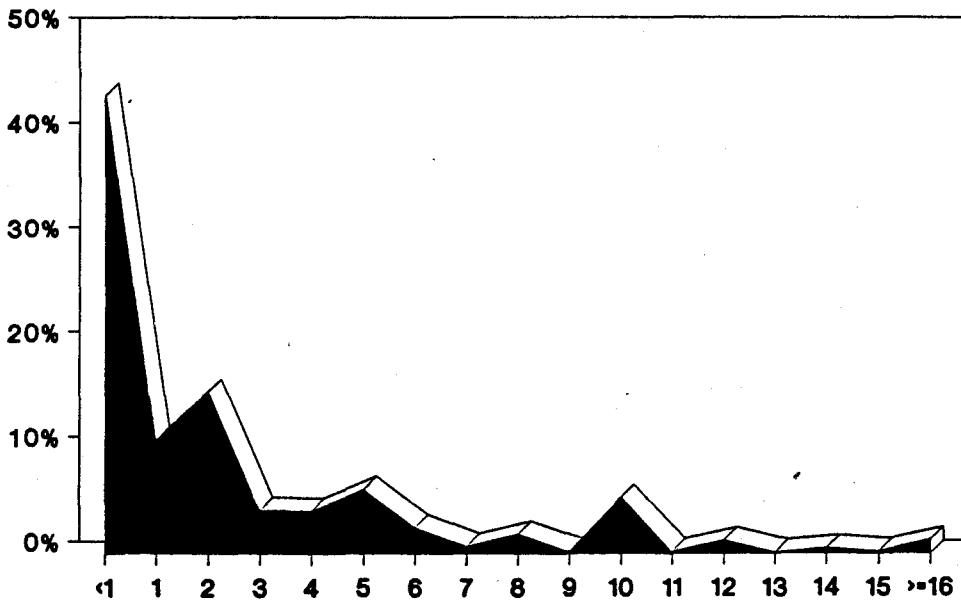
The data adjustment process is as follows. The number of responses in each frequency category is first divided by the frequency value of that category. For example, if 60 people reported a frequency of four trips per week, the resulting factor is 15; if 20 people report ten trips per week, the resulting factor is 20. The sum of all such factors is then calculated, and the individual factors are normalized (converted to a percent) relative to the sum of all of the factors. For example, if the total of all of the factors is 81, the share that the ten trips per week factor (20) represents is  $20 / 81 = 24.7$  percent. These resulting percents become the weighted frequencies that reflect the actual probabilities of different frequency riders being in the sample. The weighting adjusts for the fact that high frequency riders are almost guaranteed to be sampled, whereas low frequency riders have a very low probability of being sampled.

The key point is that while the share of trips made by people who make ten or more trips per week is large, the largest share of total users consists of people who take fewer than eight trips per week, i.e., below the minimum level needed to justify purchase of a monthly pass. This finding revealed the need to offer prepayment to this large share of more infrequent users.

**Q2. How many one-way trips in a week?  
Frequency Biased**



**Frequency Corrected**



**Figure 3-2. Trip Frequency Distributions<sup>4</sup>**

<sup>4</sup> The graphs are taken from the Miami Valley Regional Transit Authority Study (Dayton, 1992, Reference 15).

The value of promoting prepayment to low frequency users is also demonstrated by rider duration data. Figure 3-3, also from the Dayton study, shows most users were longer-term riders, but about 40 percent were riders for less than two years. More important, the data show that new users are less likely to ride frequently. This can be seen in Figure 3-3, where the frequency corrected bars of the low duration riders are higher than the frequency biased responses, with the reverse true for longer duration riders. Other data showed that new and low frequency riders were far more likely to be cash users than ticket or pass users. These findings suggested that promoting prepayment by infrequent riders would help reach new riders, build commitment by these riders and thereby stabilize their use and promote ridership increases. As prepayment is associated with more riding, the Deep Discount plan can make usage grow.

Support for this also came from Dayton's rider stability data. As seen in Figure 3-4, about half of riders (on both a market and trips basis) had a stable weekly trip frequency in the last six months. The differing heights of the frequency-corrected vs. frequency-biased bars again show that higher frequency users (frequency-biased data) have a greater tendency to increase their use or to be stable, while lower frequency users (frequency-corrected data) have a greater tendency to reduce their use or to be entirely new riders. Crosstabulations showed that those with stable or increasing use were more likely to use tickets or passes, while new riders or those reducing use were more likely to pay cash. Again, these observations support promoting ticket discounts to build commitment and stabilize the market.

These points are also evident in a close inspection of Figure 3-5, which shows fare classification data from Dayton. The relative height of the frequency-corrected and frequency-biased bars shows that cash users have lower frequencies than token or pass users. Especially after Deep Discounting is established, cash users that do not take advantage of prepayment discounts are demonstrating their insensitivity to savings. Because the total savings available to a rider is a function of that rider's frequency, infrequent riders tend to be insensitive to fares and thus pay cash.

These findings have been confirmed in many other cities. In general, prepayment carries with it a host of benefits, and thus the objective of Deep Discounting is to make prepayment the standard way to pay fares. Most transit agencies with monthly passes and undiscounted tickets have prepayment levels of about 35 percent, but with Deep Discounting this typically grows to 60 percent or more. In some cities it exceeds 80 percent.

### Q3. How long a rider?

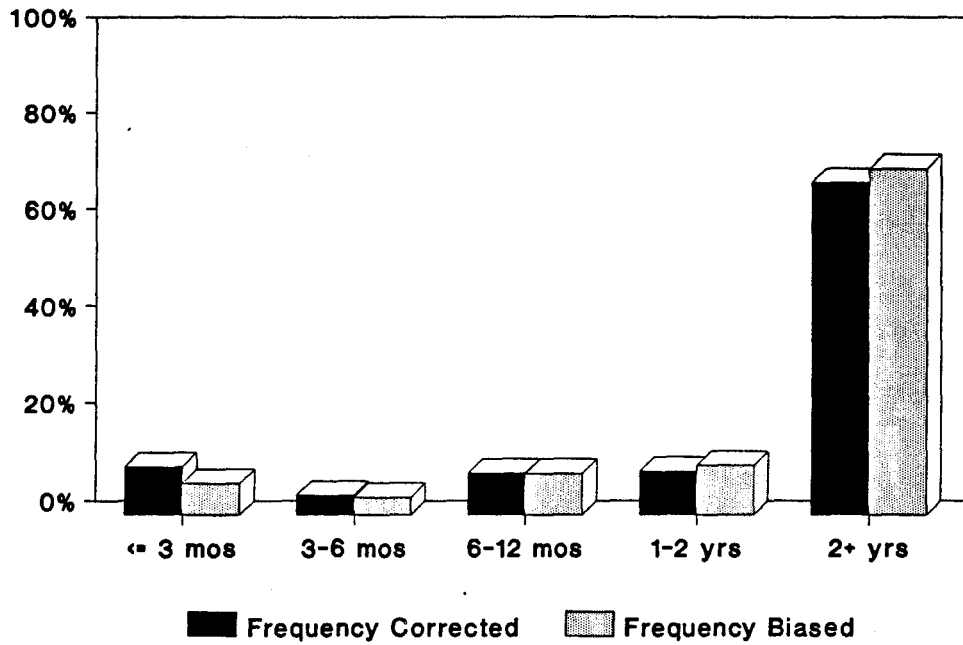
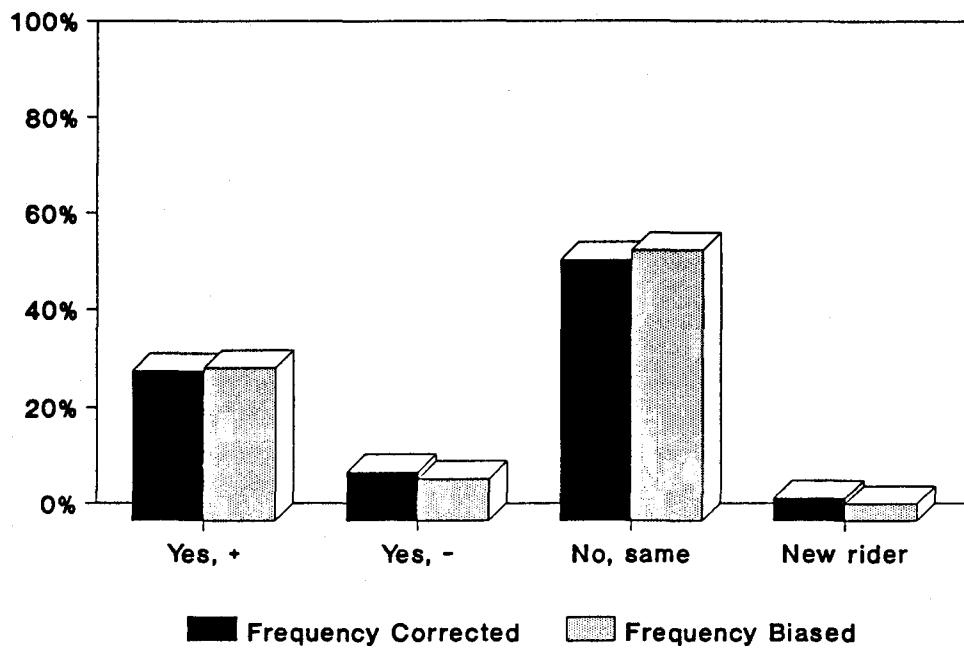


Figure 3-3. Rider Duration Data<sup>5</sup>

<sup>5</sup> The graph is taken from the Miami Valley Regional Transit Authority Study (Dayton, 1992, Reference 15).

### Q4. Trip frequency changed?



**Figure 3-4. Riding Dynamism<sup>6</sup>**

<sup>6</sup> The graph shows the results of the question "Has the number of trips you take per week changed in the past six months?" from the Miami Valley Regional Transit Authority Study (Dayton, 1992, Reference 15).

## Q1. How did you pay your fare?

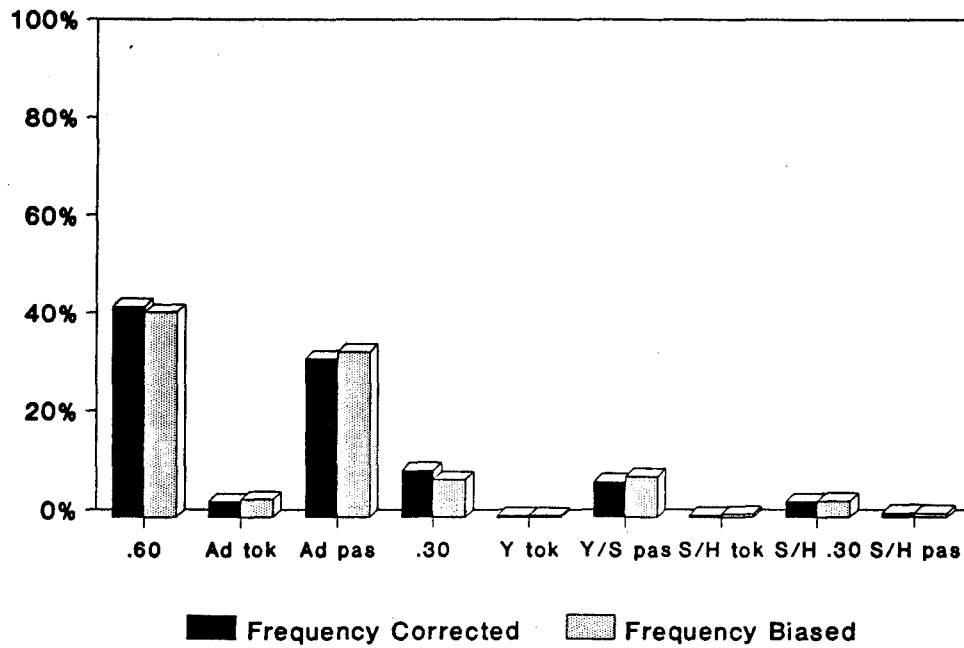


Figure 3-5. Use of Various Fare Types<sup>7</sup>

<sup>7</sup> The graph is taken from the Miami Valley Regional Transit Authority Study (Dayton, 1992, Reference 15).



### 3.2 DEEP DISCOUNT IMPACTS ON KEY MARKET SEGMENTS

The following comments reflect broad experience with Deep Discounting, including insights from experience in various cities and follow-up research studies in some of them (as detailed in Section 4). This summary information helps to frame an understanding of Deep Discount objectives and impacts to date.

Table 3-1 defines five elements of the transit market by level of riding. Usage ranges from highly infrequent to intensive.

**Table 3-1. Common Reaction of Key Market Segments to Deep Discount Fares**

Market Segment	Common Reaction to Deep Discounting
Highly infrequent users (about one trip per month)	<ul style="list-style-type: none"> <li>- Probably pay cash, and are generally insensitive to fares</li> <li>- If prompted to shift to tickets, tend to increase transit use markedly</li> </ul>
Low frequency users (one or two trips per week)	<ul style="list-style-type: none"> <li>- May use cash or tickets, and may be fare sensitive or insensitive</li> <li>- Are a key target market; may reduce transit use if not induced to shift from cash</li> </ul>
Regular users (four to seven trips per week)	<ul style="list-style-type: none"> <li>- Likely shift to tickets if well-marketed; can be quite sensitive to fares</li> <li>- Are the key opportunity for riding increases</li> <li>- Provide opportunity to build commitment to transit</li> </ul>
Commuter only users (eight to ten trips per week)	<ul style="list-style-type: none"> <li>- May use pass if break-even price is low, but some cannot afford monthly passes; tickets can substitute</li> <li>- May find ticket savings substantial and popular due to their high frequency of transit usage</li> <li>- May opt for weekday only or peak only passes</li> <li>- Offer opportunity to build commitment</li> </ul>
Intensive users (12 or more trips per week)	<ul style="list-style-type: none"> <li>- Tend to be lower income; often do not buy passes despite potential savings</li> <li>- Are potential seven-day pass market</li> </ul>

Highly infrequent users probably pay cash and likely will continue to do so, because they ride too little to be enticed to prepay. Even a 30 percent savings may amount to just a dollar over a period of a year for a highly infrequent rider. Thus, this group is generally a source of more revenue, i.e., payment of higher cash fares with no loss of ridership. Yet some of these riders are positively disposed to transit and many have higher incomes. Higher-income riders have checking accounts (they can order by mail), and higher income households can be price sensitive (most retail coupons are used by mid to high income homes). If highly infrequent users are drawn to prepay, their use can increase sharply, albeit to just once or twice a week from once a month, perhaps. Despite its low frequencies, this market is very large.

Low frequency users may be either sensitive or insensitive to fares. Higher fares may cause low frequency riders with low incomes (such as youth, the unemployed and some senior citizens) to ride less. In particular, these low income riders may refrain from discounted bulk ticket purchases, because they are unable to afford the up front outlay of cash, and thus may ride less due to the higher fares. Special efforts are needed to identify these users and market discount tickets to them, perhaps via direct mail or supplemental coupons. Some cities have drivers distribute flyers to riders as they board.

Another, but smaller, part of the low frequency user market is riders who do not have low incomes who may shift to bulk purchases; these riders may significantly increase their use of transit. Finally, some low frequency users are not fare sensitive, i.e., will not stop riding because of higher cash fares. As this discussion suggests, the low frequency market is complex, and addressing it effectively is very important to the success of Deep Discounting.

Regular users, taking four to seven trips per week, likely shift to tickets if the tickets are actively marketed and easily bought. These users can be quite fare sensitive. They are more likely to be commuters than off-peak riders, and respond well to Deep Discounting. That is, riders who might shift more trips to transit, as is the case with a commuter who uses transit only occasionally, will do so when motivated by prepaid discounts. These riders can increase their commitment in two ways: via higher frequency and lower turnover. Ridership turnover is particularly high among infrequent commuters.

Commuter only users may use monthly passes if the break-even price is about 35 trips or fewer, because their frequent transit usage makes their savings significant. Lower income transit users, who may be paid weekly, may not be able to afford monthly passes, making weekly passes or ten-ride tickets more appropriate. When commuter only and formerly cash paying riders shift to passes, they may make some additional off-peak rides which do not generate added revenue for the transit provider. Further, the increased sale of passes to commuter only users creates more opportunities for pass abuse (one person sharing a pass with another). Survey data show this to be surprisingly common, as discussed further in Section 7.6.

Peak only or weekday only passes can serve this market segment well; they allow a pass to be sold at a price low enough to appeal to these users, while preventing revenue loss from pass-induced trips and pass sharing.

Intensive users often have lower income and cannot afford monthly passes; survey data show many of the highest frequency riders do not buy passes despite the savings they would

enjoy. However, when faced with higher cash fares, these riders often shift to passes or tickets. Some revenue loss results if they shift to tickets priced below the initial cash fare (the cash fare before the change), and greater losses result if they shift to passes. The Deep Discount plan, when implemented along with a fare increase, often expands pass sales. Due to this, some cities have raised pass prices as a second phase of a Deep Discount plan, and two cities have begun using two-tiered pass plans, with one pass valid on just weekdays and another valid on all seven days and sold at a higher price. This topic is discussed further in Section 7.6.



#### **4. LOCAL EXPERIENCE WITH DEEP DISCOUNTING**

Key sources of fare and ridership information for this review were the 1990 and 1993 editions of the "Transit Fare Summary" issued by the American Public Transit Association (APTA), and APTA's Quarterly Transit Ridership Reports for the 1988 to mid-1993 period. Revenue data were obtained from the 1989 to 1992 editions of APTA's Transit Operating and Financial Statistics Reports, and from the yet unpublished 1993 summary.

