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Deep Discount Group Pass Programs: Innovative Transit Finance

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Abstract

For public transit operators in the U.S., neither fare increases nor fare reductions have been successful in boosting revenues. A different kind of strategy is needed, one that can produce more revenue for transit operators than it costs. This article argues that deep discount group pass (DDGP) programs can accomplish this goal. DDGP programs provide groups of people with unlimited-ride transit passes in exchange for a contractual payment by a group's employer or other organizing body.

While previous research on DDGP programs has ignored their impact on operator revenues, this article addresses that gap by focusing on their revenue-increasing potential. The study estimated and compared before and after revenues earned by three transit operators to draw conclusions about the revenue-increasing potential of group pass programs. The universal DDGP programs analyzed consistently yielded either higher revenues per boarding than the system-wide average or higher total revenues from target markets with the program than without it, proving their potential as innovative instruments for increasing transit operating revenues. Employment-based DDGP programs yielded the highest net revenues to operators. When appropriately priced and carefully deployed, DDGP programs can increase transit revenues, make transit operators less reliant on external subsidy, and become powerful instruments of efficient fare policy in public transit.

Introduction

Transit operators in the U.S. have historically experienced loss of market share and low levels of farebox recovery (Jones 1985). At transit's peak in the 1940s, U.S. transit operators served a combined annual ridership of 24 billion passengers; currently, annual transit ridership has fallen to fewer than 9 billion passengers nationwide (APTA 2000).

With declining ridership, transit service became increasingly reliant upon public subsidy. In 1974, federal operating subsidies were added to existing federal capital assistance programs for public transit and required a 50 percent match from any combination of farebox, state, and local sources (Wachs 1989). Measured in constant 2000 dollars, total subsidy at the national level has ranged from $4.5 billion in 1975 to a peak of $12.3 billion in 1992 (APTA 2000).

In a political environment that is increasingly hostile to public spending, transit subsidies may be reduced or eliminated in the future. As a result, prudent transit operators must seek other means of covering operating costs. Historical experience with public transit operations in the United States shows that fare increases do not increase total revenues; neither is fare reduction a surefire means to increase revenues (Rubin 2000; APTA 1991). Though reduced fares may boost ridership, they can also reduce total revenues and thus increase reliance on subsidies. The challenge for operators lies in identifying and adopting strategies that can produce more marginal revenue than cost, decreasing transit operators' need for subsidy. Deep discount group pass (DDGP) programs hold untapped potential to do so.

This paper examines the financial feasibility of DDGP programs by measuring their revenue-increasing potential. DDGP programs provide groups of people with unlimited-ride transit passes in exchange for a contractual payment for the group by an employer or other organizing body. The research asks, do DDGP programs increase revenues? If so, what are the pricing structure components that characterize revenue generating programs? The article focuses on three DDGP program case studies: the Denver Regional Transportation District (RTD) ECO Pass Program; the City of Berkeley ECO Pass Program; and the University of California (UC), Berkeley Student Class Pass Program. After discussing the nature of DDGP programs, the article describes the three cases, presents the research findings, and builds a model for successful DDGP program pricing.

The Nature of Deep Discount Group Pass Programs

Deep Discount Group Pass (DDGP) Programs mark a policy shift from a financing strategy focused on individual transit riders to one focused on larger groups of riders. The transportation literature first explored the subject of deep discount programs with respect to individual transit riders (Oram 1994; 1990; Fleishman 1993; Cervero 1990). These ear-

lier studies focus on such programs as reduced-fare single-rides, bulk-purchase token packs, and discounted monthly passes, examining the ability of general discount programs to increase ridership and revenue. Program evaluation research indicates consistent increases in ridership, but finds mixed results with regard to revenue effects.

More recent studies have focused on deep discount group passes (Brown et al. 2002; 1999; Miller 2001; Meyer and Beimborn 1996; Williams and Petrait 1993). These studies examined the operational successes of DDGP programs in terms of their ability to foster a modal shift from driving alone to using transit. Group passes have been shown to increase transit ridership by 70 to 200 percent over previous levels (Brown et al. 1999). Other documented successes include reductions in parking demand (Brown et al. 1999) and in air pollution (Meyer and Beimborn 1996) as a result of reduced vehicle trips. The research on DDGP programs, however, has ignored their impacts on operator revenues.

General Features of Deep Discount Group Pricing Programs

The literature on DDGP programs amply documents their general features (Brown et al. 2002; 1999). Key features include universal coverage of group members, unlimited rides for members, deep discount pricing, and programs also often offer guaranteed rides home programs.

A DDGP program with universal coverage typically includes all members of a participating group. In some cases, as at the University of Washington, Seattle, members may opt out of the program. In all cases, specific criteria are used to identify a distinct group of eligible DDGP participants. For instance, qualified participants in the City of Berkeley's DDGP program were defined as "benefit-receiving employees." The City opted to pay for the passes as an employee benefit. At UC Berkeley, where all students pay for the program via a fee each semester, the eligible group is defined as "all currently enrolled students". Campus-based programs generally include all students, and some programs also include faculty and staff.

In most programs, participants are offered unlimited rides on the transit system. Members use validated picture identification cards as passes to board the transit vehicles. The pass entitles participants to unlimited rides on various transit modes offered by the operator, typically for a whole calendar year.

To obtain deep discount pricing, DDGP programs generally offer passes at a 40 to 94 percent discount off the price of regular individual monthly passes. Group passes may be priced differently to account for variability in the costs of providing services to various groups depending upon location or likelihood of use. For example, in downtown Denver, rich in transit services, the per employee price of an ECO Pass is considerably higher than in the suburbs, where transit service is more limited and free parking is plentiful.

Additionally, some employment-based and neighborhood-based programs offer guaranteed rides home, usually through a contractual arrangement with a taxi or car rental company. The contracts are executed either with the transit operator as is the case with both the Denver Regional Transportation District and the Santa Clara Valley Transportation Authority, or with the employer, as is the case with the City of Berkeley. This valuable feature reassures program participants that, when they use their pass to travel by transit, they can still maintain the flexibility to return under urgent circumstances or during off peak times when transit may not be running.

Analogy to Risk-Pooling

To better understand the nature of DDGP programs, analogies can be made between a transit agency and both an insurance company and a typical private firm. It seems counterintuitive that a transit agency, already unable to recover operating costs from the farebox, could offer deep discounts to increase revenues. Yet, successful use of this model is illustrated by a comparison to other risk-pooling schemes.

Friedman (2002) explains that an insurance company that insures properties against theft does not care whose property is stolen. Its concern is that the total premiums it collects will cover the total cost of replacing property that is stolen. The insurance company is thus an intermediary, which organizes the pools of participants and incurs transaction costs. As the number of people in the pool grows, the level of risk and transaction costs assumed by the insurance company decrease, lowering customer premiums.

Similarly, under a DDGP program, the transit agency is not interested in which members of a group use the service it provides. It is concerned only that the total group revenue under the DDGP program exceeds the total cost of providing the service. The transit agency may be viewed therefore as a facilitator, which promotes the pool through deep discount group pass programs and incurs transaction costs. As

the number of participants increases, the per unit service and transaction costs decrease, and the price per participant or per pass also falls.

By similar analogy, a private firm often chooses to diversify ownership by issuing common stock, spreading the risk of failure among many individuals and thereby decreasing the risk to any one party. A stockholder purchases stocks to share in growth and profits. Similarly, a transit agency that offers a DDGP program diversifies responsibility for generating fare revenue by selling passes. The transit agency thus allows each of a large number of DDGP participants to bear only a small portion of the responsibility for raising operating revenues. Also, just as company stock holders share in profit, DDGP participants benefit by having a pass that provides access to the transit service.

The comparison between risk-pooling schemes and deep discount group pass programs suggests how the fare structure of group pass programs fundamentally differs from individual fare instruments. Consumption of transit service under individual fare instruments is sensitive to the elasticity of demand with respect to price. The absolute value of fare elasticity in public transit is typically about 0.33 according to the Simpson-Curtin rule (Curtin 1968); a one percent reduction in fares will lead to only one-third of one percent increase in ridership. Thus, a general reduction in individual fares will decrease total revenue.