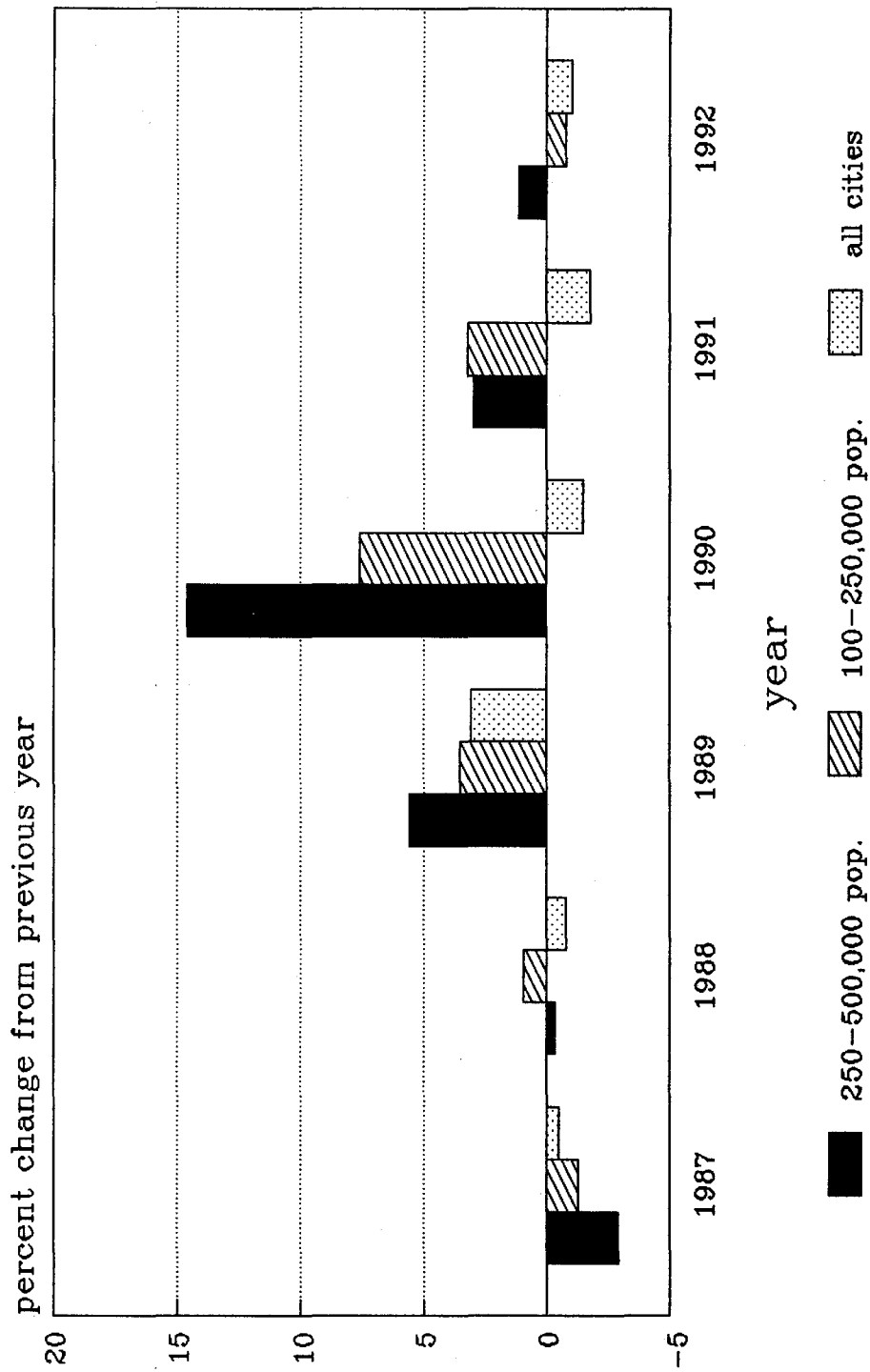
Other sources include a report produced for the Chicago Transit Authority, "Summary of Transit Pricing Innovations," May 1990 (9); "Summary of Innovative Fare System Options," prepared for Greater Richmond Transit Company, January 1992 (10); and "Transit Fare Policy and Structures at Large, Medium and Small Sized Bus Systems," prepared for the Transportation Research Board, July 1993 (11). Local agency and other research reports were also used as available; lists of references and agency contacts appear at the end of this report.

Despite efforts to obtain data, however, the findings reported below are inconsistent in the level of detail and even in the availability of empirical results in some cases. This reflects the limited use of fare and marketing evaluation methods in the industry, the numerous factors that affect transit ridership changes (particularly effects of the 1990's recession), and the fact that some of the changes are too recent to have been assessed.

Overall, the reported revenue and ridership results at transit agencies using the Deep Discount plan seemed better in the late 1980's than in the early 1990's. This is likely related to the recession which began in 1990 and whose impacts overshadowed those of the fare changes.

Concurrent changes in fares, transit service and overall economic activity severely complicate analysis of local data. For general comparison, the national trends in transit ridership are displayed in Figure 4-1. For the six years shown, aggregate (all city) transit ridership grew only in 1989, and fell in 1990-1992. Yet in both of the medium sized city categories shown, ridership has been stronger than in all cities taken as a whole. Because most of the cities using Deep Discounting are smaller, the smaller city subsets of the national data are more appropriate for national trend comparisons. Still, the 1980's were better times overall.

While limited in an empirical sense, the findings reported below remain illustrative of promising new directions in the transit industry and of the acceptance of the Deep Discount concept. It is striking that in a number of cities where it proved necessary to raise fares again after the Deep Discount plan was established (e.g., Allentown, Chicago, Grand Rapids, Madison, Richmond), the discount structure was retained and in most cases expanded. Thus, in addition to comparing available local ridership and revenue data against local trends and national data, local decision making is another indicator of overall industry satisfaction with the Deep Discount fare plan.



Source: APTA Quarterly Ridership Reports

Figure 4-1. Ridership Percent Change from 1986 through 1992 in US Cities

The following summarizes what has been learned in most of the cities using Deep Discounting. This is not an exclusive listing; experiences in other cities, including Reading, Miami, Los Angeles, Las Vegas and San Francisco (Golden Gate Transit), could have been included in this review, but were not, due to limitations on the scope of this study.

#### 4.1 ALLENTOWN

The Lehigh and Northampton Transportation Authority (LANTA) in Allentown, Pennsylvania, was one of the first agencies to implement a Deep Discount fare plan. LANTA has kept this plan in place for more than six years through two subsequent fare changes and has further increased the discount provided for tickets. LANTA's cash fare is now \$1.10 while discounted ten-ride punch cards (sold by drivers and elsewhere) are available at \$7, a discount of 37 percent. A 40-ride card is also available at \$28, as is a \$28 monthly pass. LANTA now obtains more than 84 percent of its revenue on a prepaid basis, with tickets making up the larger share. Because its use of Deep Discounting is the longest, the entire LANTA experience is reviewed below.

LANTA introduced Deep Discounting in April 1987. The agency changed its fare structure from 60 cents cash at peak and 50 cents at off-peak times, with tickets good at all times sold at 50 cents (ten for \$5), to a single cash fare of 75 cents and ticket prices kept at the 50-cent level. Thus, the cash fare increase was 50 percent in the off-peak and 25 percent in the peak. In addition, LANTA widely distributed \$1-off coupons, making a first ticket purchase cost \$4 (40 cents each), a 47 percent discount from the new cash fare. The coupons sought to maximize discounts for infrequent users.

Special efforts were made to track riding changes in the first six months of the plan; it was reported that boardings rose five percent over the previous year and revenue rose ten percent. Although the program is very well-regarded locally, LANTA does not routinely collect data allowing full, ongoing assessment of its impacts. An analytical problem is that LANTA does not routinely record ticket use data, only ticket sales. LANTA's accounting system stresses revenue control over ridership data.

The Deep Discount strategy accelerates ticket sales; it leads to more prepayment and accelerates revenue receipts. Indeed, LANTA's level of ticket use rose from approximately 17 to 45 percent as a result of the change; combined with 20 percent of trips prepaid through pass sales, the aggregate prepayment level was about 65 percent. LANTA drivers sell tickets on buses, which makes the discount plan convenient to users; this may be a key to LANTA's success. Over a longer period, ridership appears generally stable despite the rather dramatic fare changes, but without ticket use data LANTA cannot clearly discern the impact of the changes. The monthly and year-to-year data are obscured by the absence of ticket use data. Inconsistent marketing is another cause of distortions; for example, coupon use further accelerates some ticket purchases.

Despite the lack of complete data, market research confirms management's positive view of the program. A telephone survey found a ten percent increase between 1987 and 1988 in the number of people community-wide who had used the bus. An on board survey revealed that most riders reporting increased use were existing as opposed to new riders. This confirmed one goal of the discount plan, but also pointed to concurrent changes in LANTA's marketing as a weakness in the ongoing implementation of the program; soon after the program began, LANTA reduced marketing aimed at new riders. Many occasional commuter users were found to have increased use, reflecting the greater emphasis on prepayment and confirming the theory that commuters are the most inclined to respond favorably to Deep Discounting.

In April 1990, seeking additional revenue growth, LANTA raised the cash fare from 75 cents to \$1, and ticket prices rose from 50 to 60 cents each. Widespread distribution of \$1-off coupons introduced the change. As a result of this 33 percent cash fare increase and 20 percent ticket price increase (yields a new deeper discount of 40 percent on tickets), LANTA reported in July 1990 that no ridership loss was evident; in fact, a nominal increase was seen. Prepayment expanded to 80 percent, comprised of about 60 percent ticket and 20 percent pass use. The revenue goal of the fare change was exceeded.

A 1990 survey of \$1 coupon users (2) showed that directly distributing discount coupons to cash paying riders was cost effective in inducing new riding and shifts to prepayment, and also in stemming ridership turnover. Peak period commuters responded to the coupons best. The data suggested that each \$1 discount coupon likely resulted in \$4 of new revenue that otherwise would not have been retained.

In Spring 1993, LANTA again raised fares, with the cash fare rising to \$1.10 and tickets to 70 cents, retaining the Deep Discount plan through its three successive fare changes. LANTA management remains positive about the program, emphasizing both its appeal to riders and its political appeal. The discounts enabled LANTA to keep ticket prices constant for more than five years, and to sustain ridership despite sharp cash fare increases. This relative insensitivity of LANTA ridership to the fare increases is evident from Figure 4-2.

LANTA fare revenue has grown consistently, as shown in Figure 4-3. From \$1.5 million in fiscal year 1988, it expanded to \$1.831 million in fiscal 1990, and further increased by 2.3 percent to \$1.874 million in fiscal 1991. In fiscal 1992, revenue rose to \$1.937 million, up 3.4 percent from the previous year. Consistent revenue growth with essentially stable ridership clearly supports LANTA's use of Deep Discounting.



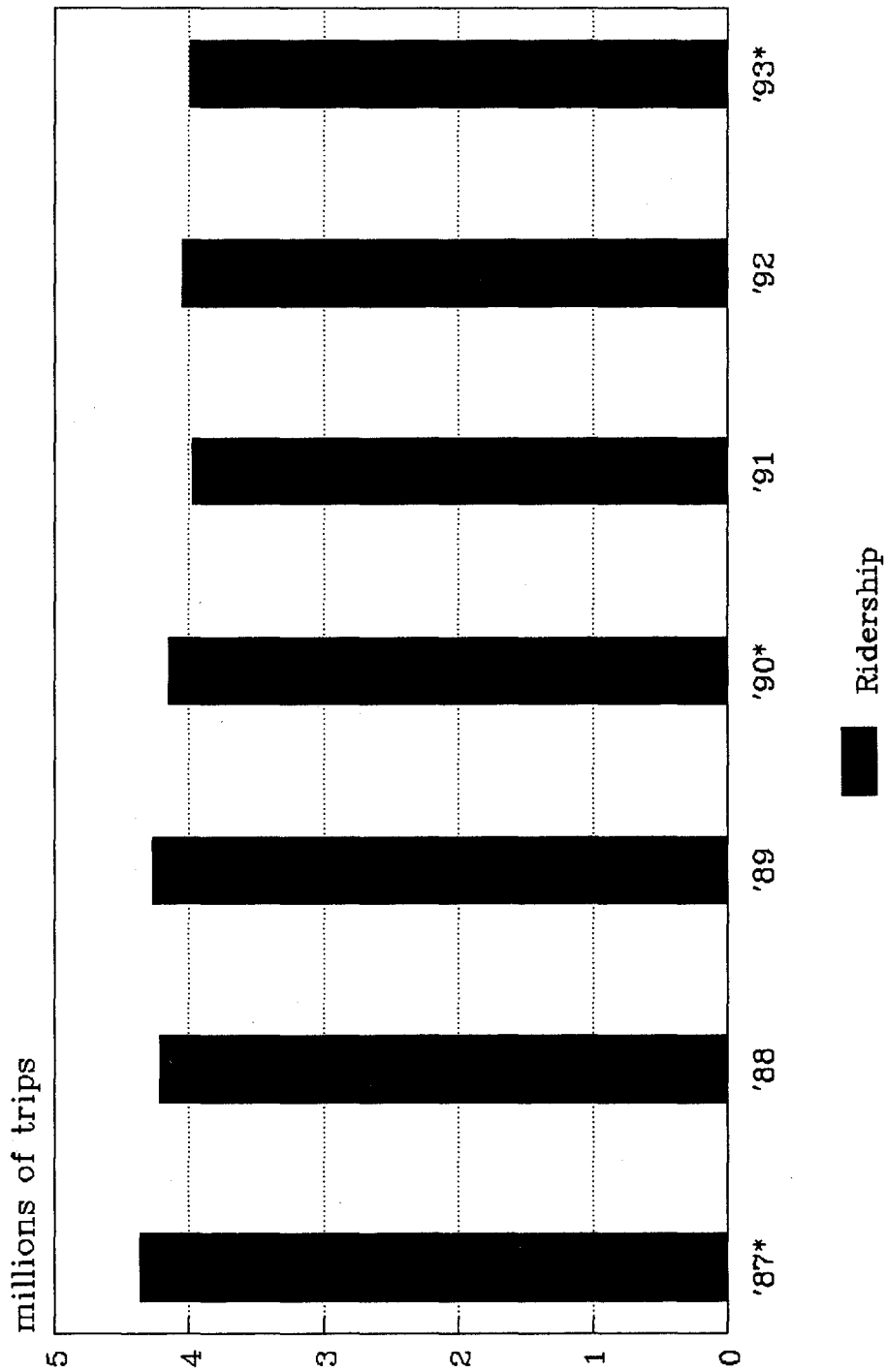


Figure 4-2. LANTA Annual Ridership, 1987 through 1993<sup>8,9</sup>

<sup>8</sup> Deep Discounting fare changes occurred in 1987, 1990 and 1993.

<sup>9</sup> 1993 annual ridership is estimated based on January through June statistics.



Figure 4-3. LANTA Annual Revenue, 1988 through 1992<sup>10,11</sup>

<sup>10</sup> Deep Discounting fare changes occurred in 1987, 1990 and 1993.

<sup>11</sup> 1987 and 1993 revenue estimates were not available.

## 4.2 CHICAGO

Seeking to build revenue without losing ridership, the Chicago Transit Authority (CTA) introduced a Deep Discount plan in April 1990. The cash fare on the rapid transit system rose 25 percent (from \$1 to \$1.25) and peak/off-peak fares were introduced on buses. The peak bus fare went from \$1 to \$1.25, while the off-peak fare stayed at \$1. The discounted token price actually fell from 95 cents before the change to 90 cents. (Tokens are sold in ten-packs only.) Senior citizen fares were also reduced. In place of the former monthly pass selling for \$50 and a two-week pass selling for \$25, two new monthly passes were offered: one allowed unlimited use and sold for \$60, and the other allowed use only on Monday through Friday and sold for \$45. The two-week pass was discontinued.

CTA's marketing of the fare change was highly effective. A CTA rider survey taken on the day the new fare plan took effect found 90 percent of respondents aware of the new fare structure and many of its details. Most riders were pleased with the change, despite the higher cash fares it involved.

After eight months of the new fares and careful tracking, CTA reported that ridership had risen by about three percent with eight percent revenue growth. Major pass market changes occurred and required thorough assessment to determine ultimate impacts. Only modest growth in token use was reported; from just six percent before the change, token use grew to 15 percent. Pass use fell by 15 percent and use of cash also fell by 15 percent. The share of prepaid revenue grew from 32 to 42 percent. The Deep Discount plan was deemed very successful in its first year.

Since the initial months, the recession and subsequent fare changes have severely complicated the interpretation of the effects of Deep Discounting in Chicago. Ridership and revenue fell sharply in 1991, but CTA staff link these declines to the overall economy and not to the fare structure. To meet revenue needs, CTA had to raise all fares in 1991; it retained the Deep Discount structure, but reduced the level of discount from the earlier 28 percent to 20 percent. At the same time, the Monday through Friday monthly pass was dropped and an unlimited use weekly pass was introduced at a \$15 price. Use of tokens continued to expand in 1991; cash use fell 22 percent, pass use fell six percent, and token use rose 44 percent. Prepaid revenue rose to 56 percent in 1991.

Despite the gain in prepayment, overall ridership and revenue continued to decline as the recession deepened. Early in 1993, CTA revised fares again by trimming the token discounts to 17 percent. Tokens now cost \$1.25 each (ten for \$12.50) compared to the cash fare of \$1.50. Yet the major 1993 change involved passes; CTA reintroduced the weekday only monthly pass at a \$66 price, the weekly pass at \$20, and the unlimited use monthly pass at \$78. Compared with other cities, CTA pass prices are high. Pass break-even levels are now 58 to 62 trips on a token price basis, and 48 to 52 compared to cash.

Based on intensive work with CTA (20), a 1993 review of its experience (3) notes these conclusions: "The recession has masked the longer term impacts of Deep Discounting in Chicago. It may be that the Deep Discount structure served to minimize the extent of ridership decline... However, the approach did prove successful in its initial year, and CTA management and staff considered it worth retaining in spite of the need to generate substantial revenues. It remains an effective means of minimizing the use of cash, and is still seen as a strategy for minimizing ridership losses when cash fares are raised."

#### **4.3 DAYTON**

The Miami Valley Regional Transit Authority (MVRTA) implemented Deep Discounting as a fare increase taking effect April 1, 1993. Despite substantial employment losses in Dayton, the shift was well-received. It was the first significant change in MVRTA fares in 11 years. All fare categories increased; adult cash fares rose from 60 to 90 cents, and tokens rose from 60 cents each to 71.4 cents (seven for \$5). Thus, the previously undiscounted tokens now offer a discount of 21 percent. MVRTA has an extensive pass program using both weekly and monthly passes. The price of the weekly pass rose just 13 percent (from \$5.75 to \$6.50), while tokens rose 16.7 percent. Monthly passes rose 13.6 percent. The new fare plan expanded weekly pass sales substantially, and had relatively less impact on tokens. However, little target marketing of infrequent riders has been done to date.

Before implementing the change, MVRTA did an on board survey (15) to affirm assumptions in the fare study that proposed use of Deep Discounting (16), and as background for later analysis of fare change impacts. The survey found that the largest share of all users rode infrequently; 75 percent of all users rode three times per week or less but accounted for 31 percent of all trips. These infrequent riders, basically all paying cash, were the key target market for the Deep Discount plan. Cash riders were disproportionately likely to be new riders and relatively more likely to stop riding. New riders were found more likely to be infrequent users. Substantial pass sharing was seen, as was the use of cash by many riders riding more than the pass break-even levels.

The fare change was reported to be well-received, but ridership losses related to the recession and closure of the major downtown department store complicated comparisons in the initial months. Ridership stabilized in Fall 1993, with the declining trend MVRTA had been experiencing reversing since the fare change. After one full year of the new fares (through April 1994), year-to-year ridership was reported to have risen by 0.2 percent, while revenues rose over 20 percent. This growth in revenue and stable ridership are even more notable, given that MVRTA reduced its service level slightly in 1993, with vehicle hours falling approximately five percent and vehicle miles falling two percent.

#### 4.4 DENVER

Denver's experience remains one of the most successful of all the cities using Deep Discounting. Denver's Regional Transportation District (RTD) implemented Deep Discounting in September 1989, applying it only to the peak period market. Earlier that year, RTD staff had assessed the Deep Discount concept and projected its impacts to be far better than those of other possible fare changes or Denver's 1987 fare change, which had been followed by a 13 percent riding loss. However, as of 1989, there had been no experience with Deep Discounting at an agency of RTD's size. Reflecting guarded interest, the Board modified the staff proposal for a fare change affecting all riders and focused the Deep Discount program on peak riders only. Thus, the change introduced a higher cash fare only in the peak service market (a change from 75 cents to \$1 for local service) and left the off-peak fare at 50 cents. It was expected that if the initial phase succeeded, the off-peak fare issue would be reexamined. Ten-ride peak tickets were offered at a 27 percent discount (ten for \$7.25).

As seen in Figure 4-4, both ridership and revenue trends in Denver have been positive since the fare change. Over this same period, Denver's economy largely recovered from the oil-based recession in the middle and late 1980's. Yet research in other cities has found that the peak market segment responds best to Deep Discounting, which is further supported by Denver's experience.

RTD mounted an aggressive marketing campaign around the fare change. New sales outlets were established. A television advertising exchange was negotiated, with RTD inserting the television station call letters on marketing materials in trade for substantial air time. Coupons reduced the price of the Deep Discount tickets from the regular discounted price of ten for \$7.25 to ten for \$6. The coupons were mailed to more than 200,000 households in a coupon circular. Drivers also distributed the coupons to cash paying riders, via a creative incentive system.

In the first three months of the program, a revenue increase of 13 percent and fractionally increased ridership (under one percent) were reported. Further fare related marketing was done later in 1990, but substantial staff turnover reduced emphasis of the Deep Discount plan after Spring 1991. Despite the initial intent to expand the Deep Discount incentives to serve the off-peak market, no further fare structure changes have been made, largely due to the favorable ridership and revenue results of the initial change.

Figure 4-4 includes data through 1991 only. RTD also implemented two employer fare subsidy programs in 1991, Commuter Check and Eco Pass. These programs increased RTD's revenue and especially its ridership; thus, the best insights on the impacts of Deep Discounting come from the 1989 and 1990 data.

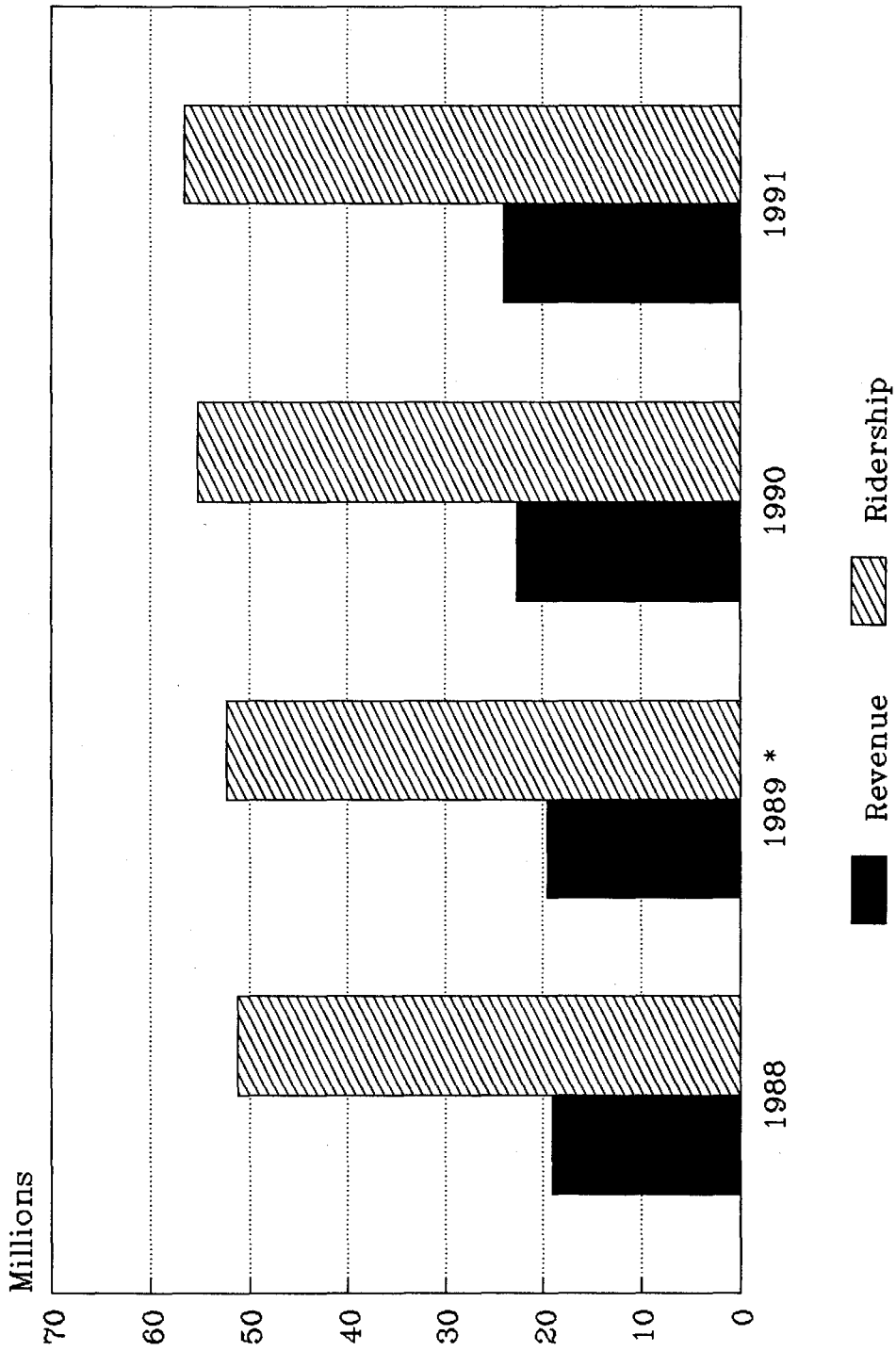


Figure 4-4. Denver Annual Revenue and Ridership, 1988 through 1991<sup>12</sup>

<sup>12</sup> Deep Discounting began in mid-1989.

## 4.5 GRAND RAPIDS

The Grand Rapids Area Transit Authority (GRATA) adopted a Deep Discount plan in September 1991. The fare change raised the cash fare to 90 cents and left adult tickets at 60 cents. In other words, with the fare change, the previously undiscounted tickets began to represent a 33 percent savings. In September 1993, GRATA deepened its discounts by raising cash fares to \$1.25 and ticket prices to 70 cents. The discount thus grew from 30 to 55 cents (or from 33 to 44 percent). This made GRATA's fare changes one of the most dramatic applications of the Deep Discount strategy.

GRATA is well-suited to Deep Discounting because its drivers sell tickets. The price of GRATA's monthly pass, which did not change with the initial adoption of Deep Discounting, was increased in 1993 more than the ticket price (from \$22 to \$27 per month), partly because pass sales grew substantially after the Deep Discount program began.

Due to staff constraints, GRATA was unable to provide a high level of marketing to support the introduction of the Deep Discount plan, and the goals originally set for the program have not been reached. Despite their availability from drivers, ticket sales have been lower than hoped. Grand Rapids also has suffered from the economic downturn of the past few years. Ridership and revenue data, shown in Figure 4-5, show that over the last three years, the average rate of revenue growth was 9.6 percent, with a 2.5 percent loss in ridership.

An on board survey of GRATA riders (5) performed in December 1991 (just four months after the new fares took effect) enabled comparison with the results of a similar survey performed four months before the fare change (4). A number of key findings emerged.

There was a loss of ridership in the initial months of the new fares and less revenue gain than projected. Survey data found that more infrequent riders were drawn to GRATA, but also that some longer-term and higher frequency riders were lost. Prepayment shifted to 53 percent rides prepaid compared with 28 percent before the fare change. Many GRATA users, especially infrequent riders, continued to pay the higher cash fares. This suggests that the new discounts were not adequately marketed, which was the case.

Riders at the middle frequency level (three to eight trips per week) fell from 41 percent to 36 percent of the total market, while the infrequent and intensive user segments grew in market share. Meanwhile, the commuter market's (ten trips per week) share grew. Riding fell among the 21-34 year old market, which had been identified as a key target market for special attention. Older riders were found more likely to take advantage of the discounts.

Increased pass sharing was revealed by monthly pass usage by riders reporting very low trip frequencies. Data on changes in trip frequency showed that cash riders were very likely to reduce their use, while ticket users were likely to increase it. Ticket use grew in both the high and low income categories; there were no distinct variations in the use of discounts among different income groups.

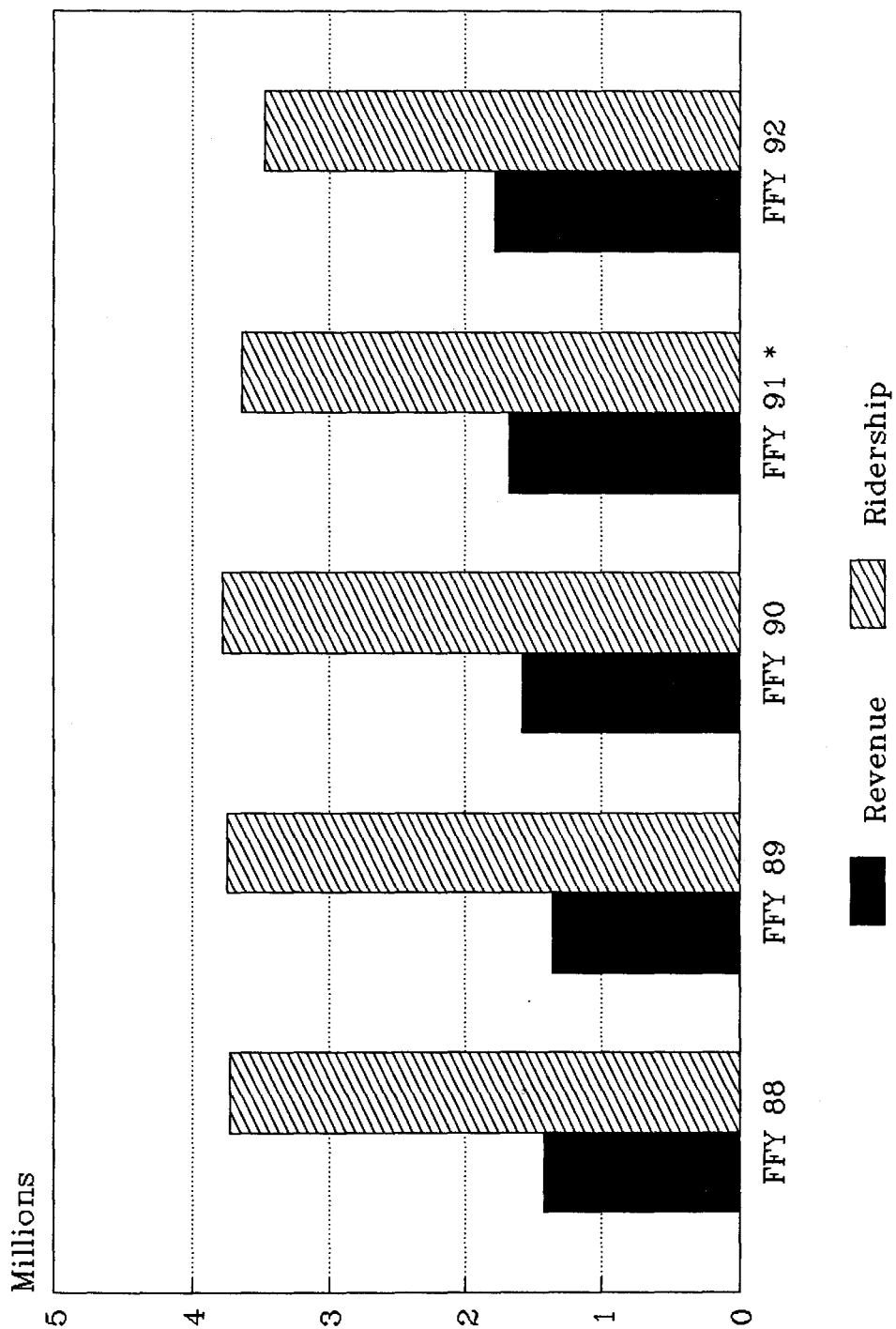


Figure 4-5. GRATA Annual Revenue and Ridership, Federal FY 1988 through 1992<sup>13</sup>

<sup>13</sup> Deep Discounting began in August 1991.



New ridership was evident in the commuter market. This market responded best to Deep Discounting, while off-peak and infrequent users took advantage of Deep Discounting far less. Ridership increases correlated strongly with shifts from cash to tickets and passes. Shifts to the pass market built ridership, but did not contribute to revenue and likely accounted for lost revenue.

A question on riders' overall assessment of GRATA's service and performance found that those who did not change their fare paying method had a notably poorer assessment of GRATA. Ridership loss was concentrated among younger riders, most evident in the contraction of the Saturday only (youth) market. Many target marketing insights were gained from the survey data.

#### **4.6 LAFAYETTE**

Greater Lafayette Public Transit Corporation (GLPTC) in Lafayette, Indiana, perhaps the smallest agency to use Deep Discounting, was also one of the earliest. GLPTC's cash fare is 50 cents, and FareSaver ten-ride tickets are sold at ten for \$4; a \$5 FareSaver includes issuance of a transfer. A monthly pass is sold for \$21, and there are no express or distance charges. The success of the Deep Discount plan was originally attributed to direct mail coupons used to promote the program, which were sent to virtually every household in the service area.

GLPTC introduced a Deep Discount plan initially as a short-term discount promotion, but later made the plan a permanent part of the fare structure. In February 1988, GLPTC introduced a new discount ten-ride card in a mail-based promotion. The promotion created a 68 percent increase in prepaid rides. By June 1988, the plan was associated with a five percent increase in riding and two percent increase in adult revenue. It is remarkable that this revenue increase occurred from a promotional fare reduction; no cash fare increase was involved. Due to these impressive results, the FareSaver plan was adopted as a permanent part of GLPTC's fare structure in late 1988. While fares remained stable, a simultaneous increase in riding and revenue also was achieved in 1989. GLPTC's Deep Discount plan remains popular. GLPTC revenue and ridership data for the three years from 1988 to 1990 appear in Figure 4-6.

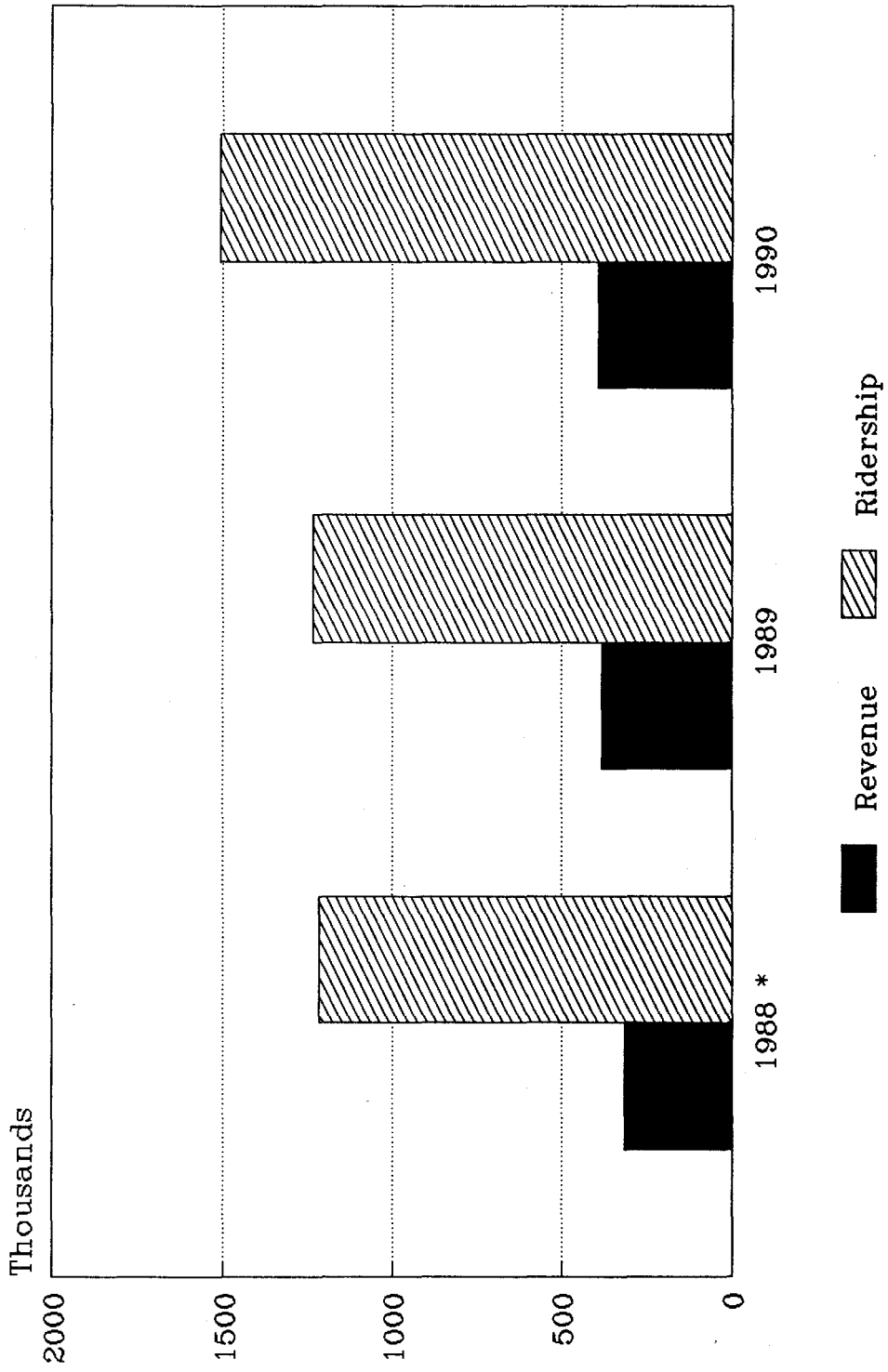


Figure 4-6. GLPTC Annual Revenue and Ridership, 1988 through 1990<sup>14</sup>

<sup>14</sup> Deep Discounting began in 1988.