In contrast, the group pass covers a large number of people and is paid for in advance whether or not each participant enrolled in the DDGP program actually uses the transit service. By pooling participants, a DDGP program can charge a relatively low per pass price as membership in the pool grows large and yet avoid any loss in revenue. The effect of a DDGP program on revenue therefore is more analogous to a risk-pooling scheme than a product of fare elasticities.

Research Methodology

This study selected three DDGP programs for evaluation. The programs included one in Denver, Colorado, one in the city of Berkeley, California, and a third on the University of California (UC), Berkeley campus. With their inception in 1991, the DDGP programs administered by the Denver Regional Transportation District (RTD) are among the longest running in the country. For more than two decades, RTD has offered the largest collection of DDGP programs of any transit operator as part of efforts to improve air quality in the Denver metropolitan area. The RTD offers employment-based, neighborhood-based,

campus-based, and teen-based DDGP programs. The UC Berkeley "Class Pass" is an example of a college campus-based group pass program. Such campus-based programs are the fastest growing type of DDGP programs in the nation. Between 1990 and 2000, the number of campus-based programs tripled from 14 to 45, and then jumped to 60 by 2002. The City of Berkeley's ECO Pass is an employer-based program for municipal workers begun in 2003. The program uses a magnetic fare card, enabling substantial opportunities to track and analyze pass use. The Alameda-Contra Costa County (AC) Transit District operates both the second and third case study programs.

The analysis estimated and compared before and after revenues earned by the two transit operators. The aim was to assess the revenue-increasing potential of group pass programs. The transit operator, in coordination with the target group, conducted ridership surveys of group members. Denver RTD and AC Transit surveyed target group participants about transit use both before and after program implementation.[1] Using ridership data from before surveys, this study estimated transit operator revenues from each target group prior to the introduction of the DDGP. These revenue estimates were compared with actual revenues from the DDGP programs following implementation to determine each operator's net gain. To complement these survey data, interviews were conducted with DDGP program administrators and spokespersons. Interview respondents were queried about the transit agency management's perception of and enthusiasm toward the programs. Prospects for DDGP programs' further deployment, program impediments, and anticipated revenue impacts were also discussed.

Deep Discount Group Pass Programs: Revenue Impacts and Pricing Structures

DDGP Case Programs Increase Transit Operating Revenues

The deep discount program case studies consistently revealed either higher revenues per boarding than the system-wide average or higher total revenues from target markets with the program than without it. This primary finding suggests that deep discount programs are instruments for increasing transit operating revenues. The three cases that

[1] While ridership impacts are not the focus of this article, it deserves mention that before and after surveys in all cases show that DDGP programs increased transit use in the target groups.

follow illustrate the potential of deep discount group pass programs to produce more marginal revenue than cost to transit operators.

The Denver Regional Transportation District (RTD) ECO Pass Programs

Every DDGP program offered by the RTD yielded more revenue per boarding than the system-wide average over all fare media. Figure 1 compares average system-wide revenue per boarding with revenue from DDGP programs. Together, the main ECO Pass programs yielded almost twice as much as the system-wide average by the year 2000. Among its various DDGP programs, the RTD's employment-based ECO Pass generally yielded the highest revenue per boarding.

Figure 1: Denver RTD Revenue: System-wide vs. ECO Pass (in Nominal Dollars)

	System-wide		ECO Pass DDGP Programs	
	All Fare Revenues[1]	Revenue Per Boarding	Pass Sales Revenues[1]	Revenue Per Boarding[2]
1994	$26,509,000	$0.43	$3,009,000	$1.093
1997	$36,747,000	$0.51	$5,612,000	$0.77
2000	$45,475,000	$0.58	$8,872,000	$1.07

[1] Rounded to nearest thousand.
[2] Revenue per boarding for combined three major programs.
[3] Data for 1993.

The City of Berkeley ECO Pass Program

Approximately 120 municipal employees commuted to work by AC before the introduction of the ECO Pass program. Assuming that infrequent and occasional riders purchased the midpoint number of rides shown in Figure 2 while regular riders purchased the monthly pass, estimated transit revenue from city employees before the program would be approximately $2,410 per month. For the ECO Pass program, the City paid AC Transit $6,650 per month (for 1,330 city employees, at $5 each) for all months of the year. This translated to net revenue of $4,240 per month, or an increase of approximately 175 percent. This estimate is consistent with revenue-per-boarding data, which was calculated by tracking magnetic fare card usage by city employees. The usage data indicated a yield of $2.00 per boarding. This yield is three

times the revenue of $0.67 per boarding that AC Transit recovered system-wide across all fare media. Therefore, by offering the program AC Transit realized a net annual revenue increase of approximately $50,880. In this case, AC Transit made no changes in service to accommodate the employee population and thus incurred no additional operating costs.