## 4.7 LOUISVILLE

The Transit Authority of River City (TARC) in Louisville, Kentucky adopted a Deep Discount fare structure in October 1993. This change involved a partial departure from the peak/off-peak fare plan TARC had in place since 1980, which, in fact, was the last time fares had been changed. Separate peak and off-peak cash fares were retained, but tickets are now good at all times and are priced at a savings for both peak and off-peak users (47 percent savings for adult peak users, ten percent savings for off-peak). The new peak cash fare is 85 cents (up from 60 cents), the off-peak cash fare is 50 cents (up from 35 cents), and tickets are sold at ten for \$4.50. The new ticket price is, in fact, a reduction from the 50 cent peak ticket price (ten for \$5) that had applied; no off-peak tickets were previously available.

A monthly pass plan also began in October 1993. Before the fare change, TARC's ridership was basically stable or falling slowly for a number of years. In 1993, ridership fell three percent from 1992 levels.

Data from the first seven months of the new fare plan (October 1993, to May 1994) suggest the program is working extremely well; a TARC memo calls it "an unqualified success." Compared to the previous year, revenue is up over 21 percent with riding down 1.2 percent. A 12 percent growth in revenue and 2.4 percent riding loss were projected by the fare study that preceded the change (8). TARC acknowledges that all of the marketing efforts it hoped to implement with the fare change were not yet completed; expanded promotion of the program is now planned.

Before implementing the new fare plan, TARC performed on board and telephone surveys to explore the Deep Discount concept. The on board survey (6) found that more than 90 percent of the total market (comprising nearly 60 percent of all trips taken) did not use TARC often enough to justify a monthly pass. A rider life cycle was also observed: most riders begin using TARC on an infrequent basis and, if their use continues, they increase their frequency. Yet turnover was substantial. These were the key observations justifying introduction of the Deep Discount plan. Existing ticket riders were longer-term, higher frequency and more stable users, while cash users had the opposite characteristics. Cash use predominated among younger users, whose turnover was highest. Interest in the Deep Discount idea was strong among all rider groups. Weekday only users, who respond well to Deep Discounting, made up most of the new riders. Higher income riders are over-represented as new riders and are also more likely to stop riding.

The telephone survey (7) which focused on very infrequent and nonriders still found overwhelming support for a Deep Discount plan. Despite their very limited use, a third of respondents said they would definitely buy ten-ride tickets that cost 30 percent less than cash fares, and an additional 13 percent said they probably would buy them occasionally. More than half the respondents said that simply using tickets as opposed to cash, irrespective of discounts, would cause them to use transit more often.

Using the 1993 on board survey data as a base, TARC implemented a follow-up on board survey in March 1994 to gain further information on impacts of the fare change. It was found that ridership grew among commuters and diminished slightly among off-peak users. Based on the results to date, TARC is now planning another fare change to take effect in late 1994. It is expected that this will further expand the Deep Discount plan by raising the peak cash fare to \$1 (up from 85 cents), the off-peak cash fare to 75 cents (up from 50 cents), and the ticket price to 50 cents each (up from 45 cents). In this second phase, TARC hopes to have as positive a response with the off-peak market segments as it has had with the commuter market segments in the first phase.

#### 4.8 MADISON

Deep Discounting is very successful in Madison, Wisconsin. Madison Metro (Metro) began Deep Discounting in August 1991. The initial fare change was a 25-cent cash fare increase (from 75 cents to \$1 for adults) with decreases in ticket and pass prices based on a five-cent reduction in the unit fare basis of prepaid rides (from 75 to 70 cents for adult tickets, and from \$27 to \$24 for the monthly pass). A subsequent change in December 1992 raised the adult ten-ride ticket back to the previous level (\$7.50), and in January 1993 the monthly pass price rose back to \$27. In March 1993, Metro began using a new weekday only monthly pass (called a Commuter Pass), which was sold at the pre-January 1993 price of the regular monthly pass. At that time, the regular (seven day) monthly pass price rose \$3 more to \$30.

Recognizing the need to promote the plan to infrequent users, Madison marketed the Deep Discount plan actively, including use of discount coupons. As Madison is a state capital relatively insulated from recession effects, it provides a very clear example of Deep Discount effects.

Deep Discounting is credited with reversing the downward ridership trend Metro had through the 1980's. On average, the increase in monthly ridership over that of the corresponding month of the previous year was 2.25 percent, during the period from the first fare change in August 1991, through December 1992. In Fiscal Year 1992 (11 months of the new fares), ridership increased 3.2 percent, and in Fiscal Year 1993, it rose another 0.5 percent. Other Metro provided data show revenue grew by four, six and 11 percent in the first three months of the plan, and that ticket sales doubled in the first two months. Metro's ridership levels for Calendar 1988 to 1993 appear in Figure 4-7.

Metro's annual revenue data appear in Figure 4-8. Significant and continuing revenue increases have resulted since the fare change. Metro had simultaneous ridership and revenue increases in 1991 and 1992, and virtually unchanged ridership in 1993. Sharp increases in average fare per unlinked trip are also seen. There were minor service increases (total bus hours and miles) in 1991 and 1992, of about two and three percent respectively, but service levels were constant in 1993. In 1993, fare revenue was 1.8 percent above the budgeted amount.

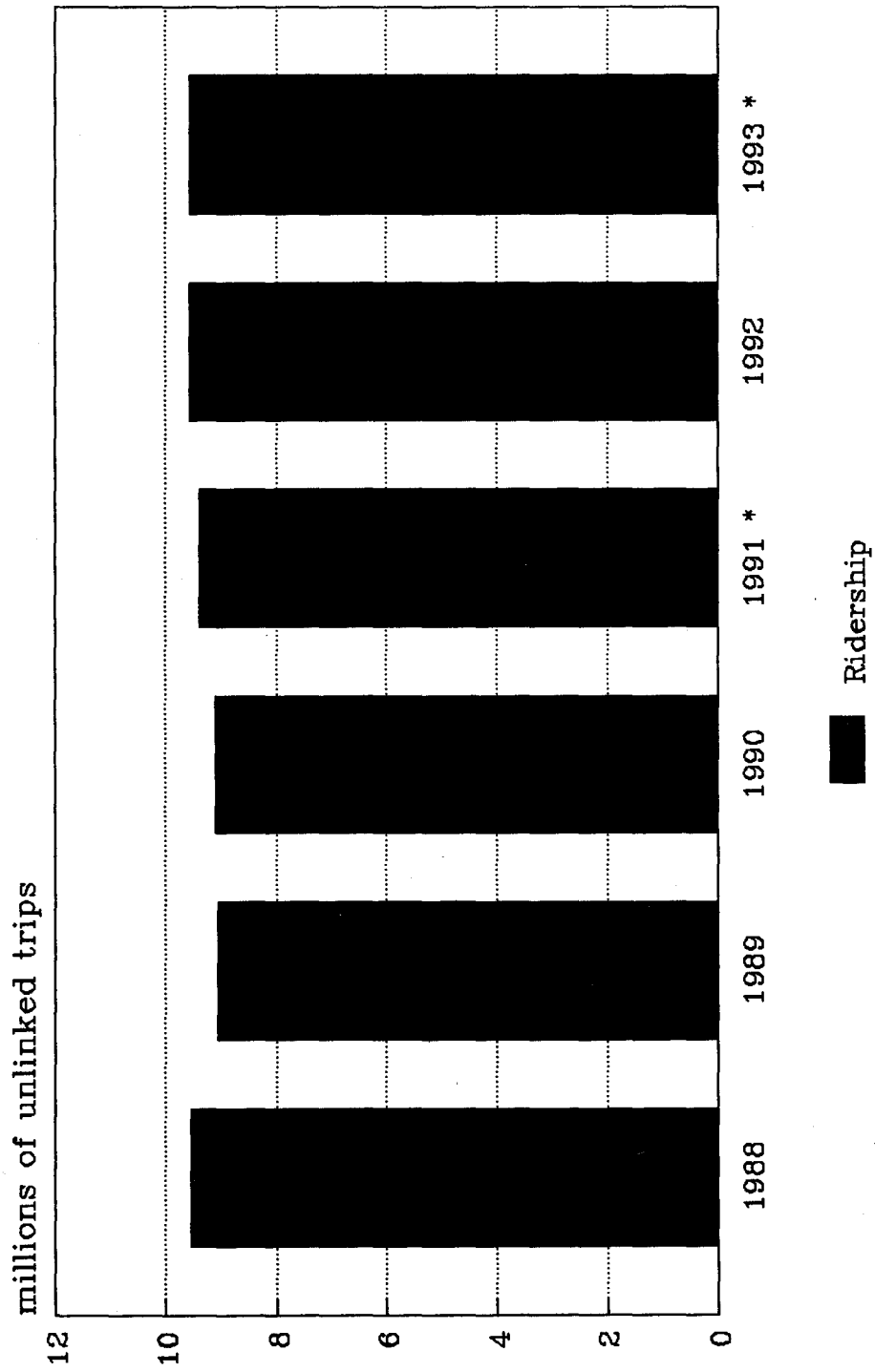


Figure 4-7. Madison Metro Annual Ridership, 1988 through 1993<sup>15</sup>

<sup>15</sup> Deep Discounting began in August 1991, and was expanded in January 1993.

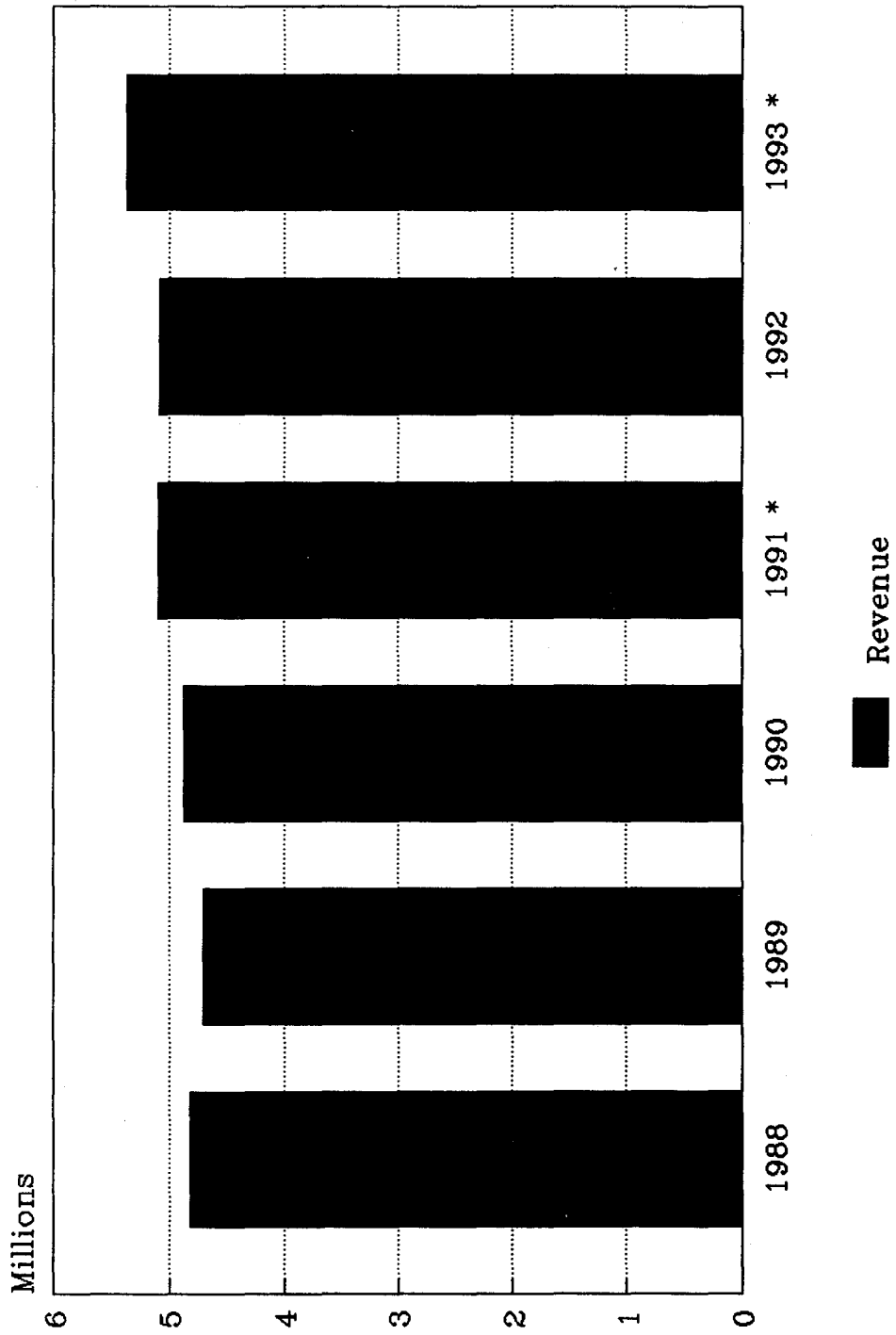


Figure 4-8. Madison Metro Annual Fare Revenue, 1988 through 1993<sup>16</sup>

<sup>16</sup> Deep Discounting began in August 1991, and expanded in January 1993.

The pass changes noted above carried the Deep Discount plan to what can be called Phase Two. When the program began, pass sales rose, as they have in almost all other Deep Discount cities. Reflecting this, Metro changed the pass plan as noted. Following recommendations originally made in the fare study framing Metro's Deep Discount plan (19), the pass plan changes Metro made after two years experience with the program made its pass pricing more consistent with observed pass trip rates and the growth in pass sales seen since Deep Discounting began. A weekday only Commuter Pass also diminishes pass sharing on weekends, which has been seen to grow under a Deep Discount fare structure. (See discussion in Section 7.6.)

The 1993 ridership data show no net riding loss due to Phase Two changes; for all of 1993, ridership fell just 0.1 percent. Through October 1993, a 0.1 percent riding gain was experienced despite the late 1992 minor cash fare increase and larger pass price increases early in 1993. No reduction in total pass sales was reported in the initial months following the pass changes. Minor ridership decline early in the year was offset by gains in subsequent months. Metro staff attributed the slight ridership loss reported for all of 1993 to bad weather and fewer school days very late in 1993, compared to 1992.

Metro's experience with Deep Discounting and related changes is very positive. With three sequential minor fare changes, Metro derived continually more revenue from fares, while reversing a decline and actually building ridership. Its sound marketing and second phase pass structure actions, make Metro's use of Deep Discounting a model. Additionally, the absence of recession-related distortions in the data during the period of Deep Discounting, makes analysis of Metro's experience highly instructive.

#### **4.9 MILWAUKEE**

Milwaukee County Transit System (MCTS) offers weekly passes, no monthly passes, and relies heavily on ten-ride tickets. More than half of its trips are prepaid. MCTS was one of the first agencies to use heavily discounted tickets, which began when it changed its cash fare from 75 cents to \$1 in 1987. A small but notable simultaneous increase in revenue and riding resulted, reversing a ten-year ridership decline. Subsequently, when ticket discounts were reduced with the cash fare remaining at \$1, the ridership decline resumed. In 1993, MCTS raised the cash fare to \$1.10 and reestablished the ticket discounts that had earlier been offered; MCTS is further expanding discounts with fare changes proposed for January 1994.

MCTS had a policy of keeping cash fares in even quarters, i.e., 50 cents, 75 cents, and \$1. When the 1987 fare change from 75 cents to \$1 was projected to generate more revenue than was immediately needed, the discounted ticket and pass prices were lowered. Adult ticket prices were reduced from ten for \$8.25 to ten for \$7.50, and pass prices were reduced even more than the tickets. These changes reversed MCTS' consistent downward ridership trend through the 1980's. Increases of 1.5, 2.3 and 0.3 percent were reported for 1987, 1988 and 1989 respectively, revenue was essentially stable in 1987, and increased one percent in 1988 and fractionally in 1989. Dramatic increases in weekly pass sales also resulted; pass sales rose 30, seven and five percent in 1987, 1988 and 1989, respectively, reflecting the lower break-even prices the program established, as well as the tendency of Deep Discount fares to build pass

sales. Ticket sales first rose but later declined; research found that many new ticket users subsequently converted to the lower priced weekly passes.

MCTS used unprecedented marketing efforts to introduce the program in 1987, but substantially reduced promotion after the program started. While revenue results were less than hoped for, the initial plan included increased pass discounts, deeper senior citizen discounts, and expanded senior discounts from off-peak hours only to all day, in addition to the new ticket discounts. MCTS viewed the reversal of its ridership trend, while keeping revenue stable, as a major accomplishment. Yet, the theory of Deep Discounting suggests the revenue results could have been better without the expansion of pass discounts or senior citizen discounts.

When MCTS had to raise fares again in January 1990, a cash fare above \$1 was not an available option. Instead, MCTS had to raise ticket prices; adult tickets rose by ten cents to 85 cents, with commensurate pass price increases. During 1990, MCTS' ridership fell slightly more than one percent. A larger riding loss had been feared; MCTS staff believed the Deep Discount plan enabled their riders to keep lower fares for a number of years, and, in fact, the 1990 increase made ticket fares just 2.5 cents per ride higher than they had been before the 1987 change. This, of course, remained an actual reduction in real dollar (uninflated) terms, which likely explains the limited loss of riders.

In 1991, however, MCTS ridership fell 3.8 percent, and in 1992 it fell another 3.3 percent. These declines are likely related to the recession, but Deep Discount theory suggests that reducing ticket discounts will sharply reduce riding. Needing to raise fare revenue but hoping again to reverse the ridership decline, in January 1993 MCTS reestablished the higher ticket discounts by raising the cash fare by ten cents to \$1.10 in January 1993, and raising the adult ten-ride ticket to \$8.75, an increase of just 25 cents or 2.5 cents per ride. While the level of ticket discounts did grow, these changes were still fare increases, and the riding decline has continued. The 1993 decline (through June) was five percent from 1992 levels. In January 1994, MCTS plans to raise the cash fare to \$1.25 (an increase of 15 cents) and increase ticket and pass prices just five cents per trip, to deepen ticket and pass discounts.

Deep Discounting appeared to work in Milwaukee in the 1980's, but ridership losses related to the recession (and deterioration in service quality, as reported by MCTS staff) have influenced riding and revenue levels in the 1990's. Revenue and ridership data appear in Figure 4-9. The reduced level of discounts that took effect in 1990 may have ended the conversion to prepayment that had been achieved and the accompanying positive results. At the end of 1992, MCTS' level of prepayment was 52 percent, lower than other systems with Deep Discounting achieved, despite MCTS' use of weekly passes and extensive sales outlet network.

Despite difficult experience with Deep Discounting, MCTS' staff believe the strategy is effective and has likely minimized losses in revenue and riding that could have been greater.



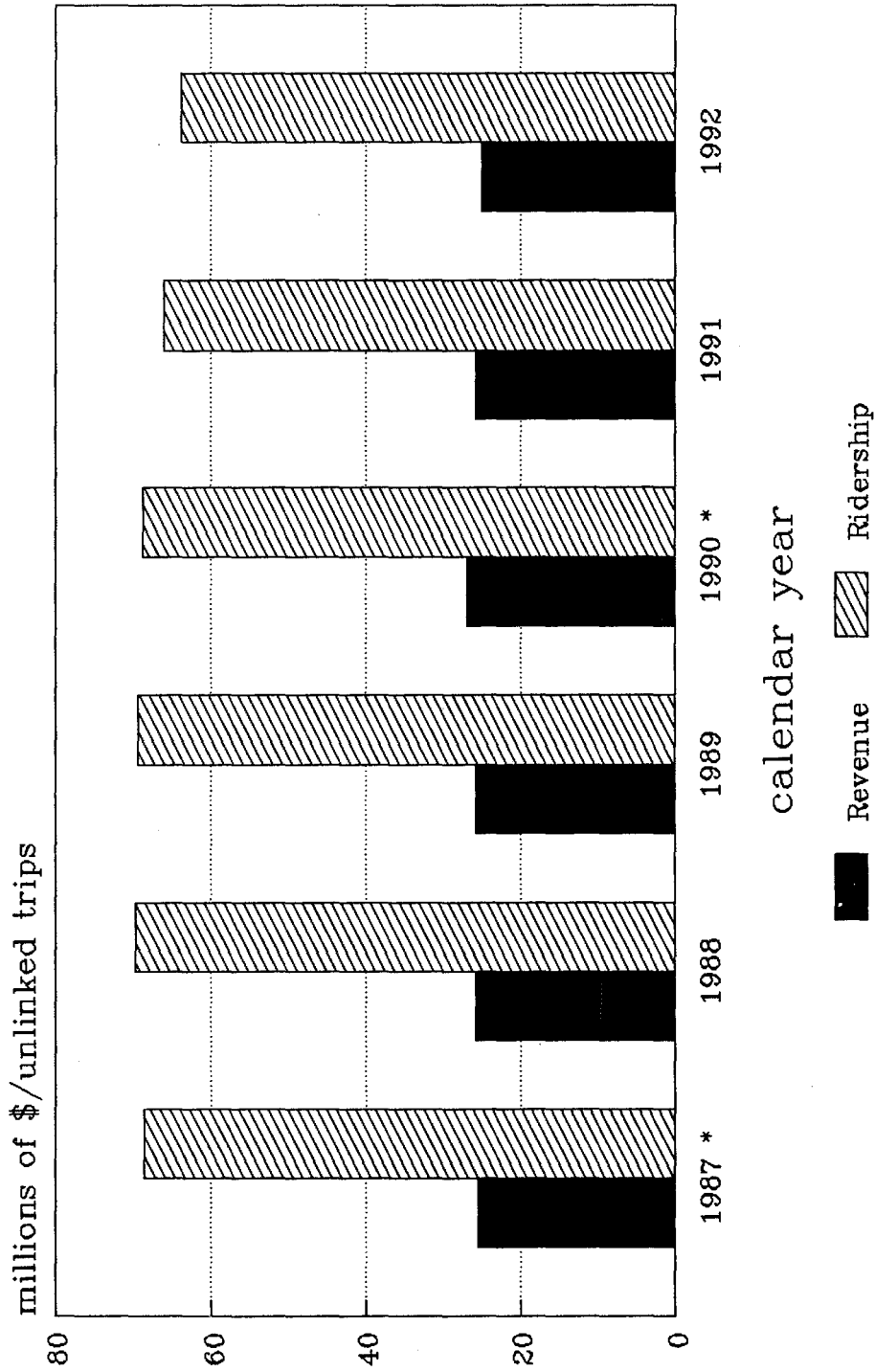


Figure 4-9. MCTS Annual Revenue and Ridership, 1987 through 1992<sup>17</sup>

<sup>17</sup> Deep Discounting began in 1987, and was reduced in 1990.

#### 4.10 MINNEAPOLIS - ST. PAUL

The Metropolitan Transportation Commission (MTC) in the Twin Cities has relatively complex fares. The fare policy has a peak period surcharge, multiple zones, express differentials and social discounts. Perhaps partly for this reason, MTC did not have a positive experience with Deep Discounting.

MTC introduced a Deep Discount plan on March 1, 1991, as a supplement to its peak/off-peak and two-zone fare structure. Offering discounted tickets was the only positive part of a sharp fare increase, in which all cash fares rose by 35 cents and even ticket prices rose by five cents. The primary Zone 1 peak fare rose from 75 cents to \$1.10, with discount tickets priced at ten for \$8, a 27 percent discount and a savings of \$3 per ten trips, but still five cents above their previous level. The difference between the off-peak adult cash fare and the basic peak adult cash fare is 25 cents (85 cents vs. \$1.10). The Zone 1 peak cash fare thus rose 47 percent, the primary off-peak cash fare rose 70 percent, and peak Zone 1 tickets rose seven percent.

The discounted multi-ride tickets are provided for each peak and off-peak fare category. MTC also offers one-day, three-day and holiday passes, as well as monthly off-peak and regular passes by zone. Tokens as well as tickets are used. Little off board or infrequent rider marketing was used to introduce the fare change, and the marketing that was done stressed passes over tickets. Due to this, it is likely that few new riders were attracted; in fact, overall ridership fell. A telephone market research survey performed late in 1991 (17) found many infrequent users and nonriders were unfamiliar with the new ticket incentives the Deep Discount plan offered. In essence, with complex fares and little marketing, the negative effects of the substantial cash fare increase dominated, and the positive effects sought by the Deep Discount plan were not achieved.

The 1991 market research study paid particular attention to former riders, i.e., people who reported that they used to use transit. Of these, eight percent said the reason they stopped riding was the fare increase, with those living in Minneapolis nearly three times more sensitive to the increase than those in St. Paul (17 vs. six percent). This suggests that lower income riders and riders who take shorter and off-peak trips are more sensitive to fare increases, which is confirmed by elasticity data. These effects would be expected from a standard fare increase without a widely marketed discount alternative.

Similarly, of existing riders who reported less riding in the past six months (23 percent of total sample), one in four attributed their lower riding level to the fare increase. This again suggests the five-cent ticket price increase had less impact than the 35-cent cash fare increases.

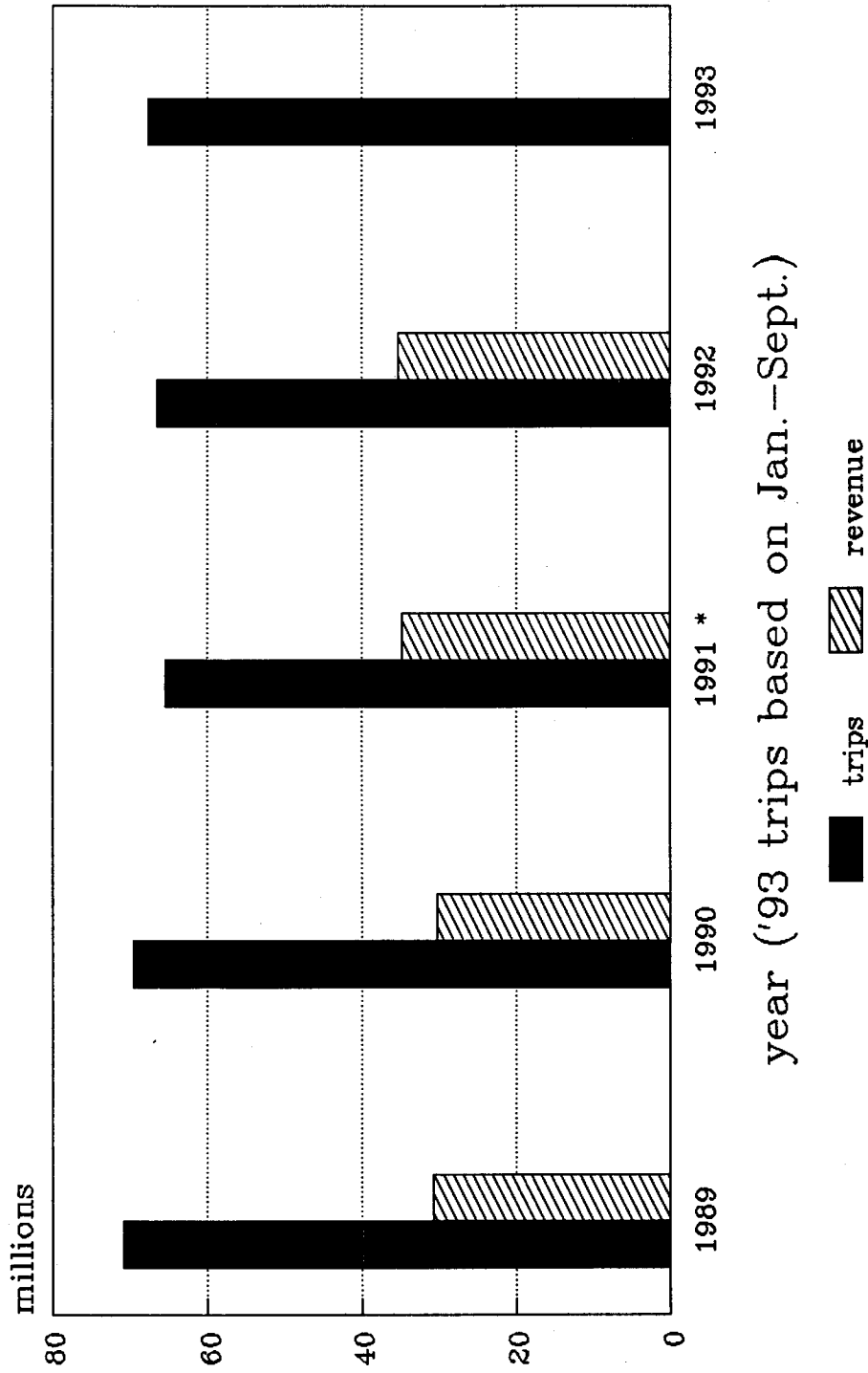
In the 1991 survey, 63 percent of all riders and 51 percent of frequent riders paid cash, affirming the dominance of the cash fare increase effects suggested above. In cities where Deep Discounting has been successful, typically 60 to 80 percent of riders prepay. By 1993, however, MTC's prepaid share had risen to 64 percent (APTA data). The shift to prepayment was delayed, but seems to have ultimately been achieved.

MTC ridership and revenue data appear in Figure 4-10. It is clear that the declining ridership trend worsened in 1991 when the fares rose, but ridership was no doubt also influenced by the recession. But perhaps the more important fact is that ridership growth has resumed. It may be that the limited marketing of the Deep Discount plan and the complexity of MTC's fares meant more time was needed to realize desired effects.

MTC data show calendar 1991 revenue was \$34.9 million compared with \$30.2 million in calendar 1990; this 15.4 percent growth was also associated with a change in cost recovery from fares of 26.0 percent to 30.2 percent. Given that ridership fell in 1991, the net revenue growth of more than 15 percent underscores how sharp the 1991 fare increase was. Indeed, what Minneapolis sought to achieve from this fare change was the most aggressive application of Deep Discounting; without intensive marketing targeted at infrequent riders, perhaps it was over-aggressive.

In calendar 1992, MTC reported revenue of \$35.2 million, up one percent from 1991. Other minor notes on MTC's experience follow. After the fare change, pass use was reported to have risen far more than expected, and ticket use rose less than projected. Increased use of passes has been observed at many agencies that implemented Deep Discounting, and this diminishes net revenue yield. Yet the far lower than expected increase in ticket use seemed to be the major problem. Not surprisingly, MTC's marketing emphasized passes far more than tickets. And being limited to on board means of communication, occasional riders had little opportunity to learn details of the change.

In addition to the need for more marketing and a more focused marketing message, the Deep Discount plan seems less compatible with complex fares. Further complicating the fare plan in the Twin Cities is the use of separate tickets for both peak and off-peak users. Infrequent riders may have to buy both peak and off-peak tickets, to obtain discounts. Minneapolis' Deep Discount plan contrasts with Chicago's, where a single discounted token price was set below the peak and off-peak cash fares. (Tickets were priced at 90 cents both when the off-peak cash fare was \$1 and the peak cash fare was \$1.25.) This single ticket price is also how Louisville integrated Deep Discounting with its peak/off-peak fare structure. Other survey evidence (Richmond and Grand Rapids) shows that peak users tend to take advantage of Deep Discounting far more than off-peak users do. Using separate tickets for the off-peak underscores the difficulty of getting off-peak users involved in a Deep Discount plan, because off-peak trip rates are usually very low.



year ('93 trips based on Jan.-Sept.)

Figure 4-10. Twin Cities Annual Revenue and Ridership, 1989 through 1993<sup>18,19</sup>

<sup>18</sup> Source: APTA

<sup>19</sup> Deep Discounting began in March 1991.

In mid-1993, MTC's peak ticket price rose by five cents to ten for \$8.50, reducing the discount from 27 to 23 percent, but third quarter ridership actually rose slightly. In December 1993, MTC's cash fares rose another 15 cents as ticket prices rose another five cents. The local peak cash fare became \$1.25 as the local peak ticket became \$1.05 (ten for \$10.50). This further reduced the discount to 16 percent, although the absolute savings remained significant (\$2 per ten-ride ticket). Pass prices also rose. Most significant is that the December 1993 change eliminated the zone fare structure (25-cent increments) MTC had long maintained for both its peak and off-peak service.

MTC has clearly struggled with Deep Discounting and has reduced the discounts from the levels which existed when the program began. Yet, it is noteworthy that MTC retains ticket discounts as the basis of its fare structure, and that ticket discounting has now replaced MTC's longstanding emphasis on distance-based fares.

#### 4.11 NORFOLK

Tidewater Regional Transit (TRT) in Norfolk, Virginia now charges a basic cash fare of \$1.10 and sells tickets at ten for \$8, a savings of 27.3 percent. There are three additional cash fare zones. Transfers are now provided free; the transfer fee was removed when TRT implemented a timed transfer network, to allow ticket users who need transfers to get them for free.

TRT first implemented a small discount plan for ticket buyers in 1988. The discounts of about 12 percent attracted only a small share of cash riders. In 1990 TRT expanded the discount to 27 percent. While growth in prepayment was reported, further analysis of the effects of fare changes in Norfolk has been impeded by severe riding losses related to the departure of Navy personnel for Operation Desert Storm, a temporary ten-cent fare surcharge imposed on every fare type on an emergency basis due to the ridership loss, service changes and service reductions, the introduction of the timed transfer network (including discontinuance of the transfer fee), and continued contraction of the local economy related to military budget cuts. Prepaid ridership still only accounts for less than a third of all trips; ticket sales are far below the levels achieved in other cities. TRT is now performing a comprehensive review of its fare policies.

Another notable element of TRT's fares is its use of the Fare Cutter Card, which reduces revenue losses related to monthly passes. In 1982, TRT replaced its monthly pass, whose sales had long been declining, with a reduced fare permit called a Fare Cutter Card. This sells at a lower front end price than a regular pass, but requires a 25-cent cash payment on each use. The Zone 1 Fare Cutter Card now costs \$19, with savings thus beginning after 22 trips compared with cash fares, and after 34.5 trips compared with tickets. An All-Zone Fare Cutter Card is also offered.

## 4.12 OAKLAND

Oakland's Deep Discount experience is very positive. Alameda Contra Costa Transit (AC Transit) operates extensive local and commuter services in Oakland and surrounding areas and into San Francisco. Fares range from \$1.10 to \$2.35 per trip, depending on type of service and distance traveled. There is a 25-cent transfer fee but no differential for time of day.

In 1991, AC Transit changed fares using the Deep Discount plan. Base fare tickets are sold for 90 cents (ten for \$9), a 19 percent discount compared to the cash fare. Monthly passes sell for \$39, which equals 43.3 ticket fares and 35.5 cash fares. This fare change was well-received; in its first four months, ridership fell just 0.5 percent as revenues rose 14 percent. The same pattern held throughout the first year. These positive results were something of a surprise, because the sales outlet system is limited, and only modest marketing efforts introduced the fare structure change. Figure 4-11 shows that AC Transit achieved simultaneous ridership and revenue growth and that the positive trends continued despite the recession, making AC Transit one of the most successful Deep Discount applications.