Figure 2: AC Transit: Monthly Ridership & Fare Revenue Estimates, Before the ECO Pass (City of Berkeley)

Transit Usage by Municipal Employees	Transit Rides per Month	With ECO Pass		Before ECO Pass	
		Number of Riders	Percent of Riders	Estimated[1] Riders	Estimated[1] Transit Fare Revenue
Infrequent	1-10	108	55.5%	67	$ 415
Occasional	11-20	34	17.5%	21	$ 395
Regular	21-40	33	16.8%	20	$1,000
Heavy	> 40	20	10.2%	12	$ 600
All		195	100%	120	$2,410

Net monthly revenue gain[2] =	$ 4,240
Net annual revenue gain =	$50,880
Percent revenue gain over pre-ECO Pass level =	176%

[1] Assumptions for estimate:
 (a) Proportion of riders by category the same before the ECO pass as with it;
 (b) Infrequent riders purchased number of rides at midpoint of range at $1.25 each.
 (c) Regular and heavy riders purchased the monthly pass at $50 each.
[2] The estimated pre-ECO Pass revenue for all riders is subtracted from the equivalent monthly payment ($6,650) for ECO Pass participants.

UC Berkeley Student Class Pass Program

A 1997 survey revealed that 5.6 percent of UC Berkeley students, or approximately 1,690 students, used AC Transit before implementation of the Class Pass. Assuming for simplicity that these students all purchased monthly passes, the maximum revenue earned by AC Transit from the UC Berkeley student-rider market would have been $84,500 per month when school was in session.

In 2000, after implementation of the Class Pass, UC Berkeley student use of AC Transit jumped to 14.1 percent (4,410 students). AC Transit had negotiated an annual payment from the University of $1,251,000 to cover the entire enrolled student population. Assuming a ten-month academic calendar year, the equivalent monthly revenue to AC Transit was $125,100. The net increase in transit revenue from UC Berkeley

students was $40,600 per month, or more than $406,000 per year. The net increase in revenue was approximately fifty percent above the pre-Class Pass level. Both student ridership and revenue increased, and because AC Transit made no service changes to accommodate the student population, it incurred no additional costs.

The findings from the three cases suggest that wide scale deployment of deep discount group pass programs be pursued as an innovative form of financing transit operations. The more revenue that transit agencies can earn from various fare instruments, the less reliant they may be on government operating subsidy.

DDGP Pricing Structures

This section discusses the pricing characteristics found in the three deep discount group pass programs used for the case studies. Hypothetical illustrations are used to explain the attractiveness of DDGP programs. Finally a systematic methodology of pricing DDGP programs is presented as a set of policy guidelines.

The attractiveness of deep discount pricing lies in the fact that pass prices tend to be very close in magnitude even if the base or individual monthly pass prices were wide apart to begin with. Figure 3 illustrates this point. For regular monthly passes ranging in price from $50 to $100 each, an across the board deep discount pass price of $10 will achieve deep discount levels of 80 percent to 90 percent. Viewed from a different perspective, a 90 percent discount applied to a range of regular monthly pass prices will result in deep discount pass prices between $5 and $10, all of which are extremely low relative to the regular fares. This fact may allay concerns from stakeholder groups about the equity of prices among various deep discount programs because transit operators can offer differential pricing to various groups without fear of being accused of price discrimination.

Illustrative Examples

Figure 4 illustrates a hypothetical case for pricing a DDGP program. The minimum number of passes that must be sold to achieve the desired revenue margin over existing receipts is indicated for a range of DDGP prices. The graph illustrates that deep discount pricing is most attractive when populations of target groups are large; minimal pass prices can yield significant margins on revenue if the target groups are sufficiently large. At any given price for a group pass, the marginal

revenue produced by the DDGP program increases as the number of group participants increases.