## 4.13 PHILADELPHIA<sup>20</sup>

The Southeastern Pennsylvania Transportation Authority (SEPTA) has had a high cash fare and discounted tokens since 1986, when the cash fare rose from \$1 to \$1.25. At that time, tokens remained priced at 85 cents sold in packs of ten, as cash fares rose to \$1.25, making the prepaid discount 32 percent. Ridership grew slightly (0.2 percent) in the next year. In 1988, ridership and revenue were both stable. With additional revenue needed, a series of fare changes were made in 1989, including temporary reversal of an increase due to a civil suit. Ultimately, these changes resulted in a lower token discount; the cash fare did not change but the token price rose to ten for \$10, reducing the token discount to 20 percent. Ridership and revenue declined two percent in 1989. The higher token and pass prices that were finally established contributed to a 7.4 percent growth in revenue in 1990, but as the fare increase was borne by prepaid riders (who are generally more fare sensitive), it is not surprising that ridership fell by 3.8 percent.

Late in 1990, SEPTA raised the cash fare by 25 cents to \$1.50, and tokens rose by just five cents to \$1.05. This reestablished a 30 percent discount. Tokens also became available in five- and two-packs, but most continue to be sold in ten-packs. It was hoped that the reestablished discounts would stem ridership loss while more revenue would come from the remaining cash riders, but 1991 ridership fell by 5.6 percent while revenue rose 4.5 percent. In 1992, ridership fell 2.2 percent as revenue fell 6.1 percent. SEPTA staff point to regional economic decline as a major factor in this recent experience, along with service cuts and disruption due to SEPTA's rail reconstruction program.

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<sup>20</sup> This discussion is derived from Reference 3.

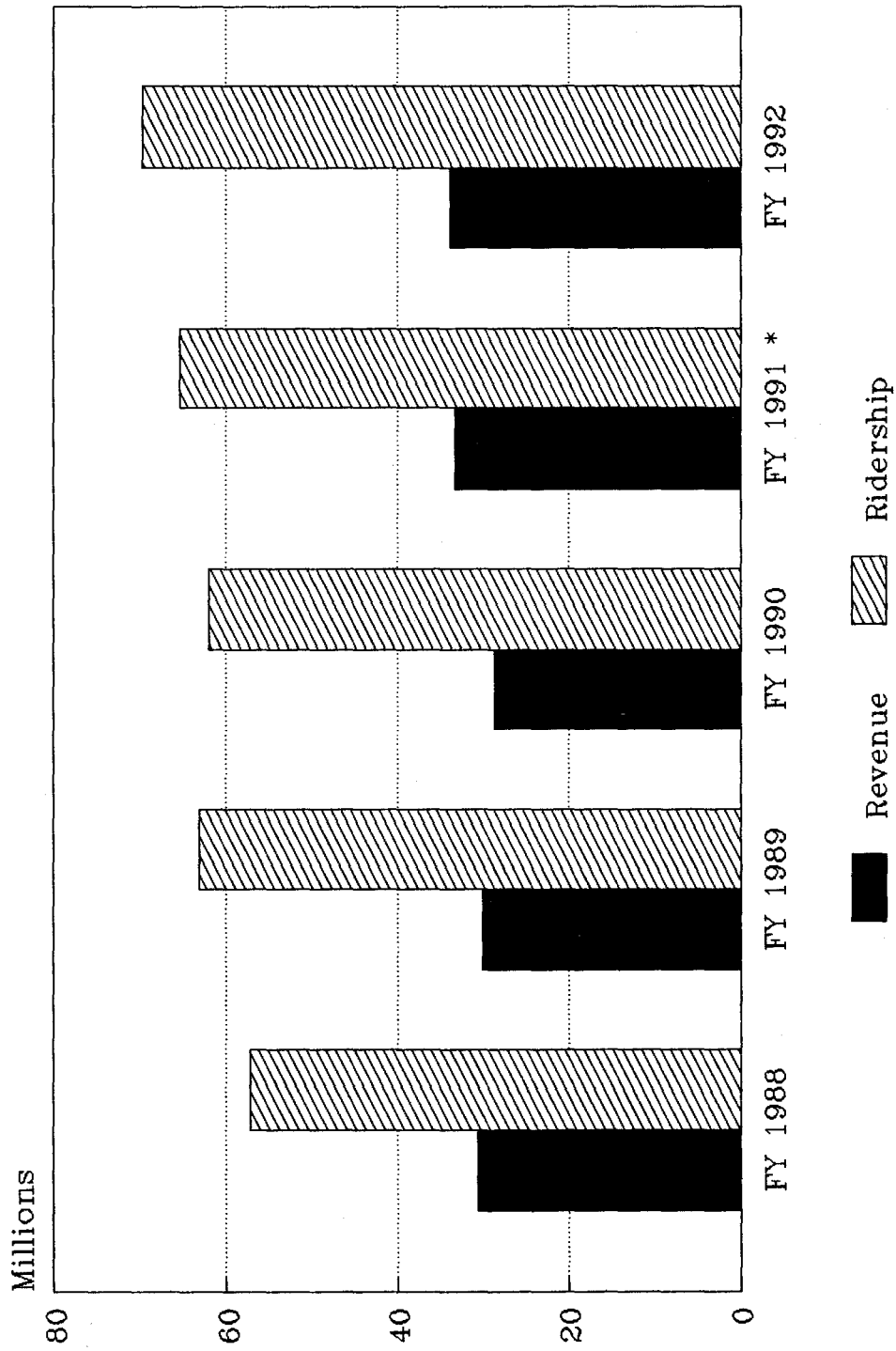


Figure 4-11. AC Transit Annual Revenue and Ridership, FY 1988 through 1992<sup>21</sup>

<sup>21</sup> Deep Discounting began in January 1991.

SEPTA's introduction of token discounts showed some positive results, but negative results began when the token discount level was later reduced. Yet, especially in the more recent years, many other factors are involved. A 1993 review of SEPTA's Deep Discount experience (3) concludes that external factors make SEPTA's trends hard to assess, but that Deep Discounting may have kept the ridership losses from being worse than they otherwise would have been. This review also noted other benefits SEPTA derived from Deep Discounting, including a sharp reduction in the amount of cash handled in the system (fare prepayment has now reached 80 percent), and a politically acceptable way to raise fares.

#### **4.14 RICHMOND**

Hoping to reverse a long trend of transit ridership decline, Greater Richmond Transit Company (GRTC) in Richmond, Virginia, began a Deep Discount plan in February 1992, which it termed the FareSaver program. It also took the opportunity to discontinue a weekly pass and simplify the fare structure in other ways. The cash fare rose from 75 cents to \$1 with adult ten-ride tickets sold at \$7.50. Transfers cost ten cents for cash paying riders, but are free to ticket users. A small number of GRTC riders also pay express and distance surcharges.

A local television station sponsored the initial fare change promotion, and GRTC also used coupons and direct mail extensively. The initial fare change was actively marketed and well-received overall; newspaper headlines cited "brisk sales in tickets" and there was little public complaint about the 33 percent cash fare increase. GRTC staff considered the program very successful throughout 1992.

GRTC reported in 1993 that ticket use by the commuter market had grown the most, and that most weekend riders continued to pay cash. This confirms findings from a June 1992 GRTC on board survey study (18) which was performed six months after the initial adoption of Deep Discounting. Based in part on comparison with an on board survey that preceded the fare change, the June 1992 survey found that riders who shifted to tickets (and also those that used coupons) increased their use, and that those who continued paying cash used transit less. Cash riders were three times more likely to have reduced use since the fare change. Older riders took more advantage of the discount tickets, while younger people tended not to. Relatively more low income people were found to shift to tickets. Low income riders were especially likely to be coupon users.

The survey also found that students and senior citizens made relatively less use of the special discount tickets offered for them. New riders tended to use cash, as was also found in the before survey. The commuter market appeared to have grown in size relative to the off-peak market, since the introduction of the FareSaver plan. A satisfaction index revealed that those who shifted to tickets had a better assessment of GRTC than those who did not.



GRTC's Board targets a 60 percent recovery of costs from fares. Due to severe recession related ridership losses (including closure of the primary downtown department store) and the inability to expand local subsidies, a second fare change was implemented in July 1993. Cash fares rose from \$1 to \$1.25 while ticket prices remained unchanged. Thus, the tickets became super-discounted, offering a 50 cents per ride savings. Before the super discount took effect, GRTC had approximately 40 percent of its riders prepaying fares; afterwards, it rose to 55 percent. GRTC has continually added sales outlets and now has 160 locations where tickets are sold; before the initial fare change, there had been only 50 sales outlets.

Another fare change may be needed in 1994; unless further local subsidies are provided, GRTC plans to raise ticket prices and remove the super discount. A 20 percent discount level will be retained (cash fare \$1.25, adult tickets ten for \$10). GRTC staff attributes the need for fare increases to the recession and not to any weakness in their fare plan. Despite continuing revenue problems, the FareSaver plan is considered a success.

GRTC tracks ticket rides and revenues as the tickets are sold, not when they are used. Due to sharp changes in ticket sales volumes related to coupon distributions and changing ticket prices, meaningful revenue and ridership information is not available.

#### **4.15 ST. LOUIS**

Bi-State Development Agency (BSDA) in St. Louis, Missouri first used Deep Discounting as part of an emergency fare increase in July 1991. This change was implemented quickly to address a financial crisis. Indeed, the specifics of the change were not settled until late May for a change that took effect on July 1. Ridership had been falling and it was feared a conventional fare increase would worsen the trend. The fare change involved increasing the base cash fare from 85 cents to \$1, with a new adult local ten-ride ticket introduced at \$8 (80 cents each). Monthly and weekly pass prices remained unchanged.

When BSDA introduced the change, many sales outlets chose not to sell the new discount tickets. They were already handling a number of BSDA fare instruments, including a weekly pass priced very close to the tickets. While priced near the weekly pass, tickets were intended to serve a very different market segment: low frequency users. The outlet problem was compounded by BSDA's reliance on outlets to advertise the tickets; thus, little advertising was accomplished and the new discount ticket was not widely used. A survey done in St. Louis six months after implementation of the new discount fare option revealed that fewer than 40 percent of respondents were even aware of the new fare plan. Intensive marketing is required for success with Deep Discounting, and the initial St. Louis experience is an example of what happens when this is not done.

After four months of its availability, the new discount ticket was being used by only two percent of the market. Many frequent riders sheltered themselves from the cash fare increase by shifting to weekly and monthly passes (which caused some revenue loss), but without the discount tickets being widely available and marketed, most riders could not avoid the fare increase, and its effects bore down on all but the relatively small share of users who could use passes. Avoiding such standard results is a key Deep Discount objective. In effect, the worst

of all results occurred: high frequency cash users shifted to tickets, thus reducing revenue, but none of the positive effects (which rely on increased usage by lower frequency riders) were given a chance to succeed.

In August 1993, as part of the introduction of new light rail service, BSDA revised the fare structure to reduce the number of different fare combinations and instruments from 16 to eight. This involved removing the number of differentials between local, express and premium service, thereby also reducing the number of prepaid options and simplifying transfer charges. The Deep Discount structure was fully retained; in fact, the more comprehensive changes in the 1993 overhaul of the fare structure simply made the 1991 incremental changes more marketable.

Introduction of light rail in 1993 also was accompanied by extensive publicity and advertising for all of BSDA's services and fare plans. The light rail service has been received quite well, with ridership reported to exceed projections.

Annual ridership data from St. Louis appear in Figure 4-12. The long declining trend that motivated BSDA to use Deep Discounting is clear. Simply slowing this trend would be an achievement. With the Deep Discount plan ineffectively begun in 1991, it may not have been until 1993 that it could have been expected to show any impact; with only two percent of the market using discount tickets by late 1991, the effect of the tickets was minimal and the effects of the cash fare increase prevailed. It remains conjecture, but the Deep Discount plan may be associated with the bottoming of the ridership decline achieved in 1992 and early 1993. St. Louis may now be an opportunity for further evaluation. If positive results do appear from the 1993 change, it would confirm the need for a relatively simple fare structure and the critical role played by intensive marketing in the success of a Deep Discount program.

#### **4.16 TUCSON**

Tucson's Sun Tran offers Deep Discount tickets priced at one third off the cash fare. The cash fare is 75 cents, but 20 tickets can be bought for \$10. (Sun Tran's use of a 20-ride instrument is unusual; to maximize ticket sales to infrequent riders, most other cities offer discounted tickets with a minimum purchase of five or ten.) A monthly pass is also available for \$20, which is 40 times the ticket price and 26.7 times the cash fare. A Saturday-Sunday pass is also sold for \$1.50. A 46 percent level of prepayment was reported in 1992.

Sun Tran implemented its Deep Discount plan in mid-1992. A 4.7 percent riding increase was reported in the first nine months of 1993 compared with the same time in 1992. Riding increased in most of the months since the fare change took effect, and set a new record in the last fiscal year. Based on this, the fare change seems to be working well, and the program may be a candidate for further evaluation. Nevertheless, these favorable results may

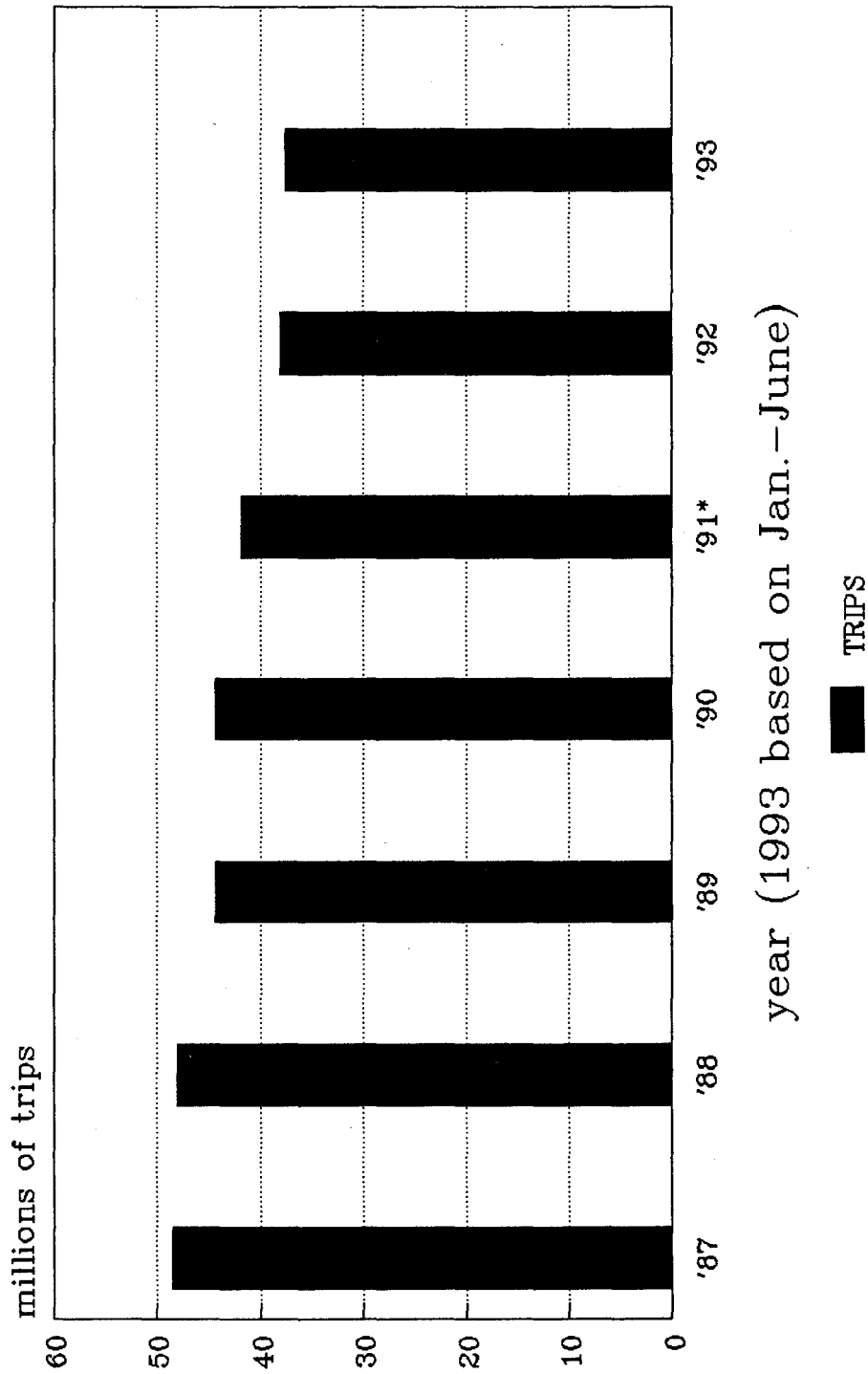


Figure 4-12. St. Louis Annual Transit Ridership, 1987 through 1993<sup>22,23</sup>

<sup>22</sup> Source: APTA

<sup>23</sup> Deep Discounting began in June 1991.

be part of an overall positive trend; over a five year period, ridership has grown 50 percent. This reflects expansion in Fiscal Year 1989 when Sun Tran increased its service level, operating more than 25 percent more bus miles than in the previous year. In Fiscal Years 1990, 1991 and 1992, total vehicle miles continued to increase by an average of more than three percent a year. The increasing service trend makes it difficult to isolate the impacts of the fare change.

#### 4.17 WILMINGTON

In January 1990, Delaware Administration for Regional Transit (DART) implemented a Deep Discount plan to reduce the complexity of its fare structure. The plan consolidated the distance-based fare structure from four to two zones and removed a peak/off-peak differential that had been instituted, while using the added revenue Deep Discounting provides to avoid the revenue loss normally expected from such simplifications. DART's aim was to make its fare structure more marketable, and to reverse a declining ridership trend. A revenue neutral impact was projected.

DART revenue and ridership data are displayed in Figure 4-13. It appears that ridership has grown while revenue has remained basically stable, as was desired. DART reported in 1991 that there was substantial month-to-month variation, but throughout 1990 ridership had expanded by about three percent, with revenue down about two percent. The fare change was actually a fare reduction to a varying extent for all riders. Prepayment increased by more than 50 percent, and the use of cash fell off by only about seven percent. DART had long sold undiscounted ten-ride tickets.

In 1993, DART was investigating changes to further promote prepayment, including a variable 28-day machine-readable pass. The agency plans to continue the simplified fare structure it has achieved with the Deep Discount plan.

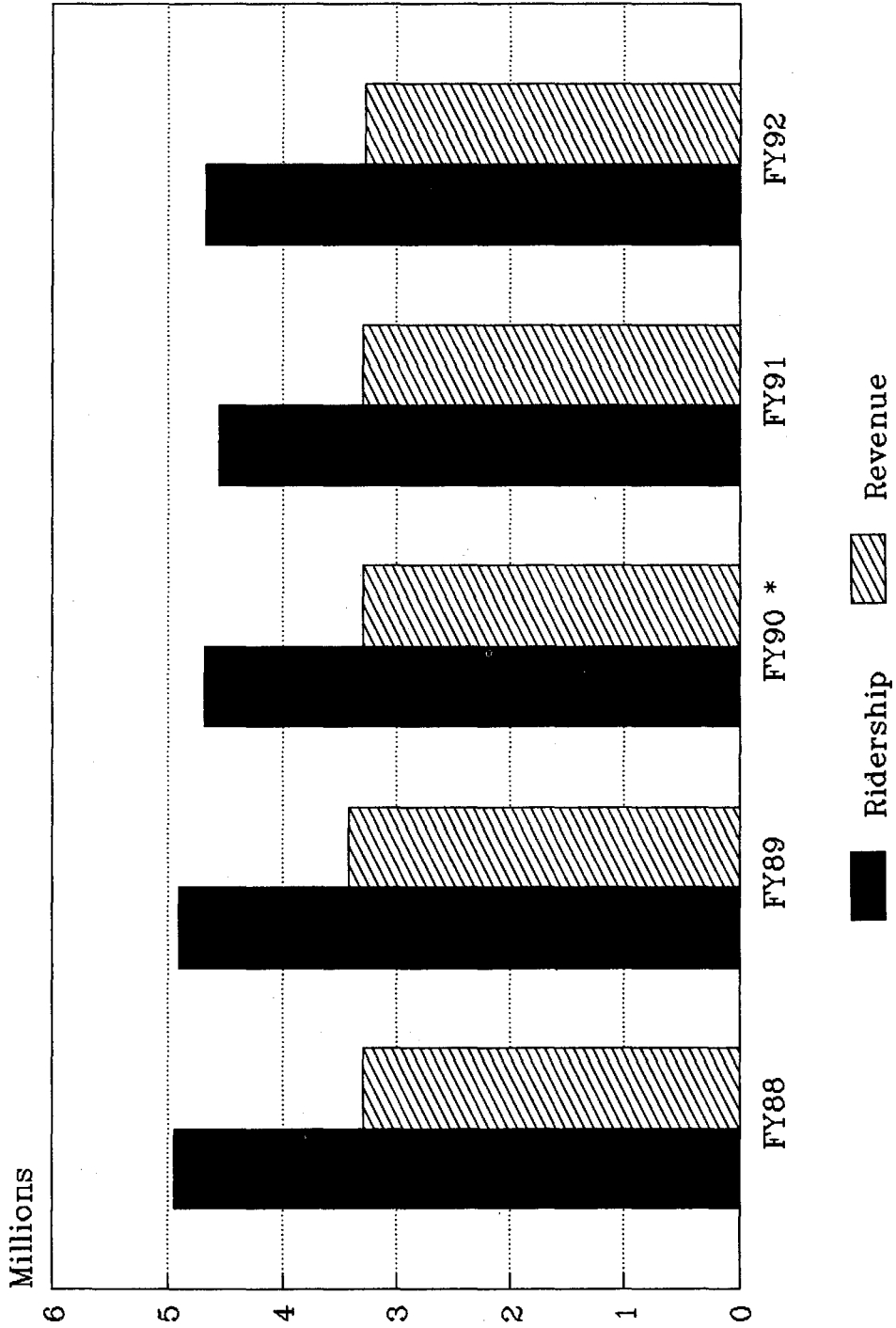


Figure 4-13. Wilmington DART Ridership and Revenue, FY 1988 through 1992<sup>24</sup>

<sup>24</sup> Deep Discounting began in January 1990.



## 5. TECHNICAL ANALYSIS OF DEEP DISCOUNT FARES

Projecting the potential impacts of a Deep Discount fare change requires the use of a modeling structure different from that used to assess impacts of standard fare changes. The term *model*, as used here, is somewhat inappropriate as the analysis that has framed most of the Deep Discount applications is simply a spreadsheet that was prepared for this purpose and restructured as necessary to suit different transit systems' fare structures. The spreadsheet itself is not technically complex, but it does involve a number of new analytical concepts.

In addition to standard techniques used in most fare change modeling work, the key modeling concepts that must be reflected in Deep Discount projections are market segment elasticities by fare type, projected shifts to different fare types, and the ridership inducement factor. The following discussion briefly notes the standard elements of modeling techniques used to assess fare changes, and then discusses in further detail the more innovative or specialized dimensions of the Deep Discount model.

In any fare change modeling effort, the model must first incorporate baseline conditions, i.e., the current fare structure and distribution of rides and revenue in each category. These are provided as external inputs. Actually, only ridership or revenue needs to be provided, as the existing fare levels allow one to be derived from the other. Any ongoing trend in ridership must also be reflected by projecting the base year's data as a nominal increase or decrease from the current year's data. Projected base year data with no fare structure change then result.

After the specific levels of each fare structure component for any desired alternate fare structures are input, the model then compares each new fare structure element to the existing fare levels to generate ridership and revenue change rates, using externally supplied *elasticity factors* for each market segment, and appropriate factors to reflect *shifts* among fare types and ridership *inducement* due to prepayment.

### 5.1 MARKET SEGMENT ELASTICITIES

Different fare elasticities reflect the unique fare sensitivities of each affected market segment. The Deep Discount plan is designed to address these differences. Deep Discounting creates a market segmentation based on sensitivity to savings. Thus, the key technical concept the model must reflect is that the elasticities of each cash and ticket market segment are different; that is, that riders who choose to shift to discounted tickets are more fare sensitive than those who choose not to shift. The concept of different elasticities by market segment is not new, but it is new to apply different elasticities by fare type within each market segment. In this sense, the model actually projects market segment changes. Thus, the model integrates

elasticity-based ridership projection methods commonly used in the industry with more innovative modeling concepts related to the differential fare, market segmentation and prepayment dimensions of the Deep Discount plan.

The following illustrates how elasticity data are used. A single measure of aggregate market response to fares, or elasticity, that is often used is  $-0.30$ . This means that for each ten percent increase in fares, ridership falls by three percent. This rule of thumb is based on longstanding industry experience with conventional fare changes, and is a very aggregate measure, i.e., it is not at all market segment specific.

It is increasingly accepted that fare sensitivity must be analyzed on a more focused basis, by market segment, rather than by simply using one aggregate measure. For example, standard market segment elasticities often cited are  $-0.30$  for the aggregate adult market,  $-0.25$  for the peak market, and  $-0.35$  for the off-peak market. Other more sensitive market segments also are typically adjusted from the  $-0.30$  aggregate, such as seniors and youth, both of which tend to have higher sensitivity, e.g., elasticities ranging from  $-0.35$  to  $-0.45$ . Conversely, commuter express and pass users are relatively less sensitive to fares, and measures such as  $-0.15$  to  $-0.20$  are often used for these market segments.

Elasticities employed for Deep Discount analysis differ markedly due to the additional segmentations of the market that are imposed. However, essentially the same market segmentation concept applies, except that each market segment subject to Deep Discount incentives is broken down to another level or subset, distinguishing the users choosing to take advantage of the savings and those that do not. The model therefore has a variable elasticity feature that applies as the existing cash fare categories are divided into the savings sensitive and savings insensitive components by Deep Discount incentives. When riders shift to discount tickets, the remaining cash paying riders are fare insensitive. When only some riders shift to tickets, the remaining riders may only be moderately insensitive to fare, but when most of them shift, the relative few that remain to pay cash are assumed to be quite insensitive to fares. This is the basis of Deep Discounting. This also illustrates why intensive marketing is necessary for successful results with Deep Discounting; without it, too many fare sensitive riders remain affected by higher cash fares.

Higher fare elasticities thus apply for the market segments shifting to tickets than for those segments that continue to pay cash. And, when comparing different levels of ticket discounts, one can assume that the larger the shift to tickets, the lower the elasticity of cash remainder riders who willingly choose to pay higher cash fares. It is reasonable to assume strong fare insensitivity for infrequent riders choosing not to shift to discount tickets, perhaps because their usage is too infrequent to make saving even 50 cents per ride significant. The elasticities used in the modeling efforts also reflect actual experience with well-marketed Deep Discount plans.



As seen in the examples of market segment fare elasticity factors used in one recent study in Table 5-1 below, *remainder elasticities* apply to riders choosing to pay cash despite the availability of prepaid discounts. *Shift elasticities* apply to the riders who shift to tickets. Experience shows high fare insensitivity for cash riders opting not to prepay; elasticities below -0.15 and as low as -0.05 have been used.

**Table 5-1. Elasticities Used to Project Impacts of Deep Discount Fares for the Transit Authority of River City<sup>25</sup>**

Fare Type	Elasticity
Adult Peak Cash Fare Remainder	-0.05
Adult Off-Peak Cash Fare Remainder	-0.15
Adult Ticket Shifters from Peak	-0.25
Adult Ticket Shifters from Off-peak	-0.35
Current Peak Tickets	-0.35
Current Off-peak Tickets	-0.45
Current School Cash	-0.20
New Reduced Cash Shifted from Peak	-0.40
Current School Tickets	-0.40
New Reduced Tickets from School Cash	-0.35
Current Senior Tickets	-0.35
Passes	-0.15

<sup>25</sup> Source (8)

Cash users who shift to tickets are assumed to have a higher elasticity (-0.35 is used for adults), but this has an impact only if the ticket price changes from the current cash fare. If a small ticket discount were already in place, existing ticket users would be given a slightly higher elasticity, to reflect that some already shifted to take advantage of the savings opportunity.

Thus, the elasticities used reflect industry norms adapted for the Deep Discount strategy. Use of industry elasticity data for each market segment is almost always more appropriate than the use of local data. Even if local data are available, they are usually less reliable than national norms as considerable variation in elasticity findings can result from any specific fare change. Other complicating factors include local economic conditions, concurrent service changes, and shifts in usage among fare types (as opposed to ridership changes). In other words, many internal and external factors can compound the interpretation of any single fare change. It is more reliable to use well-established elasticity averages that reflect the presumed relative differences in market segment fare sensitivity as the basis for further revisions due to Deep Discount effects.

## **5.2 MARKET PENETRATION AND SHIFT RATES**

Aggressive marketing is a key to the success of Deep Discounting, because the level of marketing determines how many infrequent riders shift from cash to tickets. A 40 to 50 percent shift from cash to tickets is considered standard, with variation for the level of discount, peak and off-peak use, preexisting ticket use and other factors. That not all riders shift reflects the fact that much of the market is generally not fare sensitive; only a fraction of all riders need to be shielded from the fare increase to diminish riding losses that normally result from conventional fare increases. Peak users tend to take most advantage of Deep Discounting. Shifts from cash to passes must also be reflected. On board survey information, in particular, frequency distributions by fare type, helps formulate the necessary assumptions.

Beyond market segment and fare specific elasticities, other key model parameters are the specified shift rates from cash to tickets and passes. These are applied as an external input and varied during sensitivity analysis to assess how critical any single assumption is to the overall results. Market research can help determine which shift rates to apply, but responses to questions like "Would you buy discounted tickets that saved you 30 percent?" are highly unreliable; the responses greatly overstate the actual shift rate. More useful is a careful review of the trip frequency distribution for each fare category, e.g., adults paying cash. Comparing experiences from a number of cities is helpful, if care is taken to assure compatibility (such as similar levels of discounts and marketing efforts, comparable sales outlet networks, and employer fare subsidy influences). The current prepayment level and the alternate prepayment instruments that are available also must be considered in projecting shift rates.

### 5.3 INDUCEMENT

Another market characteristic the model reflects is *inducement*. This recognizes that, independent of any associated price changes, when a rider shifts from using cash to prepaying fares, ridership growth results. The inducement factor is also termed the prepayment effect.

Experience shows cash riders shifting to prepayment typically expand their use by two to ten percent, with the largest increases coming from infrequent riders. To be conservative, a three percent rate is most often applied to project induced rides and revenue. But again, the preexisting level of prepayment also affects this factor.

### 5.4 SAMPLE OUTPUT

Figure 5-1 is a graph of the projected ridership and revenue for two different Deep Discount fare structures compared to the projected results of a conventional fare change (standard increase), a small discount plan, and a peak/off-peak fare strategy. The numbers are actual results of the fare study framing Richmond's application of Deep Discounting.

Figure 5-1 shows that Deep Discount Option 1 projects the most revenue while projecting only a minor ridership loss, and that Deep Discount Option 2 actually raises both ridership and revenue projections. Option 1 involves raising the cash fare from 75 cents to \$1 and keeping ticket prices stable at 75 cents. Option 2 also raises the cash fare to \$1 but proposes a five-cent reduction in ticket prices to 70 cents. It is clear the projected results of either Deep Discount option are preferable to those of the other three options assessed.

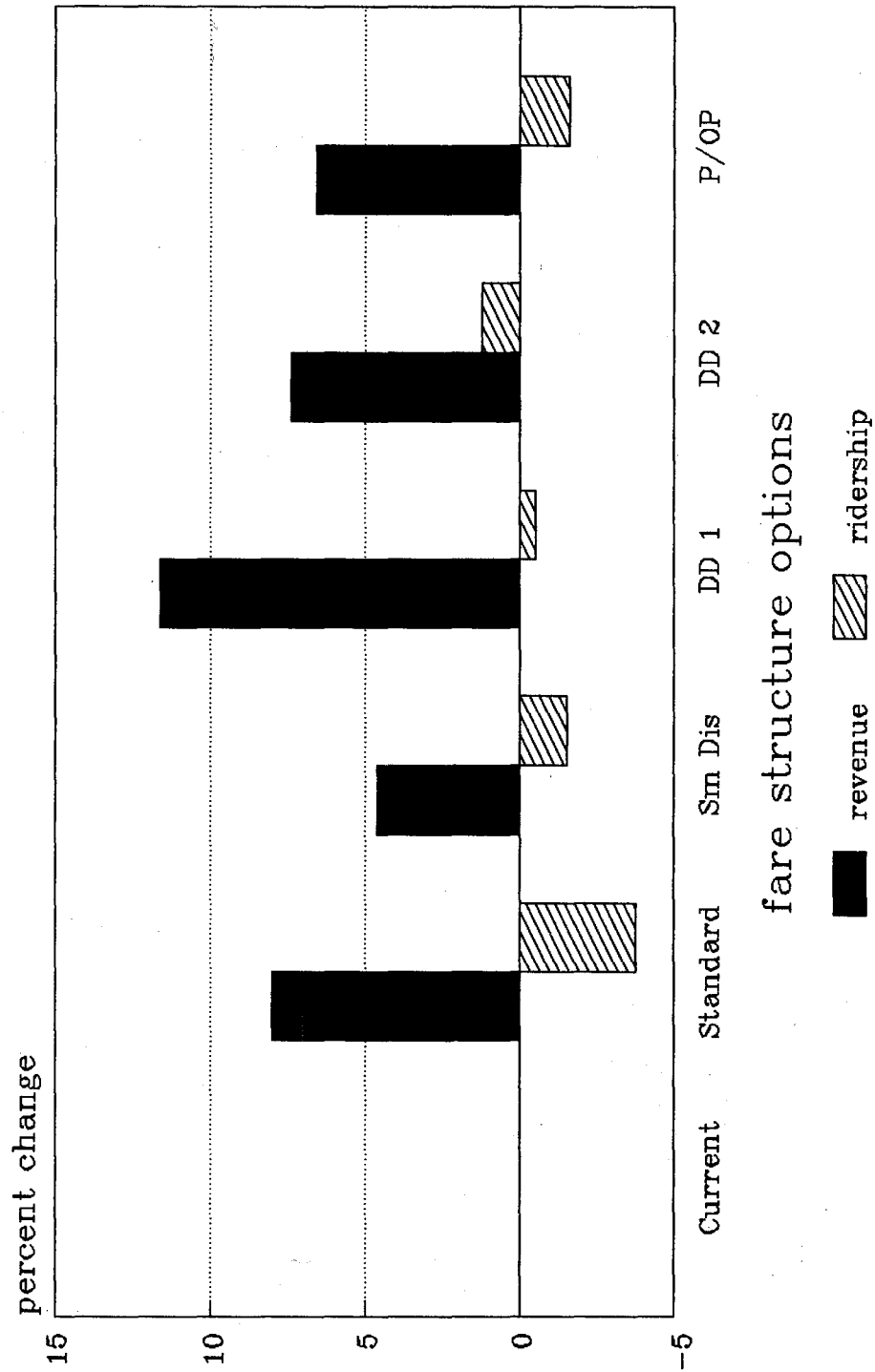


Figure 5-1. Change in Revenue and Riding for Various Fare Structure <sup>26</sup>

<sup>26</sup> The graph uses sample model output resulting from the Richmond analysis.

## 6. MARKETING GUIDANCE

Effective marketing is *absolutely critical* to the success of Deep Discounting; its importance cannot be overstated. Positive results are only achieved, if it is recognized that an important element of Deep Discounting is a major and ongoing marketing program. That is, Deep Discounting cannot simply be established as a static element of fare policy; it must be intensely promoted at the outset and must receive continuing attention. It should be viewed as part of a broader revenue maximization strategy or, as some agencies have described it, part of an overall "revenue management program."

The concepts on which the Deep Discount strategy is based suggest that both a broad and a continuing marketing outreach program are necessary. Infrequent transit riders are diffuse among the general population. Many reside in suburban areas and have higher incomes than the average transit user. The Deep Discount program also requires conveying a considerable amount of information to the primary target market of infrequent users. Information is needed on the savings available, and where and when to buy tickets or passes, to motivate the user into the prepayment decision. When usage is infrequent, getting the market to pay attention to generally low transit fares and changing habits, can be difficult. Even a large per ride discount (such as 40 percent) may be inconsequential to someone who rides just once a month, for example. Because infrequent riders use the bus only occasionally, a marketing program limited to low cost, on-bus communications is a formula for disaster.