**Figure 3: Discount Level by Unit Pass Price by Regular Pass Fare**
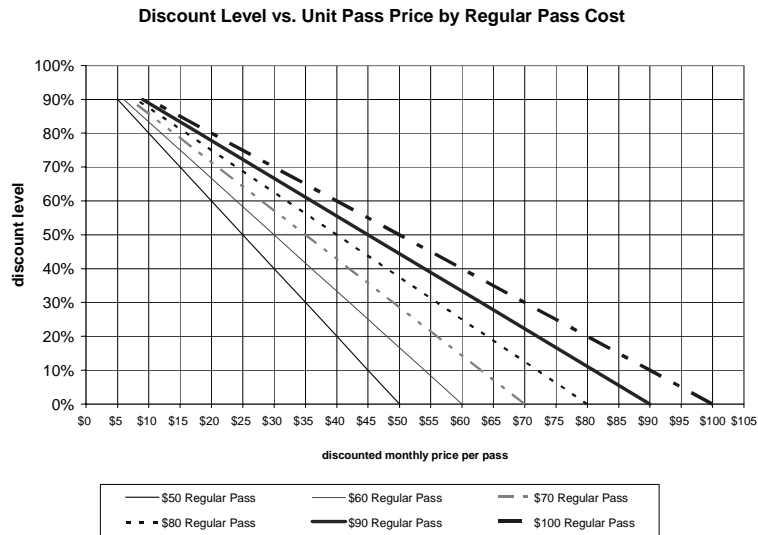
The graph illustrates that a transit agency could offer very high discounts (for instance, a 90-percent discount off standard pass prices) to target groups with large memberships and still make net gains on revenue. For example, if an employer purchased 1,330 passes for employees at the equivalent rate of $5 per month and previously, 90 employees used transit at the regular pass price of $50 per month, Figure 2 shows that the transit agency can earn more than a 50 percent increase over previous revenue for offering the program to the group. The same example with 90 existing riders requires that 900 deep discount passes are sold to earn a 100 percent increase on existing revenue with a deep discount pass price of $10.

The calculations performed for this analysis also demonstrate that the required minimum number of passes for a given group increases in proportion to the number of existing riders for given pass prices. An equation for calculating the required number of passes (N_g) as a function of the standard monthly pass price (P_s), the deep discount pass price (P_g), the desired margin over existing revenue (T_m) and the number of existing transit users (R_b) within the group is:

$$N_g = (P_s / P_g) * (1 + T_m) * R_b$$

Figure 4: Required Number of Passes by Pass Price and Desired Revenue Margin
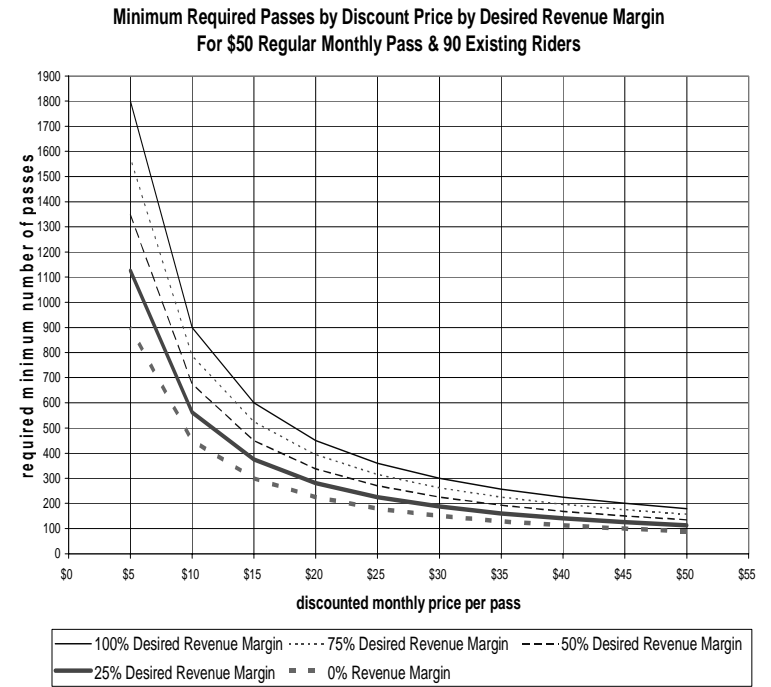
How to Price DDGP Programs

In order to serve as efficient, innovative fare instrument, the pricing of deep discount programs should increase, and at least maintain, revenue receipts following program implementation. The goal is to ensure that the new revenue received from a qualified group is higher than the sum any revenue no longer received from existing transit riders in the group and any additional operating costs associated with program implementation.