Experience shows the most effective marketing strategy for Deep Discounting is direct marketing, involving direct mail, direct distributions (such as by bus drivers), use of discount coupons, etc. The direct approach may, in fact, be essential to a successful program. Agencies that have used only limited or awareness marketing and on board communications (such as bus posters) to introduce Deep Discounting have failed.

In the direct marketing approach, the information is typically presented as a brochure or flyer emphasizing benefits of the new savings plan and giving information on sales outlet locations. This information must be provided in print and in a form that can be retained, that is, it cannot be conveyed simply via newspaper articles or ads, because infrequent users are unlikely to rush off and buy tickets. Instead, they will wait until they are near a sales outlet or are otherwise reminded of the savings plan. The most effective means of distribution are operator handouts, "take one" flyers, and a range of direct mail options. Awareness marketing, such as television, plays only a supportive or secondary role in effectively marketing Deep Discounting.

Direct marketing of Deep Discounting is most cost-effective when used with supplemental incentives (such as discount coupons) which add to the motivation to save by conveying the idea of an especially good bargain. Such incentives also serve to give the fare brochure longer retention in the home. Not surprisingly, agencies that have used supplemental discount coupons (e.g., Allentown, Denver and Madison) have been the most successful with the program. Coupons can be worth as little as 50 cents (i.e., five cents per ride for a ten-ride ticket), because their purpose is to draw attention to the overall program. It is not necessary to make the

coupons valid for monthly passes, because these are purchased only by regular riders (not infrequent users), and pass marketing is generally best accomplished in an on board fashion. Coupons also can help target special incentives to groups naturally expected to make less use of Deep Discounting, such as off-peak market segments where ridership might fall. They are also well-directed to key target markets, e.g., groups with low frequency, high turnover, higher income, etc.

Coupon use was evaluated for LANTA in Allentown, with positive results (2). Despite the sacrificed revenue associated with supplemental discount coupons, the experience suggests that coupons pay for themselves by inducing more ridership and therefore revenue.

Experience also shows that having drivers distribute flyers (perhaps including coupons) for the Deep Discount plan is highly effective. This is a relatively easy way to capture the attention of infrequent, cash paying riders, although it is limited to those who ride on the day(s) the flyers are distributed. It also helps enhance the drivers' role in customer service and in building ridership. Drivers have been found to participate in such projects enthusiastically, if they are presented as incentive programs. As implemented in Denver, Allentown, Richmond, Norfolk and elsewhere, drivers hand out flyers that include a discount coupon. The coupon includes a space where the driver inserts his operator number. After the coupons are redeemed, there is a drawing to determine a winning driver, who receives, say, \$500. This is an effective marketing method that has many other benefits and applications. It can also be used to promote a mail order plan.

In contrast to a primary focus on media advertising (radio, television or newspaper), direct marketing techniques such as those described above provide more cost-effective marketing results for this program. Complimentary media publicity should, of course, be fostered through press releases or special background meetings for reporters when the fare change is being instituted; the innovative nature of the Deep Discount plan makes it good copy. But, the first priority for paid advertising should be print and direct distributions through drivers, low cost coupon package circulars, or free standing inserts distributed with newspapers.

In conjunction with direct marketing, the local media can play a major role in introducing a Deep Discount plan. Due to the appeal of the Deep Discount plan, a local radio or television station or major newspaper may be willing to co-sponsor promotion of the program. This can insure its success. This was done in Denver, Richmond and Louisville by placing television station call letters on all printed materials produced in exchange for considerable air time. (In some cases air time was free; in others it was provided at a discount.) This joint promotion or sponsored approach is the most desirable strategy; it almost guarantees awareness of the program will be high, which will make the direct marketing actions even more effective. This strategy marries mass awareness with direct marketing, yet because of the sponsored approach, it keeps costs low. It makes news, enhances the agency's image, and draws the attention of infrequent riders who otherwise might not notice. In a sense, gaining a sponsor validates the program, which is particularly helpful for transit.

The opportunity for sponsorship is a testament to the general appeal of the Deep Discount concept; it makes a fare increase something positive rather than inherently negative, as fare increases normally are. Television stations also like to associate with the promotion of public

transit; a very promotable message could integrate a Fare Saver discount theme with an Air Saver theme, that stresses transit's environmental benefits.

The need for both an introductory and a sustained marketing effort must also be appreciated. A two-phased approach has been outlined, termed "obligation" and "opportunity". The first phase for Deep Discount marketing must be to ensure that all current riders are adequately apprised of the fare plan changes and are able to take advantage of the savings. This is needed to make sure that negative effects do not take hold at the outset. Special efforts to communicate the changes and new savings options to off-peak riders might be made, such as driver handouts during light traffic times.

The second phase of the program directs further marketing resources (usually including supplemental discount coupons), at key target markets, primarily infrequent riders and more suburban and higher-income households. The Carol Wright or Val Pak discount coupon packs, which many transit systems have used effectively, are recommended for this. Carol Wright has the broadest reach, best image and most economic pricing of all the coupon packages available. Perhaps it is somewhat counterintuitive, but the reach of these coupon packages, serving about 50 percent of all households in any area but focusing on higher income and suburban homes, is actually a great match for the infrequent riding market. Coupons also reach bargain sensitive consumers who are most likely to be motivated by the Deep Discount plan.

It is also recommended that at least one target market direct mailing be sent to homes that market research has found to be particularly important. Research in a number of cities has shown that the 21-34 age group is the primary market producing new riders, and that low frequency riders and turnover riders are also most prominent in this category. Sometimes income and geographic factors can also help isolate a target market. Mailing labels can be purchased for special direct mailings for most any target market.

The adequacy of sales outlets is another key concern. To reach infrequent users, Deep Discount fare products must be easy for customers to buy. Sales commissions should be seriously considered, as noncommissioned outlets can be difficult to establish and manage; sales commissions should be considered a necessary cost or marketing element to the Deep Discount plan. However, without commissions, Richmond tripled its sales outlets from the level that existed before the Deep Discount plan was established (from 50 to 150), and Denver doubled the size of its outlet network. A mail order plan is also worthwhile; Louisville and Richmond have both expanded their mail order sales considerably as part of their Deep Discount plans. Many infrequent riders will respond to mail order promotions, especially if special discount coupons are used.

Finally, marketing evaluation is crucial. It is recommended that a brief telephone survey be administered approximately four months after a Deep Discount plan begins. This survey would generally focus on nonrider and low frequency rider households, to gauge whether a reasonable level of awareness for the program has been reached. A follow-up on board survey is also routinely recommended to help identify impacts, leading vs. lagging market segments, etc.





## **7. RECOMMENDATIONS**

Although experience with Deep Discounting is still limited, the use of the strategy continues to grow. It is clear that more evaluation is needed, but it is also clear that most of the cities that have used Deep Discounting are satisfied with the results, and even in cases where it has not had demonstrably superior impacts over what a standard fare increase might have yielded, the cities have opted to continue using Deep Discounting as their overall fare policy framework. Increased evaluation, and implementation efforts that take guidance from the experience to date, should further improve the results that are derived.

Some valuable insights were gained from the broad review this current effort has involved. These may also be looked upon as recommendations (or potential pitfalls to avoid) for cities considering or already using Deep Discounting.

### **7.1 COMPATIBILITY WITH COMPLEX FARES**

Deep Discounting appears to work best when the fare structure is relatively simple. While multiple fare strategies can be implemented together, the Deep Discount plan is more difficult to implement when it is part of a complicated fare structure. Because a key objective is to persuade infrequent riders to buy tickets, and ticket discounts themselves are an added complication, the overall fare plan must be simple enough not to deter a user for whom transit is not important. This does not mean that multiple fare strategies cannot be addressed, such as incentives for prepayment along with distance-based fares or a peak/off-peak differential, but if they are, special care must be taken to make sure the marketing is effective.

### **7.2 SINGLE VS. PEAK AND OFF-PEAK TICKETS**

When Deep Discounting is implemented with a peak/off-peak cash fare structure (which, as noted below, may be the most promising approach), it appears necessary to offer a single ticket priced lower than the off-peak fare, so that infrequent riders do not have to buy both peak and off-peak tickets. That is, the ticket plan should involve a larger discount for peak riders than for off-peak riders and utilize a single ticket instrument. Thus, a single ticket might have a deeper discount, such as 35 or 40 percent from the peak fare, and a more modest 20 percent discount off the off-peak cash fare. Off-peak only tickets are hard to sell because off-peak users tend to have low trip frequencies. Having multiple tickets complicates the program unnecessarily.

### **7.3 LEVEL OF DISCOUNTS**

Early evidence suggests that the deeper the discount, the better a Deep Discount plan works. It is clear that small discounts do not work. In fact, because only regular riders take advantage of discounts of ten percent, for example, small discounts are likely to be counterproductive. It is also clear that Deep Discounting works better when the new ticket price is the same or lower than the previous cash fare. This also provides public relations benefits as the fare change can then be called restructuring as opposed to an increase. If all fares rise, the positive image is diminished.

### **7.4 RESPONSE FROM COMMUTERS VS. OTHER USERS**

On board survey and other data show that the market segments that respond best to Deep Discount incentives are commuters. Low and middle frequency commuters show a high propensity to shift to discounted tickets, and to ride more when they do. New riders, many who ride very little, also seem to be drawn to commuter/peak period use as a result of discount ticket marketing. Conversely, off-peak riders do not seem to respond as well, which is logical given that many off-peak users are naturally low frequency riders with less potential to expand use. For highly occasional off-peak only users, even a 30 percent fare savings may not motivate ticket purchase, because the absolute cash savings is still small. Post-implementation survey data from Grand Rapids, Louisville and Richmond support these findings, as do daily ridership and fare type counts from Richmond.

### **7.5 POTENTIAL OPTIMAL APPROACH**

Excellent results from Deep Discounting were achieved in Denver where the discounts apply only at peak times. Very good results were obtained in Oakland where there is a large commuter market. In Louisville, where a single discount ticket was integrated with a peak/off-peak cash fare structure, results were very positive. This also is how the program was first implemented in Chicago.

While it is premature to conclude that there is any single best way to implement Deep Discounting, observations from these most successful scenarios support the view of the commuter market (frequent and infrequent transit commuters) as the primary target for Deep Discounting, and that the off-peak markets (such as weekend ridership) may need added marketing attention or even sheltering from the impacts of the Deep Discount plan.

If this is true, and assuming that the program is well-marketed, it may be that a peak/off-peak cash fare structure with a single discounted ticket priced lower than the off-peak fare is the optimal way to structure a Deep Discount program. This recognizes that the peak market responds best to Deep Discounting and that off-peak markets are potentially a source of significant ridership loss. While additional evaluation is needed, these observations are also confirmed by the available market research data from the settings that have been both most successful and less successful.

The added complexity that peak/off-peak cash fares introduce suggests that there may be a trade off, however. An interesting alternative for protecting at least part of the off-peak market is the two-day weekend pass which Tucson now uses, presuming such instruments are easily obtainable by riders (e.g., sold by drivers, like transfers). Single day passes may also be applied to this end. Further research and perhaps carefully defined experiments would be helpful in this area.

## **7.6 IMPACTS ON PASS SALES AND REVENUES**

Deep Discount pricing increases pass sales, and increased use of passes most often reduces revenues. This extended impact of the Deep Discount plan can be a major pitfall; it can, in fact, reduce or totally offset other benefits of Deep Discounting. This phenomenon tends to be unappreciated and is somewhat difficult to understand, but experience shows that it is clearly an important factor.

Increased pass sales have been seen in virtually every city that is using Deep Discounting. Particularly in cities offering weekly passes, such as Milwaukee and St. Louis, the results of Deep Discounting have been less satisfactory because of increased weekly pass sales. Even when only the cash fare rises and the pass prices remain constant relative to the price of tickets or tokens, introducing a Deep Discount plan may increase pass sales.

Increased pass sales occur for two main reasons. The first reason involves the group of riders who should buy passes, because of their intensive transit usage and urban residences, but continue to pay cash, because their low incomes impose a front end cost barrier to the purchase of passes. These people may hold down two or more part-time jobs, and live in urban neighborhoods offering high off-peak transit service levels. They have the potential for significant savings from passes, because their transit usage is greater than the typical commuter's usage upon which the pass price was based.

When cash fares rise to implement a Deep Discount plan, these riders face a major increase in total cost if they continue to pay cash, and are thus induced to change to either a pass or a ticket. Tickets are easier to afford for some, but it appears that once these riders are prompted to go to a sales outlet, at least some do buy a pass. Weekly passes cost essentially the same as ten-ride tickets, which explains why use of weekly passes rises most. As these riders were previously paying cash fares that in sum exceeded the pass price, revenue loss results from these conversions.

A second reason pass use rises with Deep Discounting (contributing to revenue loss) is that an increased fare increases the incentive for riders to share passes. Whereas pass sharing by two household members may have formerly saved the 75-cent cash fare for a Saturday trip, when the cash fare becomes \$1 after the introduction of Deep Discounting, the savings increases to \$1. Pass abuse is in general underappreciated; on board survey data routinely show that many riders reporting very low frequencies also note that they used a pass for the trip, which can only be explained through pass sharing. These problems have been observed repeatedly with monthly passes, and weekly passes exacerbate them, as weekly passes are affordable to virtually all riders. It may be that Deep Discounting is less compatible with weekly passes, and that a ten-

ride instrument should substitute for a weekly pass, if possible. Perhaps for similar reasons, in Grand Rapids, Norfolk, Richmond and elsewhere, transfer issuance grew after Deep Discounting was introduced, despite observed increases in pass use. (Increased pass use should make some transfer issuance unnecessary.)

The upshot of the findings on pass use is a recognition that at least some of the added revenue the Deep Discount plan can generate may be offset by increased pass use. Accordingly, agencies should assess pass use closely. Monthly passes are popular instruments, typically priced at 40 trips per month, since most commuter only users (a large market segment whose use averages around 35 trips) tend not to buy passes priced at more than 40 trips. However, regular monthly passes are often used for 50 or more trips per month.

Frequency data show there are distinct segments of the pass market. Market segmentation may be used to manage pass revenues. For example, by selling two monthly passes, one valid only on weekdays and one valid every day, an agency could offer a lower pass price for weekday only use without losing excessive revenue to more intensive users, or risking pass sharing. Thus the every day pass price could be based on 45 or 50 trips per month, substantially higher than the regular monthly pass price, and drawing more revenue. Thus, the most common pass price based on 40 trips may be the least appropriate price in a Deep Discount location.

From the above discussion, it is evident that pass plans should be an important focus when the Deep Discount plan is implemented. Implementing Deep Discounting without a careful review of potential pass market impacts is risky. It is clear that a broader review of the overall revenue stream (or the subject of revenue management) is needed when considering Deep Discounting.

The increased savings to pass holders derived from pass abuse under a Deep Discount fare structure also suggests that agencies already using the practice would benefit from further studies of the pass market. They should also carefully track changes in transfer use and consider potential revisions, as similar abuses, i.e., potential revenue loss, can also occur from transfers.

## **7.7 MARKETING AND MARKET RESEARCH REQUIREMENTS**

Failure to market Deep Discounting effectively is a common pitfall. As stressed above, aggressive and ongoing marketing is critical to the success of a Deep Discount plan. Limiting marketing to low cost on board opportunities is a mistake, because reaching infrequent riders is the key objective. Infrequent riders do not focus on transit regularly, and even a month long campaign can fail to get much of the market's attention.

Deep Discount marketing is best guided by cost-effective market research both before and after its implementation. The Deep Discount plan cannot be seen as a no cost way to boost ridership and revenue. Some of the added revenues the program derives must be reinvested in added marketing, sales support and market research activities.



## 8. CONCLUSION

Deep Discount pricing remains highly promising. It is now a widely accepted and proven idea, but full appreciation of all of its impacts is still not available. The recession in the early 1990's severely clouded the interpretation of Deep Discounting's impacts, but it has had some impressive successes, and no agency that has used Deep Discounting is known to have subsequently replaced the strategy with an alternative plan.

In contrast to experience with distance-based fares, peak/off-peak differentials, user side subsidies or other theoretically sound ideas that have been widely suggested but not widely implemented by the industry, Deep Discounting has gained rapid acceptance by transit agencies of all sizes. Indeed, in a political and perhaps a behavioral way, it seems to suit the industry especially well.

But in some ways, such as its reliance on market research and the requirement for a high level of ongoing marketing, the Deep Discount strategy is not a good fit with the transit industry. Yet, as it has become very popular and seems to have positive influences that could be expanded considerably, continuing to guide this interest with more in depth evaluation of Deep Discount experience seems necessary. This would help clarify the potential pitfalls and avoid them in future applications of the plan.

It may be that Deep Discounting's most important message is simply that fares, marketing and market research are powerful management tools that contemporary and consumer sensitive transit systems should not neglect.





## LIST OF ACRONYMS

<b>AC Transit</b>	Alameda Contra Costa Transit (Oakland)
<b>APTA</b>	American Public Transit Association
<b>BSDA</b>	Bi-State Development Agency (St. Louis)
<b>CTA</b>	Chicago Transit Authority
<b>DART</b>	Delaware Administration for Regional Transit (Wilmington)
<b>GLPTC</b>	Greater Lafayette Public Transit Corporation
<b>GRATA</b>	Grand Rapids Area Transit Authority
<b>GRTC</b>	Greater Richmond Transit Company
<b>LANTA</b>	Lehigh and Northampton Transportation Authority (Allentown)
<b>MCTS</b>	Milwaukee County Transit System
<b>Metro</b>	Madison Metro
<b>MTC</b>	Metropolitan Transportation Commission (Twin Cities)
<b>MVRTA</b>	Miami Valley Regional Transit Authority (Dayton)
<b>RTD</b>	Regional Transportation District (Denver)
<b>SEPTA</b>	Southeastern Pennsylvania Transportation Authority (Philadelphia)
<b>TARC</b>	Transit Authority of River City (Louisville)
<b>TRT</b>	Tidewater Regional Transit (Norfolk)



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