The method of pricing the contract sum paid by the group for the DDGP program should therefore reflect the administrative and service operating costs of providing service. The method should also enable the pass price per participant to reflect the group's location. The primary factors that affect the cost of administering deep discount programs include:

   a. The availability of applicable transit service at a location. If, in order to serve a group's members, the transit operator must

extend its service, the operator would incur additional expense and this would result in a higher unit price;

b. The number of qualified group members at the location. As illustrated in Figure 4, the fewer the number of group participants, the higher will the unit price be; and

c. The level of peak-hour service trips near the location. The greater the number of peak-period service trips in the locality (such as a downtown business district), the higher the unit price. If the DDPG creates additional peak hour ridership and if this additional ridership necessitates additional buses, this would result in additional operating expenses. Such service increases could increase operating costs dramatically.

The contract sum of a deep discount pass program should therefore reflect five factors:

1. any relinquished revenues previously earned from existing riders at prevailing fares;

2. any additional costs necessitated by the program;

3. the primary location of the participating group (i.e., the origin or destination of concentrated pass use);

4. the attractiveness of program terms to participating groups; and

5. the marginal revenue increase desired by the transit operator.

Considering these factors, an operator will prefer to implement a DDGP program where the additional riders attracted do not require the operator to add service. Or, if the operator must add service to accommodate DDGP riders, the price of the group pass must be high enough to offset the cost of that additional service. Also, the operator must gain enough revenue from the DDGP program to offset any loss of revenue from riders who previously purchased individual fare instruments but who now receive a DDGP through their employer, school or other group.

Concluding Discussion

This paper addresses a question in transportation planning and finance that carries important implications for transit agencies' long-

term sustainability. The DDGP program is a concept that is slowly, but increasingly, being adopted by transit operators around the nation. The case studies consistently revealed that DDGP programs produced higher revenues from target groups with the programs than without them, suggesting that DDGP programs could be widely deployed as an innovative way to finance transit operations. The more revenue transit agencies are able to earn from various fare instruments, the less they may need to rely on government operating subsidy. When effectively implemented, DDGP programs are instruments for increasing transit operating revenues.

Deep discount programs also have other attractive features. With group pass programs, participants in a DDGP program have equal access to transit services and non-users cross-subsidize those who use the service. The programs therefore offer all contributors to the pool equal opportunity to use the transit service without additional out-of-pocket cost. Thus, the pass programs are a great source of convenience to users and can provide an inexpensive employee benefit.

A key attraction of deep discount pricing lies in the fact that pass prices tend to be close in magnitude even if the base or regular fares were wide apart. This enables transit operators to offer differential pricing to various groups without raising concerns about price discrimination.

The challenge is to price deep discount passes carefully so that they remain attractive to potential participants and yet produce increased revenue to transit operators. The pricing methodology discussed in this article could be used to increase revenue without negatively impacting ridership or the transit-dependent.

Given the pressures faced by transit operators to improve their revenue base and to lessen reliance on subsidy, the insight that appropriately priced DDGP programs can increase transit revenues is an important one. Yet, transit operator interviews conducted in this study suggested that operators had little systematic documentation of DDGP programs' revenue impacts and were largely unaware of their revenue increasing potential. Ironically, in some cases operators with DDGP programs have proposed their elimination when faced with budget crises. For instance, during the summer of 2003, Denver RTD and AC Transit both proposed to eliminate these programs in the midst of budget crises.

When transit operators propose to eliminate DDGP programs to close budget gaps, they may come close to shooting themselves in the foot. In DDGP programs, operators have found a way to increase revenues, but seem unaware of that fact. By analyzing the revenue impacts of

three separate DDGP programs, this article has aimed to inform policy decisions surrounding the deployment of deep discount group pass programs in general. More specifically, it has aimed to highlight the potential of these programs to increase transit revenues.

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